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OFFICE FOR INFRASTRUCTURE AND LOGISTICS

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Manual
of standard building specifications

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PREFACE

The Manual of standard building specifications has served since 1992 as the reference document on buildings used both internally by the Commission departments and by the Commission's external partners in the Brussels property market.

In accordance with the Commission Decision laying down the administrative rules for the Office for Infrastructure and Logistics in Brussels¹, and in particular Article 6(3) and (4) thereof, the technical standards with which Commission buildings must comply are set out in the Manual of standard building specifications by the Director of the OIB and approved by its Management Board.

As well as updating the regulatory framework, this edition, which replaces the 2004 edition, emphasises the environmental and functional quality of buildings for all users. This is based in particular on better energy management and the use of environmentally-friendly materials. In some cases, the Manual of standard building specifications does not recommend a general technical solution to specific problems, because projects need to be developed keeping in mind the overall picture and total costs.

The Manual of standard building specifications sets out the technical performance and characteristics required of a building in which Commission departments are to be housed in Brussels. Each building does, however, have its own attributes. Carrying out a compliance test in the light of the standards laid down in the Manual of standard building specifications enables a work programme to be established for each building to bring it up to the required standard. All new buildings or buildings which have undergone large-scale renovations must have as high a compliance rating as possible with the Manual of standard building specifications. The Manual of standard building specifications does not apply to existing buildings in its current version. For such buildings, please refer to the versions in force at the time of construction or large-scale renovation.

This document is divided into four parts: Part A deals with the general aspects, Part B covers the technical descriptions of the four domains involved in fitting out buildings, namely architecture, specialised technical services, health and safety and security of persons and property, Part C deals with premises used for crèches and after-school centres and Part D contains the technical annexes.

It distinguishes between regulatory obligations or best practice, highlighted in the Manual², and programme components, which are detailed as necessary for each project.

This document was approved by the OIB Management Board on 2 December 2011.

Gábor Zupkó,

Director OIB

¹ C(2003)570 of 22 July 2003

² The regulatory obligations are in bold in the text.

A. GENERAL

A.I. THE MANUAL OF STANDARD BUILDING SPECIFICATIONS

A.I.1. DESCRIPTION

It has always been one of the objectives of the administration and the staff representative bodies to produce a detailed description of the type of building which best meets the needs of the Commission and its departments.

This document reflects those needs. It is a complex document that can serve a wide variety of purposes, viz.:

- a manual for the use of the various departments of the Commission,
- a directory for general use, and
- a reference document for use in formulating tender specifications.

The goal of this document is to lay down the level of technical performance to be attained and define the minimum comfort of buildings intended to house the Commission's departments. The technical methods applied to achieve those goals are a matter of choice, but the requirements themselves are mandatory.

The complexity of buildings policy derives from the need to reconcile four different factors:

1. economic interests, looked after by administrators and executives who must ensure that budgetary procedures are correctly followed,
2. technical interests, the responsibility of specialists, who must correctly assess the quality of technical services and conformity with technical and safety standards,
3. the interests of the users for whom the building is intended, who are entitled to an acceptable level of comfort and safety,
4. environmental interests.

One aim of this document is to help reconcile conflicts arising from this complexity.

A.I.2. CONFORMITY ASSESSMENT

Assessing a building's conformity with the descriptions in the Manual of Standard Building Standards makes it possible to determine whether or not that building meets the needs of the Commission's departments.

A.II. LEGISLATION AND STANDARDS

A.II.1. GENERAL

Any building selected to house Commission departments must conform in every respect to the public-buildings legislation in force in the country where it is located. If such legislation has less binding force than a European directive, then the building must comply with the directive.

Buildings legislation can be categorised according to the various stages of the building process from planning to use, namely:

- urban development legislation (planning permission and environmental licences),
- architectural legislation (architectural design, structural calculations for the building shell),
- legislation governing technical installations (dimensions, energy consumption),
- legislation on health and safety at work,
- environmental legislation.

Standards are categorised according to the issuing body and the technical domain to which they relate.

For the purposes of safety legislation, buildings occupied by the Commission's departments are treated as private buildings. By contrast, premises which are specifically intended to receive the public, such as info-points, reception offices and the like, are treated as public buildings.

Any building site within a building must comply with the safety regulations.

A.II.2. LEGISLATIVE ASPECTS

Belgian legislation

Belgian legislation is published in the national gazette, the *Moniteur Belge*. Legislation on health and safety at work and environmental protection may be found by consulting:

- The *Moniteur Belge* website (<http://www.ejustice.just.fgov.be/cgi/welcome.pl>)
- The Prevent website (<http://fr.prevent.be/net/net01.nsf/p/mm00-03>)
- The Communauté française website (<http://www.espace.cfwb.be/sippt/>)

Community legislation

Community legislation is published in the Official Journal of the European Union. The legal provisions on buildings, health and safety at work and environmental protection may be found by consulting the CELEX/EUR-LEX database (<http://eur-lex.europa.eu/en/index.htm>) .

A.II.3. STANDARDS

Belgian standards (NBN)

Belgian standards are recognised as rules of the trade or profession. Nevertheless, they can assume a compulsory character if they are explicitly referred to in official legislative acts.

The rules of the trade also include technical specifications contained in the conditions imposed by insurance companies (CEA, VdS, FM etc.), in specific courses and in trade journals etc. They must be implemented in full, without mixing up their individual specifications

Standards of other Community countries

The standards of the other Community countries are published by various national standardisation bodies. They may or may not be found among the standards registered by the Belgian Institute for Standardisation (IBN).

European standards

European standards emanate from three bodies:

- the European Committee on Iron and Steel Standards (ECISS), which is gradually replacing the Euronorms of the European Coal and Steel Community;
- the European Committee for Standardisation (CEN), which brings together the national standards institutes of the EU and EFTA countries;
- the European Committee for Electrotechnical Standardisation (CENELEC), which is the equivalent of CEN in the electrical engineering field.

Global standards

Global standards are published by three bodies:

- the International Standardisation Organisation (ISO), which brings together the standards institutes throughout the world,
- the International Electrotechnical Commission (IEC),
- the International Committee on the Conformity of Electrical Equipment (CEE-El).

A.III. TECHNICAL AND ADMINISTRATIVE DOCUMENTATION

A.III.1. ADMINISTRATIVE DOCUMENTATION

For every building occupied by the Commission's departments there shall be a full set of administrative documentation containing all the legal authorisations relating to that building. The documentation is put together in a file by the promoter or owner of the building and delivered in duplicate to the competent departments of the Commission.

List of documents to be provided:

1. The number of people who may occupy the building and the number of parking spaces available.
2. A certificate attesting that the building is asbestos free for new builds or a certificate that it is 'Asbestos safe' for existing buildings – see also B.I.31.
3. Planning permission including:
 - the decision of the commune (Collège des bourgmestre et échevins) or region,
 - the regulations of the relevant fire brigade,
 - the signed and approved building permit plans.
4. Certificates of conformity to the relevant planning permission and the environmental licence, in particular:
 - **the certificate of conformity to the planning permission, issued by a SECT** (External technical inspection service - an approved inspection body),
 - **the certificate of conformity to the fire safety regulations.**
5. Environmental licence, in particular for:
 - car parks,
 - fuel storage areas (holding more than 3 000 litres),
 - motors developing more than 10 kW,
 - high-voltage electricity transformers.
6. Report on the **energy performance of the building.**
7. List of the names, addresses and contact details of firms which took part in the work, together with an indication of the work carried out.
8. Reports, **issued by a SECT**, certifying the compliance of the building and its facilities, including the conformity of the facilities for disabled persons with the Welfare At Work

Act (LOI), the Welfare At Work Code (CODE), the General Regulation on Labour Protection (RGPT) and other legal obligations.

9. Compliance report certifying that the gas fixtures (pipes, expansion chamber, boiler room) comply with the safety rules and standards, and are properly sealed.
10. Compliance report on steam generating plant
11. Compliance report on fuel tanks
12. Compliance report, **issued by a SECT**, certifying that the building's electrical installations (including those relating to other technical installations such as HVAC systems, lifts etc.) comply with the rules and standards in force (General Regulation on Electrical Installations: RGIE).
13. Commissioning reports for lifts and other hoisting installations, **issued by a SECT**, in the case of new or refurbished equipment, and/or the annual and quarterly inspection reports on hoisting installations from the year before the Commission first occupied the building, **issued by a SECT**, in the case of old buildings which are rented.
14. Inspection report, **issued by a SECT**, lightning conductors and/or earthing of metal structures (frames, roofing).
15. Inspection report, **issued by a SECT**, for the following technical installations:
 - air-conditioning machinery,
 - ventilation in car parks,
 - heating, including gas pipes.
16. Inspection reports, **issued by a SECT**, on fire protection appliances such as:
 - smoke outlets,
 - alarm systems,
 - public address system,
 - fire detection system,
 - automatic fire extinguishing system (sprinklers, using spray water, dry-powder extinguishers, etc.),
 - operation of the fire dampers,
 - firefighting equipment: hoses, hydrants, etc.,
 - emergency lighting.
17. Report, **issued by a SECT**, certifying that the electricity generators are functioning correctly.

18. Reports, **issued by an approved laboratory**, on heat tests on firebreak fixtures such as:
 - fire doors,
 - trapdoors to service shafts, housing,
 - fire dampers
 - fire partitions,
 - floors (cross-Chapter),
 - reaction-to-fire performance of floor coverings and suspended ceilings.
19. Report approving the davits, the fixing mechanisms for window-cleaning cradles and the cradles (**issued by a SECT**).
20. Report on the compliance of fall arresters.
21. Safety report, **issued by a SECT**, on motorised garage doors.

Final versions of the reports issued by SECTs must be submitted during approval and acceptance operations. They must explicitly indicate which installations have been checked. Provisional versions may be accepted, but the history of such reports must be documented.

A.III.2. TECHNICAL DOCUMENTATION

For every building occupied by Commission departments there shall be a file listing subsequent work done (the 'DIU' as defined by the Royal Decree of 25 January 2001, as amended by the Royal Decree of 19 January 2005 on temporary or mobile building sites), containing all the 'as-built' construction drawings and the documentation on the materials and installations in the building (data sheets, instructions for use, maintenance manuals). The documentation should be put together in a file by the promoter or owner of the building and delivered to the competent departments of the Commission.

The as-built construction drawings must be supplied in AutoCad format (details of the version of AutoCad in which drawings must be supplied (should be requested from OIB). Each area (architecture, partitions, wiring, electricity, HVAC, etc.) is to be contained in a separate file. The drawing conventions, such as layers, colours and types of lines, must be in line with the OIB's graphic design guidelines. For an existing building, the plans provided must be easily usable and must comply with the rules of the trade. The conventions used are subject to the approval of the OIB.

List of plans to be provided:

1. as built architectural drawings, with floors, façades, cross-sections in line with the OIB's graphic design guidelines,
2. stability plans,
3. hydraulic, ventilation and electrical plans, including electrical switchboards,
4. plans showing the position of the fire dampers and how they work,

5. plans of the flue pipes,
6. maximum nominal load on the floors in the different types of premises:
 - offices
 - registries and archives
 - plant areas
 - indoor car park
 - other areas.

The documentation on each component material or installation must comprise:

- a technical description of the material or installation,
- a set of plans,
- the servicing manual or instructions for use,
- EC certificates of conformity,
- list of approved suppliers and repair shops.

Documentation and drawings must be organised inside the files as follows:

- Architecture
- Lifts
- Building Management Systems (remote management)
- Wiring
- Floor loads
- Partitions
- Kitchen/Restaurant/Cafeteria
- Fire detection
- Electrical installations
- Façades
- Shell
- HVAC
- Water and sanitation

- Window cleaning
- Interior joinery
- Finishing work
- Safety railings etc.
- Signposting
- Telephony-Data transmission

Identification of equipment:

All the plant and fittings in the building must be identified in collaboration with, and with the agreement of, the Commission. The chosen identification system should be compatible with the system used by the Commission for computer-assisted maintenance management

B. TECHNICAL DESCRIPTIONS

B.I. ARCHITECTURE

B.I.1. URBAN-PLANNING ASPECTS

Any building housing Commission departments must comply with the urban-planning regulations in force at the time it is first occupied. In the Brussels-Capital Region, the Brussels Town Planning Code (*Code Bruxellois de l'Aménagement du Territoire - CoBAT*) lays down the following instruments and administrative procedures:

- the Regional Urban Planning Regulation (Règlement Régional d'Urbanisme - RRU),
- the Regional Development Plan (Plan Régional de Développement - PRD),
- the Regional Land-Use Plan (Plan Régional d'Affectation du Sol - PRAS),
- Local Urban Planning Regulations (Règlements Communaux d'Urbanisme - RCU),
- Local Development Plans (Plans Communaux de Développement - PCD),
- Individual Land-Use Plans (Plans Particuliers d'Affectation du Sol - PPAS).
- the Decree by the Brussels-Capital Region government of 21 December 2007 on requirements concerning the energy performance and indoor climate of buildings
- the Order of 7 June 2007 on the energy performance and indoor climate of buildings

Buildings located in the other sites (outside the Brussels Region) must comply with their local regulations.

B.I.2. ARCHITECTURAL ASPECTS

1. GENERAL

Both the overall design of the building and the configuration of each individual element should permit total and efficient control of the ambient conditions (HVAC, lighting, acoustics, etc.).

Buildings must be versatile so that they can be adapted at reasonable expense to any new needs that the Commission may have in the future. From that point of view, a modular approach to the main architectural elements (structure and façade) makes it easier to convert a building to a new use.

Buildings should be both functional and economical, while respecting the essential design principles of simplicity, efficiency and the state of the art.

Smoking is prohibited in all Commission buildings.

2. THE “INTELLIGENT BUILDING”

Buildings shall be constructed in accordance with the latest developments in “intelligent building” theory.

According to that theory, the architectural structure, the whole range of technical installations, the internal services and the management procedures are to be integrated in such a way as to give the occupants of the building a working atmosphere that meets the specific objectives of suitability, low cost, safety, comfort and efficiency, while minimising the impact on the environment.

So from the planning phase until the keys are handed over, the building should be seen as an organic collection of elements designed in the light of its intended use and the activities to be performed in it.

3. MODULAR CONFIGURATION OF OFFICE SPACE

The ideal architectural module of office space is 1.20 metres, but could be between 1.20 and 1.40 metres.

4. ALLOCATION OF SPACE WITHIN BUILDINGS

The architectural design of the building should minimise or even eliminate any wastage of covered space by ensuring that space is fairly allocated to the different functions to be performed by the building.

Buildings configured in modules can be easily assessed for efficiency by examining how the different types of area are allocated in accordance with the following classification:

- | | |
|------------------------------------|---|
| 1) Active office space: | Net offices. |
| 2) Office support areas: | Archives and computer rooms or similar |
| 3) Special areas: | Kitchenettes, kitchens, canteens, store rooms |
| 4) Auxiliary areas: | Garages and other car-parking facilities |
| 5) Passageways: | Lifts, stairways, corridors, fire lobbies, foyers |
| 6) Toilet and washroom facilities: | Toilets, showers, saunas, downpipes |
| 7) Plant areas: | Shafts, special technical spaces (HVAC, lift machinery, private automatic branch exchange (PABX)), electricity, water and sanitation systems) |
| 8) Internal divisions: | Pillars, shells, walls, movable partitions |
| 9) Structural areas: | External walls, façades, technical installations |
| 10) Other areas: | Commercial areas |

B – Technical descriptions – Architecture

11) Uncovered spaces:	Patios, gardens, access to the roof
12) Site area:	Land parcel
13) Occupied area:	Surface area of the actual building
14) Built area:	Aggregate surface area of all buildings

Proper size of the following shall be guaranteed:

- the entrance foyer,
- corridors,
- stairways,
- plant areas,
- indoor car parks and access routes, and
- archives without windows, as well as other special-purpose facilities.

The percentage of the surface areas intended for use as offices or meeting rooms should not be less than 65% of the total surface area of the building.

The following minimum ceiling heights are considered ideal:

- technical facilities in attic areas: $h = 3.0$ m
- office areas: $h = 2.6$ m. Areas where the floor to ceiling height is less than 2.5 m are not included for the purposes of defining office areas
- horizontal circulation: $h = 2.4$ m
- ground floor: $h = 3.5$ m
- basement floors: $h = 2.2$ m
- manoeuvring areas in indoor car parks: $h = 4.0$ m

5. ACCESSIBILITY FOR DELIVERY OF SUPPLIES

Buildings shall be designed for easy access for service operations, such as the delivery of supplies and publications, removals and the removal of dustbin containers.

Wherever possible, buildings should have an unloading bay for lorries, or dedicated unloading area (alley, esplanade, etc.) located away from external or internal roadways, or a garage access able to admit a lorry.

Buildings should have a goods lift serving the unloading level, all administrative floors and the level where stores are kept. (see Section B.II.5 - Hoisting installations).

Storage areas must be situated where goods can be easily moved to and from them (See Section B.I.6 - Premises for special purposes), preferably at the same level as the unloading area.

Routes for moving goods between the unloading area, storage areas and administrative levels must be wide enough to allow passage of a pallet on a pallet truck. To that end, there should be neither steps nor narrow doorways along such routes.

6. FURNITURE

The architectural design of buildings should take account of the following requirements:

- furniture delivery,
- the arrangement of furniture in the different areas of the building, and
- the need for floor and wall coverings that are resistant to shocks caused by the use and transport of furniture.

In terms of furniture delivery, problems can arise if a building is not easily accessible to transport vehicles or has insufficient space to manoeuvre furniture once inside. These problems can be solved by providing a parking area for removal lorries, a hoisting device (goods lift – see Section B.II.5 – Hoisting installations) and doors and passages which are wide enough to allow the movement of furniture.

In terms of placing furniture, problems can arise from the dimensions (length, breadth and height) of areas, the dimensions and position of access doors to those areas and the location of electricity and telephone sockets. These problems will not arise if the architect has drawn up plans for a standard office for one, two or more occupants. As a guide, the dimensions of the furniture used by the Commission's various departments conform to the DIN standards applicable to office furniture.

Concerning the resistance of floor, wall and ceiling coverings, damage can be caused by revolving chairs bumping and rubbing against internal walls and the feet of items of furniture leaving indentations in soft floor coverings. These problems can be avoided by choosing appropriate coverings (see Section B.I.5, point 6.1 - Floor coverings), and in some cases by installing protective fittings to minimise permanent damage to materials.

7. APPEARANCE OF BUILDINGS

7.1. General appearance of buildings

The Guide to the Commission's architectural policy (C(2009)7032) must be followed for all large-scale projects (new builds or large-scale renovation). The quality of the architecture should both enhance the efficiency of work and create a pleasant and comfortable environment.

The colours of the facings, the textures and the various materials used should all help to create a sober but pleasant, convivial and warm atmosphere. Particular attention should be given to decorations such as statues, sculptures, plants, pictures, etc.

Special care should also be paid to the general signposting in the building. Every pointer to special parts of the building must be functional and blend in perfectly with the whole (See chapter B.III.4 - Signs).

The colours and textures used in the finishing and cadding of the building must be carefully chosen to fit the different architectural elements, the key areas and the different levels, offices and other facilities.

7.2. Decoration of office areas

Staff members should be able to personalise their individual working space with furniture, pictures, plants and other types of decoration, except for self-adhesive decorations which damage wall and floor surfaces.

Every effort must be made when designing office areas to ensure that they will not be damaged by the occupants' personal decoration. For example, it should be possible to install a picture rail so that the wall is not damaged when hanging pictures. The colours in the working environment should be chosen to avoid monotony which might affect well-being at work.

8. UNDESIRABLE MATERIALS

The list of undesirable materials changes over time. **The present version at the time of publishing this document is as set out in D.III.**

B.I.3. STRUCTURAL ASPECTS

1. GENERAL

This Section describes the structural aspects of buildings. By structural aspects we mean aspects relating to the shell of the building, i.e. the foundations and rising structures (beams, pillars, curtain walls, floors, stairway, etc.).

Building structures must be calculated according to the following European standards:

ENV 1991-1992-1993-1994-1995-1996-1997-1998-1999, Eurocodes.

The materials used to construct buildings may not contain asbestos. The owner of the building must confirm this by providing the Commission with an "asbestos-free" certificate for a new building and "asbestos-safe" for a renovated building, issued by a SECT.

In the case of existing buildings, an asbestos inventory and management plan must be drawn up by a SECT in accordance with the Royal Decree of 16 March 2006 (on the protection of workers from the risks related to exposure to asbestos at work - MB of 23 March 2006), as amended by the Royal Decree of 8 June 2007 (MB of 22 June 2007). It must be drawn up by the owner at his or her own expense.

2. FLOOR LOADING

The floor loading to be observed in the different areas within buildings are those laid down by Belgian standard NBN B03-103. Nevertheless, to ensure flexibility in the future

use of premises, the following values are required, irrespective of partitioning (movable or fixed):

- minimum floor-loading capacity for all premises (including offices) = Class III (4 kN/m²);
- floor loading for all areas intended for current and compact archives, technical areas, limited paper stocks, photocopiers, computer rooms, the main kitchen and equivalent purposes = Class V with a minimum capacity of 6 kN/m²; an area with a floor loading suitable for archives (movable shelving) should be provided on each level;
- the permissible floor loading at ground level spread evenly per m² must be at least 2.5 kN/m² for underground car parks; a floor point loading of 10kN on 0.1 m x 0.1 m should be met in car parks;
- where applicable, the loading for the building surrounds should be at least 6 kN/m².

Floor loadings for meeting rooms and the special-purpose facilities referred to in Section B.I.6 must be Class III, IV or V, as interpreted above, depending on the intended use of the area concerned.

3. SOUNDPROOFING

3.1. Soundproofing criteria: Dn and R

The normalised gross sound insulation between areas separated by a light partition (symbol: Dn = between areas, in situ) should correspond to category IIIb (performance level +3dB) as defined by standard NBN S 01-400.

For partitions with a door, the normalised gross sound insulation Dn between areas must correspond to category IVb, in accordance with standard NBN S 01-400.

The insulation criteria (Dn, in situ) concern all the elements used in the insulation between areas, i.e. not only partitions, but also connectors between partition components, connectors for frames and façades, shared air ducts and any false floors or suspended ceilings.

To obtain this result in practice, the sound reduction index R (measured in the laboratory) of the partition must correspond at least to category IIIa, in accordance with standard NBN S 01-400.

For partitions with a door, the sound reduction index R of the partition/door unit must correspond to category IVa.

3.2. Noise-level limits designed to prevent discomfort in buildings (NBN S01-401)

Noise levels may not exceed the maximum laid down in standard NBN S01-401, category 4 (See also standard EN ISO 717-1: 1996)

Types of environment (standard NBN S 01-401)

Type	External noise dB(A)	External environment (external sources of noise)
1	$Leq \leq 55$	Rural or suburban residential areas more than 500 m from any major road (300 to 600 vehicles/hour) and more than 1000 m from any busy road (more than 600 vehicles/hour)
2	$55 < Leq \leq 65$	Residential urban areas; residential rural or suburban areas more than 200 m from any major road (300 to 600 vehicles/hour) and more than 500 m from any busy road (more than 600 vehicles/hour)
3	$65 < Leq \leq 75$	Area used for light industry, mixed residential and commercial areas, area bordering a major road (300 to 600 vehicles/hour) and more than 200 m from any busy road (more than 600 vehicles/hour), area between 5 and 10 km from an airport runway.
4	$75 < Leq$	Town centres; area used for heavy industry; areas less than 200 m from a busy road (more than 600 vehicles/hour) and areas less than 5 km from an airport runway.

Equivalent continuous sound level (Leq) is defined as the constant sound level which would produce the same noise exposure as the succession of fluctuating sounds received over the period of observation.

The sound level measured inside finished and furnished premises with the windows closed, the lighting on and the HVAC system in operation may not under any circumstances exceed the following values:

Equivalent limit values (LAeq) (Standard NBN S 01-401)

	Values in dB(A)			
Categories	1	2	3	4
Office	30	35	40	45
Computer room	55	55	60	65
Training or study rooms	30	35	40	45
Music room, library	30	30	35	40
Rest rooms	30	30	35	40
Gym	35	40	45	50
Laboratory	55	55	60	60
Maintenance workshops	50 à 75			

Workshops with machines must comply with the LOI/CODE/ RGPT. The maximum level is 80 dB(A).

Limit values (LAeq) for various rooms

Type of room	LAeq in dB(A) continuous and non-continuous sound	NR index continuous sound
Conference room	35	30
Meeting room	40	35
Restaurant	45	40

Limit values (LAeq) for technical areas

Type of room	LAeq in dB(A) continuous and non-continuous sound	NR index continuous sound
Archives	45	40
Kitchen, extractor fan	40	35
Kitchen, extraction hood, dishwasher	65	60

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Car park	60	55
Vertical lift shaft	70	65
Vertical technical shaft	70	65
HVAC technical area	80	75
Heating technical area	80	75
Central refrigerating plant room	85	80
Toilets	45	40

Acoustic measurements (NBN S01-005: laboratory, and NBN S01-006: in situ)

The noise-level measurements must be taken at a least 1 m from the internal walls (with windows closed) and at a point 1.2 metres above the floor. The reference level must conform to standard NBN S01.002

Noise levels must be measured with a precision sound-level meter conforming to standards NBN EN 60651 or NBN EN 60804.

Standardised gross insulation D_n is to be measured in situ in accordance with standard NBN S 01-006.

The sound reduction index R is to be measured in the laboratory in accordance with standard NBN S01-005. A conformity certificate for tests performed by an approved laboratory must be issued for all the partition units, partitions and doors implemented.

Four tests are to be carried out in-situ by a SECT to measure the airborne insulation of partitions between offices, and between offices and corridors.

3.3. Specific criteria

All joining elements between partitions and the shell or finish of the building are to be soundproofed (soundproofing in convector housings, noise barriers, suspended ceilings) so as to conform to the above categories.

In office areas, sound barriers made of non-friable material must be placed in the ceiling void:

- a) parallel to the façade, in line with the partitions of the access corridor (FR30/FR $\frac{1}{2}$ hr/EI30/REI30);
- b) perpendicular to the façade, for each façade module (see section B.I.2, point 3).

Sound barriers must also be placed between each fan-convector in the convector-housing and for each façade module in the cable troughs. The shared ventilation ducts between offices must be fitted with sleeves to reduce noise transmission.

The transmission of floor impact noise must be below the values stipulated for category IIa.

Exceptionally, fire-resistant polyurethane foam may be used to finish the cladding around the pipework in convector housings.

Noise levels produced by hydraulic equipment are subject to standard NBN S01-403.

3.4. Acoustic plan

Large spaces (auditoriums, cafeterias, restaurants, etc.) must be designed to have pleasant acoustics.

To this end, the following aspects must be surveyed and optimised in accordance with the prevailing standards:

- Echo: the composition of walls, ceilings and other reflective surfaces must be such that the time difference between the arrival of incident sound and reflected sound is less than 0.02 seconds.
- Reverberation: the coverings of horizontal and vertical surfaces must be chosen having regard to their area and absorption coefficient in order to obtain a suitable reverberation time for this type of room (for example, 1.1 seconds for auditoriums).

Specifically for auditoriums and large conference rooms, acoustic optimisation is to be sought by determining the radiation pattern and the sound attenuation and diffusiveness, and adapting/sizing the volume of the space having regard to the required reverberation time.

An acoustic plan should be made of the space by a specialised firm, and will be subject to prior approval by the Commission.

Once the space has been fitted out, an independent SECT body must carry out tests to measure and verify the acoustic values set out in the plan.

4. HEAT INSULATION AND ENERGY EFFICIENCY

For new buildings, the overall insulation level of buildings should be at least K45, in accordance with standard NBN-B 62-301. The aim is to achieve energy consumption levels for heating or cooling of 15 kWh/m²/year or less.

The heat transmission index of the most exposed walls must be less than 0.8 W/m²K. The following elements must have a heat transmission coefficient “K” (W/m²K) below the following values:

- for all window frames and glazing: see points 6.2.3 and 6.3.2 below,
- for opaque surfaces behind heating elements: 0.4 W/m²K,
- for roofing : 0.3 W/m²K.

All the walls of the exterior shell (façades, pitched and flat roofs) must be the subject of a hygrometric study taking account of the expected interior climate and the characteristics of the various materials that might be included in the composition of the walls. The final

composition of the walls must be adjusted in light of the findings of the study in order to avoid any condensation and associated damage, especially in air-conditioned premises in winter.

The class of vapour barrier is to be determined either by calculation or on the basis of the recommendations listed in standards NIT 175, 186 and 195 of the CSTC, having regard to transitory weather extremes and the thermal and hydrological inertia of the roofing materials.

Heat bridges are to be avoided as far as possible, and under no circumstances may surface condensation form on opaque walls.

In terms of summer conditions, the building design must include two calculations covering the nature, surface and solar protection of glazing units, the composition of opaque components, thermal inertia, shadows, etc.:

- (a) one calculation will be for air-conditioned premises, showing that the chosen design is the best option in terms of equipment cost and operation. Comfort criteria: see Section B.II.2,
- (b) the other calculation will be for premises equipped with heaters and forced ventilation, showing that the maximum indoor temperature reached in summer does not exceed the maximum outdoor temperature by more than 5°C (assuming that the forced air is not cooled).

In general terms, the inertia of the outer shell should be such that:

- the variation between the internal and external temperatures is reduced by 10°C from daytime to night time;
- the maximum indoor temperature should be reached two hours after the external temperature has peaked.

If necessary, additional heat insulation should be provided for administrative areas adjacent to the access passage to internal car parks. Similarly, particular attention should be paid to corner offices to ensure that the occupants remain comfortable without excessive energy being expended by comparison with other offices of the same type.

Environmental aspects:

European Directive 2010/31/EU on the energy performance of buildings and Directive 2002/91/EC, as incorporated in national law, apply to all projects falling within their scope. See also Section B.II.2, point 6.

The E-level for primary energy consumption should not exceed E75.

The energy performance test should be followed by an airtightness test (blower test).

The following instruments apply in particular :

- **Order of the Brussels-Capital Region of 7 June 2007 on the energy performance and indoor climate of buildings (MB 11 July 2007),**

- **Decree by the Brussels-Capital Region government of 21 December 2007 on requirements concerning the energy performance and indoor climate of buildings (MB 5 February 2008).**

The objectives of energy efficiency can be achieved by:

- boosting the heat insulation of the exterior shell of the building to higher than K45,
- insulating energy storage facilities,
- recuperating solar heat,
- using façades and rooftop vegetation to absorb weather effects,
- putting in place free cooling,
- using photovoltaic panels (to produce electricity),
- using solar panels (to heat water),
- using boilers with low NOx emissions,
- using ceiling-diffuser systems,
- using cogeneration systems (combined heat and power).

All heat insulation, for walls, floors, roofs and ducts, including ventilation ducts, should be made of environmentally-friendly materials. It should not give off volatile organic compounds. Insulation materials should therefore preferably be made of mineral fibres, cellular glass, cork, wood wool, cellulose, perlite, coconut fibre or recycled materials. Their heat conductivity should be lower than 0.044W/m.K.

5. INTERNAL PARTITIONING WALLS

Fixed dividing walls must be made of masonry with a minimum thickness of 14 mm; **they must have the following fire resistance: FR60/FR1hr/REI60 or FR120/FR2hr/REI120, depending on the prevailing laws and standards.**

It should be possible to remove these masonry walls without compromising the stability or load-bearing capacity of the structure.

6. FACADES, FRAMES AND GLAZING

6.1. Façades

Façades must be designed in the light of the following criteria (lighting, insulation, protection, etc.) and must satisfy the criterion of making the best use of solar energy (passive use) with regard to the use of the building. Proactive and sensible use of solar energy is a desired option for newly constructed or renovated buildings.

A computer simulation of how the building reacts to heat must be carried out, taking account of the cooling system envisaged, internal requirements and the orientation and materials used in the façades.

The building must be fitted with permanent equipment for regular maintenance of the façades (façade cradle or other device).^{*} This equipment must conform to work-safety regulations and be simple to use, store and inspect. See also Section B.III.8, point 9 - Safety of window and facade cleaning operations.

Building façades and other surfaces must be easy to clean and sandblast.

Façade surfaces should be made of materials which do not require the use of cleaning products based on dichloromethane (methylene chloride). Surfaces should therefore be cleanable using high-pressure water jets without chemical additives.

Preventive treatment of accessible surfaces likely to attract graffiti artists must be carried out to minimise cleaning.

Façades should not include crevices or protrusions that might serve as a shelter or perch for birds.

6.2. Frames

6.2.1. General

Metal window units must be made of insulating enamelled steel or aluminium. The use of wood should be considered wherever the urban-planning project so requires or circumstances permit (see above) and provided the building rules and standards are complied with.

Units must be built so that screening strips for curtain rails can be fitted on the inside surface without dismantling, and so that convector covers and internal partitions (fixed or movable) can be installed easily and effectively.

All opening mechanisms on frame units must be fitted with a circuit breaker activated by electromagnetic repulsion to control the operation of the air conditioning.

Metal window units must be designed so that window panes can be easily replaced from inside the building.

Frames must have BENOR/TGA technical approval issued by the UBAAtC.

All opening frames must be either tilt-and-turn or projecting.

Each potential office must have an opening window or a natural ventilation system^{*}.

Wherever possible, office windows should open onto the outside, and not onto inner courtyards or technical installations.

In the case of atriums, opening windows should be authorised by the competent authorities.

6.2.1.1. Tilt-and-turn frames

Tilt-and-turn mechanisms must have the following characteristics:

- turning: window leaf mounted on hinge plates, fitted with a mortised closing device, operated by a sliding key (to block the turning position which is to be used only by the window cleaners);
- tilting: tilting window leaf equipped with rods with peripheral locking and angle mechanism; the tilting leaf must be fitted a retaining arm on each side. The reinforcing surface plates to which the arms are fixed must match the selected style of hardware. The tilting mechanism must always be free without requiring a key.

6.2.1.2. Projecting frames

Projecting mechanisms must be fitted with an device to limit opening to 6 cm. This device must have sufficient mechanical resistance to prevent falls. When open, projecting windows may not obstruct the operation of façade/window-cleaning cradles. A fixed section at the bottom of the frame must prevent objects from falling from the sill. Failing that, a 10 cm high screen must be installed in front of the opening window.

6.2.2. Soundproofing

The noise-reduction index of façades must allow compliance with the internal noise limits set out in point 3 above.

6.2.3. Heat insulation

The “U” coefficient of heat transfer must not be greater than 1.7 W/m²K.

6.2.4. Equipotential links

Exterior metal window units must be fitted with stainless-steel bolting devices.

Units must resist the effects of mass inertia (glazing) and meet the performance criteria laid down in STS 52.0, 2005 edition (External window units - general).

6.3. Glazing

6.3.1. General

Double or triple glazing must be approved and monitored by the Belgian Building Standards Federation (UBAtC).

The manufacturer’s guarantee on glazing must be at least 10 years in accordance with standard NBN S23-002 and NIT 133 of the CSTC.

Glazing must be fitted in accordance with standard STS 38.

Weather strips must not reduce the soundproofing quality. In order to prevent any loss of soundproofing as a result of wear and tear on fitting joints, these must be easily replaceable.

A spare frame must be provided for each variation for buildings with structural silicone glazing.

6.3.2. Special performance factors

Insulating double or triple glazing with thermal gas must have the following characteristics:

- clear glazing,
- neutral appearance,
- “U” coefficient not exceeding 1.1 W/m²K,
- acoustic performance: in accordance with standards NBN-EN ISO 717-1 and NBN-EN ISO 140 (R_w (C; C_{tr}) - 41 (-2 ; -4) dB,
- solar factor not exceeding 26% (NBN-EN 410),
- light transmission not less than 50% (NBN-EN 410),
- the thicknesses of glazing must comply with standard NBN S23-002, with a minimum thickness of 6 mm for external windows,
- use of low-emissivity glass is encouraged.

6.3.3. Security glazing

In addition to the above characteristics, glazing in certain areas (including the ground floor) must correspond to class P6B in accordance with standard EN-356.

6.3.4. Thermal shock

Hardening of glazing to take account of technical constraints in the glass due to partial heating is to be decided on in the light of the supplier’s advice.

7. STAIRWAYS

See Section B.III (in particular B.III.1 and B.III.5).

B.I.4. ENVIRONMENTAL QUALITY

1. GENERAL

The Commission considers it important that all buildings which it constructs or renovates or which are constructed or renovated on its behalf should undergo an environmental assessment. It is therefore desirable that the project is designed from the start using a recognised method such as BREEAM (UK), HQE (F), ISO 21931.

The full lifecycle of the building (project, construction, maintenance, renovation, demolition) must be considered, with particular reference to the following:

- integration in the urban environment,
- the integrity of the site and vegetation during construction,
- use of native plants in landscape design,

- protection of natural resources, soil and water,
- climatic conditions,
- economical land use,
- reduction in the use of impermeable surfaces,
- minimising emission levels,
- the position and shape of the building in relation to wind effects and natural passive solar heating,
- planning of offices with due regard to heating requirements and measures to reduce internal and external noise,
- planning of offices using natural light,
- inclusion of green spaces.

This approach involves taking all the steps needed to:

- reduce the consumption of energy and water and minimise the production of waste,
- achieve energy efficiency and use renewable energy sources,
- take account of direct and indirect environmental impact,
- conserve and recycle resources,
- allow materials and equipment to be reused,
- achieve high environmental quality both inside and outside,
- use environmentally-friendly materials and components wherever possible,
- prohibit the use of banned materials (list in D.III).

Buildings must be constructed in accordance with the most recent findings on how buildings and materials affect health and welfare.

2. ENVIRONMENTAL ASPECTS OF CONSTRUCTION, MANAGEMENT AND MAINTENANCE

2.1 Choice of materials:

At the design phase, standard dimension building materials will be selected to reduce waste during construction. Sustainable materials, both in terms of manufacture and recycling, and which require little maintenance, will also be given preference.

For ease of recycling, materials made of natural or synthetic fibres (not both) will be preferred.

All the wood used must meet the requirements of the PEFC (Pan-European Forest Certification) label, the FSC (Forest Stewardship Council) label or equivalent* (see also B.I.5. – Finishes, C.I.3. - Materials and C.I.10 – Furniture).

2.2 Management of waste, reuse and recycling

There must be clearly indicated places in buildings where recyclable materials are collected and stored (batteries, cardboard, cartridges, solvents, glass, metal, paper, food packaging, etc. (see Section B.I.6 - Special-purpose areas). These collection points should not obstruct passageways. They should not affect smoke detectors or sprinklers.

During renovation, refurbishing and demolition work, waste should be sorted so that materials can be collected separately and recycled appropriately. A procedure of the type EMAS-SOP-05 should be implemented. Re-use is encouraged.

Where necessary, certificates concerning the disposal, treatment and recovery of waste and/or hazardous products should be submitted to the OIB.

2.3 Lighting

Effective and economic lighting is necessary. The principles are:

- The level of lighting should be regulated according to the type of activity (work spaces, horizontal circulation, etc.),
- Preference given to the use of natural light,
- Use of fluorescent and energy-saving lights,
- Automated “intelligent” management,
- Installation of absence detectors in offices, toilets, meeting rooms and stairways, provided that emergency lighting remains on,
- Highly reflective ceilings will be given preference in order to reduce the need for artificial light,
- Installation of brightness gauges,
- Direct lighting will be given preference so that the occupants can adjust the amount and direction of lighting. The controls will be located near the occupants,
- The level of lighting in large communal areas will be regulated by photoelectric cells,
- See also Section B.II.3.

2.4 Rational use of water

Savings can be made in this area by:

- providing suitable sanitary installations (see Section B.II.4),
- using rainwater (see Section B.II.4).

In addition, the following could be installed if justified by a techno-economic study:

- automatic taps on wash basins,
- minimised sanitary waste by re-using used tap water,
- using alternative waste-water treatment methods.

2.5. Façades and roofs

During the design phase, environmental criteria must be taken into account when choosing:

- the type of façade and its covering,
- the roof covering, exploring the use of green roofs,
- the type of window frames,
- the quality of glazing, and
- the insulation,
- the disposal of hazardous waste from the finishing of the above elements.

2.6. Floor coverings

When choosing floor covering, account must be taken of the environmental aspects of both the components of the product and how it is laid and maintained, and of recycling. See Section B.I.5, point 6.

Preference will be given to carpets which can be recycled, or which contain recycled fibres.

2.7. Technical facilities

In the case of technical facilities, preference should be given to systems which are effective and safe from the following points of view:

- environmental protection,
- the recovery of heat,
- renewable energy,
- high-efficiency systems,
- water-saving devices,
- rainwater collection,
- management systems permitting economical and ecological monitoring, including measurement systems which can identify areas which are heavy consumers of electricity, gas and water.

Choosing light, matt colours for interior walls and flows helps minimise the energy used for lighting.

The tender specification should lay down environmental protection requirements. When tenders are evaluated, those which propose environmentally sound materials, components and procedures will be given priority.

B.I.5. FINISHES

1. MOVABLE PARTITIONS

The term “movable partitions” should be interpreted to mean all types of partition consisting of prefabricated elements which do not seriously deteriorate when dismantled and reassembled and which do not damage surrounding materials such as wall and floor coverings, suspended ceilings, ceiling projections, convector covers and window piers.

Partitions must be designed to avoid distortion or overload caused by variations in height due to uneven floors and suspended ceilings. They must have the flexibility to absorb variations in height of up to 12 mm in relation to each level feature. Partition surfaces, finishes and junctions should be free of any nails, screws and soldered joints.

The building’s movable partitions should allow the physical separation of different areas, especially offices. They should be modular, prefabricated partitions which can be dismantled and moved and the modular elements they contain must be interchangeable. It must be possible to dismantle 20% of the modules without dismantling adjacent modules. Modules must be distributed in a regular and logical manner throughout a series of partitions.

Movable partitions should be designed to meet soundproofing (see Section B.I.3, point 3), heat-insulation and be at least FR30/FR $\frac{1}{2}$ hr/EI30. There should be an equally solid barrier ensuring fire-resistance and soundproofing in each room above suspended ceilings and if necessary below false floors.

Any insulating materials made of mineral wool must be encapsulated.

Movable partitions contribute to the architectural appearance of the building.

They should be freely structured. The standard coating for panels should be scratch-resistant melamine for wooden partitions and heat-polymerised acrylic paint or electrostatic-powdered epoxy paint for metal partitions.

The use of wooden panels certified by the European Ecolabel scheme or equivalent is encouraged.

The partitions in the building should be made up of several modular elements with different functions and characteristics. These elements are categorised as follows:

- a) design:
 - full-size standard modules
 - modules with a door

- glazed modules
- end or joining elements
- corner elements

b) technical characteristics:

- fire-resistance
- soundproofing.

Movable partitions should be supplied with all the necessary fittings to enable their full integration into the structure of the building, and their harmonisation with the other design finishes and technical installations.

2. OFFICE DOORS

In order to facilitate use by persons with reduced mobility, doors should not be fitted with automatic door-closer devices.

Doors giving access to corridors should be of the type FR30/FR $\frac{1}{2}$ hr/EI30.

Each door should comprise a frame (made of wood, metal or prefabricated sections) and a door leaf (consisting of a solid wooden core with extra-hard facing panels, wooden edges and edge-strips, finished with decorative paint or panels, or enamelled sheet-steel facing).

The decorative facing should consist of laminated plates, natural wood panels, sheet steel, thermolacquered sheet aluminium or glazed sections.

The main characteristics of office doors should be as follows:

- The minimum breadth should be 93 cm and the minimum height 201.5 cm.
- Door furniture should be made of brushed stainless steel.
- There should be four brushed stainless steel hinge plates on each door.
- Locks should be reversible mortise locks (see point 4 below).
- Handles: see point 4.4 below.
- Accessories: door stops and draught excluders.

3. FALSE CEILINGS

With the exception of indoor car parks, storage facilities, plant rooms and other such areas, all premises in the complex should be fitted with false ceilings to conceal the cables and pipes attached to the ceiling.

Where applicable, false ceilings should be designed in concordance with the activities to be carried out in each room, taking into account lighting and soundproofing requirements and

any constraints linked to a possible reorganisation of the premises. They should be adapted to the modular system in use and must facilitate the integration of lighting, ventilation, loudspeaker and fire-detection equipment.

The ceilings should be constructed from standardised panels that are easy to remove and sturdy enough to allow the modification and maintenance of the equipment they conceal; they must be easy to clean.

It should not be necessary to dismantle false ceilings in order to install and remove movable partitions. False ceilings should contribute to the soundproofing of one room in relation to the next.

False ceiling systems must conform to A0 or A1 (NBN S21-203) – A1, A2 or B (EN 13.501) fire-resistance standards; they must be able to resist the effects of fire for 30 minutes and the quantity of smoke they give off and its degree of noxiousness must be negligible.

Any insulating materials made of mineral wool must be encapsulated.

4. LOCKS

The building should be fitted with two quite distinct types of doors, namely internal and external doors.

4.1. Internal doors

Internal doors should be fitted with unprotected five-pin cylinders, with keys duplicated according to a key chart of the type set out below. In all cases keys must be compatible with European-type profiled cylinders or half-cylinders and have a minimum basic length of 60 mm, with the possibility of adding 5 mm standard extension sections on one or both sides up to a total length of 140 mm.

In relevant cases this compatibility standard must also apply to:

- extendable cylinders
- tubular locks
- padlocks
- safety bolts
- cam locks
- contact cylinders.

The key chart should normally be structured as follows:

- one general master key,
- one master key for plant areas,
- one master key for office areas,

- one master key for the kitchen and canteen area.

Some cylinders may be identical or may even be opened centrally, which should entail a preliminary study by the supplier.

The installation of locks should be based on several different key profiles, both in terms of individual keys and in terms of the various master keys; the purpose of this is to avoid any re-cutting.

All doors must be fitted with cylinders, including doors to storage cavities, trapdoors leading to ducts, the outermost entrance doors to washrooms, etc.

It must also be noted that internal doors giving access to certain facilities may need to be equipped with protected cylinders and non-duplicable keys.

In such cases, the supplier must provide a factory certificate stating that:

- the keys will not be duplicable for a period of at least 15 years, certified by an international guarantee;
- rotors and stators contain steel or tungsten carbide inserts or plates protecting the cylinder against drilling;
- some of the pins are of the mushroom type to enhance resistance to lock-picking.

SPECIMEN INTERNAL KEY CHART

(each cylinder should have five keys, and ten of each master key should be supplied)

GENERAL master key

OFFICE master key, with:

- different versions for each office,
- different versions for each archive room,
- different versions for each kitchenette,
- an identical version for the women's and men's showers and toilets,
- one version for cleaning-equipment stores,
- one version for stairwells.

CONFERENCE ROOM master key, with:

- different versions for each facility (if necessary).

CANTEEN master key, with:

- different versions for each facility.

PLANT ROOM master key, with:

- one version for the HVAC circuit,
- one version for the ELECTRICAL circuit (HV, LV),
- one version for the Telecommunications circuit,
- one version for the LIFT circuit,
- one central opening facility for the HVAC and ELECTRICAL circuits,
- one central opening facility for the Telecommunications and ELECTRICAL circuits,
- one central opening facility for the HVAC, ELECTRICAL and Telecommunications circuits.

4.2 External doors

The building's external doors should be fitted with VACHETTE RADIAL SI type 207/107166 cylinders.

The locks on these doors should remain the property of the Commission and all keys must be returned to the Commission official responsible; in the event of a breach of this condition, the lock fittings concerned must be replaced at the contractor's expense.

Locks should carry a ten-year guarantee against manufacturing defects or malfunctions.

For protected cylinders with non-duplicable keys the supplier must present a certificate from the manufacturer confirming that:

- the keys will not be duplicable for a period of at least 15 years, certified by an international guarantee;
- rotors and stators contain steel or tungsten carbide inserts or plates protecting the cylinder against drilling;
- some of the pins are of the mushroom type to enhance resistance to lock picking.

SPECIMEN EXTERNAL KEY CHART

BUILDING master (5 keys)

Main entrance:	(if there is a vestibule with several doors, the same cylinder version should be used for each door, with 15 keys in total.)
Contactors for indoor car parks:	external doors: 3 keys internal doors (caretaker's cabin): 3 keys
Emergency exits:	one version for external locks: 3 keys one version for internal locks: 5 keys
Other access points:	3 keys per cylinder

4.3 Locks

Locks should be of the reversible mortise type with a sheet-metal casing at least 2 mm thick and a steel faceplate and strike plate. They should be fitted with a plug reinforced by a steel ring to prevent abrasion of the plug and the sheet metal casing; the plug should have a diameter of 8 mm. All the locks will have the same dimensions in terms of casing, faceplate, keyway and length from end to end, so that they can be interchanged without the leaf of the door being altered. The casing of the lock should be pierced through from one side to the other at the level of the plug and cylinder hole (European type) to allow the rose of the door handle or a finger plate to be fitted by means of a transverse screw and socket. Wherever there are metal splays there should also be double locks.

4.4 Handles

These should be U-shaped with a diameter of 20 mm, a length of approximately 135 mm and a projection of 70 mm. They should be attached by means of pressure screws and mounted on two circular rosettes. Locks fitted with devices indicating “vacant/occupied” should be of the same diameter and should be equipped with a knob on the inside for operating the red and white disc indicator visible on the outside of the door; provision must be made for unlocking these doors from the outside with an emergency key or coin.

4.4.1 Polyamide

Door handles should be made of coloured nylon material and reinforced along their full length. The nylon should have a smooth, non-porous surface resistant to oil, detergent, acid and disinfectant and should be non-flammable and non-combustible. A selection of colours should be available so that door fittings can be harmonised with the colours of other fittings and the doors themselves, although there should be a contrast for visually-impaired people.

4.4.2 Metal

These fittings should be made of stainless steel or of a light metal with a high magnesium content; they should not be susceptible to scratches or cracks and should be free of corrosive materials. Zamak zinc alloy and other less robust alloys must be avoided.

4.5 Hydraulic overhead closers

Overhead closers should have the following characteristics: invisible fixing, the body should be made of oxidised extruded aluminium with high corrosion-resistance; the device should be lightweight, compact and should protrude to a minimum. Overhead closers should also be reversible (enabling them to be opened in either direction by pushing or pulling the right or left door leaf) and should allow doors to open up to an angle of 180°. It should be possible to adjust closers without removing the fitting. They should carry a minimum two-year guarantee.

In addition to the specifications set out in current regulations, overhead closers should be fitted on doors to archive rooms, access doors to toilets, washroom areas, kitchenettes and photocopier rooms, and emergency doors equipped with alarm devices. In the case of double doors each leaf should be fitted with its own overhead closer, and a priority selector should also be installed. The doors of kitchenettes and photocopy rooms are equipped with a magnetic device connected to the fire detection system.

4.6 Door-blocking devices

Access doors should be fitted with a device allowing them to be automatically blocked open at a 90° angle if necessary.

4.7 Emergency exit door-bars

All emergency exit doors must meet the following standards:

Emergency doors (in particular external access doors) should be preferably constructed of a solid material and frames should comply with the following security standards: ENV 1627 (1999) and ENV 1630 (1999), class 5.

Emergency doors should be equipped with safety hinges reinforced with anti-rising mechanisms.

There should be no external means of opening emergency doors. Emergency doors must facilitate evacuation of the building without allowing entry from the outside.

Emergency exit bars (panic-bars) should be fitted to allow emergency doors to be opened from the inside in the event of an evacuation. Panic bars should have a three-point locking mechanism or be equipped with a mortise lock. They must meet building standard EN 1125:1997, amended by A1:2011 (building hardware - panic exit devices operated by a horizontal bar – requirements and test methods).

In order to protect occupants emergency exit doors must close automatically.

Emergency exit doors must remain closed at all times and should be connected to the intruder alarm system (see Section B.IV.3).

For more details see Section B.III.5, point 2.2.

4.8 Sun screens

Sun screens should be incorporated into the façade by architectural means (blinds, roof overhang etc.), with easy access for maintenance of screens and windows (see Section B.III.8, point 9). Installation of sun blinds is recommended for façades which are particularly exposed to the sun. In addition, interior blinds, of vertical design, light grey in colour and sufficiently opaque, of a density of 180 g minimum per m², must be installed on all façades. Slats should be made of a 100% fibre-glass fabric that complies with the current standard or, if this has not been established, with the equivalent to M1 under the former standard; they should be resistant to humidity, heat and UV rays, and should not distort. The fabric used must be anti-static, non-flammable and colourfast. They should be 127 mm wide unless otherwise specified.

They should be fitted individually on each window in such a manner that partitions can be rearranged without removing or altering window blinds.

Technical characteristics:

- oxidised aluminium rails;

- carriers mounted on nylon rollers and fitted with internal safety friction devices that are activated if blinds are incorrectly manoeuvred, in order to avoid any damage to the mechanism.

The position of the carriers should be adjustable by means of an aluminium rod.

The space between carriers should be calculated on the basis of the length of the rail, so that the distance between each set of carriers is identical.

The control rod should be equipped with a planetary gear system to facilitate the adjustment of slats.

The controls for opening and adjusting blinds should be adapted and positioned to suit the physical characteristics of each window.

The axial movement of the slats should be controlled by a thin bead chain which will not break when pulled.

The lateral movement of the slats should be controlled by a nylon cord weighted with an ABS torsel.

The weighting discs at the base of each slat should be made entirely of corrosion-proof synthetic material linked by an unbreakable nylon bead chain.

4.9 Security cabins

Depending on the circumstances one or more heated and ventilated security cabins should be installed at the entrance to and exit from the car park. (see Section B.IV.4, point 3.1.2.)

4.10 Convex mirrors

Convex mirrors should be installed beside indoor car park ramps, at car park exits (for pedestrian visibility) and where necessary also on the street opposite the car park (for traffic visibility).

4.11 Locks on cupboard doors

A duplicable master key should be provided for all cupboard locks. Three keys should be supplied with each lock, together with three pass keys. Locks and keys should be numbered in an identical manner.

4.12 Comments

Upon delivery of the premises the Commission must be given a reserve of locks and fittings equivalent to 10% of those installed in the building.

In reference to point 4.1 all key charts, master keys and other keys must be given to the Commission representative in charge one week before the building is occupied. Key registration numbers should be recorded door by door on a comprehensive plan mapping each storey and each door, including the basement and attic areas.

A complete set of technical records documenting the above installations as well as windows, garage doors, motorised devices, window frames (including mechanisms and bolts) and all sun screens must be submitted to the Commission.

This documentation must list in particular:

- makes and models;
- names and addresses of fitters;
- names and addresses of suppliers;
- warranty periods;
- electrical circuit diagrams;
- colours and dimensions;
- thickness, types and colours of glazing.

5. METAL FITTINGS AND ACCESSORIES

5.1 Handrails and internal railings

These must conform to standard NBN B 03.103 and the LOI/CODE/RGPT.

In stairwells, handrails must be installed on each side.

5.2 External railings

These must conform to standards NBN P 21.001 and NBN B 03.103, and the LOI/CODE/RGPT. They must be made of non-rusting metal.

Where the railing delimits an access path, it must be equipped with two handrails, one at 75 cm from the floor and the other at 100 cm from the floor, or at 65 cm and 90 cm respectively from the nosings. This double handrail should protrude beyond the end of the ramp or of the staircase by 50 cm.

5.3 Floor gratings

Any accessible service shafts and air outlets opening on to the roof must be fitted with gratings on every floor in order to prevent accidents.

However, gratings are not to be used on:

- emergency staircases;
- escape routes leading to a terrace or flat roof.

Fire escapes and emergency exit routes should instead be fitted with perforated metal sheets with a non-slip surface.

6. COVERING MATERIALS

The types of covering to be used on the horizontal and vertical surfaces of each area of the building should be selected in accordance with a cost-benefit analysis, taking into account all of the following factors:

- main purpose of the premises;
- intensity of usage;
- type and frequency of cleaning;
- environmental aspects of materials;
- physical aspects of materials.

As far as possible the use of PVC should be avoided.

The data sheet should set out the factors determining the choice of materials as described above.

6.1 Floor coverings

Floor coverings in corridors and vestibules should facilitate the movement of wheelchairs. Thick fitted carpets and doormats must not be installed in these areas. Dust-repellent doormats should be placed at the entrances to buildings and in well-frequented areas.

Any non-slip floor coverings should be appropriate to the rooms in which they are fitted (class R9/R10 in accordance with DIN 51130, or class B in accordance with DIN 51097).

There should be a distinction between the floor coverings used in office spaces and those used in areas with a different specific function.

Floor coverings used in office spaces should either be carpet or have a smooth surface. They should be quick and easy to clean. The colours selected for floors, walls and ceilings should be harmonious but should not generate a monotone environment.

Floor coverings in premises with a specific purpose (archive rooms, foyers, kitchens, kitchenettes, toilets, computer rooms) should be selected from the following:

- flexible floor coverings: rubber, linoleum, cork, etc.
- hard floor coverings: concrete screed (treated or untreated), parquet (solid wood or layered), ceramic tiles, natural stone, epoxy resin, etc.

Where concrete floors are exposed the surface should be protected with an anti-dust treatment. The same applies to concrete stairs.

6.1.1 Carpets

CHARACTERISTICS	STANDARD S	CARPET TILES		CARPET STRIPS		ENTRANCE MATS
		looped	velour	looped	velour	
manufacturing process	ISO 2424	loop pile 1/10	cut pile 1/10	loop pile 1/10	cut pile 1/10	cut pile
composition of pile	ISO 2424	100% polyamide	100% polyamide	100% polyamide	100% polyamide	100% polyamide on non-woven support
dye		spun-dyed PA	spun-dyed PA	spun-dyed PA	spun-dyed PA	spun-dyed PA
total weight of pile	ISO 8543	min. 360 g/m ²	min. 390 g/m ²	min. 360 g/m ²	min. 420 g/m ²	min. 750 g/m ²
tip/tuft count	ISO 1763	min. 150 000/m ²	min. 165 000/m ²	min. 150 000/m ²	min. 165 000/m ²	min. 57 500/m ²
light fastness:	ISO 105 - B02	≥ 7	≥ 7	≥ 7	≥ 7	≥ 5
dimensional stability	EN 986	< 0.2%	< 0.2%			
flame resistance	NBN S21.203	min. A2	min. A2	min. A2	min. A2	min. A2
	EN 13501-1	min B FL s1	min. B FL s1	min. B FL s1	min. B FL s1	min. B FL s1
anti-static level	EN 1815 - ISO/TR 6356	≤ 2 kV	≤ 2 kV	≤ 2 kV	≤ 2 kV	≤ 2 kV
class of usage	EN 1307	33 (intensive commercial use)	33 (intensive commercial use)	33 (intensive commercial use)	33 (intensive commercial use)	33 (intensive commercial use)
anti-stain treatment		Yes	Yes	Yes	Yes	Yes
acoustic performance (contact)	ISO 140/8	≥ 24 dB (1000 Hz)	≥ 24 dB (1000 Hz)	≥ 24 dB (1000 Hz)	≥ 24 dB (1000 Hz)	≥ 31 dB
depth of pile	ISO 1766	Min. 2.6 mm	Min. 3.0 mm	Min. 2.6 mm	Min. 3.0 mm	≥ 6.0 mm
Total depth	ISO 1765	Min. 5.5 mm	Min. 5.5 mm	Min 5.5 mm	Min 5.5 mm	7 mm ≤ ép. ≤ 14 mm

Floor coverings must be glued across their entire under-surface using a non-slip, non-flammable adhesive that does not emit smoke or harmful fumes in the event of fire, and must be registered by the manufacturer.

Dye and patterns: the same dye batches must be used throughout.

6.1.2 Linoleum flooring

6.1.2.1 Linoleum strips

CHARACTERISTICS	STANDARDS	LINOLEUM STRIPS
flooring material	EN 548	Linoleum
type		Marbled
reverse side		impregnated hessian
flame resistance	NBN S21-203	Min A2
flame resistance	EN 13501-1	Min B fl sl
sound insulation	ISO 140-8	≥ 6 db
width	EN 426	200 cm
length	EN 426	20-33 m
total thickness	EN 428	≥ 2.5 mm
total weight	EN 430	≥ 2.9 kg
residual indentation	IN 433	≥ 0.1 mm
light fastness	ISO 105-B02	≥ 6
indentation resistance	VDE 0100	≥ 50 kΩ
electrostatic charge limit	EN 1815	=< 2.0 Kv
industrial class	EN 685	41-42 NORMAL
resistance to cigarette burns	EN 1399	resistant
resistance to wheelchairs	EN 425	resistant
resistant to bacteria	NF EN ISO 846	Bactericidal (hygenic) – bacteriostatic properties
resistance to chemicals	EN 423	Resistant to most solvents

Linoleum should not be laid at a temperature below 15°C. The entire under surface of the linoleum should be glued and the joins between strips should be bonded using linoleum seam adhesive. Edges should be trimmed in advance.

6.1.2.2 Linoleum tiles

CHARACTERISTICS	STANDARDS	LINOLEUM TILES
flooring material	EN 548	Linoleum
type		Marbled
reverse side		impregnated hessian
flame resistance	NBN S21-203	Min A2
flame resistance	EN 13501-1	Min B fl sl
sound insulation	ISO 140-8	≥ 5 db
width	EN 426	50 cm
length	EN 426	50 cm
total thickness	EN 428	≥ 2.5 mm
total weight	EN 430	≥ 2.9 kg
residual indentation	EN 433	≥ 0.08 mm
light fastness	ISO 105-B02	≥ 6
indentation resistance	VDE 0100	≥ 50 kΩ
electrostatic charge limit	EN 1815	anti-static
industrial class	EN 685	Commercial 34 - Industrial 42
resistance to cigarette burns	EN 1399	resistant
resistance to wheelchairs	EN 425	resistant
resistant to bacteria	NF EN ISO 846	Bactericidal (hygienic) – bacteriostatic properties
resistance to chemicals	EN 423	Resistant to most solvents

Linoleum should not be laid at a temperature below 15°C. The entire under-surface of the linoleum should be glued, paying particular attention to the joins. Seams between strips should be sharp.

6.1.3 Non-enamelled, vitrified pressed fine earthenware tiles

These tiles must offer a minimum level of performance under standard NBN B27-011 with:

- Class 3 compressive strength,
- Class 4 or 5 wear-resistance (test NBN B27-003),
- Class 3 impact-resistance
- and Class 2 chemical-resistance.

Each tile should measure 300 mm x 300 mm or 200 mm x 200 mm. Tiled surfaces should be restricted to around 50 m² in area and 10 m in length because of expansion at joints.

Tiles should be fixed to a hardened screed surface using adhesive. Joins should be filled using a grouting cement that is compatible with the laying-adhesive.

6.1.4 Parquet flooring laid with adhesive

CHARACTERISTICS	STANDARDS	MINIMUM PERFORMANCE REQUIRED
Manufacture	EN 13226	wood flooring — solid parquet elements
Laying	DTU 51.2 or equivalent EN	laid using adhesive – tongue and groove assembly
Bevelled edge		with or without bevelled edge along the length
Design		single layer of wood with edge joins
Laying patterns	EN13226	single, double, triple, quadruple herringbone, offset square basket, 'à l'anglaise' - vertically laid with random length strip pattern or with alternating length strip pattern, or laid with alternating strip pattern offset diagonally
Finish (soft parts of wood are brushed out)		at the factory
Stains		applied in the factory before varnishing, selection from the manufacturer's range
Varnish		select from matt/satin/gloss, minimum three indissociable coats of varnish – no harmful effect on the environment
Wear layer		minimum ≥ 6.0 mm
Moisture content of wood consignment on delivery	NIT 268	average percentage of total weight between 9 and 12 %
Fire resistance	EN 14342	Dfl s1 - Cfl s1 depending on type of wood
Widths		between 56 and 112 mm (tolerance ± 0.2 mm)
Length depending on type of wood		from 200 to 2000 mm (tolerance ± 2.0 mm)
Total thickness		≥ 14 mm (tolerance ± 0.2 mm)
Weight per m ²		≥ 8 kg/m ²
Stability factor of wood	NIT 268	relation between the width and thickness of a sheet, between 4 and 8
Resistance to wear	U.P.E.C. or EN 13696 or equivalent	U2s
Resistance to indentation	U.P.E.C. or EN 1534 or equivalent	P2
Water resistance	U.P.E.C. or EN equivalent	E1
Resistance to chemicals	U.P.E.C. or EN 13442 or equivalent	C0
Stress class	XP B53-669 or NBN EN 685 or equivalent	B23 - C33 according to the hardness of the selected wood Brinell hardness class: A between 10 and 20 N/mm ² - B between 20 and 30 N/mm ² - C between 30 and 40 N/mm ² - D > 40 N/mm ²
Type of wood		to be selected from the manufacturer's range
Packaging		on pallets, under 100% recyclable plastic film with cardboard protection of the end of the strips
Eco-certification of wood	FSC or PEFC or equivalent	wood certified according to FSC/PEFC labels or equivalent
Volatile substances		absence of volatile substances
Prohibited materials		formaldehyde emission class: $E1 \leq 0.124$ mg/m³ and Pentachlorophenol (PCP) content < 5 ppm
Adhesives		technical and safety datasheet must be supplied - absence of solvents or harmful substances 24 hours after laying
Maintenance		Maintenance datasheet must be supplied

6.1.5 Floating parquet flooring

CHARACTERISTICS	STANDARDS	MINIMUM PERFORMANCE REQUIRED
Manufacture	EN 13489	wood flooring — multilayer parquet
Laying	DTU 51.11 or equivalent EN	two or three layers glued together, floating parquet, assembly by snapping together
Single strip or multistrip design	EN 13489	Strips with bevelled edge joins along the length and/or tongue and groove on four sides
Finish (soft parts of wood are brushed out)		at the factory
Stains		applied in the factory before varnishing, selection from the manufacturer's range
Varnish		minimum six indissociable coats of varnish – no harmful effect on the environment. Select from matt/satin/gloss
Wear layer		≥ 3.5 mm fine wood
Base		spruce core-board, 5-ply plywood, MDF, HDF or similar
Backer		softwood or similar
Moisture content of wood consignment on delivery	NIT 268	average percentage of total weight between 7 and 9%
Fire resistance	EN 13.501	Cfl s1 or Dfl s1 - depending on type of wood
Width (single layer and multilayer)		between 40 and 195 mm (tolerance ± 0.2 mm)
Length (single layer and multilayer)		between 250 and 2250 mm (tolerance ± 0.2 mm)
Total thickness		≥ 14 mm (tolerance ± 0.2 mm)
Weight per m ²		≥ 8 kg/m ²
Resistance to wear	U.P.E.C. or EN 13696 or equivalent	U2s
Resistance to indentation	U.P.E.C. or EN 1534 or equivalent	P2
Water resistance	U.P.E.C. or EN equivalent	E1
Resistance to chemicals	U.P.E.C. or EN 13442 or equivalent	C0
Stress class	XP B53-669 or NBN EN 685 or equivalent	A 21 – B22 – C31 - D33 according to the hardness of the selected wood. Brinell hardness class: A between 10 and 20 N/mm ² - B between 20 and 30 N/mm ² - C between 30 and 40 N/mm ² - D > 40 N/mm ²
Type of wood used for wear layer		to be selected from the manufacturer's range
Packaging		on pallets, under 100% recyclable plastic film with cardboard protection of the end of the strips
Eco-certification of wood	FSC or PEFC or equivalent	wood certified according to FSC/PEFC labels or equivalent
Volatile substances		absence of volatile substances
Prohibited materials		formaldehyde emission class: E1 ≤ 0.124 mg/m³ and Pentachlorophenol (PCP) content < 5 ppm
Maintenance		Maintenance datasheet must be supplied

6.2 Environmental aspects of floor coverings

When selecting floor coverings, the materials and means used to lay and maintain them should be considered from an environmental perspective. Preference will be given to floor coverings which have a European Ecolabel or similar.

The following points should be taken into account:

- 1) Finishes in the entrance areas and on the ramps of garages must be such that the scattering of de-icing chemicals can be kept to a minimum in the event of a frost.
- 2) PVC floor coverings are prohibited. If PVC must be used, a product with a high proportion of recycled PVC is preferable.
- 3) In choosing materials for finishes and flooring preference should be given to natural or recycled materials, for example:
 - gypsum and plaster manufactured from the desulphurisation of power station smoke;
 - concrete or bricks containing flue ash;
 - glass;
 - paper.
- 4) Floor coverings made of a mixture of textile and synthetic fibres with a limited lifespan and generating large masses of waste contaminated with adhesive should be avoided as far as possible. If, however, this type of material is chosen, it must be easy to recycle or to dispose of as polluting waste.
- 5) The presence of a high percentage of recycled products in a floor covering and the recycling potential of the covering itself are points to be taken into consideration.

7. WALL COVERINGS

7.1 Fibreglass fabric and paint

Walls should be covered in a very finely woven, dense layer of thin fibreglass fabric suited to surfaces that require frequent cleaning, ceilings, etc. The inside surface of the fabric roll should form the visible face of the wall covering, and the breadth of the fabric should be 100 cm.

The fabric should be painted using an emulsion paint and should be glued to a base that complies with inflammability standard A2, in accordance with standard EN 13 501-1. The adhesive used to glue the roll to the base should be non-flammable and should not emit either smoke or noxious gas in the event of a fire. Mounting should be carried out from top to bottom using a spatula so as to evacuate any pockets of air, in accordance with the manufacturer's instructions.

7.2 Textile on duffel

100% textile wall coverings should consist of a surface fabric bonded to thick viscose felt, providing both soundproofing and thermal insulation, with an impervious layer to prevent filtration. The material should be of class A1, in accordance with standard EN 13 501, or the equivalent to M1 under the former standard NF P 92 507, providing thermal insulation of $0.10^{\circ}\text{C m}^2/\text{W}$ and weighing between 500 and 700g/m^2 .

The surface fabric should have the appearance of linen and be light in colour.

The adhesive should be colourless, non-flammable and of a type that does not emit either smoke or noxious fumes in the event of a fire. It should be applied across the entire surface of the base to which the fabric is to be glued. Strips should have a minimum breadth of 260 cm and must be applied plumb; selvages should be trimmed in advance and seams between strips should be sharp. Mounting should be carried out from top to bottom so as to evacuate any air pockets. Wall coverings are set in ceiling sections and baseboards.

7.3 Pressed earthenware wall-tiling

Highest quality enamelled ceramic earthenware tiles should be used to cover interior walls that are not exposed to frost. These tiles must comply with standard NBN B27-106 and the supplier must provide the results of tests carried out on the tiles.

Tile dimensions: 300 x 300 mm / 200 x 200 mm.

Tiles must offer a minimum level of performance under standard NBN B27-011 with Class 1 compressive strength and Class 1 flexural strength.

Tiles are glued by positioning them on the adhesive mortar in accordance with the manufacturer's instructions and pushing them into the adhesive before it dries using a slight twisting movement. Ceiling work should be carried while the adhesive mortar or synthetic adhesive on the tiles is setting. Joints should be filled within a maximum of 24 hours using grouting cement that is compatible with the adhesive mortar/fixing adhesive.

8. PAINT

Unless otherwise required, all paint should have a matt finish.

Before use, safety data sheets (SDS) and material safety data sheets (MSDS) should be supplied.

8.1 Environmental aspects

All paints used in the building, whether acrylic, latex or enamel, must meet the most stringent environmental criteria. Preference will be given to products which have a European Ecolabel or similar.

When applying finishes (for example: painting recyclable gypsum plates) recyclable products should be used wherever possible.

During the completion of the building, especially when paint and fungicides are being applied to surfaces, any materials such as varnish and lacquers that release organic hydrocarbons should be avoided.

Preference should be given to water-based products (acrylic paints), paints with a high concentration of solid substances (high-solid paints) or powder-based paints (used on industrially prefabricated construction elements).

When finishing, repair or renovation work is being carried out, waste materials from painting (brushes, tins, rags, etc.) should be treated as hazardous waste, and contractors must be bound by contract to observe the regulations governing the disposal of these types of materials.

8.2 Acrylic paint on smooth surfaces

Decorative matt paint for interior use coated in varnish must not contain solvents based on copolymers in aqueous dispersion. Acrylic paint should be used on porous or permeable mineral-based surfaces such as plasterwork, masonry, concrete, etc. This type of paint is also suitable for plasterboard, fibre glass fabric, rough-cast surfaces and wallpaper.

Main features:

- odourless, solvent-free, does not emit organic substances;
- washable in accordance with DIN 53778;
- very easy to apply;
- negligible surface tension;
- permeable;
- high coverage and utility;
- does not spatter.

Properties at 23°C and 50% RH:

- relative density: 1.3g/cm³;
- solid content: 40.5% by volume;
- drying time: touch-dry in 30 minutes,
recoatable in 5 hours;
- application : brush, roller, gun;
- thinner: tap water;
- coverage: 300g/m² - 12 m²/litre.

8.3 Wood varnish

Aqueous colourless varnish for interior use, based on a polyurethane-acrylic dispersion.

Main features:

- non-toxic;
- rapid drying;
- very low odour;
- scratch-resistant, durable and UV-resistant;
- easy to clean;
- may be treated with cleaning products when completely dry (after 7 days).

8.4 Food grade paint

The paint used in kitchens and cafeterias must be food grade and resistant to soiling, mould, bacteria and stains.

9. ACCESSORIES

Each office should be equipped with a coat stand.

10. NAME PLATES

Offices should be provided with a name plate for each individual occupant. As a minimum, this should show the name(s) of the occupant(s) (character height at least 5 mm) and the number of the office (character height at least 15 mm).

B.I.6. SPECIAL-PURPOSE AREAS

This section covers the design of building areas not used as offices.

The health and safety rules on these areas are dealt with in section B.III.8 (Special Health and Safety provisions).

1. MEETING ROOMS/CONFERENCE CHAMBERS

Meeting rooms/conference chambers must comply with the criteria set out in section D.I.

2. PREMISES FOR COLLECTIVE USE

2.1 Meeting rooms

Meeting rooms are rooms planned in or near office areas and reserved for use by the departments occupying the building. As a rule, they are created by combining several office units.

These rooms may be equipped with:

- special furniture (tables and chairs for meetings, boards etc.),
- sound amplification facilities,
- audiovisual facilities,
- 230V sockets and network connection points at the centre of tables to avoid the risk of falling,
- blackout systems.

Meeting rooms are connected to the same air-conditioning and electrical systems as the rest of the building they are in. These systems may be controlled and configured specifically for the room.

In the interests of safety, meeting rooms with a capacity to hold more than 80 people must have at least two access doors, placed at opposite ends of the room. Under no circumstances may the capacity of the meeting rooms exceed the number of occupants of the level of the building on which they are situated.

2.2 Training rooms

Rooms intended as venues for training courses should be equipped like meeting rooms, except that each seat in a training room is to be regarded as a workstation. This means that every trainee's place must comprise:

- a standard work table,
- two electricity sockets (computer, desk lamp),
- one network connection point.

3. FOYERS AND STAIRWAYS

Foyers must be accessible from the public thoroughfare through a set of double doors with automatic opening.

The main entry into the building must provide access for persons with reduced mobility alongside any revolving or automatic doors (See Section B.III.9 - Facilities for persons with reduced mobility).

Foyers must have floor and wall coverings of a quality befitting an important public building.

Floors must have antiskid surfaces (DIN 51130 category R9/R10).

Foyers must be equipped with:

- a reception desk with two workstations (or more if necessary),
- a room, niche or fixed cabinet housing the central fire-alarm unit,
- a waiting area,

- a fixed stand for a directory board indicating the departments located on the various floors of the building,
- a place where a safety equipment cabinet can be installed,
- telephones (internal and outside lines).

At least one of the building's stairways must lead directly to the foyer. Otherwise, access to stairways must be clearly indicated in the foyer and corridors. Stairways must be architecturally attractive in order to encourage their use.

Doors must be easy to open, without this compromising their firebreak function.

Stairways must not serve only as emergency exits, but should be well-populated thoroughfares. They must be wide enough to allow several people to pass at the same time, well lit and generally pleasing. Doors opening onto stairwells must be equipped with handles on both sides and not only with a button on the stairwell side.

4. CAR PARKS

4.1 Arrangements to facilitate access by car

Indoor car parks must be designed to:

- allow organised parking of passenger vehicles and two-wheel vehicles,
- facilitate official operations requiring transport vehicles.

Official operations regularly carried out through indoor car parks are:

- transport of documents (mail shuttle),
- transport of office materials (paper, publications, etc.),
- transport of refuse (bins and kitchen waste),
- transport of maintenance equipment and materials (for the technical and cleaning services),
- transport of food and catering supplies (canteens and cafeteria).

The number of parking spaces in indoor car parks must conform to urban-planning requirements.

Indoor car parks must be designed in conformity with the specific standards governing the prevention, detection (see Section B.II.8 et seq.) and control of fire in such areas (see Section B.III.2).

Particular care must be taken with signposting in car parks (see Section B.III.4, points 8 and 9).

Access and exit ramps for vehicles must be separate. The speed on access ramps must be restricted to 5 km/h. The number of ramps should be limited to the strict minimum.

Any slopes steeper than 5% must have an antiskid surface.

A cable must be suspended above all parking spaces to indicate reserved spaces.

Space must be provided near the vehicle entrance for storage of sacks of road salt to combat surface ice.

Each entry to and exit from a car park must be equipped with a security guard's booth (see Section B.IV.4, point 3.1.2)*.

Vehicular access car park doors opening to the outside must have key-operated motorised opening (see Section B.IV.4.1).

The ventilation system must be designed to prevent draughts coming in through the entrance door from outside.

Number of electricity sockets: see Section B.II.3, point 3.12.

An area must be reserved at the lowest deck of the car park for vehicles equipped with LPG (approved installation only). Since LPG is heavier than air, adequate floor-level extraction must be provided in this area.

All car parks must have an area reserved for use by persons of reduced mobility. It must comply with the RRU (Regional Urban Planning Regulation). These spaces must be located near the doors leading to the lift lobby. There must be no physical obstacles (such as steps) obstructing the passage of a wheelchair from the parking spaces for persons of reduced mobility to the lift lobby. The doors between the indoor car park and the lift lobby must be motorised and must be wide enough to allow a wheelchair to be manoeuvred easily.

Parking spaces for persons of reduced mobility must conform to Section B.III.9 – point 2.4 - Reserved parking spaces.

A parking area must be provided for motorcycles, with appropriate markings on the ground.

4.2 Facilitating access for cyclists

Buildings must be directly accessible to bicycles from the public thoroughfare, via either the access road for motor vehicles or a dedicated non-slip cycle path.

4.2.1 Car park barriers

Barriers must allow cyclists to pass without needing to be raised; this requires a 1.40 m wide clearance on the roadway. Failing this, or if the access mechanism used does not allow free passage to cyclists, they must be able to activate the barrier opening, if necessary under the supervision of a security guard. Detectors set in the road surface must be regulated to react to the passage of a cyclist and cover the entire width of the roadway (see also Section B.IV.4.1).

4.2.2 Access ramps

In buildings with an alternating one-way access ramp, cyclists must be able to activate the mechanism for changing the lights.

4.2.3 Number spaces for bicycles*

In buildings with fewer than 250 occupants, the car park must have at least 20 bicycle spaces for every 100 occupants or a number of spaces meeting the identified demand. In large buildings, the number of spaces will be determined by experience.

Ideally, buildings which frequently host meetings and training activities should have an additional five bicycle spaces for every 100 places available in conference and training rooms.

4.2.4 Location of bicycle spaces

Sheltered parking spaces for bicycles should ideally be located as close as possible to the surveillance post, on the ground floor or the first underground deck, near the pedestrian exits. They must be well lit, physically separated (for example by posts or a secure partition) from spaces for cars, mopeds and motorbikes and from areas used for other purposes (such as technical equipment and depots) to prevent misuse by others.

4.2.5 Equipment of bicycle spaces

Parking spaces for bicycles must be equipped with bicycle stands fixed to the ground. These stands must be fitted with anti-theft devices and repeated use should not distort bicycle wheels. They must be suitable for all types of bicycle. The height of the storage slots must vary and there must be at least 150 cm between two slots.

Access to the bicycle stands must be wide enough to allow easy access without obstruction from the other parked bicycles (around 100 cm).

4.2.6 Bicycle parking spaces for visitors

Ideally, spaces equipped for bicycles should be provided near the entrance to the building in a place which does not obstruct pedestrians.

The number of spaces will vary according to the size and use of the building. They must be covered.

5. PREMISES FOR USE BY DOCUMENTATION SERVICES

5.1 Local archives

Commission buildings must contain areas designed for the local storage of archived documents and publications. These areas should generally be situated in windowless parts of the building or where there is little natural light.

Each area designated for use as archives must first be assessed in light of the permissible floor loading, and that figure must be visibly indicated on the access doors to the area in question.

Floor coverings in archive areas: see Section B.I.5, point 6.

All archives must be equipped with fire-detection installations (see Section B.II.8) and fire fighting apparatus (see Section B.III.2).

5.2 Libraries

Where service requirements so dictate, certain areas within Commission buildings are to be designated for use as libraries.

Libraries must comprise the following areas:

- a reception area,
- a documentary research area,
- a reading room,
- archives.

Apart from the areas used as archives, all areas of the library must receive natural light.

Each area designated for use as a library must be assessed in advance in light of the permissible floor loading, and that figure must be visibly indicated on the access doors to the area in question.

Floor coverings in archive areas: see Section B.I.5, point 6.

All archives must be equipped with fire-detection installations (see Section B.II.8) and fire fighting apparatus (see Section B.III.2).

6. PREMISES DESIGNATED FOR USE BY REPROGRAPHICS SERVICES

6.1 Reprographics centres

Where service requirements so dictate, certain areas within Commission buildings are to be designated for use as reprographics centres.

Such areas must meet the following requirements:

- easy access by road and good parking facilities for transport vehicles,
- facilities for delivering, stocking and handling large quantities of paper,
- floor coverings: see Section B.I.5.6,
- fire-detection installations (see Section B.II.8) and fire fighting apparatus (see Section B.III.2)
- adequate ventilation for solvents and other products, with ad hoc signage,
- own facilities for treating toxic waste (solvents),
- high degree of ventilation and natural light,
- soundproofing of areas where machinery operates,
- dissipation of the heat produced by photocopiers.

6.2 Local print shops

Decentralised reprographics centres (print shops) are generally areas designated to accommodate a high-volume photocopier (light press).

Such print shops must have the following characteristics:

- parking and access from the street entrance of the building for supplies (paper, cardboard, consumables, etc.),
- enough space to allow for reprographics work to be performed around the machine without difficulty and for the shelving needed to store reproduced documents (approx. 30 m² per machine),
- space for storage of paper and consumables (enough to avoid high weight concentrations) (approx. 15 m² per machine),
- the access door to the storage space must be high and wide enough for fork-lift trucks to pass through,
- office space for staff (separated by a glazed partition) (approx. 10 m² per operator).

The floor covering in print shops must be especially hard-wearing (see Section B.I.5, point 6).

Local print shops must have opening windows.

Fire-detection installations (see Section B.II.8) and fire fighting apparatus (see Section B.III.2).

Special attention should be paid to the soundproofing and air conditioning of these premises. Every possible measure must be taken to limit any noise nuisance caused by the operation of the machines and to ensure a stable temperature and optimal relative humidity in the print shop.

7. PREMISES DESIGNATED FOR USE BY VARIOUS SERVICES

7.1 Premises for maintenance services

A number of areas in each building must be made available to the maintenance services.

These areas may be categorised as follows:

Premises for cleaning services:

- area for storage of cleaning products (detergents, acids, etc.), with ad hoc signage,
- area for storage of paper products (toilet paper, paper towels, etc.),
- area for wastepaper bins,
- area for organic-waste bins (kitchen waste),

- washing-machine room: equipped with electricity plugs and appropriate water supply and drainage.

Premises for technical maintenance services:

- plant areas (ventilation system, refrigeration system, electrical generator, etc.),
- area for storage of maintenance equipment.

Premises for maintenance staff*:

- changing rooms,
- canteens.

All these areas must be equipped with fire-detection installations (see Section B.II.8), and their floor coverings must be hard-wearing and acid-resistant (see Section B.I.5, point 6).

None of these areas may have direct access to any part of the building designated for use as office accommodation or for similar purposes (foyer, vestibule of office area).

All storage areas and waste-collection areas must have a suitable access door to the indoor car park or inner courtyard.

Areas for collecting and sorting refuse (dustbin area)*:

Buildings must have an area for the collection of refuse. Ideally, this area should be on the ground floor and must meet all health and safety requirements.

The area will be used to collect and store different types of waste and prepare them for removal. As such, it is the heart of the waste sorting system. The area must have its own loading bay or access to the building's general loading bay, if necessary by means of a hoist capable of carrying skips.

The area must be sufficiently spacious to accommodate skips for various types of waste (paper, recyclable paper, cardboard, organic waste (see Section B.I.6, point 9), solid objects, liquids, plastic, food packaging, general waste, etc., as stipulated in the increasingly differentiated collection contracts) and, where appropriate, equipment for compressing and bundling waste. The dimensions of the area will depend on the size of the building and the frequency of collection.

The area must have an impervious floor and skirting board, a water tap connection, a drain and a sprinkler system (see Section B.III.2, point 3.2). Natural static or mechanical ventilation is required.

The area must be equipped with a fire detector (see Section B.II.8).

7.2 Mail sorting office

Mail sorting offices are areas for sorting the mail delivered to the building.

These offices must be situated near a lift lobby and equipped with furnishing specially designed for the sorting of mail. The offices must be large enough to allow the incoming mail

to be sorted easily and must at all events have space for the storage of at least four mail trolleys. Fitted carpet is not permitted in these rooms.

Special care must be paid to the quality of the lighting, both natural and artificial, in these rooms and at work stations.

The door to the mail sorting office must be covered with a material resistant to accidental knocks resulting from heavy traffic of mail trolleys. The door must be lockable.

All the walls must be protected up to a height of 100 cm from bumps from trolleys.

If circumstances permit, the sorting office should be served by a hoist specially designed for the movement of mail to each floor of the building (chain conveyor).

7.3 Kitchenettes

There should be kitchenettes on each floor, the number being determined by the floor area of the offices. All equipment must be easily accessible to persons of reduced mobility.

The kitchenettes must be equipped with at least:

- a sink with a mixer tap,
- an electric water-heater: see Section B.II.4, point 3.8,
- a refrigerator;
- a microwave oven,
- a cupboard for storing crockery,
- a cupboard for use as a food pantry,
- a cupboard for storing cleaning materials,
- a work surface,
- a fire detector, with a fire-alarm button close by (see Section B.II.8),
- a fire extinguisher placed close by,
- electricity sockets: see Section B.II.3, point 3.12.

The wall coatings must be washable (see Section B.I.5.7).

The floor covering must be lino (see Section B.I.5.6).

The door must be fitted with an overhead closer with a magnetic device connected to the fire detection system (See Section B.1.5, point 4.5).

8. FIRST-AID POSTS

All buildings must have a first-aid post located near the building entrance. It must be accessible and easy to find, both for ambulance staff and building occupants. The door must be at least one metre wide to allow stretchers to pass through comfortably. Adequate signs must be displayed.

The floor and wall coverings must be suitable for washing with water and thorough disinfecting.

First-aid posts must be equipped with a sink with a hot water supply (in line with the LOI/CODE/RGPT) and medical-type furnishings.

The soundproofing in first-aid posts must be superior to that of offices.

See also Section B.III.8, point 8 - health and safety in first-aid posts.

9. PREMISES DESIGNATED FOR USE BY CATERING SERVICES

Where buildings contain premises designated for use by catering services, these premises must comply with the following conditions.

9.1 General Provisions

9.1.1 Legislation

- 1) The provisions, regulations and standards in force in Belgium apply and will constitute the minimum acceptable level.**
- 2) European directives should be complied with (those provisions which have been incorporated into Belgian law automatically apply under point 1 above).**
- 3) In the absence of a directly applicable directive, regulation or standard, the directive, regulation or standard deemed to be the most advanced in the relevant field, if in force in one or more other Member States, is to be taken as the reference basis.

9.1.2 Kitchen plan

The plan must meet the following conditions:

- The layout must permit a clear separation of ‘clean’ and ‘dirty’ areas and facilitate the passage of products through a continuous sequence of operations (step-by-step system).
- ‘Dirty’ area means premises or locations which could be at the origin of serious contamination (e.g. vegetable cleaning area, sink block/dishwashing area, waste-disposal area, etc.), while ‘clean’ area means premises where meals are put together and ready-to-serve hot and cold dishes are prepared (e.g. cold meals, cooking area, etc.).
- The ‘dirty’ and ‘clean’ areas must be strictly separated, with no intersection of the ‘dirty’ and ‘clean’ lines.

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- Food deliveries, staff movements, the location of changing-rooms, entrances and exits for food and people must be examined with a view to meeting these conditions.
- Stairs leading to the various production areas must be covered in an antiskid coating and be equipped with a hand-rail.
- Kitchens and cafeterias must be equipped with meters to measure separately electricity, hot water, cold water and the energy required for the production of hot water

9.1.3 Different areas

Areas should be identified by means of a rigid, washable pictogram (storage areas, cloakrooms, office, production area, laundry area, dustbin area, etc.)

9.1.3.1 Goods deliveries

The different areas must be clearly identified by a fixed, washable pictogram (food stores – changing rooms – pantry – production area – dishwashing area – waste disposal area – etc.)

A practicable unloading area must be available for delivery vehicles.

Raw materials intended for the preparation of meals must be delivered to the unloading bay, which must be separate from the bay used to collect waste (refuse containers) etc. wherever possible.

Scales must be provided to check quantities on delivery.

Where necessary, vertical transport must be by two separate goods lifts clearly identified ‘dirty’ and ‘clean’, with separate controls, serving the kitchen only.

These must be fitted with wall protection against collisions by trolleys, and with an easy-to-clean stainless-steel floor with a seamless antiskid coating (dry and wet) (see also Section B.II.5).

9.1.3.2 Unpacking area

An unpacking area must be provided on this level so that the outer packaging (boxes etc.) can be removed as soon as the goods arrive in the kitchen.

This area must be equipped with the following:

- hot and cold tap
- washer with an automatic rewind mechanism
- insect killer
- knee-activated hand basin with hot and cold water, a liquid soap dispenser and a towel dispenser
- crushed ice machine.

9.1.3.3 Storage area

The distance between the unloading bay and the stores must be as short as possible with easy access for transporting goods by trolley (note in particular the height of the access corridors: ± 2.50 m).

The different types of storage area must be equipped with shelves ensuring that no item is placed directly on the floor.

– Food store

The food store is a storage area for non-perishable foodstuffs which must be located near the delivery bay or close to the kitchen.

If it is located at a distance from the kitchen or on a different floor, a ‘daily food store’ for non-perishable foodstuffs must also be provided near the kitchen.

– Non-food store

An area must be provided to this end to store cleaning products and other products which might contaminate food.

– Cold rooms:

All cold rooms must have impermeable walls.

A cold room for ‘raw’ products must be provided (where possible in front of the entrance to the kitchen).

‘Clean’ raw materials needed by catering services (in vacuum-packed bags, goods unwrapped from their packaging, etc.) must be stored in positive and negative temperature cold rooms.

A cold room for processed foodstuffs (where possible communicating directly with the kitchen).

A freezer room with a refrigerated lobby must be provided.

The refrigerating set must have a refrigerating temperature capacity of $+1^{\circ}\text{C}$ to 4°C .

Each refrigerated room must be served by an individual refrigerating installation. **Current regulations on refrigerant gas must be respected.**

These must be permanently monitored by sensors triggering an alarm if the maximum or minimum permitted temperatures are exceeded. The alarm must be automatically transmitted to the control centre and the maintenance technicians for immediate action (see B.II.1 – Building management systems).

Shelving units must be mounted on castors to allow thorough cleaning (provided that there is sufficient storage space and it is easy to move them).

No floor gullies are to be placed in cold rooms to avoid any reflux of air from the mains drainage system.

9.1.3.4 Tin-opening area

This area must be located just outside the entrance to the kitchen and must be equipped with:

- a washer with an automatic rewind mechanism,
- an insect killer,
- a knee-activated hand basin with hot and cold water, a liquid soap dispenser and a towel dispenser.
- A work-table with a built-in sink compliant with GN (Gastro Norm) dimensions, with hot and cold water and a tin opener must be provided.

9.1.3.5 Kitchen

An office with windows must provide a view of the entire kitchen.

The kitchen must be separated into two separate areas:

- cooking area: see Chapter B.II.2, point 4.2 (Interior conditions)
- cold meal area: max. 14°C

It must have insulated doors, if possible swing doors which are completely transparent or equipped with a porthole.

It must be equipped with a mains-operated digital clock/thermometer which is large enough to regulate the room temperature easily.

Cooling must be calculated on the basis of area, taking into account staff movements to and from the cooking area.

For the comfort of the staff, the cold air flow must be distributed through a fabric air duct.

9.1.3.6 Dining room

The restaurant or canteen layout must allow meals to be served in an efficient and hygienic manner.

The return flow of dirty crockery from the restaurant must not pass through the area in which meals are served to consumers or cross the line behind which meals are prepared.

This is to ensure that there is no cross-contamination between dirty crockery and meals being served.

Exits and emergency exits must be wide enough to allow all the occupants to be evacuated.

The decoration and design of the dining room must create a convivial, comfortable atmosphere with the use of elements other than the furniture.

This can be achieved, for instance, by:

- creating separate areas with movable partitions, or opaque glass screens with lighting, or by creating areas in different colours,
- using other decorative elements such as flower vases, decorative pictures, coat stands, pictograms, etc...

9.1.3.7 Dishwashing area

Wherever possible, access to the dishwashing area must be at the end of the dining room, through a double door entry system to prevent the noise affecting customers.

The dishwashing area must be properly ventilated and take account of the heat emitted by the dishwasher.

A waste disposal area must be located at the entrance to each dishwashing area. The waste collected from clearing the trays must be emptied into the bin-bag holder.

If the waste has to be disposed of by production area, to avoid any crossover between the 'clean' and 'dirty' areas:

- waste from the dishwashing area and from the kitchen must be stored in a refrigerated cabinet before being disposed of at the end of the shift in 200 litre covered mobile containers,

or:

- waste must be crushed and broken in the dishwashing areas by waste pulpers (crushers). The remains must be thrown into suitable containers and transported in liquid to the waste-disposal area where they must be separated from the liquids and then disposed of. The system must allow the flush water to be recirculated and treated so as to limit water consumption.

The waste disposal chute must be equipped with a magnetic separator, to prevent the flushing away and loss of cutlery and protect the waste pulper. Cutlery must therefore be made from magnetic material (17/8 stainless steel, for instance).

The dishwashing area must be equipped with a conveyor or automatic feed dishwasher for crockery and cutlery.

Dishwashing areas must also be equipped with hood dishwashers for glasses, and with a sink unit with two sinks of +/- 130 l for cleaning large items from the kitchen and self-service restaurant.

A sink block for washing cooking equipment must either be an integral part of the dishwashing area or be located near the kitchen.

These sink blocks must be equipped with a sink unit with two sinks of +/- 130 l each, a clearing table and storage shelves on castors with shelving which allow water through for thorough cleaning. Where possible a stainless steel rack must be provided for the storage of cutting boards.

Sufficient numbers of hermetically-sealed electric sockets must be provided (separate electrical circuit) to plug in plate warmers on which plates can be placed as soon as they are

removed from the dishwasher, in order to resupply the free-flow area with warm plates during dining periods.

9.1.3.8 Refuse areas

Waste and food scraps must be stored in tightly-closing refuse containers placed in a separate area, far enough away from the storage facilities and the kitchens, with direct access to the dishwashing area, and near the public road.

110-litre stainless steel bins must be placed in the food preparation areas for all food preparation waste.

At the end of the dining period, these bins must be emptied into containers in the refuse area on the loading bay.

The areas in which these municipal refuse containers are stored must be kept at a low temperature (+/- 15°C) to prevent smells and the proliferation of bacteria. The area must be depressurised and refrigerated: on temperature, see Section B.II.2, point 3.2. - Occupation density, on ventilation, see Section B.II.2, point 3.7 - Fresh air flow rate. Ensure good ventilation and effective protection against insects and rodents. The area must be designed for easy cleaning and disinfection (a floor gully and a washer with an automatic rewind mechanism must also be provided in this area).

The transport and storage of waste must be designed to avoid any contamination of foodstuffs or drinking water.

9.1.3.9 Linen

An area must be provided for linen (storage cupboard and shelving).

9.1.3.10 Sanitary installations, changing rooms and showers

See Section B.II.4. - Plumbing

Toilets should never have a door or window communicating directly with the kitchens.

A changing-room and shower area must be provided for staff in accordance with the LOI/CODE/RGPT (for example, +/- 25 persons for a canteen serving 1 000 meals).

Separate male/female changing rooms located near the kitchen must be provided for the staff of self-service restaurants and cafeterias. They must be equipped with hand basins with hot and cold running water (plus a shower in the case of the self-service restaurants). Staff may not go into the changing rooms via the garages or another 'dirty' area'. Direct contamination from such routes must be avoided.

The walls and ceilings must be washable.

A storage container must be provided for dirty linen awaiting collection.

The changing rooms and showers must be ventilated and heated. Personal and work clothing must be strictly separated and stored in separate, well-ventilated lockers.

Wall panels must be constructed in hard, waterproof material to avoid damage by leaks (showers, etc.).

9.1.4 Finishings

These requirements apply to all areas in which foodstuffs are prepared and stored.

Finishings must allow simple and efficient physical and hygienic maintenance (hard-wearing materials with smooth surfaces, without any narrow angles or recesses).

9.1.4.1 Floors

Floors must slope enough for rinsing and cleaning water to flow easily towards the drains, either directly or via open channels (kitchen floors must incline at least 1%). However, any reverse slopes towards the doors of lifts (electrical circuits) and cold rooms must be avoided at all costs, to prevent water from penetrating and stagnating.

A water-resistant sheet must be placed under the screed in all damp areas.

Floors must be made of a material that does not absorb humidity, is easy to clean and has an antiskid surface (dry and wet). Floor coverings must preferably be seamless.

Kitchens and dishwashing areas: tiles, epoxy or, preferably, poured methyl methacrylate.

If tiled, the space between and below the tiles must be well filled to avoid creating breeding grounds for insect pests (cockroaches etc.). Particular attention must be paid to the type of tile joints chosen and how they are implemented: they must be impermeable, completely smooth and easy to clean (e.g. methyl methacrylate).

9.1.4.2 Floor junction with walls

Corners between walls and floors must be rounded (sanitary skirting board – linking methyl methacrylate flooring with tiled wall coverings: rounded methyl methacrylate skirting rising to around +/- 15 cm) to allow easy cleaning.

9.1.4.3 Drainage:

Drains should be of the type with companion flange. There must be a thicker methyl methacrylate filling around gutters.

This channel must be at least 2 cm wide and deep.

9.1.4.4 Walls

Walls must be finished in materials that can be easily cleaned and do not contain areas which may accumulate dirt or harbour insect pests.

- Walls must be smooth and impermeable.
- Walls in the cafeteria production and serving area (bar – pantry – dishwashing area – etc.) must be tiled.

- Walls must preferably be light-coloured to show any dirt clearly (if tiled, the space between and below the tiles must be well filled to avoid creating breeding grounds for insect pests such as cockroaches, etc).

Particular attention must be paid to the type of tile joints chosen and how they are implemented: they must be impermeable, completely smooth and easy to clean (e.g. methyl methacrylate).

The dividing walls between premises must be constructed in masonry. Protection against collisions by trolleys must be installed: horizontal protection by means of synthetic strips 20 cm and 90 cm above the floor and vertical protection in the corners.

9.1.4.5 Wall fittings

Waste pipes and water pipes must be embedded in the wall. If fixed onto the wall, the distance between such fittings and the wall must be large enough to permit cleaning of the wall behind them.

9.1.4.6 Doors and windows

Door and window design and installation must avoid any influx of polluted air or penetration by insects without creating maintenance difficulties or hindering cleaning of the premises they serve.

If windows can be opened, they must be fitted with fly screens which can easily be removed for cleaning purposes.

Spring-loaded swing doors (non-latching, with a porthole and protection against collisions by trolleys and from floor cleaning by a stainless-steel plate at the bottom of the door 90 cm above ground level) must be used.

9.1.4.7 Ceilings

Ceilings must be designed to prevent condensation and the accumulation of dirt. They must be easy to clean. The angle between the wall and the ceiling must be slightly rounded to allow cleaning without any hindrance.

9.1.4.8 Ventilation

The work areas must be adequately ventilated in order to avoid excess heat, steam, condensation and dust, and to clear polluted air. The air flow must never be directed from a dirty area towards a clean area.

The artificial ventilation system must meet the following conditions:

- the aerator must be fitted with a grill or some other form of protection in a corrosion-resistant material,
- the filters and other parts of the installation must be easily accessible for maintenance and cleaning purposes.

An extractor fan above the cooking appliances must effectively remove steam and greasy vapours. No condensation or fat must fall back onto the hob.

9.1.4.9 Lighting

Good lighting throughout the working area is extremely important. Lighting must meet the following requirements:

- Direct natural or artificial lighting which does not throw shadows on the worktops.
- See the requirements set out in B.II.3, point 2.2 - Lighting levels.
- All light fittings must be protected to avoid any contamination of foodstuff in the event of the glass breaking.

9.1.5 General provisions relating to equipment

9.1.5.1 Large-scale equipment

- Equipment must be made of a material that is easy to clean and to disinfect, and is corrosion-resistant.
- The design, construction and installation of large-scale equipment must allow simple and thorough cleaning and disinfection: separate parts must be easy to dismantle, there must be no sharp or inaccessible corners or edges, etc.
- Equipment in kitchens and cafeterias must be hermetically sealed by a fixed plinth (rustproof with a silicon sealant) at the bottom of the kitchen units, or mounted on a bracket with rounded corners (or wall-hung).
- Gas appliances are prohibited and must be replaced by electric.

9.1.5.2 Sundry items

Sundry items must be:

- Made of a hard-wearing material which is resistant to corrosion (rustproof), non-toxic and easy to clean and to disinfect.
- No aluminium (not corrosion-resistant) or wood (grains),
- Smooth and hard surface without bumps, splits or tears.
- Easy to wash by machine,
- No shaped handles in which food scraps can become incrustated.

9.1.5.3 Worktops

- As for equipment in production and distribution areas, worktops must be made entirely of AISI 304 standard stainless steel (18/10 – thickness of vertical parts: 10/10ths – thickness of horizontal parts 12/10ths (structure, supports etc.)).
- Worktops must be fixed to the wall to prevent dirt from becoming lodged behind them, and must be hermetically sealed at the base of the unit with a stainless-steel plate and a silicon sealant, or be wall-hung.

9.1.5.4 Storage cupboard for maintenance equipment

A separate area or cupboard must be provided for cleaning and disinfection products and cleaning materials away from the kitchens and food storage areas. A rack must be provided to store brooms, brushes, etc.

9.1.5.5 Refrigerator

There must be enough refrigerators to allow separate storage of products (separation of raw and prepared products).

All refrigerators must be made of and housed in AISI 304 standard stainless steel.

All refrigerators must be equipped with a digital display thermometer. The sensor must be placed in the hottest part of the casing.

9.1.5.6 Freezer

Purchased frozen products must be stored either in freezer rooms, or in upright freezers with a freezing temperature of -18°C minimum.

9.1.5.7 Hand hygiene

Kitchens must be provided with one or more hand basins which are not used as kitchen sinks. The conditions required for good hand hygiene must be met, i.e.:

- hot and cold running water of drinking quality,
- liquid soap in a soap dispenser and a disinfectant where necessary,
- throw-away hand towels (large-fibre paper),
- a well-sealed pedal bin,
- taps which are not touched by hand (e.g. knee/shoulder/electronic sensor-operated taps, etc.).

9.1.5.8 Safety of kitchen equipment

It must be possible to cut the electrical circuit for kitchen equipment (apart from refrigerated materials) manually, using a key in emergencies.

Flat or mushroom emergency stop switches must be installed on all kitchen equipment.

9.2 Self-service restaurant

9.2.1 Description of function

All employees of the Commission should in principle have a communal catering facility nearby (within 500 metres).

The numbers to be catered for must be calculated on the basis of two sittings, assuming that one-third of those who work in the vicinity of a canteen must dine there.

Consequently, the standard seating capacity of a canteen must be based on one-sixth of the population of the building in which it is located and surrounding Commission buildings within a radius of about 500 metres.

If the buildings in question house a conference centre, the capacity must be reviewed and adjusted upwards.

The standard Commission canteen is organised on a self-service basis, with a free-flow area, a dining room and a kitchen with cooking, dishwashing and storage areas located on the same floor (preferably the ground floor) as far as possible.

The standard surface unit for a dining room is 2 m² per seat.

9.2.2 Area required

The average area for a canteen serving 1 000 meals must be approximately:

- cooking and cold meal area: 280 m²
- free-flow area: 340 m²
- dining room: 1000 m²
- dishwashing area: 100 m²
- dry store: 80 m²
- non-food store: 100 m² (= divided into 5 rooms)
- cold storage above 0°C: 70 m² (= 4 cold rooms)
- cold storage below 0°C: 10 m² (= 1 cold room)
- postmix drinks store: 4 m²
- **toilets, changing rooms and showers (for staff, separate from that for clients): in conformity with the LOI/CODE/RGPT.** There must be at least one toilet per 25 male employees and at least one per 15 female employees who are present at work simultaneously. There must be at least one urinal per 15 male employees, subject to the same conditions. Urinals may be replaced by toilets.
- Refuse areas 20 m²

9.2.3 Free flow area

The free-flow area must be organised so as to allow the flow of customers to move through as smoothly as possible, avoiding bottlenecks (at the grills, hot-meals counters and cash desks).

The counters must be arranged so that customers can serve themselves in a logical order and have a clear and immediate overview of the dishes available.

There must be at least two cash desks, separate from the service counters and with a common waiting area. Overall there must be at least one cash desk for every 200 to 300 customers.

Access to the free-flow area must be organised to regulate the influx of customers as well as possible (zigzag barrier or equivalent). The access must end with a refrigerated display case showing the dishes available in the free-flow area and with the distribution area for trays.

The equipment required is listed in Section D.II. – Catering services. The dining room must be laid out so as to create a convivial atmosphere, in terms of décor, soundproofing, etc. It must be equipped with tables for four and tables for two (+/- 120 x 80 cm and +/- 80 x 80 cm respectively).

It must also contain dispensing points for water, sauces and condiments, equipped with microwave ovens; there must be two to six such points depending on the size and capacity of the canteen (one per 200 seats).

Crockery must be cleared by a conveyor belt taking trays directly to the dishwashing area; it must be spacious enough to avoid bottlenecks.

9.2.4 Kitchen equipment

The kitchen is generally equipped with the material described in Section D.II. – Catering services. Small appliances, shelving, trolleys, mixers, scales, weighing machines, scales and other easily moved equipment (excluding mobile tables, vacuum-packing machines and other basic equipment) are not considered as fixtures. Only power sources required for their use should be provided.

9.2.5 Trolleys

The various types of trolleys used in the kitchen are described in Section D.II. – Catering services.

9.2.6 Dishwashing area

The dishwashing area must be equipped as described in Section D.II. – Catering services.

9.3 Restaurant with table service

If the plans include a restaurant with table service, a specific programme will be communicated.

9.4 Cafeteria

9.4.1 Description of function

Its purpose is to serve hot and cold drinks, sandwiches, cakes and pastries.

The cafeteria in the proper sense of the term must be spacious and equipped with seats calculated on the basis of the number of occupants of the building and of the nearby buildings if they do not already have a cafeteria.

9.4.2 Area (for 100 seats)

- | | |
|---------------|--------------------|
| – dining room | 200 m ² |
| – counter | 25 m ² |

- pantry 25 m²
- dishwashing area 20 m²
- storeroom 25 m²
- changing room 20 m²
- **toilet and changing room for 4 persons (staff only, separate from that for clients), in conformity with the LOI/CODE/RGPT.**

9.4.3 Counter

The counter must be equipped as described in Section D.II. – Catering services.

There should be no raised floor behind the counter, so as to withstand the heat generated by the equipment and facilitate the circulation of trolleys.

An area must be provided near the counter in which to place an ice-cream cabinet and a refrigerated drinks cabinet.

9.4.4 Pantry

The pantry must be equipped as described in Section D.II. – Catering services.

There must be an area nearby or in the counter to prepare coffee for meetings (shelf for coffee machine, water supply and waste water drain, electric socket, trolley space, thermos), three 230V sockets and a three-phase reserve socket on the front and rear counter.

9.4.5 Dishwashing area

The dishwashing area must be equipped as described in Section D.II. – Catering services.

9.4.6 Storeroom

The storeroom must be equipped as described in Section D.II. – Catering services.

9.4.7 Dining room

The dining room must be equipped as follows:

- wall clock
- wall-mounted coat rack (+/- 20 coat hooks).

The decoration and design of the dining room must create a convivial atmosphere. Special care must be taken to limit noise to a comfortable level.

9.5 Snack bar

9.5.1 Description of function

The cafeteria in the proper sense of the term must be more spacious and equipped with seats calculated on the basis of the number of occupants of the building and of the nearby buildings if they do not already have a cafeteria.

It must also be equipped with a “hot pantry” and a “cold pantry”.

9.5.2 Area (for 100 seats)

- dining room: 200 m²
- counter: 25 m²
- pantry: 25 m²
- dishwashing area: 20 m²
- storeroom: 25 m²
- changing room: 20 m²
- **toilet, changing room and shower for 4 persons (staff only, separate from that for clients), in conformity with the LOI/CODE/RGPT.**

9.5.3 Counter

The counter must be equipped as described in Section D.II. – Catering services.

There should be no raised floor behind the counter, so as to withstand the heat generated by the equipment and facilitate the circulation of trolleys.

Likewise, the section of the ceiling above the counter must not be lowered by a structure housing the lighting system.

An area must be provided near the counter in which to place an ice-cream cabinet and a refrigerated drinks cabinet.

9.5.4 Pantries

9.5.4.1 Cold pantry

The cold pantry must be equipped as described in Section D.II. – Catering services.

There must be an area nearby or in the counter to prepare coffee for meetings (shelf for coffee machine, water supply and waste water drain, electric socket, trolley space, thermos), three 230V sockets and a three-phase reserve socket on the front and rear counter.

9.5.4.2 Warm pantry

The warm pantry must be equipped as described in Section D.II. – Catering services.

9.5.5 Dishwashing area

The dishwashing area must be equipped as described in Section D.II. – Catering services.

9.5.6 Storeroom

The storeroom must be equipped as described in Section D.II. – Catering services.

9.5.7 Dining room

The dining room must be equipped as follows:

- wall clock
- wall-mounted coat rack (+/- 20 coat hooks).

The decoration and design of the dining room must create a convivial atmosphere. Special care must be taken to limit noise to a comfortable level.

9.6 Coffee-Shop

9.6.1 Description of function

The purpose of the coffee shop is to serve hot and cold drinks. These facilities are normally small in area and typically offer standing room only; they are usually situated at the exit of large canteens (i.e. those serving more than 800 meals).

9.6.2 Area (for 100 seats)

- dining room: 200 m²
- counter: 25 m²
- pantry: 25 m²
- dishwashing area: 20 m²
- storeroom: 25 m²
- changing room: 20 m²
- **toilet and changing room for 4 persons (staff only, separate from that for clients), in conformity with the LOI/CODE/RGPT.**

9.6.3 Counter

The counter must be equipped as described in Section D.II. – Catering services.

There should be no raised floor behind the counter, so as to withstand the heat generated by the equipment and facilitate the circulation of trolleys.

Likewise, the section of the ceiling above the counter must not be lowered by a structure housing the lighting system.

An area must be provided near the counter in which to place an ice-cream cabinet and a refrigerated drinks cabinet.

9.6.4 Pantries

The pantry must be equipped as described in Section D.II. – Catering services.

There must be an area nearby or in the counter to prepare coffee for meetings (shelf for coffee machine, water supply and waste water drain, electric socket, trolley space, thermos), three 230V sockets and a three-phase reserve socket on the front and rear counter.

9.6.5 Dishwashing area

The dishwashing area must be equipped as described in Section D.II. – Catering services.

9.6.6 Storeroom

The storeroom must be equipped as described in Section D.II. – Catering services.

9.6.7 Dining room

The dining room must be equipped as follows:

- wall clock
- wall-mounted coat rack (+/- 20 coat hooks)

The decoration and design of the dining room must create a convivial atmosphere. Special care must be taken to limit noise to a comfortable level.

9.7 Vending machines

Each building must be equipped with automatic vending machines, located in an easily accessible position on a main passageway. They should not impede evacuation routes or get in the way of the building occupants.

The vending machines must be positioned in groups of three, viz.:

- one cold-drinks dispenser,
- one hot-drinks dispenser,
- one snack dispenser.

The machines must be installed by a company under contract to the Commission.

Provision must be made for water and power supplies and for a network connection point.

The floor covering up to 2 m in front of the machine must be lino or tiles.

10. PREMISES FOR SOCIAL SERVICES

10.1 Creches and after-school child-minding centres

See Section C - Creches and after-school child-minding centres

10.2 Social and leisure centres

If service requirements so dictate, certain areas within Commission buildings may be assigned for use as social centres and/or leisure centres.

The use of these centres will be highly diversified; they may be used as:

- music rooms,
- dance studios,
- religious meeting places,
- billiard rooms,
- recreation rooms.

These premises can sometimes have a kitchenette (see Section B.I.6, point 7.3 - Kitchenettes), toilets and showers.

These centres must be provided with particularly hard-wearing floor and wall coverings (see Section B.I.5, point 6 – Floor coverings).

11. PREMISES FOR PUBLIC SERVICES

Premises designated for public services must conform to the following descriptions.

11.1 Reception/information office (“info shops”)

Reception offices and the information offices are an interface for all those who need to contact the Commission or who require information.

These premises should be right next to the outside of the building to make them as accessible as possible to the public. They must therefore meet the same criteria as premises open to the general public.

Access to these premises must be separate from the controlled access to the building.

The telephone and computer wiring for these premises must be adequate for heavy demand (see Section B.II.6 – Telecommunications).

Special attention should be paid to signposting and to the layout of the reception desks.

11.2 Exhibition rooms

Exhibition rooms are designed to accommodate a large number of people from outside.

The furniture and exhibits must be arranged to receive large influxes of visitors.

The floor and wall coverings in exhibition rooms must be highly resistant to wear and tear (see Section B.I.5, point 6 – Floor coverings).

The electrical lighting in these rooms must be flexible and powerful enough to do justice to the exhibited works. Lamps within reach of visitors must be of low voltage.

When exhibition rooms are planned, particular attention must be paid to access for people with reduced mobility.

11.3 Newspaper kiosks

Newspaper kiosks are premises inside the building designed for the sale of newspapers.

Because the material permanently stored in these kiosks is inflammable, extra fire detection and fire fighting appliances should be installed in their vicinity (see Section B.II.8 – Fire detection).

Since newspaper kiosks are commercial premises, a trading licence for them must be obtained from the competent authorities.

11.4 Automatic cash dispensers

Depending on the size of the building, automatic cash dispensers may be installed. They must be sited in such a way that the queue from the machine does not impede the passage of other building occupants.

* Condition with which all new fitted-out buildings must comply, unless otherwise stipulated.

B.II. BUILDING SYSTEMS

B.II.1. BUILDING MANAGEMENT SYSTEMS

1. GENERAL INFORMATION

All the buildings occupied by Commission departments in Brussels are equipped with one of the following Building Management Systems (BMS): *Johnson Controls, Honeywell, Sauter or Siemens*. Systems installed in new or renovated buildings should ideally be of one of the above types.

The BMS work stations are located at a central Commission building.*

Communication with the BMS is via the Commission's Ethernet TCP/IP network.

2. SYSTEM ARCHITECTURE AND TRANSMISSION

The Building Management Systems operates with four-level architecture:

- Level 1 : Sensors, servomotors, indicator, etc.
- Level 2: Local processing units (LPUs): see Section B.II.1, point 4.
- Level 3: Management systems (MS): see below.
- Level 4: Building Management Systems (BMS): see Section B.II.1, point 5.

The building management systems make it possible to share and use information coming from different subsystems called management systems.

The Commission decides which MSs to set up (lifts, fire detection, water and sanitation, lighting, louvres, etc.). It must also decide what information will be taken over from the MSs, and in what form, by one of the Commission's BMS systems.

It should be noted that levels 2 and 3 and levels 3 and 4 can be merged into one level. The HVAC (heating, ventilation, air-conditioning) management system can also act as a BMS. Wherever possible, the information points of the other technical controls should be linked directly to the LPUs of the HVAC MS, so as to keep the number of MSs to a minimum.

Levels 1 to 3 must operate inside each building following communication protocols to be determined in the light of the various systems selected.

The LPUs will be linked to the control and calculation unit by a bus cable, so that if an LPU fails it will be bypassed and the rest of the network can continue to operate normally.

3. SENSORS AND BASIC OPERATION OF THE EQUIPMENT

3.1 Servomotors

Servomotors must be either on/off or modulating, and either electric or electronic.

Modulating servomotors are controlled proportionately either to the pilot signal received or to an incremental signal.

All servomotors for taps and registers must be operable manually, without dismantling, via an override, from the corresponding command module.

The servomotors fitted to the intake registers of air-conditioning units must be fitted with return springs. Registers should be closed by their return springs only in the event of a power failure. This system may not be used for automatic operating.

The control system must meet requirements in terms of speed of response, precision, stability and power.

Servomotors for fire dampers must be equipped with a return spring to ensure that they revert automatically to the safety position in the event of a power failure.

3.2 Sensors

Sensors immersed in fluid must be placed where the values to be measured are homogeneous. The dimensions (length, surface area, etc.) of the sensitive elements must be adjusted accordingly. Ducts and pipes must be gradually widened if necessary to allow sensors to be placed without reducing the notional cross-sectional area through which the fluid passes, and they must achieve the depth of penetration dictated by the type of equipment concerned. Sensors installed in rooms must be in quiet, well-ventilated positions as far away as possible from heat sources, mounted on an inside wall or pillar about 1.2 to 1.7 metres above ground level.

Sensors may be active or passive. Active sensors must have an amplifier which can emit a signal of 0-1 Volt DC, 0-10 Volts DC, 4-20 mA or 0-20 mA, the strength of the signal being proportionate to the measurement recorded by the sensor.

3.2.1 Temperature sensors

- either platinum or nickel, 100 or 1000 ohms at 0°C, linear variation,

or

- with a nominal resistance of 500 ohms or else NTC or PTC type, 20 000 ohm resistance, or any other system based on resistance variation, provided that it is stable and constant over time.

3.2.2 Humidity sensors

Wafer containing lithium chloride or a capacitive sensor the capacitance of which varies in accordance with the relative humidity of the ambient air.

3.2.3 Pressure and differential-pressure sensors

Aneroid capsule, the expansion or contraction of which is converted into a reading on a potentiometer, or measurement by strain gauge or of the flow of fluid in a known restricted space.

3.2.4 Pressure-difference sensors

Two steel and aneroid-capsule pressure chambers, the expansion or contraction of which is converted into a reading on a potentiometer, or a tube containing permanently heated variable-resistance coils, the extremities of the tube being linked to the pressure ports.

3.2.5 Air-quality sensors

These detectors must be mounted in the air-intake ducts and can be based on either of the following measurement principles:

- the CO₂, SO₂ or CO content of the air. These detectors must be electrochemical and have a measurement scale ranging from 0 to 2000 ppm;
- the use of a semiconductor sensitive to concentrations of certain pollutant gases in the atmosphere.

3.3 Frost thermostats

These thermostats should be sequential, with a capillary tube of a length corresponding to the size of the unit to be protected. At all events, the entire surface area of the unit must be protected.

The thermostats should be equipped with two controls: a potentiometer to gradually open the adjustable valve of the preheater, and a reversing contact for the mechanism controlling the air-conditioning system.

They should start operating several degrees above the threshold temperature laid down for frost protection. When the temperature of the air emitted by the preheater drops, the potentiometer should start by gradually opening the adjustable valve, overriding the regulator. If the temperature continues to fall until the protection threshold is reached, the reversing contact will swing across and activate the antifreeze process. When a system cuts out normally, the frost thermostat must ensure that the preheater maintains a minimum temperature several degrees above the protection threshold, facilitating reactivation of the installations, especially those operating entirely on an external air intake.

The frost thermostats must be manually resettable.

3.4 Safety thermostats

These thermostats must be manually resettable and able to withstand temperatures of 300°C. The thermostats selected must allow the control point to be set at either 100°C or 200°C. The temperature-regulating button should not be accessible without a special tool; it must be placed inside a case, the lid of which must be screwed to the base, and the screws sealed with varnish. These thermostats are to be calibrated and set in the factory. Thermostats set at 100°C must be distinguished from those set at 200°C by a visible and indelible mark.

3.5 Fan convectors

Fan convectors must be equipped with:

- a temperature gauge located in the used-air intake (in the ambient air in the case of fan convectors located in the false ceiling),
- a potentiometer (change of control point),
- a speed switch (see Section B.II.2, point 5.8),
- two two-way adjustable valves, one for the heating unit and one for the cooling unit. Thermal servomotors are to be avoided.

The temperature gauge transmits its measurements to a control unit consisting of microprocessors with two serial ports controlling the two adjustable valves successively on the basis of the control point and the position of the potentiometer. The potentiometer must allow the control point to be adjusted up or down by 1.5°C.

A master/slave regulator should be installed on each fan convector, with operation in mode P or PI.

However, depending on the technical situation, the two following techniques could also be used:

- either a network based on special connectors, allowing the circuits to be adapted easily (Wieland or similar system),
- or two fan convectors controlled by a single control unit: the first fan convector is controlled by the control unit, the second is selected by means of a system of switches whereby either a given fan convector or the one in the next module can be selected so as to adapt to the different configurations of office partitioning.

All the fan convectors must be controlled via a data bus by one or more terminal control units. The fan-convectors will be activated during optimised working hours and in accordance with the nearest façade.

The window contacts are to be connected to the control unit of the corresponding module: for control if a window is opened, see Section B.II.2, point 5.8 – Frost protection.

If alterations are made to partitions, the control system must be adapted by reprogramming (software) the address of the reference sensor and the window contacts of the office in question. This must not require any hardware adjustments.

3.6 Heating and/or cooling ceilings

A temperature gauge fitted with a potentiometer should be placed in the ambient air. The temperature gauge transmits its measurements to a control unit consisting of microprocessors with two serial ports controlling the adjustable valve(s) successively on the basis of the control point and the position of the potentiometer. The potentiometer must allow the control point to be adjusted up or down by 1.5°C. In the case of cooling ceilings supplemented with radiators or convectors, there must be a dead band between operation as a cooling ceiling and as a radiator.

In the case of heating/cooling ceilings, the control unit should generate an output signal to open the hot or chilled water valves. There should be no changeover. A master/slave regulator

should be installed on each module, with operation in mode P or PI, and one potentiometer and one sensor for each zone. However, depending on the technical situation, both the regulation techniques described in the previous point (fan convectors) could also be installed: Wieland or similar system and control-unit selector switch.

All the control units must be controlled via a data bus by one or more terminal control units. The control units will be activated during optimised working hours and according to façade.

The window contacts are to be connected to the control unit of the corresponding module: for control if a window is opened, see Section B.II.2, point 5.8 – Frost protection.

If alterations are made to partitions, the control system must be adapted by reprogramming (software) the address of the reference sensor and the window contacts of the office in question. No hardware adjustments must be needed for this.

Anti-condensation protection must be included.

The controls, automation and alarms for heating and/or cooling ceilings must be included in the Building Management Systems.

3.7 Production and distribution of hot water

The boilers are activated in response to requests for heat from the system or according to the outside temperature (average reading from the outside sensors) and by an optimised timetable for building occupation.

The temperature of outgoing water is regulated by the outside temperature, with an upper limit for outgoing water and a lower limit for returning water.

The adjustment of the power of the burners and the boiler cascade system with automatic rotation after a preset running time is activated by the temperature gauge in the outgoing water.

If the lead boiler or the pump breaks down, that boiler will be stopped and another automatically activated.

Once the boilers have shut down, the pumps stop only after an adjustable delay.

When heat is required, the isolating butterfly valves of the boilers open and activate the boilers. The circulation of the water in each boiler will be controlled by flow switches.

When boilers are started up, they are first put into preheat mode with closed-loop circulation (no distribution).

Only once the working temperature is reached are the distributors activated (successive activation of distribution circuits, with return temperature monitored by a gauge located in the return of the boiler); the default minimum return temperature must be adjustable.

The heating installations are started up as best suits the needs of the building, by zones (keeping a minimum temperature of 14°C when the building is not occupied) and priority requests when the outside temperature is below 4°C.

If the water in the installation falls below the minimum level, the pressure-sensitive switch is activated and the burners and pumps are stopped. When the flow switch controlling circulation within the boiler is no longer activated, the boiler and the pump are stopped. If the boiler's circulation pump begins to overheat, the boiler is to be stopped. If a gas leak is detected, the entire heating system will be closed down (wiring, pipework and hardware), and a 'gas detection' alarm will be transmitted to the BMS.

The hot-water distribution systems are activated and optimised according to the outside temperature, the average ambient temperature for each side of the building and the grid for the hours during which the building is occupied. The system must also have a self-correcting mechanism taking account of the ambient temperature, the outside temperature and the average of the local control points.

The outgoing temperature in the circuits is regulated by activating the servomotor of the three-way adjustable valve installed at the outlet, triggered by the outside temperature.

3.8 Production and distribution of chilled water

The production of chilled water is activated by the outside temperature (summer/winter mode) and by the timetable for building occupation, optimised for specific periods. A temperature gauge installed in the general cold-water outlet transmits its measurement to a regulator assembly, which compares it to the control point and sets off a chain reaction to activate or deactivate the refrigerating sets.

The start-up sequence will be as follows: evaporator pump 1 of refrigerating set 1, refrigerating set 1 with individual power adjustment, evaporator pump 2 of refrigerating set 2, refrigerating set 2 with individual power adjustment and so on. For shutdown, the sequence is reversed.

The cascading sequence can be changed automatically depending on the operating times, or where the lead installation breaks down.

The refrigerating sets cannot start up all at once, so as to avoid peak loading on start-up (at least 15 minutes between any two refrigerating sets).

If the water in the installation falls below the minimum level, the pressure-sensitive switch is activated and the refrigerating sets and pumps are stopped. When the flow switch controlling circulation in the evaporator of the refrigerating set is no longer activated, the refrigerating set and the pump are stopped.

The circulation of chilled water is activated by the outside temperature of the façade in question, the average ambient temperature for that side of the building and the grid for the hours during which the building is occupied, optimised for specific periods.

An outgoing-temperature gauge transmits its measurement to a regulator assembly, which compares it to the control point and activates the servomotor of the three-way adjustable valve.

3.9 Air-conditioning units

The air-conditioning units must be activated either by timer response (start of working hours) or by optimisation of comfort levels, where the units so permit.

Where the building design allows this, the air conditioning units must be placed in 'free cooling' mode.

When the fan motor is started, the temperature gauge will transmit the measured airflow temperature to a regulator assembly, which will compare it with its fixed control point and act upon the servomotor of the three-way adjustable valve of the reheating battery and upon the circulator. The control point for the 'dew point' is calculated on the basis of the humidity of the returning air and is $13^{\circ}\text{C} \pm 1.5^{\circ}\text{C}$. This measurement is transmitted to a regulator, which then acts on the servomotor of either the reheater set or the cooling set to maintain the calculated control point.

The start-up sequence is as follows: start-up of the regulator, opening of the fresh-air shutter of the blower unit, opening the register of the extractor unit, start-up of the fan motor in the blower unit and start-up of the fan motor in the extractor unit.

When the frost thermostat is in operation, the three-way adjustable valve of the reheater must be wide open, the circulator will remain in operation or will be activated, the motorised fresh-air register will be closed and the fan motor stopped. The frost mechanism can be reset only manually.

During a fire alarm, the extractor and blower units operate in fire-protection mode.

When one of the following safety mechanisms is activated, the units are shut down and an alarm is transmitted:

- overheating protection of the blower or extractor fan,
- lack of outflow or intake pressure on the pressure-sensitive switch,
- fire detected by sensor in the blower unit,
- fire detected by sensor in the extractor unit (in this case the extractor unit will continue to operate, but the blower unit will be stopped).

The fans can only be restarted after manual intervention on the spot.

4. LOCAL DATA ACQUISITION AND PROCESSING UNIT

4.1 Introduction and definitions

The local data acquisition and processing unit (local processing unit, or LPU) is a device which:

- digitally regulates (in modes P, PI or PID),
- controls
- and monitors, the technical installations in the building.

To do this, the unit is linked to a number of elements and appliances in the heating and electrical installations, known as points. In this way, by means of sensors, gauges and preset

signals, it receives the data required to position the control mechanisms (modulated or on/off) and control the operation of burners, pumps, fans, etc.

Regulation can:

- remotely change default settings,
- remotely send the physical measurements taken by regulating and monitoring sensors,
- override the control mechanisms both manually and from the LPUs.

Terminal units (fan convectors, cooling ceilings, etc.) are regulated, monitored and controlled by control units consisting of microprocessors with one or two progressive or on/off ports.

It must be possible to set or programme the control units from one or more terminal-unit control systems via a data bus.

Systems requiring each control unit to be set or programmed locally, or locally adjusted after commissioning, are unacceptable.

Local processing units consist of a microprocessor and operate autonomously; i.e. the regulatory operations, commands and control measures are digital and require no intervention by additional control devices independent of the unit. However, certain appliances belonging to the heating installations may also have some internal safeguards and controls independent of the unit, such as the automatic burner controls.

There may be several local processing units within a building (one for each boiler, for example, or one or more for each technical room), so that part of the installations can be controlled separately.

The suppliers themselves may select the option they intend to use, justifying their choice on the basis of technical and financial criteria (balance between cost of cabling and cost of equipment). All other things being equal, the ‘minimum cabling’ solution should always be preferred.

The local processing units should be designed to be integrated into a BMS system and extended to cover all building systems. To that end, all the local processing units in a building must be connected to a MS or directly to a BMS.

The local processing units will be programmed in their own language. However, it must also be possible to programme them and upload to them from the MS or BMS system.

Definitions:

- A point is a variable which is unequivocally linked to a particular physical element with a value that is either requested or controlled by the local processing unit.
- An input point is a point with a value that is requested or accessed by the local processing unit.
- An output point is a point with a value that is controlled (governed) or transmitted by the local processing unit.

- A digital point is a point which can assume two or more discrete values.
- An analog point is a point with a value which can fluctuate continuously between two limits.

4.2 Composition

- Smart unit: this unit comprises the power supply, the microprocessor and its memory.
- Power supply: 230V or 24V via a transformer (+10-15%), 50 Hz (+/- 3%). No-break power supply (see point 9 below).
- The microprocessor performs all calculations and commands and governs operation of the memories, interface modules, communications and the control mechanism. The storage capacity [EPROM(EEPROM)/RAM] must be sufficient to guarantee the processing of all the data to be managed rapidly enough to attain the required performance. It must be possible to connect the microprocessor to a professional personal computer (PC) without any subsequent alteration. The type and performance criteria of this PC are to be specified according to the project. A communication interface with the MS and/or BMS system must be an integral part of the system.
- The memory will consist of an electrically erasable programmable read-only memory (EEPROM) and a random access memory (RAM). These will store all the programmes, parameters and other data needed by the local processing unit for the performance of its functions. It must also be possible to load and save the contents of the local processing unit memory on disk, diskette or tape.
- The LPU's inputs and outputs are either on the unit itself or effected with the aid of interface modules. Interface modules convert the information arriving from the measurement entry points into appropriate digital format and the information intended for the exit points into an appropriate format. They also provide electrical insulation between the local processing units and the installations. The input-output modules must be equipped with control and override switches, LED displays and a potentiometer for regulating analogue output signals. Any override operation carried out on these modules must be communicated to the MS and/or BMS system.
- A digital input point may take the form of a no-voltage contact (open or closed), electrical voltage (present or absent), a physical value or a mechanical status. A point with more than two status indicators represents more than one input. In this case it is the software which enables these different inputs to be interpreted as if they represented a single point. If the measurement signal from a point consists of pulses (from a counting device, for instance), that point will also be regarded as a digital input point.
- A digital output point may be static (a contact must be open or closed) or dynamic (one contact (pulse) must be closed to engage and another closed to disengage). Like digital input points, digital output points may also have more than two positions.
- Analog input points are not available as directly usable electrical signals but as measurable physical or mechanical values. These values are converted by the sensors into measurable terms. The module includes relays and an analog-to-digital converter to convert the analog signal of each input into a digital code. Local processing units

do not comprise converters of non-electrical values into values which are electrical or electrically measurable and vice versa (e.g. sensors, thermostats, servomotors, etc.).

- Analog output points: digital/analog converters are used for each output. The type of output depends on the application; if necessary, additional converters or amplifiers can be integrated into the local processing unit. If a local processing unit fails, it can be overridden and maintained in its last position or programmed position.

4.3 Program

4.3.1 Programming

For programming purposes, a number of instructions are available, such as logical and arithmetical operators, conditional and menu functions, save and retrieve, etc. Commands and programming are done at the level of the local processing unit. Programs are input directly into the local processing units either by means of a laptop which can directly be connected to the unit or through the MS and/or BMS system. However, it must also be possible to download programs remotely from any point in the data bus linking the local processing units.

4.3.2 Override

Each point can be overridden (blocked) by the operator, and this blocks the exchange between the local processing unit and the installations it serves. This means that the programs concerned will take account not of the actual measured value or a value calculated by the microprocessor but rather of a value imposed by the operator. Blocking is done by a simple command, with no need to change any parameters or default values.

Any blocking actions needing specific programming are defined in the application programs; however, it must be possible to easily block any point at a later stage without altering the installed equipment and connections. Every blocked point must be clearly identified, both locally and remotely via a terminal or the MS and/or BMS system. The blocking options must be selective and related to the level of access to the system.

5. BUILDING MANAGEMENT SYSTEMS (BMS)

5.1 Description

The Building Management Systems (BMS) centrally monitors and controls each building's installations. Each command must be duplicated by an override switch placed on or near the equipment so that it can also run autonomously in local mode. The information collected in the MS and/or BMS loop is collected via the LPUs.

More specifically, the purpose of technical control is to facilitate the management of these installations to allow the Commission's technical services and the maintenance companies:

- to check at any time the operational status of the technical installations (comfort levels, alarms, consumption, temperatures, etc.),
- to control the technical installations so as to reduce energy consumption, and
- to make maintenance easier.

To that end, all the LPUs in each building or complex are connected to the MS and/or BMS system and provide information, *inter alia*, on:

- actual measured values,
- settings,
- outside temperature,
- position of control mechanisms,
- occupation of the building,
- the mode currently in operation,
- the program running,
- the statistical values of the system,
- maximum, average and minimum values for the entire installation and for each set of units,
- ambient temperatures, with minimum values, for each set of units and for the entire installation.

5.2 Control and calculation unit

The control and calculation unit can be configured in different ways, depending on the main characteristics of the system adopted (size of memory, back-up possibilities, disk access time, processor, keyboard used, mouse provided) to guarantee the capabilities and performance levels described below. These performance levels are to be upgraded as necessary in the light of the requirements and size of the installations.

The control and calculation unit:

- makes calculations,
- directs the operation of the memories and appliances as well as exchanging data with the local processing units,
- supervises the heating and air-conditioning appliances and other building systems in the HVAC technical lots,
- makes it possible to simultaneously perform the administrative tasks required for complete control of the installations. To that end, software features such as spreadsheets, word processing, databases, etc., must be installed. These software features must be capable of directly accessing system information (history, trends, etc.) without needing to convert data. It can generate displays showing the general arrangement of the installations as well as synoptic tables and flow charts.

All information stored in the system must be accessible from these flow charts, for surveillance of points in installations, monitoring of occurrences and controlling and altering the operation of appliances.

All user inputs must be based on simple, user-friendly operating principles, i.e. selection menus activated by function keys or a mouse.

The graphic menus must have various access levels and permit hierarchical access to information.

Operators must be able to select updated values and edit modifiable values such commands, default settings, etc., by moving a mouse or cursor over a visually displayed model, provided their level of access to the system so permits.

In the event of an alarm message, the images will appear automatically, and up to ten images will be put on hold in chronological order. This function is freely programmable and applicable at the discretion of the operator.

Each display must enable the user to view at least 40 updated values, representing the status values of the installations (alarms, measurements, commands, etc.) in the form of text and figures, symbols, etc.

They must show a description and the status of each point. All technical equipment (burners, pumps, fans, etc.) must be represented in different colours depending on whether these appliances are on, off or operating on override. The main colours are green (normal operation), red (alarm mode) and yellow (discrepancy and/or local override).

All the displays showing the hydraulic, ventilation and electrical installations controlled by the system must be available.

When a point is responding to an override command issued by the local processing unit or the MS and/or BMS system, this must be clearly shown in the representation of the point in the screen image or images in which it appears (specific text message, change of colour, etc.).

The system must permit several application programs and functions to operate simultaneously (for example, a task cannot be interrupted because a printout is being delivered), new versions of software to be installed without modifying the specific data of the project, and software to be reinstalled on new generations of control and calculation units in the range of proposed machines.

5.3 Addressing

Each point has an associated user address comprising a string of alphanumerical characters identifying the physical location and function of the point (the structure of these addresses must correspond to the Commission's existing address structures), a technical address identifying the position of the point in the network of local processing units, so as to locate the element responsible for any defect (this address must be independent of the user address), and a short description of the point.

A list of all addresses must be available at the operator's request. In addition to the points themselves, 'software points' can also be given addresses in the same way; software points are variables which are produced, appear or are defined in programs, such as logical combinations of digital points, arithmetical combinations of analog points, results of calculation programs, etc.

5.4 Programming

The full library of user programs must be contained in the MS and/or BMS system, which must be programmed in clear language. The programming may be graphic.

The chosen language must have enough instructions to be able to create new programs.

All user programs, except those on ROM, are to be stored in the control and calculation unit.

To control the system, the operator must have access to standard functions using menus to help non-specialists to operate the system.

It must also be possible for experienced users to enter direct commands to carry out certain functions and retrieve data with a minimum of keystrokes or using a mouse.

All the commands available in the connected local processing units must be obtainable from the MS and/or BMS system. It must be possible to retrieve data from, or send commands to, several local processing units by means of a single instruction by using selective addressing.

Each local command from a local processing unit must be signalled to the operator of the MS and/or BMS system; the data stored in the MS and/or BMS system must be updated accordingly.

All the data needed to adapt the system (MS, BMS and local processing units) to the installation concerned must be stored in the control and calculation unit. A simple command must suffice to copy them onto a CD, backup diskette or magnetic tape.

The program must specify the day, month and year; no other method (such as serial numbering of the days and/or weeks of the year) is permissible. The switch from summer time to winter time and vice versa must be programmed.

5.5 Basic programs

The programs are intended for general use of the system and as a means of informing operators of the state of the installations controlled by the system.

– Notices:

Notices are programmed messages which appear when there is a change in a digital or analog value. The variable concerned may be an input or output point, or any other variable occurring in the programs, such as exceedance of a particular limit in an analog value.

The notice must show: the time at which the change occurred, the address of the point concerned, the new status of the point, and a programmed message (description).

It must be possible to consult notices without acknowledging them. However, under no circumstances should it be possible to delete them before an acknowledgement has been sent. Notices will also be printed, but printing may not interrupt any listings being printed by other programs.

Notices will be deleted once the point concerned is blocked and the program controlling the system to which the point belongs has halted the operation of the system to prevent the generation of unnecessary notices while the system is at a standstill. It must also be possible to defer notices by an adjustable period of time (from a few seconds to a few minutes).

– Alarms:

Alarms are similar to notices, but their appearance on the screen must differ: (underlined, flashing, etc.) and they must be accompanied by an audio signal.

Alerts are always linked to the following changes in digital or analog variables:

- whenever any safety or fault signal is received is transmitted to a local processing unit (e.g. messages regarding burner safety, rate control, overheat protection of power units, water-level monitors, etc.).
- whenever the actual operational status of an element (e.g. burner, pump, etc.) does not correspond to the status prescribed by a local processing unit, insofar as the unit possesses information about this actual status (in other words, an independent measuring point must be added to the control point to identify the actual status).
- whenever a critical threshold measurement is exceeded.

– History:

The history is a list of the notices and alarms generated during a predetermined period. This list must be printed at a programmable time, one or more times each day. Operators must be able to print the list on request, specifying particular criteria (periods or types of alarm or notice).

Each list must also indicate the time and date of the printing request. It will be possible to send each list to different printers.

The program must also permit the statistical logging of incidents occurring within a specific period and the detection of the various weaknesses in the installations. It must be possible to take up to 6 000 events into account to compile these statistics.

Operators must be able to request a display or print-out of the status of a number of points. For each point, the list must show the date and time, the address, the status, any additional indications (such as 'blocked', 'alarm', 'limit reached'), and a short description.

The operator must be able to select the points to be included in the list. Each list must be stored in a standardised form so that its data can be processed with standard software packages.

Regular recording of status reports: this program records the status of selected points in the computer memory at programmed times or intervals; it must be possible to retrieve the records subsequently for display on the video screen or print them in the form of a graph or table.

List of points on override: this list shows all points diverging from their default settings and their current status. Operators must be able to display or print the list on request. Lists can concern an entire installation or part of it.

List of addresses: this list shows all the addresses present in the system.

Operators must be able to display or print the list on request. Lists can concern an entire installation or part of it.

List of alarms: this list must show all the points for which alarm messages have been generated, and operators must be able to display or print it on request. Alarms should be capable of division into at least five categories, and it must be possible to request a list for each category. The list will be requested for an entire installation or part of it.

6. POINTS TO BE LINKED*

The following list shows the main points but may be reviewed according to the project.

The three main criteria for linking points to the system are as follows:

- all the points in installations affecting the safety of persons must be linked to the system;
- the points in installations which maintain comfort in buildings must be linked;
- the points needed to operate, use, maintain and protect technical installations and the building in general.

Fire detection

- fire alarm
- evacuation alarm
- central unit malfunction alarm
- central unit override alarm

Gas detection

- gas-detection alarm (threshold 1)
- gas-detection alarm (threshold 2)
- central unit malfunction alarm
- main gas valve status

High-voltage cabinet

- transformer temperature alarm

- alarm for high temperature in the room
- high-voltage circuit-breaker status
- main meter for day-rate and night-rate electricity, quarter-hourly kW loading

General low-voltage distribution board

- low voltage alarm
- general circuit-breaker status
- inverter status
- sectoral distribution boards
- one control switch per sectoral board for lighting
- position of the switch (local or automatic control) and status

Generator set and security lighting

- generator set status
- general alarm
- fuel level
- inverter status
- circuit-breaker status
- override alarm

No-break power supply

- general alarm

Blower and extractor units

- control switch of blower and extractor units
- humidifier control switch
- status of blower and extractor units
- air register status
- humidifier status
- temperature measurement (fresh air, air mixture, dewpoint, airflow, intake, etc.)
- ambient temperature measurement

- humidity of intake measurement
- blower and extractor fire alarms
- regulation of the different units (reheating, cooling, post-heating)
- frost alarm
- overheat alarm for all motors: blower/extractor units, pumps
- override alarm for each control switch
- pumps, fans and electric motors in general:
 - control switch,
 - status
 - local override
 - overheat alarm

Window contacts

- status

Terminal unit regulators

- all parameters

Boilers

- control switch
- status
- burner defect alarm
- control switch for outgoing butterfly valve
- low-pressure alarm
- circulators: see pumps
- outgoing and return temperature measurement
- pressure measurement

Refrigerating units

- control switch
- status

- fault alarm per refrigerator
- control switch for outgoing butterfly valve
- low-pressure alarm
- circulators: see pumps
- outgoing and return temperature measurement
- pressure measurement

Cooling columns

- control switch
- status
- fault alarm per column
- low-pressure alarm
- circulators: see pumps
- outgoing and return temperature measurement

Drainage pump(s)

- general technical alarm
- high water-level alarm
- override alarm
- pump status

Compression pump

- override alarm
- general technical alarm
- pressure measurement
- pump status

Water-softener

- general technical alarm
- water meter
- circulator control switch

- circulator status
- circulator overheat alarm
- circulator override alarm

Sprinklers

- fault alarm
- status (via flow control)

Lifts and platform-lifts

- general alarm for each lift/platform-lift
- push-button alarm in the lift cage/on the platform-lift

Kitchen refrigerators

- low-voltage alarm for the circuit supplying the refrigerators
- temperature in each coldstore and freezer

Meters

- gas
- water
- metering for electricity on the main outputs
- metering of gas and/or water on major consumers

Sensitive areas

See Section B.II.7. – Specialised rooms

General technical installation (cogeneration, etc.)

- status of the installation
- general alarm
- high temperature points

Switchboard (PABX)

- general alarm

7. PROGRAMS

- The energy management program is based on the readings from the various meters and provides the information described below in the form of graphs and tables:
 - climate data,
 - energy consumption,
 - daily, monthly and annual expenditure for working days and public holidays,
 - comparisons of actual consumption with quantities estimated and budgeted for,
 - a monthly schedule of peak power loadings,
 - calculation of the cost of energy consumed per square metre (electricity, gas, fuel oil, etc.),
 - comparisons with similar buildings,
 - integration of fluctuations in energy prices and updating of the envisaged budgets.

Consumption must also be obtained for fixed and variable periods. A program must be included to limit peak consumption, i.e. consumption over a 15-minute period.

- The timer program serves to generate active commands automatically on particular days of the week and at particular times. Operators must be able to define, modify and monitor all commands to be carried out every day, or on certain weekdays. The program should ensure that conditions are comfortable during the fixed work schedule.

It must be possible to programme public holidays and periods of leave into several circuits at the same time.

All data relating to timer programs are to be stored in the relevant local processing units and in the MS and/or BMS system. Whenever data are altered in the MS and/or BMS system, these changes must be automatically transmitted to the local processing units concerned (and vice versa).

- In the case of recording (trend-plotting) to check either the logical status of installations or analog measurements over predetermined periods, there must be a function allowing various parameters to be recorded and plotted on a graph.

To that end, it must be possible to program the divergence between two recordings, the duration of recording, the beginning and the end of the recording, and at least six simultaneous recordings. These recordings can concern any points in the system.

- Regulation on the basis of the outside temperature ensures that the output temperature value is inversely proportional to the input signal representing the outside

temperature. The relation between these two values is linear and adjustable, and can be expressed by a curve joining various programmable coordinates.

It must be possible to program three different curves (for the day setting, the night setting and accelerated compensation); the day curve may be moved to take account of sunlight intensity if the program includes this measurement.

- Optimisation and economy program

This program determines the optimum daily time for starting and stopping the installations in order to achieve or maintain adequate conditions of comfort for a given length of time. Parameters specific to the building must be taken into account when the optimum starting and stopping times are determined. The program must determine these parameters automatically on start-up and adjust them automatically as changes occur. A minimum temperature level must be monitored during non-working hours, and the installations activated if the temperature falls below that level. The following parameters must be taken into consideration: the comfort temperature to be reached or maintained for a given length of time, the outside temperature and the characteristics of the installations to be activated.

Operators must always be able to ascertain the time at which the installations started up and the stopping time scheduled by the program on the basis of the previous day's data.

Besides optimisation by temperature control, the optimisation program must ensure that the heating installations always operate in the mode best suited to requirements. There are four possible modes: normal mode, which applies most of the time during working hours; night mode, outside working hours, safety mode, which prevents climate conditions from exceeding certain thresholds when night mode is in operation; accelerated mode, which establishes the required climate conditions for the start of the working day.

The switch from normal to night mode must take place the shortest possible time before the end of working hours so that the climate conditions in the different rooms are still within adjustable limits when the working day ends. It must be possible to adjust the minimum and maximum intervals between the switch-over and the end of normal working hours.

The switch from night to safety mode takes place if the climate conditions in the premises exceed the adjustable limits. Once conditions return within the limits, the system must revert to night mode.

The switch from night to accelerated mode takes place the shortest possible time before the start of working hours so that the climate conditions in the different building will be within adjustable limits when the working day begins.

It must be possible to adjust the minimum and maximum intervals between the switch-over and the beginning of normal working hours. The switch between accelerated and normal mode takes place as soon as working hours begin or the desired climate conditions are achieved; a combination of these two modes must be possible.

Switches to night and accelerated modes must be timed on the basis of indoor and outside temperatures, the adjustable limits for climate conditions, the thermal characteristics of the building, the installation concerned, the number of heat generators in operation and the results of previous calculations (i.e. self-adjustment).

Data on the optimum starts and stops of the last thirty days must be stored in the computer memory.

- All pumps and circulators controlled by the substation must be run for a few minutes at least once every 24 hours to prevent them from seizing up.

The circulators of mixed circuits must be stopped when the three-way mixer valve is completely closed. For all pumps and circulators controlled in conjunction with other elements (such as burners and three-way taps), provision must be made for an adjustable delay between switch-off and shut-down. The reserve pumps must be automatically activated if the other pumps break down.

Where there are sets of pumps, when one pump stops, operation must be programmed to rotate automatically to the next.

- There must be a program to trigger commands (start/stop, open/close, etc.) on the basis of certain specific parameters such as a change in the status of a signalling point, a major fault, attainment of measurement thresholds (digital, analog, metering) or a change in a parameter of an optimising or regulatory function.
- There must be an alarm delay program to prevent the transmission of alarm messages in response to a transient phenomenon. It must be possible to delay alarms by a variable length of time as necessary (from a few seconds to a few minutes). The program initiated by the alarm signal should be launched only if the alarm message is still being received at the end of the programmed delay.

Operators must be able to enter the length of delay for each point. They must be able to obtain a list of all the points concerned indicating the length of delay assigned to each point.

- There must be an alarm suppression program to automatically suppress fault or excess-value messages during the normal use of an installation. For each alarm message, operators should activate the delay option if the installation restarts or stops when the warning reappears. Operators must be able to obtain a list of all the alarm messages concerned indicating the length of delay assigned to each message.
- There must be a counting program to count and calculate totals and subtotals for the hours of operation of an installation or appliances and compare these figures with preselected values.

Once the number of hours of operation has reached the preselected value, that information must be displayed.

If necessary, other commands may also be carried out when the preselected value is exceeded (such as closing down the installation, using another unit, etc.).

For each point concerned, operators must be able to enter the preselected number of hours of operation. They must be able to obtain a list of all the points concerned indicating the preselected running time for each monitored point. The counting program must be applicable to any appliance fitted with logical control.

- There must be a monitoring program to fix maximum and/or minimum values for all the measurement points connected to the system.

Any reading outside the maximum or minimum thresholds should trigger an alarm message. The message must also show the time at which the alarm occurred and the registered value. Other automatic responses may be triggered in the event of alarms. For each point, operators must be able to enter an upper and/or lower limit. They must be able to print a list of all the points for which a limit is set and the value of the limit(s).

- Nocturnal air renewal is based on one or more measurements of ambient temperature which restart generators on maximum power output with a completely new air intake but without activating the heating, cooling or humidification functions. It can also be done by opening motorised flaps on the façade. Renewal must occur only when the building is unoccupied and when:
 - the ambient temperature exceeds an adjustable limit,
 - the outside temperature is at least 3° lower than the ambient temperature, and
 - the outside temperature is not below an adjustable limit.
- The generator must stop when the ambient temperature falls below an adjustable maximum.

8. COMMUNICATIONS, POWER AND NO-BREAK FAILURE

In the event of a power failure, the MS and/or BMS system must automatically resume functioning without any need for manual intervention.

There must be a restart program to ensure that the system returns to the configuration in effect prior to the power failure, taking account of the timer program.

Delays must be selected between successive switch commands in order to reduce peak loading on start-up. It must not be possible for different units to start up simultaneously.

If a local processing unit loses the content of its memory following a lengthy power cut or as the result of a fault, it must be possible for the memory to be automatically reloaded from the disk memory of the MS and/or BMS system once power is restored.

Each fault in a local processing unit must be signalled immediately to the operator of the MS and/or BMS system.

In the event of a malfunction in the terminal-unit control system or disruption of the data flow in the bus resulting from a power failure or short circuit, the regulator must switch automatically to stand-alone operation within no more than ten minutes.

It must then operate in comfort or economy mode, on the basis of local choice if a selector is fitted, with the regulation parameters in its permanent memory. Its operation should therefore not be interrupted.

In addition, there must be a rechargeable or integrated battery in place to preserve the information stored in the memory, the programs and the operation of the system clock in the event of a power failure.

If the local processing unit fails, the output points must switch to a safety mode.

The MS and/or BMS system must be run on a no-break power supply. Fire and gas detection points and points in sensitive areas should if practically possible be grouped together on the same input modules, so that they can be run on a no-break power supply. The gas alarm points may not be mounted on an electrical switchboard installed in the boiler room itself.

9. AUXILIARY EQUIPMENT AND MISCELLANEOUS PROVISIONS

9.1 Power Supply

The MS and/or BMS system and the local processing units handling critical alarms must be run on the no-break power supply network supplying a voltage of 230V $\pm 10\%$ at 50 Hz $\pm 3\%$.

9.2 Screens

Visual display units (VDUs) must have a diagonal measurement of at least 19 inches.

9.3 Printers

Two printers must be installed in the Commission's technical control department; two more are to be reserved for the maintenance company, each assigned to a specific purpose:

- One printer is for run-of-the-mill printing and serves to publish lists and periodical information bulletins and issue updates on request concerning the key parameters of the system.
- The second printer is to be used for printing alarm messages.

Printers are to be supplied with a paper reserve.

9.4 Climate conditions

The MS and/or BMS system and all these appliances must be able to operate at an ambient temperature of 16° to 32°C and in relative humidity of 40% to 60% without condensation.

9.5 Acoustic conditions

The whole range of installations installed in the premises where the MS and/or BMS system is situated may not attain noise levels above NR 40.

This might mean fitting silencing mechanisms (especially for the printers) in order to observe the noise limit.

9.6 Cables and connections

All data-transmission cables must be protected against possible interference from nearby cables; the route must be as far as possible from sources of interference.

10. ACCESS TO THE SYSTEM

Access to programming facilities and functions must be restricted by the level of priority of each operator and terminal used.

The system must be protected from misuse or operating errors committed by unauthorised persons.

The system must have at least five levels of access, freely programmable so that specific access programs can be created for each installation to be controlled.

The system must be able to identify at least 100 different operators. Each operator must have an access code identifying them and granting them:

- a particular level of access,
- a maximum period of inactivity before being automatically disconnected.

The system must also provide a history of operations and operators (traceability). The list of the operators must be approved by the Commission.

11. EXTENSIONS AND RESERVE

There must be the option to increase the number of inputs and outputs by 25%, by adding either new interface modules (centralised architecture) or new local processing units, to be linked to a communication bus, where one exists.

Under no circumstance may the performance of the network (communication speed) be disturbed by such extensions.

It is not permitted to group several points into one in order to limit the number of physical inputs and outputs in the system, even if the same program is run for each point.

Memory capacity must be determined accordingly, with a reserve capacity of 30% of utilised memory capacity. This reserve may be reduced to 10% if the RAM is expandable.

A reserve of 10% is required for the modules (input - output).

12. TESTS

During acceptance of the equipment, the data network will be present and active within the building but will not yet be connected to the Commission network (SNet)

The tests must therefore be carried out in two phases. The first should take place at the provisional acceptance stage and should include a check of all the local equipment.

Once the building is under the Commission's control and responsibility, the network may be connected to SNet. Communications tests with entities in other buildings can then be carried out.

Prior to provisional acceptance, the following tests are to be conducted:

- check that the measurement points work properly,
- check that the control points work properly; certain statuses are to be manually imposed,
- test of alarms,
- check that the timer programs work properly, for example by entering overrides,
- check the downloading of online programs,
- alter parameters or programs remotely and check that the changes are transmitted to the local processing units,
- check that regulatory programs work properly, to that end, imaginary measurements must be fed in (e.g. external temperature) to check the reactions of the regulatory mechanisms (i.e. the activation of burners, modulating valves, air registers, etc.),
- check that the other programs work correctly,
- check that the system, selective addressing, display of charts and tables, lists, etc. all work correctly,
- test the reaction of the system to power failures or faults such as:
 - disconnection of power supply to the MS and/or BMS system,
 - disconnection and short-circuiting of a data-transmission cable,
 - disconnection of power supply to a local processing unit,
 - total deletion of the memory of a local processing unit (caused, for example, by the disconnection of both the mains power supply and the back-up supply),
- check that these faults are signalled correctly. After repair, check that the entire system automatically resumes operation,
- test reaction times,
- check that the basic and applications programs work properly.

13. TRAINING

Briefing and training are conducted in two stages:

- The first stage involves general training provided by the suppliers on their own premises, using appliances similar to those to be installed. Training should include a theoretical part (knowledge of the appliances and the system) and a practical part.
- The second stage involves specific on-site instruction with the actual appliances and the installation.

A manual must be compiled so that future operators and users can learn about, understand and master the supplied technology, installations and control mechanisms available through the MS and/or BMS.

14. DOCUMENTATION

The following documents must be provided in duplicate:

- a user's manual, covering all the operations normally carried out by the user, such as data retrieval, logging and altering working hours, default commands, alarms, customising, etc.,
- a technical manual, comprising a description of the equipment, the programming and the programs provided,
- a maintenance manual, dealing with the checks to be performed to ensure that the MS and/or BMS system is functioning properly.
- all the 'As built' plans.

B.II.2. HEATING, VENTILATION AND AIR CONDITIONING (HVAC)

1. GENERAL

Installations must be fully compliant with the relevant standards and regulations, in particular:

- the relevant EU directives
- the basic regulations on fire prevention
- the LOI/CODE/RGPT
- General Regulation on Electrical Installations (RGIE)
- Royal Belgian Association of Gas Suppliers (ARGB) standards
- standards NBN S21-200, NBN S21-201, NBN S21-202, NBN S21-203, NBN S21-207, NBN S01-401 and NBN 263
- standards on air flow rates and bacteria in the air
- Hydrobru (IBDE) and Vivaqua regulations
- good practice, and
- particular requirements of the environmental licence.

The installations must be inspected by a SECT.

The HVAC system must be one of the following types:

- Preferred type:

Ceiling-mounted radiant air conditioning - ambient air is cooled or heated by means of convection panels built into the office ceilings, with the air supplemented by an intake of humidified clean air. To save energy, the system in any given room/area must stop automatically when any window is opened there, although a minimum level of frost protection must always be maintained.

- Types tolerated:

- Fan convector air conditioning - the entire range of air-conditioning functions (heating and cooling) is provided by fan convectors, supplemented by an intake of humidified clean air. To save energy, the system in any given room/area must stop automatically when any window is opened there, although a minimum level of frost protection must always be maintained.
- Heating by radiators (convectors)
- Radiant floor air conditioning (not advisable)

- Unacceptable types:

- Individual air-conditioning units
- Induction units

Supplementary electrical heating should be avoided but may be used in guard's booths.

2. TECHNICAL AREAS HOUSING HEATING, VENTILATION AND AIR-CONDITIONING EQUIPMENT

2.1 Boiler room

The boiler must be housed in a separate room, if possible in the roof area, which contains no other equipment.

The legal requirements relating to the fire resistance of the walls and doors of the boiler room are those laid down in Article 52.7 of the RGPT and standard NBN B 61-001. The door to the access bay for the boiler room must be an automatically closing fire door (RF1/2) compliant with standard NBN 713.020. The door should open in the direction of evacuation.

The boiler room should have low level ventilation (external air intake) and high level ventilation (exit of vitiated air), as defined in standard NBN B 61.001.

A fuel gauge is needed to determine the exact fuel consumption of the boilers and to ensure efficient use of energy. One gauge for all the boilers is sufficient.

The boiler must be fitted with an external emergency stop button outside the boiler room but near the entrance.

2.2 Tank room

The room must be ventilated direct from outside. A room housing one or more tanks must be equipped with a fire door with fire resistance of at least half an hour (in accordance with standard NBN 713.020).

The walls, floor and ceiling of the room should have fire resistance of at least one hour (in accordance with standard NBN 713.020).

Only metal tanks or tanks made of reinforced thermosetting material are authorised.

All tanks must have a manhole. The inspection facilities above the manhole must be resistant to oil leaks.

All connections and the openings of tanks must be located above the maximum fill line of the fuel. Single wall tanks must have a lining resistant to oil leaks. If not, the room housing the tank(s) must be fitted out to provide a leak-resistant containment facility.

2.3 Air extractors on the roof

The extractors must be fixed securely to the building structure.

Electric motors and moving parts must be engineered to ensure silent operation. They may be soundproofed.

2.4 Refrigeration equipment room

Refrigeration equipment must be placed in a machine room or on the roof (outside). Use of refrigerating equipment by unauthorised persons must be prevented by keeping it closed or partitioned off or by displaying appropriate signs.

Access doors must open outwards (in the direction of evacuation) and it must also always be possible to open them from the inside.

Any equipment which produces a naked flame or which has hot surfaces (such as boilers, internal combustion piston engines or internal combustion engines, heat generators or air compressors) may not be located in the machine room, unless it is equipment which is only used in exceptional circumstances.

A clearly visible sign bearing at least the following information must be placed on or near the machines:

1. Name and address of the installer or manufacturer
2. Model or series number
3. Year of manufacture or installation
4. ISO number of refrigerant
5. Weight of refrigerant
6. Nominal electrical capacity of the refrigeration equipment in kW

3. BASIS FOR CALCULATION AND COMFORT TARGETS

3.1 External conditions

In Brussels:

- Basic winter outside temperature: -10°C, 90% relative humidity
- Basic summer outside temperature: +30°C, 50% relative humidity
- All seasons: wind speed: 5 m/s

3.2 Interior conditions*

- Humidity: 40-70% relative humidity
- Temperature:
 - Air-conditioned areas - with external temperatures of between -10°C and +27°C, interior temperatures must be between +20°C and +25°C.
 - With external temperatures ($t^{\circ}\text{ext}$) greater than 27°C, interior temperatures ($t^{\circ}\text{int}$) vary according to the external temperature as follows:

$$t^{\circ}\text{int} \leq \frac{1}{2} t^{\circ}\text{ext} + 11.5^{\circ}\text{C}$$

- Ventilated areas: in winter, the minimum temperature must not fall below 14°C.
- Toilets/washrooms and passageways: $\geq 20^{\circ}\text{C}$
- File registries: $\geq 20^{\circ}\text{C}$
- Historical archives: $18^{\circ}\text{C} \leq t^{\circ}\text{int} \leq 20^{\circ}\text{C}$ and $45\% \leq \text{relative humidity} \leq 55\%$
- Storage areas: $\geq 16^{\circ}\text{C}$
- Indoor car parks: $\geq 5^{\circ}\text{C}$
- Atrium, piazza: $\geq 18^{\circ}\text{C}$
- Miscellaneous premises:
 - wastepaper bin areas $\geq 16^{\circ}$
 - kitchen bin areas $\leq 15^{\circ}$
 - Main Distribution Frame (PABX, switches/router, operator infrastructure, cable TV infrastructure, satellite TV reception: see Section B.II.7)
 - computer centre: see Section B.II.7.

For passive buildings, the Commission will determine the comfort conditions to be obtained.

3.3 Occupation density

- Offices:
 - individual office made up of two façade modules or 10 m² minimum.
 - shared office of 8 m² per person (partitioning on a case-by-case basis)
- Meeting rooms: 2.5 m² per person.
- Restaurants: 2 m² per person.
- Interpreting booth: see Section D.I.4
- Cinema: 1.5 m² per person.
- Lobby: 1.5 m² per person.
- Piazza/atrium: subject to study of the particular circumstances.
- Cafeteria: 400-500 people.

3.4 Air supply temperatures

Minimum temperature of air supply:

The inflow of air into the premises must be calculated to ensure that air supply is always between 15°C and 40°C. The difference in temperature between the forced air supply and the ambient temperature may not exceed more than 10°C in the summer.

Particular attention must be given to the temperature requirements of corner areas. If necessary, supplementary hot and cold air must be provided.

3.5 Air speed

Residual air speed must, in normal circumstances, be below 0.25 m/sec. In the habitually occupied parts of an office or a meeting/conference room, residual air speed must be below 0.15 m/sec.

In the particular areas below, residual air speeds may be higher in the habitually occupied parts, up to a maximum of:

- 0.30 m/sec: computer centre, atrium, piazza,
- 0.25 m/sec: lobby, kitchen, print shop, reception, restaurant, cafeteria.

3.6 Acoustic conditions

The acoustic conditions to be observed in the various types of premises are given in B.I.3.

Soundproofing of attic equipment areas in roof spaces must be provided by floating ceilings.

Under no circumstances may the operation of the installations cause a disturbance in the surrounding area.

3.7 Fresh air flow rate

- Offices - 30 m³/h fresh air per person.
- Meeting rooms - 30 m³/h fresh air per person (adjustable flow depending on the CO₂ level as measured by a sensor in the air intake)
- Conference rooms - 30 m³/h fresh air per person (adjustable flow depending on the CO₂ level as measured by a sensor in the air intake).
- Restaurants - 30 m³/h fresh air per person (adjustable flow depending on the CO₂ level as measured by a sensor in the air intake).
- Toilets - 50 m³/h per cubicle (fresh or recirculated air)
- Showers - 50 m³/h per cubicle (fresh or recirculated air).
- Cafeteria - 30 m³/h fresh air per person (adjustable flow depending on the CO₂ level as measured by a sensor in the air intake).
- Lobby - 30 m³/h fresh air per person.
- Indoor car parks - 250 m³/h per vehicle (extracted from offices).
- Kitchen bin area - air renewal rate of four times per hour (new or recirculated air if possible).
- Wastepaper bin area - air renewal rate of twice per hour (new or recirculated air if possible).
- Archives and storerooms - air renewal rate of twice per hour (new or recirculated air).
- Underground storage areas - air renewal rate of once per hour (new or recirculated air).
- Photocopier area - air renewal rate of six times per hour (fresh air).

3.8 Air Quality

- Dust content of terminal units to be less than 0.2 mg/m³
- CO level to be less than 10 mg/m³ in 8 hours
- CO₂ level to be less than 1000 ppm

3.9 Maximum concentrations of bacteria and chemicals

Equipment must be designed to comply with the current regulations.

4. HVAC METHODS FOR SPECIFIC AREAS

4.1 Air-conditioned premises (offices and similar premises)

In permanently occupied premises, the required temperature and air-speed conditions must be achieved in an area defined as the whole surface area of the floor except for a peripheral zone of 0.10 m and up to a usable height of 2.10 m.

The minimum winter temperature to maintain in unoccupied, unlit premises is 14°C. The equipment must be capable of restoring the normal operating temperature in 2 hours.

Facade modules must be alternately fitted with a pre-set (fresh air) air supply vent (Aldes type) and extraction vent (vitiated air) with a slight difference in flow rate in order to pressurise the office.

Special case for double-skinned walls - the air must be extracted from between the 2 faces of the facade.

The pressurised vitiated air must be recycled, preferably via the corridors towards the toilets and washrooms and towards secondary areas, which are maintained at lower pressure. The supply inlets and extraction outlets must be fitted with a flow regulator.

An acoustic insulating sleeve must be placed between each supply or extraction vent and the ventilation system, with the exception of certain specific applications.

The air supply network must be completely ducted, as will the extraction network (including in office areas), except where technically impossible.

The clean air must be heated, humidified or chilled, as required.

4.2 Premises air-conditioned by supply and extraction

Conference and meeting rooms (all fresh air)

Interpreting booths (all fresh air),

Lobbies

Restaurants (no humidification)

Cafeterias (no humidification)

Plenum extraction must not be used for restaurants, to keep unpleasant kitchen odours away from occupants. The operation of the extraction from the kitchen must be permanently subordinated to the restaurant air supply, which must maintain a slightly higher pressure in the restaurant. An extra-thick sealed duct must be provided, not hooked up for extraction from the kitchen.

Kitchens and washing areas (no humidification).

4.3 Premises heated by supply and/or extraction

File registries (with humidification),

Historical archives (with humidification),

Storerooms (no humidification),

Indoor car parks (no humidification),

Attic equipment areas (supply and/or extraction + air heaters)

4.4 Premises ventilated by supply or extraction

Toilets, showers and passageways (corridors, etc.) (air extracted from offices; an alternative solution must be found if these rooms are on the same floor as a car park),

Lift machine rooms: ventilation must comply with current legislation,

Grease extractor (extraction),

High and low-voltage unit,

Photocopier room – extraction fans serving areas where there is recurrent use of solvents must be of the EEx type.

4.5 Self-contained air conditioning

The following areas must be fitted with a self-contained air-conditioning system capable of running 24 hours a day even when the building's air-conditioning systems or hot and cold production facilities are switched off:

- 1) Control centres (see B.II.7)
- 2) Computer rooms (see B.II.7)
- 3) Main Distribution Frame and cable concentration rooms (see B.II.7)
- 4) Reception desk in lobby
- 5) Kitchen bin area (no emergency power supply)

The chilled water circuits must contain two pumps in parallel, one as a back-up, powered by a backed-up electrical circuit.

All buildings' chilled water production systems must be able to provide an emergency supply of chilled water if there is any malfunction of the self-contained air-conditioning system's cold-air function (see B.II.7).

4.6 Static heating

The energy output of radiators must be based on NBN D 13.001.

They must be connected to a two-pipe system.

Heaters must be fitted with thermostatic valves.

5. DESCRIPTION OF EQUIPMENT

Hot water production

The boilers must be high-performance semi-industrial boilers.

5.1.1 Hot water boilers

These must be firetube boilers with a horizontal cylindrical stack closed at the back. The use of refractory must be limited to the minimum necessary. The boilers must be designed to withstand variable water temperatures; water circulation in each boiler must be performed by the boiler circuit circulation pump. The boilers must be mounted on a raised concrete base or acoustic floating slab.

5.1.2 Condensing boilers

Where condensing boilers are supplied, they must be fitted with a built-in condensation heat exchanger enabling floating regulation of the water temperature up to 30°C and efficiency of 104%.

Efficiency must remain above 90% with a return water temperature of 70°C. Even at –10°C the temperature during normal operation must be 70-90°C. The boiler should be fitted with a non-jamming double-body pump.

5.1.3 Steam generator

Where a steam generator is supplied, it must be of the instantaneous vaporisation, “high pressure” type (over 5 bars). It must be equipped with an automatic water-filling system.

Where there is a return of condensates, a vapour relief valve and an automatic blowdown system must be provided.

Steam generators will be supplied with distilled water.

5.1.4 Forced air gas burner / atmospheric burner

All burners must be natural gas burners.

All burners, gas floats and gas fittings must be approved by the Royal Belgian Gas Suppliers' Association (ARGB).

All burners must be modulating burners, and be equipped with a “standby” mode.

5.1.5 Gas circuit

The natural gas supply pipework for the boiler room must be made of steel. The pipes must not have any weld seams and be standard according to NBN A 25-104.

All the weld seams must be X-ray-checked by a SECT.

The entire length of the pipework must be visible and accessible. **It must be painted yellow (RAL1003).**

Meters must be installed to measure gas consumption and, if possible, the energy needed to produce hot water.

5.1.6 Gas detection

A multiple-detector gas-detection station must be provided. See section B.II.12.

5.1.7 Water circuit

Each boiler must be protected by two safety valves, with the outflow visible when an inspection door is opened.

In cogeneration systems, it is highly recommended that exchangers be provided to disconnect the individual circuits.

5.2 Distribution of hot water

Hot water output into the secondary circuits must be limited to 90°C. All pipework must be placed and fixed so as to prevent the transmission of vibrations and noise generation when passing walls. They must be painted and insulated.

5.2.1 Collectors

The collectors must be equipped with automatic bleeder vents, especially at all high points. The bleeder vents must be placed so as to be accessible and be equipped with isolation valves.

Draining valves must be placed at the low points so the circuit can be fully drained.

5.2.2 Fan-convector / radiant ceiling / radiant floor circuits

Circuits must be organised on the basis of one for each façade of the building. Injection circuits are not accepted.

A three-way valve must regulate the outgoing temperature on the basis of the external temperature (maximum outgoing temperature: 60°C).

There must be three modes (slow - normal - fast).

In radiant ceiling or floor circuits using synthetic pipes, exchangers should be provided to disconnect the individual circuits.

5.2.3 Heater circuits for supply units

Each heater set must have a power reserve of approximately 10%. These circuits must include a temperature-regulation mechanism.

5.2.4 Radiator and air heater circuits

A three-way valve must regulate the outgoing temperature on the basis of the external temperature. Injection circuits are not accepted. There must be three modes (slow - normal - fast).

5.2.5 Backup circuit

Space must be provided for a supplementary circuit.

5.2.6 Water filters

These must be flanged (from DN 50 upwards) and have an angled seat PN10 and PN16 (hot and chilled water); body and cover in grey cast iron GG25; stainless steel grills

5.2.7 Non-return valves

The non-return valves must be of the tilt type with a steel disc or equivalent variant. The body and the cover must be in grey cast iron GG25; seats and plate/cone made of stainless steel. Direction of fluid circulation must be indicated.

5.2.8 Emptying valves

The different circuits must be equipped with devices for draining water so they can be completely emptied.

Drainage valves must also be installed at all the low points.

5.2.9 Shut-off valves

Isolation valves must be installed at regular intervals so water can be cut off in the event of a leak.

Valves with a diameter of DN50 or less must be the single-body, spherical-key type.

Valves with a diameter greater than DN50 (PN16) must be the butterfly type and mounted between PN10 or PN16 flanges.

Particular care must be taken to lay down in the plans the precise placement of the shut-off valves in order to facilitate maintenance.

5.2.10 Hydraulic pressure balancing

This must be done separately in vertical and horizontal networks by the use of relief valves. When the network is too big or variations in pressure build up due to the operation of the installation, the use of high-performance temperature exchangers is highly recommended.

5.2.11 Pumps

All the main pumps must be backed up by replacements, controlled automatically in series and of the non-jamming type. Speed variators are highly recommended.

5.2.12 Circulators

Double-body circulators are recommended.

5.2.13 Tap fittings

Valves with rubber washers must be fitted to the entry and exit points of each pump or circulator to allow measurement of the manometric lift.

The tap fittings must be appropriate for the fluid carried, with different materials used for different fluids.

The tap fittings must be PN 16 for heating fluids and chilled water.

They must be of the spherical-key type (stainless-steel head and shaft) for diameters smaller than size DN40. For larger diameters, the taps must be of the butterfly type.

The regulating valves must be of the globe type with sockets for the connection of a differential pressure gauge. They must be equipped with a device for resetting them after closing/opening.

Pressure gauges must be installed and connected to the BMS to detect any leaks.

5.2.14 Hoses

The use of hoses is not accepted. Where they are the only solution technically possible, they are permitted, subject to all the hoses, connections, rotary connectors, joints, etc.. having Benor ATG accreditation issued by UBATC or another independent official construction inspection body.

Neither the twisting nor expansion of the hoses may generate any stress or, noise or movement in the pipework or the installations to which they are connected.

5.3 Production of chilled water

Chilled water for general requirements must be produced by “conventional” production on demand by coil chillers, enabling a high yield and continuous power regulation. The open-type screw compressor must have a progressive output of 10 to 100%.

The following methods are also acceptable:

- direct-combustion absorption machines with gas burners. These should be considered if the energy balance is favourable.
- absorption chillers as part of a trigeneration system. These machines use a water/lithium bromide absorption refrigeration cycle.
- production of glycol water by coil chillers enabling a high yield and continuous power regulation for the ice storage compartments. The compressors must be set to operate where possible during off-peak times (electricity rates). Refrigerating energy must be stored in latent form to reduce storage volume, i.e. as ice formed by the refrigerating effect of the coolant, glycol water, in order to reduce the temperature of the coolant without any risk of freezing. The compressors must be designed to withstand a working pressure of 1000 kPa and be tested at up to 1300 kPa. The ice tanks must be designed and manufactured so as to avoid all possibility of cracking. Minimum lifespan of ten years.

- For buildings for which small amounts of chilled water are produced (less than 50kW), piston or scroll compressors could be installed.
- The number and size of the chillers must be calculated to cover requirements even in the event of machine stoppage. This redundancy factor must be agreed with the Commission.
- The refrigerant must have the lowest possible global warming potential (GWP) to limit global warming through greenhouse gases. CFC and HCFC refrigerants are prohibited.
- High-powered chillers in general and the absorption units in particular must be subject to preliminary approval in the factory by a SECT.
- BMS regulation of the chillers must be subordinate to the chillers' own internal regulation.
- Preference will be given to installations equipped with air condensers.

For computer rooms and similar areas (control centre, PABX, concentration, etc.) - see B.II.7.

5.3.1 Evaporation freezing agents

Cooling towers are towers with a closed circuit equipped with low-noise fans. They must be specially constructed to resist corrosion (Blygold anti-corrosion treatment or similar).

As the objective is to save water in the building, cooling towers must operate in dry mode for as long as possible. The size of the towers must be chosen to allow them to operate in dry mode up to a dry aspirated air temperature of 14°C, at average speed.

Each tower must be fully drainable individually.

There must be easy access to the pipeways, to facilitate cleaning and descaling.

The towers must be equipped with an automatic dispersal system depending on the conductivity of the water, with automatic biocide dosing.

5.3.2 Air pressure expansion systems

The expansion systems must be of the air-pressure type. Compressed air must be produced by one or more motor-driven compressor units, preferably mounted on the tank.

The calculations for the installation must take account of the hot and chilled water temperatures, including when the machine is stopped. Reserve capacity for thermal expansion volume must be built into the system.

The automatic regulation of the compressed air expansion tank must be precise, with fluctuations in pressure limited to 0.2 bar.

5.4 Production of chilled water

5.4.1 Collectors

The collectors must be fitted with automatic bleeder vents, in particular at all high points. The bleeder vents must be placed so as to be accessible and must be equipped with isolation valves.

There must be drain valves at the low points to enable the circuit to be fully emptied.

All the pipework must be placed and fixed so as to prevent the transmission of vibrations and creation of noise through walls. They must be painted and insulated.

All the main production pumps must be lined, controlled automatically in series and be of the non-jamming type. Speed variators must be provided.

Fan-convector/ radiant ceiling / radiant floor circuits: outgoing temperature must be governed by a 3-way valve.

On radiant ceiling or radiant floor circuits using synthetic pipes, exchangers must be provided to disconnect the circuits.

Isolation valves must be installed at regular intervals to enable the water to be cut off in the event of a leak.

Each group of exchangers must have a power reserve of approximately 10%.

Backup circuit: space must be provided for a supplementary circuit.

Installation in computer rooms: see B.II.7.

The cooling-water distribution pipes for the refrigerating units and the absorption unit must be PN16 steel pipes.

5.4.2 Hydraulic equilibrium

Hydraulic equilibrium must be guaranteed separately in the vertical and horizontal networks by the use of relief valves. When the network is too big or variations in equilibrium are caused by operation, the use of high-performance temperature exchangers is highly recommended.

Cold-water valves with a diameter of DN50 or higher must be of the butterfly type.

5.5 Cogeneration/trigeneration

Cogeneration enables electricity to be produced by recovering the thermal energy produced by the drive machine or turbine used in the cogeneration generator.

For large-scale projects, a feasibility study must be performed to assess the practicability of setting up a high-performance cogeneration system. It must show the cost of the investment and energy output and savings for the primary energy source on the basis of expected use under realistic conditions. The output criteria and the calculations must be based on European Parliament and Council Directive 2004/8/EC of 11 February 2004, on the promotion of

cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC. The decision to install a cogeneration system must be taken by the Commission on the basis of the investment cost involved, feasibility and output obtained.

In cogeneration systems, recovered heat is used directly for a building's hot water requirements. Trigeneration systems produce both heat for the building and chilled water via absorption chillers.

When installing cogeneration systems, account must be taken of the noise and vibrations generated by the machinery involved, which will preferably be installed underground.

The system must not transmit any vibrations to the floors or superstructure of the building, so as not to cause any disturbance for the occupants of neighbouring premises.

For the same reason, acoustic insulation must be provided to prevent the transmission of noise to adjacent rooms and neighbouring buildings (see Section B.I.3.).

Electricity generators and cogeneration systems must be housed in separate fire-resistant compartments.

Exhaust gases must not be permitted to enter the air either in the cogeneration area or any other part of the building.

The generators must be fitted with an emergency-stop mechanism that is easily locatable and accessible. In summer, it must be possible to connect the motor-cooling network to the air-cooling system.

5.6 Fireproofing and smoke extraction - fire dampers

The status of all fire dampers and ventilation units must be indicated on the remote fire panel which is relayed to the control centre. Certain units must also be configured to allow manual override.

The fire dampers must be:

- motor-driven (electric motor) in the supply network,
- motor-driven or fuse-controlled in the extraction network,
- lift-type in the pressurising network for escape routes; these valves must be powered by a no-break supply,
- equipped with two limit switches to show their status on the remote fire panel. IP55-type terminal blocks,
- represented individually on the remote fire panel,
- meet the requirements described in Section B.III.1.3,
- numbered in the format “FLOOR/WING/OFFICE NUMBER”. The installer must keep to this numbering format.

Installation of ventilation pipes and ducts through walls: see Section B.III.1.3.

Easy access must be provided to hidden fire dampers.

The smoke-extraction fans must meet the requirements described in Section B.III.6.

5.7 Control and remote control

See Section B.II.1– Building management systems.

5.8 Fan-convectors

Fan-convectors must be compliant with standard NBN D16-001. One-piece units must contain at least the following components in entirely separate sections:

- rail-mounted four-pipe heating/cooling coil,
- watertight, sliding, pivotable G3 filter,
- detachable motor/fan assembly,
- condensate drip pan,
- electric terminal block,
- galvanised sheet steel chassis with internal insulation,
- an inlet/outlet plenum with silencer and connector.

The water coils must be composed of copper tubes with aluminium fins spaced at least 2.5 mm apart.

A fan-convector with four pipes must be installed for every two façade modules. Each coil must be fitted with a motor-driven, two-way valve. Users can switch between automatic and manual modes by adjusting the speed selector.

There must be four manual speeds:

- 0: zero air speed,
- rotation speeds 1, 2 and 3 for each fan.

Users can return to automatic mode by pressing a button.

Each office must be fitted with a potentiometer for changing the set temperature up or down by 1.5°C.

Every night, the regulators must automatically be reset to automatic mode (the selected speed (0) must be cancelled) so the system is set to comfort mode the next day.

The condensation evacuation pipes for the fan-convectors must be made of PVC. The network must be designed to prevent water stagnation and the escape of odours.

The system must be set up to be remote controlled by the BMS, to ensure optimal start-up of the fan-convectors.

The fan-convectors must be set to operate only when all the office windows are closed (window contacts must be fitted). When any window is opened, the fans must stop and the coil valves close (the antifreeze safeguard, however, must remain active).

A dustproof connection control box must be provided.

The soldered end of the coil must be immobilised by a mechanical part to prevent the solder from twisting.

5.9 Radiant ceiling heating/cooling

Each module of this system must comprise one or more ceiling panels in offices and meeting rooms. Each module must have a motor-driven two-way valve connected to each of the branch take-offs. A DC-type master-slave regulator (see chapter B.II.1.) must be fitted for each module, as well as one potentiometer per office to enable users to change the set temperature up or down by 1.5°C; the temperature regulator must have three settings: day, standby and night. Any time a window in the premises is opened, the hot/chilled water supply to the whole section must be automatically cut off. The temperature of the chilled water must be regulated to prevent any risk of condensation on the ceiling. Humidity sensors must be carefully positioned to prevent such condensation forming.

The heating and cooling of each office must be performed by a network of four circulating pipes in the suspended ceiling of the corridor.

A system of free cooling must be included, using either:

- all fresh air and the colder night air,
- or the condensor circuit, bypassing the chillers when they are not in operation.

The electrical equipment for the power supply, control and regulation must be housed in junction boxes placed inside the suspended ceiling.

Supplementary radiators (convectors) must be provided to heat the premises if necessary, fitted with solenoid valves and controlled by the same regulator that controls the ceiling units.

The radiant ceiling heating/cooling system must not comprise a hydraulic changeover distribution system.

5.10 Radiant ceiling cooling with supplementary heating

The above specifications for radiant ceiling systems also apply here. However, premises with this type of air conditioning can be heated by radiators (convectors) fitted with thermostatic valves.

A locking mechanism should be installed to prevent energy waste through simultaneous operation of the heaters and ceiling diffusers.

5.11 Radiators

Supplementary heating using simple (convector) radiators can be installed in ancillary premises. These must be fitted with thermostatic valves.

5.12 Underfloor heating/cooling

One form of radiant floor heating/cooling consists of a latticework of special pipes laid within the screed floor.

Such systems are not advisable.

Under standard DIN53455, the maximum permissible radiant temperature is 25°C, to avoid health problems (phlebitis). The installed system must include safeguards to prevent the water reaching overly high temperatures that could damage the screed floor.

5.13 Ventilation systems

5.13.1 Air-conditioning unit

The air-conditioning units must be modular, with standard components and must be delivered in one piece or in several modules for assembly on site.

The casing must be double-walled panels at least 50 mm thick.

The panels must be assembled using an interlocking system and be completely sealed, with fireproof internal insulation (DIN 4102/Class A1). They must be silenced to a minimum value of RW = 44 dB.

Air-conditioning units must meet all the following criteria:

Characteristic	Classification according to EN1886 Class
Heat conductivity	T3
Heat bridge	TB 3
Air leaks from casing	B
Air leaks from filter	F9
Rigidity of casing	1A

5.13.2 Fans

The fans must operate silently.

They must be centrifugal fans in volute-shaped casing, statically and dynamically balanced according to DIN ISO 1940.

They must have backward-curved vanes.

Preference must be given to a direct drive rather than a belt drive.

The fan and its casing must be assembled so as to produce as little vibration or noise as possible.

A report from an official body, certifying the acoustic power spectrum of each fan, must be provided to the Commission before an order is placed with the constructor.

Each unit must be equipped with a safety switch.

The bottom of the drive unit must be constructed so as to prevent the water from stagnating.

Lighting must be provided inside the casing.

The internal walls of the air ducts must be smooth (no internal insulation).

5.13.3 Humidifier casing

The humidifier casing must be designed to ensure the greatest possible ease of regular maintenance and minimise the concentration of bacteria and pollutants in the water.

The tray must be designed to prevent water stagnation and consequent bacteria development (*Legionella*, etc.). It must be equipped with a tap so it can be completely drained.

The design of the condensate outlets must ensure that contamination of the air conditioned in the units is impossible.

The spray pump (where installed) must be controlled by a humidity sensor in the recovery inlet.

5.13.4 Humidifier

The function of a humidifier is to raise the absolute humidity of the air in the building by increasing its water-vapour content.

The humidification system must be one of the following:

- Types preferred:
 - Individual steam humidifiers (direct injection of steam produced by boiling water in the unit) (power less than 180 kg/h of steam).
 - Central steam humidification (direct injection of steam produced centrally for the whole building).
- Types accepted:
 - Air-washer humidifiers (only for units with air flows over 10 000 m³/h; such systems must always include a droplet separator and ultraviolet capacity for treating the humidifier water). The tank must have an automatic dispersal system which depends on the conductivity of the water.
 - Fixed-nozzle compressed-air cool mist spray humidifiers (only for units with large air flows).
 - Ultrasonic mist spray humidifiers (not advised).
 - Evaporation/mist spray humidifiers (not advised).
- Types not accepted:
 - Rotating nozzle mist spray humidifiers.

- Centrifugal mist spray humidifiers.
- Steam-injection humidifier using steam produced by an evaporation humidifier (e.g. “Amazone” humidifiers).
- Mist injector humidifiers.

The humidifiers must be corrosion-proof and as resistant to clogging as possible. Minimum useful life of ten years.

In crèches, only steam humidifiers are authorised.

5.13.5 Dehumidifiers

Dehumidifiers are not accepted, except in the following cases:

- to regulate relative humidity in the area housing the historical archives. Such systems must be absorption dehumidifiers with an electrically heated air outflow. Refrigerant or absorption dehumidifier systems are not accepted
- to regulate relative humidity in specialised rooms, using cabinet air conditioning (see Section B.II.7)
- to regulate relative humidity in specific areas genuinely in need of such conditioning.

5.13.6 Air filtration for supply units

- F7 synthetic filter compliant with EN779,
- 80-90% opacimetric effectiveness,
- measurement of dirt accumulation by means of pressure difference.

5.13.7 Heat recovery

A system of heat recovery must be installed on the units’ outbound airflow. It must be one of the following systems:

- run-around heat-recovery coils,
- heat-recovery wheels,
- mixture of vitiated and fresh air as a function of the enthalpy, but always in compliance with the prescribed minimum intake of fresh air (this method is not permissible for interpreting booths). However, preference should be given to a method of energy recovery other than recycling air,
- transfer of office air to the indoor car park after heat recovery by one of the abovementioned systems.

5.14 Ventilation ducts

The air ducts must be made of galvanised sheet steel.

The extraction air ducts in the car parks must be capable of extracting smoke at up to 400°C for 120 minutes.

Flexible ducts must be made of corrugated aluminium and be inflammable (category A0 (EN 13501) or A1 (NBN S21-203)). Where used for smoke extraction, they must belong to category A1 (EN 13501) or A0 (NBN S21-203)).

Large ducts must be equipped with man-sized access hatches to enable internal cleaning. Smaller ducts must be equipped with hatches large enough to allow access to cleaning tools. These hatches must be accessible and must be placed at regular intervals so that access to the full length of the duct is possible.

Extractor ducts for the kitchen (extractor hoods) must be made of stainless steel - see also Section B.III.8. point 6.1.4.

5.14.1 Insulation of ducts

To prevent heat loss by conduction, supply ducts must be covered with heat insulation.

Rectangular ducts must be heat-insulated with mineral wool lagging, stuck to reinforced aluminium sheets. These should be 25 mm thick for interior ducts and 50 mm thick for external ducts.

Where ducts pass through internal walls, the space around the ducts must be filled with non-combustible thermal-insulation material to prevent the spread of flames or smoke. Filling gaps in this way must preserve the firebreak characteristics of the wall in question.

Generally, air intakes do not have to be heat insulated. To avoid any risk of condensation, those sections of extraction ducts that pass through areas where the temperature is below 15°C must be covered with heat insulation. Extraction ducts leading from heat recoverers must be insulated, except for in the area receiving the conditioned air.

5.14.2 Vents and grilles

Vents and grilles must be located exactly as indicated on the AutoCad as-built plans.

Apart from supply grilles, all vents must be connected to the ventilation network.

5.14.3 Fresh-air intakes

The fresh-air intakes will preferably be placed in the upper part of the building, sheltered from the dominant winds and any sources of chemical or biological pollution, so as not to draw them into the building (e.g. aerosols emitted by cooling towers, vitiated air from extractor hoods or ducts, exhaust gases, smoke from boilers, etc.).

Fresh-air intakes must be placed as far as possible from any exhaust outlets - at least ten metres.

The vents must not be located close to any vegetation. Like exhaust vents, they must be fitted with grilles to prevent the entry of birds or small animals.

5.15 Chimneys

Chimneys must be double-walled in stainless steel and aluminium sheeting to protect the heat insulating material.

The location and type of chimneys must be based on an assessment of the dominant winds, to prevent waste gases produced by cogeneration, back-up systems and boilers being directed towards the building's ventilation intakes.

5.16 Car park extractors

The amount of variable-speed extractors to be placed in the car parks must be based on the concentration of carbon monoxide. Extractors must be also placed at ground level on the lowest level of the car park to expell any liquified petroleum gas (LPG) (see Section B.III.6.2, B.II.10. and B.II.11.).

5.17 Treatment of water in cooling towers

An automatic biocide injection system must be installed to treat the cooling tower water circuit.

An automatic dispersal system must be installed.

The water supply must be fitted with an automatic system for injecting corrosion and limescale inhibitor and a water meter.

5.18 Production of hot tap water for the kitchen.

Hot water for the kitchen must be produced by a plated exchanger connected to the building's primary hot-water network. If necessary, an electric boiler (made of stainless steel) should also be installed to produce hot water when the circuit is switched off. The boiler must be placed as close as possible to the water points.

To prevent the possible development of bacteria in the storage boilers, the pipework must be fitted with tapping points and valves enabling the installation of a chlorination system, as well as taps for taking water samples.

6. ENVIRONMENTAL ASPECTS OF HVAC

6.1 General

As regards emissions, the building will preferably be equipped with a natural gas heating system. Preference should also be given to local generation of a combination of electrical and heat energy.

The use and storage of fuel must meet the following criteria:

- fuel to have less than 0.05% by weight of sulphur,
- avoid the use of aditives,
- double-walled tanks equipped with a leak sensor must be used.

Additives to HVAC circuits must not contain hydrazine. Instead, products based on sodium sulphite or sodium thiosulfate should be used.

The HVAC refrigeration systems, including kitchen systems, must be of the low energy-consumption type.

Heat-insulating foam produced using CFCs is not acceptable. In new systems or when replacing equipment that uses refrigerating liquids, only liquids without CFCs or HCFCs are acceptable.

When renovating or replacing equipment, waste liquids, pipework, tanks, exchangers etc, must be treated as harmful waste. Contractors are required under the terms of their contracts to follow the appropriate rules for disposing of such material.

6.2 Clean technologies

Solar-powered water heaters:

Hot water systems may be supplemented by the installation of solar-powered water heaters.

Solar-powered water heaters are always installed with a back-up heating system (running on gas, see above).

Other energy sources:

Depending on project needs, alternative energy sources such as geothermics may be evaluated.

7. ENERGY MANAGEMENT

7.1 General

The building and especially its outer walls and HVAC systems must be designed to optimise energy management.

7.2 Energy audit/study

No building may be renovated or constructed without **an energy audit/study first being carried out, in accordance with European Parliament and Council Directive 2010/31/EU on the energy performance of buildings.**

The audit/study must establish the building's heating, cooling and electricity requirements and its energy performance as described in the Directive. The operation of the building will then be governed by the provisions of the Directive.

A comparison must be made of the costs and benefits/disadvantages of various technical solutions liable to meet the building's energy needs. This comparison must include the cost of investment, operation and energy consumption over the useful life of the building (30-years).

7.3 Energy-efficiency criteria

The HVAC systems must be fully compliant with energy-efficiency criteria, i.e. using reduced consumption, energy recovery and combined generation methods.

7.3.1 Control and regulation

Buildings must be equipped with regulating and control devices to ensure maximum energy efficiency through the use of thermostatic valves; temperature adjustment depending on occupancy and external temperature; subdivision of the building's heating and cooling fluid distribution circuits by façade; monitoring of maximum and minimum values; use of circulators with built-in frequency transformers, etc.

7.3.2 Limiting energy consumption

The fluid production and distribution systems must be designed to limit energy consumption as much as possible by employing one or more of the following methods:

- condensing boilers,
- high-performance boilers,
- modulating burners,
- speed variators on the motors of the ventilation units and fluid-transfer pumps,
- energy recovery by air/glycol water heat exchanger,
- energy recovery by heat-recovery wheel,
- free-cooling for cooling towers,
- combined generation of heat and electrical energy (cogeneration),
- combined generation of heat, cold and electrical energy (trigeneration),
- ice storage,
- active double-skinned walls,
- solar-powered water-heaters,
- water/water-water/air-source heat pump.

B.II.3. ELECTRICITY

1. GENERAL

The electrical installations are to comply with the standards and regulations in force, including:

- the relevant European Directives;
- the LOI/CODE/RGPT;
- the Belgian General Regulation on electrical installations;
- the Belgian standards NBN L13-001, NBN L13-006, NBN C18-100, EN 50171, EN 50172-2, EN 1838 (1999) and EN 60598-2-22 (1998);
- the basic regulations on fire prevention;
- the latest best practice;
- the requirements stipulated by the electricity supplier.

The installations are to be approved by a SECT.

2. BASES FOR CALCULATION

2.1 Power estimates

Small applications:

- offices and similar rooms: 30 W/m²
- conference room: 25 W/m²
- entrance hall: 25 W/m²
- interpreter's booth: 25 W/m²
- cafeteria: 5 W/m²
- restaurants: 5 W/m²
- lobbies: 5 W/m²
- toilets and cloakrooms: 5 W/m²
- roadways/walkways (including in car parks and basements): 3 W/m²
- archives/storage rooms: 3 W/m²
- equipment rooms and car parks: 2 W/m²

Power circuits: to be studied

Emergency power supply: to be studied

2.2 Lighting levels*

Lighting levels are to be measured at 0.80 m from the floor:

- offices and similar rooms: minimum 300 lux measured at the workstation, regardless of where it is located in the room.
- meeting rooms: 300 lux
- entrance halls: 300 to 800 lux (with dimmer switch)
- interpreter's booth: see chapter D.I.
- security standby area: 500 lux
- technical management control centre dispatching: 500 lux
- roadways/walkways: 100 lux
- toilets: 250 lux
- restaurants: 400 lux
- kitchens: 500 lux
- technical rooms: 200 lux
- storage rooms: 200 lux
- car parks: 150 lux in passageways and 50 lux above parking spaces. This configuration will preferably be achieved using two circuits
- archives: 150 lux
- exterior: 30 lux

Electricity consumption for lighting is to be reduced as much as possible.

A consumption of 8 W/m² is considered the optimum. If this proves technically impossible, the figure may be increased to 10 W/m² - particularly in special-purpose rooms.

3. DESCRIPTION OF THE EQUIPMENT

3.1 High-voltage substation

Transformers must be sited on the ground floor or on the -1 level, in line with the requirements of the relevant fire department on accessibility.

Only static transformers and high and low voltage equipment (no other equipment or installations) must be located in the transformer rooms. There must be no pipework other than that belonging to the electrical installations. Gas pipes, drainpipes and drains are always prohibited.

Where electricity transformer rooms are located in buildings where no standard or regulation has been established as regards the fire-resistance of walls and doors, the following values apply, without prejudice to stricter requirements which might be put in place by the relevant fire department:

- walls, floors and ceilings must be made of masonry or concrete, with fire resistance of one hour, in accordance with standard NBN 713.020.
- the doors at the entrance to the transformer room which give access to interior corridors must have a fire resistance of half an hour, in accordance with standard NBN 713.020. The doors should open in the direction of evacuation and it must be possible at all times to open them from the inside.

If the NR index inside a transformer room is greater than 70, the operator must soundproof the room in accordance with the requirements of Belgian standard NBN S01-400-1.

These rooms are ventilated by means of independent high and low ventilation mechanisms, to ensure that the temperature does not exceed 30°C. **They must also be resistant to the penetration of liquids to the extent set out in the the Belgian General Regulation on electrical installations with regard to designated areas for electrical equipment.**

The transformers are to be of the dry or oil type and must on no account give off noxious gases. The cells are to be of the armoured, prefabricated type. Provision is to be made for a 20% power reserve.

Space is to be provided for an additional transformer and its ancillary devices. An automatic system is to maintain a power factor of 0.95 (with resistance in series).

The entrance to the room must be large enough for replacement transformers to pass through.

The cabinet must be constructed so that any water entering it would be able to flow away before reaching the level of the electrical equipment.

The point where the distributor feed cables enter the room must be accessible.

3.2 Rooms for stationary batteries

Walls, floors and ceilings must be made of masonry or concrete, with fire resistance of one hour.

The doors which separate the room from the rest of the building must have a fire resistance of at least half an hour. The door must open in the direction of evacuation and must be equipped with an automatic closer device and a panic lock.

Only the equipment required for the proper functioning of accumulator batteries or which are directly dependent on the use of such batteries should be present in these rooms.

Accumulator batteries must be easily accessible.

Exits must be kept free of obstacles and must be indicated by pictograms.

The battery packs must be placed in a containment facility or in a lined room (bowl-shaped). The covering of the floor and walls of the containment facility or lined room must be made of impervious materials that are inert to electrolytes.

The room containing the battery packs cannot be connected to the sewer.

Steps must be taken to ensure that the water level, regardless of the source (including water used to fight fires), remains constantly and automatically below the vital parts of the electrical installation. **The premises must have a degree of protection against the penetration of liquids in accordance with the RGIE requirements relating to 'spaces devoted to electrical services'.**

Rooms containing battery packs must be ventilated continuously and efficiently by means of a ventilation system of low air intake and high air extraction.

3.3 Generator (400 V III+N)

The walls, floors and ceilings of rooms containing emergency generators must be made of masonry or concrete, with fire resistance of one hour.

The only openings allowed are for the purposes of access, ventilation and evacuation of combustion gases.

Doors must have fire resistance of at least half an hour. They must close automatically.

These rooms must have ventilation direct to the outside, by means of pipes with a fire resistance of at least half an hour. In the case of pipes longer than 1.5 m, fire dampers must be provided at pipe level.

Combustion gases must be evacuated directly towards the exterior by means of pipes lined with fire-resistant material offering at least one hour's protection, to ensure that they do not cause a nuisance in the vicinity.

Steps must be taken to ensure that the water level, regardless of the source (including water used to fight fires), remains constantly and automatically below the vital parts of the electrical installation. If the oil tank is located in the same room as the emergency generator, it must have double walls to ensure that it is leak-proof, or if it is single-walled, it must be placed in a leak-proof liner.

The tanks must be equipped with a system to prevent overfilling. The maximum amount which can be stored in the tank is 3000 litres.

The generator must be able to operate independently for at least 24 hours under full load. The main double-walled fuel tank must be correspondingly large. A day tank is to be located close to the generator.

The generator must start automatically within a maximum of 12 seconds in the event of a power cut. Switching from the normal to the emergency power supply is to be effected by means of failsafe power-cut switches.

Once the power cut is over, the installations are to be switched back to the normal power supply gradually.

A board for parallel switching on the network after synchronisation is to enable own-energy production.

In particular, the generator is to power:

- safety lighting;
- the UPS systems;
- the lifts' return to the evacuation floor(s);
- the priority lifts for firefighters and for evacuation;
- stairwell lighting;
- every fourth light in the corridors;
- the smoke evacuation and overpressure systems in the evacuation routes;
- the PA system;
- the emergency monitoring systems (fire detection, alarm, sirens, smoke-detectors, etc.);
- the remote-control system;
- the fire-brigade panel;
- the entrance/exit doors, barriers and flaps;
- the drainage and excess water pressure pumps;
- the kitchen's refrigeration rooms;
- the computer rooms, cable concentration rooms, PABX rooms (computers and air conditioning) and the centralised technical management rooms, including the production and distribution of cool air for these rooms (see chapter B.II.7).

Provision is to be made for a 20% power reserve.

In the case of a gas-powered cogeneration system, the maximum load is to be 80%.

The fuel-tank filling pipe must have a double casing to collect any leaks. The tank is to be fitted with a filling alarm whistle, a pre-alert level and low level indicator, which are to be transmitted and connected to the centralised technical management room.

The generator must be installed so as not to cause vibrations elsewhere in the building.

The battery packs must be placed in electrolyte-resistant containers of sufficient capacity, in accordance with the legislation.

3.4 Lighting appliances

In the offices and meeting rooms, the appliances (fluorescent lamps) are to be:

- recessed;
- of low symmetrical luminance (200 cd/m² at an angle of over 65° in all directions);
- at least 80% efficient.

The fluorescent tubes are to be type TL 5 at 3000 K and a colour reproduction index of 85.

The electronic ballasts are to be equalised in order to guarantee a power factor of at least 0.95 capacitive.

The lighting appliances for the kitchen and the exterior are to have at least IP 55 protection.

Spots are to be fluorescent or similar.

Low-voltage halogen lamps, although generally prohibited, are authorised in some places if architecturally justified.

Lamps are to be fixed to the top slab by chains or by a fall prevention mechanism.

Passageways, lift lobbies, toilets and open areas must be equipped with low energy lighting.

3.5 Emergency lighting

Emergency lighting, which is operated on the emergency power supply, must ensure that the evacuation routes are sufficiently lit and easy to access in the event of a power cut. **Independent emergency lighting that is not connected to the normal power supply and complies with the basic fire regulations and Article 63a of the RGPT** must be provided using one of the following systems:

- autonomous units;
- autonomous units with centralised control which combines the monitoring and maintenance functions (test/load/no load);
- lighting units working from several central redundant sources (with verification and monitoring functions) supplied by battery units.

These units are also to be provided above the exit doors of toilets, meeting rooms, restaurants and cafeterias, and all rooms without windows. The brightness at floor level is to be at least 1 lux (5 lux in dangerous areas). The minimum autonomy is to be 1 hour.

3.6 Neutral connection system

This is to be of type TN. Primary distribution is to be TN-C and secondary distribution TN-S.

3.7 Distribution boards

There must be at least one board per floor. The boards are to be metal with a security key lock(a single key for all the boards).

At least IP55 protection.

A fuse is to be provided for each board.

Lighting controlled by a door switch is to be provided.

All exits are to be fitted with automatic cutouts. Total selectivity is to be ensured.

There are to be no differential cutouts on the socket circuits engaged (except for damp rooms).

The boards are labelled. The appliances on the boards are to be identified with plastic labels with black and white lettering. The labels must be affixed by rustproof metal screws or plastic screws.

A document holder is to be affixed to the inside of the door.

Provision is to be made for a reserve of at least 20% for both power and space. The cables are to come in through the bottom of the cabinet via stuffing boxes of suitable diameter.

3.8 Supply cables

The supply cables are to ensure a 20% power reserve in addition to voltage-loss requirements. Throughout their length, the insulated cables are to be identified by means of etched strips.

In the vertical shafts, distribution is to be by prefabricated conduits. All cables are to have fire-retardant insulation. Exposed cables are to be protected by plain-joint steel or PVC tubes ($\frac{3}{4}$ " minimum).

The type of cables chosen must restrict wave propagation (e.g. frequency control appliance).

3.9 Lightning conductors

The whole building is to be protected by non-radioactive, Faraday-cage type lightning conductors.

All the major metal parts of the roof are to be earthed.

3.10 Earthing

Earthing and equaliser connections:

- one high-voltage earth (5 ohms maximum);
- one protective earth (neutre du transformateur) (5 ohms maximum);
- equaliser connections.

All the various earths are to be connected in order to ensure total equalisation.

The incoming earth cables in the conduits must be accessible.

3.11 Office areas

Each façade module is to have three 230 V wall sockets. A network of at least two separate ducts, conduits are to well-mounted near floor level to ensure 230 V distribution.

In the case of distribution via floor housings, one housing containing 230 V sockets and data sockets should be installed per façade module

These ducts are to be connected to the distribution boards by means of floor circuits with two compartments (370 x 38 mm). Drawing boxes are to be provided at regular intervals and every precaution taken to ensure easy subsequent addition of cables.

The lighting is to be controlled by an absence detector and a double switch (separate operation of the light near the corridor and those near the window). A light sensor should automatically regulate the intensity of the artificial lighting.

In order to minimise lighting work when altering the partitioning, there should be:

- either a network with special plugs so that the circuits can be altered easily (Wieland system or similar) - in which case, provision is to be made for remote control so that the lighting circuits can be managed from a distance;
- or appliances powered via a regulator connected to a communication bus enabling centralised management of each light so that the light near the corridor and that near the window can be controlled separately. If the partitioning is altered, only the allocation of lights to switches will have to be changed – thereby avoiding any re-cabling work.

If provision is made for centralised management of the lighting, the elements of the system are to be:

- Connection module for offices

Modules enabling connection to the bus of terminal or intermediate units (absence detectors, brightness gauge, control housing, etc.); they are also to provide the electricity supply for those same intermediate units and for the lighting appliances concerned. Each input and output is to be individually addressable.

- Absence detectors

The absence sensors are to be sensitive to infrared rays emitted by the temperature of moving bodies. They must not be so sensitive that they trigger power cuts in an office occupied by a seated person doing normal office work.

The sensors are to be recessed into the ceiling panels. The detection angle must be 360°. The detection area is to be a circle measuring at least 5 m in diameter.

The activation delay must be adjustable between 0 and 30 minutes.

The following areas will be fitted with absence detectors: offices, toilets, showers, meeting rooms, stair lobbies.

The office lights must not come on merely because people are passing by in the corridor when doors are open.

- Light sensors

These are also to be recessed into the ceiling panels.

The sensors must comprise a converter and a detector. The converter is sent the present level of brightness by the detector and controls the lighting.

The sensors are to function either in on-off mode (with an upper threshold and a lower threshold), or in continuous-adjustment mode (automatically adjusting the lighting to a pre-set level of brightness).

The brightness adjustment range is to be from 150 to 1 000 lux.

The light sensors could possibly be combined into single multi-sensor appliances with the absence detectors.

- Control boxes

These are to be wall-mounted and not removable without special tools. It must be possible to call up each function (on, off, dimmer) and each light setting simply by pressing a button.

- Communication bus

Control computer:

- Control is to be from a computer running Microsoft Windows or similar. A modem link is to enable remote action using passwords. The system is to be as user-friendly as possible.
- Changes to the allocation of the various inputs and outputs are to be made via a graphic interface enabling softwiring.
- The programming is to enable several groupings of lights and therefore various control scenarios: individually by office, by floor, by operational unit, etc.
- The master-slave principle is to provide the option of keeping the lighting on when the building is actually occupied (link between occupation of an office and related common areas: corridors, toilets, lift hallways, etc.).
- It must be possible to use the absence detectors in a manner which avoids unwanted triggering of the lighting.
- The maximum and minimum brightness levels must be freely programmable, with independent settings for office areas near the window and near the corridor.

- The system must accept importation of AutoCad files as the working basis for light positioning.
- The system must enable the absence detectors to be used as anti-intrusion devices during freely-programmable time segments (e.g. outside office hours). For this, the access control system should be provided with contacts or a software link made between the two.

Spares for all the system's components must be guaranteed for at least 10 years.

3.12 Other rooms

The corridors and hallways are to be equipped with one recessed power point for every 10 m of working radius.

The technical rooms, car parks (one power point per 300 m²) and storage rooms are to be equipped with exposed power points.

The kitchenettes are to be equipped with three 10 A power points and a refrigerator power point which remains on all the time. They must be protected by an earth leakage circuit breaker.

Lighting for the accessible shafts is to be provided.

3.13 Emergency lighting for escape routes, corridors and stairwells

Emergency lighting must operate in the event of a power cut. When the normal power supply is working, it also supplies the emergency lighting. If that power is cut, the emergency lighting must come on again within a few seconds by switching automatically to current from an emergency generator while the autonomous emergency units are turned off in order to maintain their autonomy.

One appliance (fluorescent tube) in four is to be connected to this network.

If the emergency network is down, the emergency autonomous units are put back into operation.

These appliances will not be taken into account when calculating the minimum lighting level stipulated by the basic regulations on fire prevention. Emergency lighting is described at point 3.5 above.

Lighting appliances (normal and emergency) are to be controlled by movement detectors installed near each landing, in the lift hallways and in passageways.

The detectors are to be installed in such a way that all the lighting on the floor in question can be switched on simultaneously from any point on the floor in question, even if there are several distribution boards.

The timing must be adjustable (between 0 and 60 minutes).

The stairwell lighting must be linked to the emergency lighting and controlled by movement detectors with adjustable timing of 0 to 60 minutes.

3.14 Transmission of alarms*

The following alarms must be relayed to the security post in the entrance hall:

- fire alarm;
- gas-leak alarm;
- intrusion alarm;
- lift alarm;
- dome-open alarm.

Each alert or alarm is to be indicated by a separate warning light accompanied by a buzzer. It must be possible to respond to an alert or an alarm at the touch of a button and thereby restore the circuits so that they are again ready to receive further alarms. The alert or alarm transmission could be replaced by installing a remote-control system terminal (see Section B.II.1).

3.15 Remote control

(See Section B.II.1)

Every remote instruction passing via the centralised technical control room is to be duplicated by a local instruction permitting local override. Any such override is to be reported to the centralised technical control room.

A safety switch – lockable by padlock – is to be installed at the side of all motors for turning off the power supply.

3.16 Environmental aspects

Additional electricity could be produced by installing solar panels or any other system which produces power independently.

A feasibility study must be carried out for any building or large-scale renovation project.

3.17 Meters

Buildings must be equipped with separate electricity meters for the garages, kitchens, offices and HVAC equipment.

B.II.4. PLUMBING

1. GENERAL

The plumbing is to comply with the standards and regulations in force, including:

- the relevant European Directives;

- the LOI/CODE/RGPT;
- the Belgian General Regulation on electrical installations;
- Hydrobru (IBDE) and Vivaqua regulations;
- fire protection standards and regulations;
- fire prevention requirements laid down by the relevant fire brigade;
- the latest best practice.

2. BASES FOR CALCULATION

2.1 Maximum water supply rates:

- 0.8 m/s in appliance connections;
- 1.2 m/s in rising mains;
- 1.5 m/s in basements.

2.2 Mains water pressure

Varies from 5 to 10 bar: a pressure-reducer and a filter are to be fitted at the intake.

The pressure-reducers are to be of the constant secondary pressure type with a filter, gauge and adjustment wheel; they are to be placed between two drain cocks.

There is to be a filter bypass pipe with valves to ensure continuity of service during maintenance.

The filter body is to be stainless steel. The filter element is to comprise a monofilament synthetic cloth; the filters are to be complete (with accessories such as closure valves, drainage connection, etc.).

The fire-fighting network (hose-reels/hydrants/sprinklers) is to be connected upstream of the pressure-reducer.

2.3 Number of toilets and urinals

- 1 toilet for every 25 men;
- 1 urinal for every 15 men;
- 1 toilet for every 15 women;
- toilets for persons of reduced mobility: see Section B.III.9 – specific provision for persons of reduced mobility;
- restaurant: to be studied; see Section B.I.6.9 – rooms for use by the catering service, and Section B.III.7 – hygiene recommendations;

- kitchen: special study (see Section B.III.7 – hygiene recommendations);
- meeting room: see Section D.I and Section B.III.7 – hygiene recommendations.

2.4 Drainage

- Rainwater: 0.05 l/s/m².
- Car parks: 3 l/s (at the point of entry into the hydrocarbon separator). Water collected in car parks must pass through hydrocarbon separators.

3. DESCRIPTION OF THE EQUIPMENT

3.1 Drainage

The drainage system is to be of the separation type:

- rainwater: will preferably be collected and stored in tanks in the basement for local recycling. A feasibility study must be carried out for any building or large-scale renovation project. The overflows are to be connected to the drains via HDPE downpipes fitted with stench traps. The pipes are to be fitted with inspection points at regular intervals. There must be an inspection point at the foot of each downpipe and at least one on every floor.
- sanitary waste water + ventilation: the downpipes on each floor are to be made of HDPE. The network is to have inspection points at regular intervals.
- Kitchen: the pipes are to be made of HDPE. A fat separator of the semi-automatic emptying type is to be provided. The tank of the separator will preferably be made of synthetic material and divided into two parts, the first acting as a dredger and the second as a separator. The separator is to operate by means of simple settlement. It will not be motorised; its ventilation will be separate and located immediately nearby. Only kitchen waste may be placed in the fat separator. Ventilation to the roof is to be installed taking into account the air conditioning system's air intakes. The pipe between the fat separator and the lorry must be made of HDPE. The shape and the bottom of the sloping tank must enable easy cleaning. There must be drainage for the cleaning water. The installations must comply with the requirements described in Section B.III.8.6 – Kitchen safety and hygiene.

An extractor fan is to be located as close as possible to the fat separator to extract smells. Ventilation is to be separate.

The matter expelled by the fat separator is to be pumped straight into the collection lorry. The connection point on the lorry must be located as far away as possible from the entrances and windows of occupied premises. Hot tap water is to be provided in the room so that the system, including the pipes, can be cleaned.

- Car parks: water from the car parks is to be collected by gullies without a stench trap. A gutter is to be installed at the bottom of the access ramp. A collecting pit must enable the removal of any water which is below the level of the public drains. The control panel must not be accessible to car park users. The drainage pumps must be

connected to the BMS. A mud filter and a hydrocarbon separator are to be placed at the entrance to the collecting pit, which is to be ventilated by a pipe (110 mm diameter) going up to the roof.

- Technical rooms (special precautions are to be taken in order to guarantee complete watertightness) and drainage of condensation from the air-conditioning equipment on each floor: The technical room and facade drainage pipes are to be fitted with a closed T connection on each level. Connection to the public drains is to be via a backflow preventer with a ventilation pipe (110 mm diameter) going up to the roof. Before the backflow preventer there must be another stench trap to separate rainwater from waste water and sewage.

There must be sufficient inspection points to enable proper maintenance.

3.2 Toilet blocks

Each floor must have toilet blocks which comply with the LOI/CODE/RGPT; the toilet blocks must be evenly distributed throughout the building.

The sanitary installations must comply with the hygiene recommendations described in Section B.III.7.3.

The location and design of toilet blocks for persons of reduced mobility are specified in Section B.III.9 - specific provision for persons of reduced mobility.

Each toilet must have a stop cock which is easy to access (service shafts if possible).

The men's and women's toilet blocks must have separate access.

Each toilet block must have at least:

- as many hand basins as toilets; the basins are to have a cold tap only;
- mirrors and shelves;
- liquid-soap dispensers;
- paper-towel dispensers;
- toilet-roll holders in the cubicles;
- coat hooks in the cubicles;
- floor drains.

In the toilet blocks for kitchen staff, cloakrooms and showers are also to be provided separately from the toilet areas (see Sections B.III.7 – Hygiene recommendations) At least one wash basin must have a tap which is not hand-operated.

For Commission staff, one shower room with lockers and changing rooms is to be provided in each building (see point 3.15). The shower room should preferably be located at the first basement level, close to the bicycle park.

On each floor there must be at least one room for cleaning equipment with a tap, an overflow and a floor drain.

3.3 Toilets

The toilets are to be made of white porcelain.

The flush mechanism is to be as quiet as possible and have a maximum capacity of 9 litres, with a manual button (marked with text or a pictogram) to stop the flush. A dual flush system may be installed.

Flush flow: 6 l, adjustable.

Stopcocks must be fitted so that each toilet can be isolated.

Water supply: mains water or rainwater - see point 3.7 below.

3.4 Water points

A sufficient number of water points (dual-diameter taps with a non-return valve) are to be provided in the service rooms and car parks and outside the building.

It must be possible to drain outdoor pipes if there is a risk of frost. The draining taps are to enable drainage by means of a flexible tube.

3.5 Pipe insulation

The cold-water pipes are to be insulated at all points where there is a risk of frost or condensation.

The pipes to be insulated against condensation must be covered by flexible synthetic rubber tubing with a closed-cell structure and smooth outer surface, or by rigid-shell mineral wool with an aluminium-sheet cover.

Heating strips are to compensate for heat losses from the pipes in order to maintain the water temperature and prevent freezing.

3.6 Water softener

A softener (or a two-way system to be specified in the light of the flow required) is to be provided to produce softened water.

The installation must enable the hardness of the water to be regulated between 2 and 15 degrees French by means of a needle valve.

There must be a general bypass for the softener, and each outlet must have a mixer bypass. The softener outlet must have a tap from which samples of softened water can be taken. This must be installed upstream of the water and sanitation system.

A tap with a non-return valve must be provided for taking samples before the water enters the softener.

If a two-way system is used, switching must be done automatically by a pulse counter.

The water softener must only be put into service after approval by the Commission.

3.7 Rainwater

This is to be collected to the maximum possible extent in a buffer tank for:

- watering green spaces;
- supplying the cooling towers with evaporation water;
- supplying water for the toilets;
- producing steam.

Provision is to be made for treating the rainwater distribution networks with chlorine.

Rainwater is to be collected in tanks by a separate network and, as a back-up, by the public water network. In order to avoid any contamination of the public water network, the rainwater and public water networks are to be separated/disconnected by means approved by the water distribution company.

3.8 Production/distribution of sanitary water

Kitchens: see Section B.II.2., point 5.18.

Individual water heaters are preferred. Failing that provision is to be made for using a looped hot-water distribution network which can be sealed off.

Kitchenette: a 5 litre electric water heater is to be provided.

Mixer taps should preferably be thermostatically controlled

3.9 Preventing legionnaires' disease

Hot water is to be produced and distributed in a manner which prevents proliferation of legionella bacteria.

To that end, the cold water distributed must at no point exceed 25°C.

By the same token, hot water is to be produced at a minimum of 60°C and distributed via a loop in which the temperature never falls below 55°C.

Connections to that loop must be less than 5 m long and have a capacity of less than 3 litres.

In order to prevent scalding, the taps and shower heads supplied with hot and cold water must have thermostatically controlled mixers.

The expansion devices and the material from which the hot-water distribution network is made must be chosen to withstand the 70°C needed for thermal-shock disinfection.

3.10 Hosereels/hydrants

See Section B.III.2.

A single network is to supply the fire hose cabinets and hydrants. Each hydrant is to be of fire-brigade approved design, fitted with a valve and a DSP 45 connection fitted with a cap on a chain.

3.11 Sprinklers

See Section B.III.2 and B.II.9.

3.12 Overpressure system

This must maintain sufficient flow and pressure to supply the highest floors with a spare pump.

3.13 Equipment identification

Labelling: All instruments, such as panels, valves, warning lamps, control switches, etc., are to be labelled with white rigid synthetic material with black lettering. The labels are to be affixed by means of stainless-steel or plastic screws.

Pipe identification: **Identification is to be by means of self-adhesive tapes coloured in accordance with standard NBN 69 and the LOI/CODE/RGPT.** The tapes are to be affixed at most 6 metres apart, at each connection and on each side of walls. Natural gas pipes must be painted yellow (RAL 1003). Pipes which feed fire hose cabinets and sprinklers must be painted red (RAL 3000).

3.14 Pipework in screed

This is prohibited. If it proves absolutely essential, supply and fitting must be guaranteed for 10 years.

3.15 Shower rooms

These must comply with the LOI/CODE/RGPT, the Belgian General Regulation on electrical installations, and current standards.

The shower rooms are to comprise a changing area with a bench, coat stand and lockers which are locked using a key or a chain, one or more shower cubicles, and a toilet if there is no toilet block in the vicinity. The cubicles are to comprise a shower tray and individual changing area.

The individual changing area is to be equipped with a bench and a coat-rack, a washbasin with hot and cold mixer tap, mirror and shelf. It should also have a liquid soap dispenser, a paper-towel holder, an electric hair-dryer and an electric wall socket.

The door must be of a standard type with ventilation, lockable from the inside but unlockable from the outside by means of an emergency key or a coin (see Section B.I.5.4: locks).

The shower tray is to measure at least 80 x 80 cm with a U-bend accessible from the outside, a thermostatic tap with a recessed anti-theft T° lock, an adjustable wall-mounted economy shower head, a soap holder, a rail and shower curtain, and a synthetic grating.

The floor of the changing rooms and shower baths must be non-slip. The ceilings, building materials and furniture must be able to withstand a damp environment. The pipes and fittings

are not to be visible. A dual-diameter tap and a floor drain must be provided in the changing area.

All the floors and walls must be easy to clean and mould proof.

3.16 Meters

Buildings must be equipped with separate water meters for the kitchens, offices (including kitchenettes and toilets) and HVAC equipment.

4. CRITERIA FOR REDUCING WATER CONSUMPTION

The technical installations must satisfy the criteria for reducing water consumption by means of one or more of the following:

- using automatic dispersal flushing in the cooling towers' water circuit and the washer tanks of humidifiers;
- calculating the dimensions of the cooling towers so that they can operate in free-cooling mode (without water) up to 14°C;
- preferably equipping the wash-basin taps with an automatic shut-off, both to save water and for hygiene reasons;
- collecting rainwater and drainage water (see Section B.II.4., point 3.7);
- using automatic dispersal flushing in the circuit supplying water to the steam boilers equipped with a condensation return circuit.

B.II.5. LIFTS AND ESCALATORS

1. GENERAL INFORMATION

Lifts and escalators must be fully compliant with the applicable standards and regulations, in particular:

- the LOI/CODE/RGPT,
- the General Regulation on Electrical Installations (RGIE),
- NBN EN 81,
- the basic regulations on fire prevention,
- the Royal Decree of 9 March 2003 (MB 30 April 2003) on the safety of lifts, as amended by the Royal Decree of 17 March 2005 (MB 5 April 2005),
- NBN E 52-019 - transport capacity of lifts,
- NBN S 21-100 and addenda on the design of automatic fire detection equipment with point detectors (for fire detectors placed in the lift shaft by the lift installer),

- the Machinery Directives,
- the Royal Decree of 9 May 1977 (MB 8 June 1977), implementing the Law of 17 July 1975 (MB 19 August 1975) on disabled access to public buildings,
- Decree of the Brussels-Capital Region Government of 21 November 2006 (MB 19 December 2006) laying down Titles I to VII of the regional urban planning regulation (RRU) which applies to the whole of the Brussels-Capital Region.
- good practice.

No point in the building may be more than 50 m away from a lift or escalator.

For security reasons, persons moving from the indoor car parks to the upper floors of the building must exit the lifts on the ground floor. A bank of lifts must be provided to link the parking floors with the ground floor or reception floor.

The building must have at least one goods lift, serving all floors including the attic service space.

Each block or compartment of the building must be served by (a) a goods lift that functions as the fire service lift in the event of an emergency and (b) an evacuation lift for evacuating injured, sick or disabled persons with the aid of specially trained staff. These must be two separate cars. They operate in the same way.

To facilitate the movements of the visually impaired, signs must be also be reproduced in Braille and a voice synthesiser must be installed in one of the lifts. A description of the type of voice synthesiser required is given in point 3.13.

All lifts must be accessible to persons of reduced mobility. Lift lobbies must be fitted with a special button for such persons, to slow the opening and closing of doors. In the event of fire, access to the lifts must be separated from the rest of the building by automatically closing fire doors which create a buffer zone, except on the ground floor.

The lifts must operate in groups (controlled by a microprocessor). The programming for each group must be sufficiently flexible to enable the service to adapt to variations in traffic flow resulting from:

- peak periods,
- priority calls from the busiest floors,
- exceptional measures.

It must be possible to programme easily the activation and deactivation of lift-call buttons both in cars and in lift lobbies. A group of lifts must be able to be programmed to stop at every floor served by that group or not to stop at one or more floors.

The lifts must be electrically operated. To save space, electric lifts of the type that have no machine room may be used. If this is not possible, hydraulic appliances may be installed, providing that the proper level of service is guaranteed.

2. BASIS FOR CALCULATION

Waiting times must not exceed 25 seconds.

Transport capacity must be at least 25% in five minutes.

Minimum speed: 1.6 m/s. For goods and hydraulics lifts, the speed must be determined by special study.

Car acceleration and deceleration: no more than one metre per second.

Standard capacity criteria (people per m²) are given in Section B.II.2 point 3, “Basis for Calculation and Comfort Targets” and 3.3, “Occupation density”.

3. DESCRIPTION OF EQUIPMENT

3.1 Drive system

The drive machine must be of the asynchronous type, specially designed to operate on variable-frequency current so that it can adjust the speed of movement between 0 and the nominal speed. The speed regulator must reduce peak current as much as possible on start-up and provide maximum operating comfort by ensuring the car starts and stops gradually.

Stopping precision must be ± 5 mm from floor level. The brake must not be applied until after the car has completely stopped in order to maintain this precision.

3.2 Control system

The control system must use the latest technology (microprocessor-based, etc.), allowing computerised control of the operation, in particular:

- speed of travel,
- acceleration and deceleration,
- travel time between floors,
- car position,
- direction of travel of the cars,
- continuous traffic analysis,
- waiting times,
- load capacity,
- assignment of lifts in response to calls,
- energy consumption,
- general condition of the system,

- alarm signalling,
- status of the doors and opening/closing times,
- total operating time,
- number of trips,
- statistics on use and down time (breakdowns, repairs, maintenance),
- traceability of events and the use of override mode.

Each individual bank of lifts must be controlled by its own control system, capable of calculating the comparative ability of each lift to respond to each call. This calculation, which the system must be able to perform at least five times per second, must allow each call to be answered by the lift that can do so most efficiently without detracting from passenger convenience, energy efficiency or the operation of the other lifts in the group.

The control system must also take account of three other types of parameter for the purposes of optimising the service in real time:

- system-related parameters: number of stops, reopening of doors, closure of doors, acceleration, deceleration, distance travelled at nominal speed, etc,
- circumstantial parameters: car load, ratio of total load to number of journeys, adjacent floors, number of calls registered per car, priority for the ground floor, priority for a given floor, priority for the previous direction of travel,
- efficiency parameters: anticipated energy consumption, analysis of operating time, relative frequency of calls from the various floors, lifts at rest on the ground floor, comfort in the car, peaks in upwards and downwards traffic, volume of traffic between different floor combinations, amount of two-way traffic.

3.3 Cars*

The lift car must meet the specifications of European standard EN 81-70 and Annex A1 thereto (Safety rules for the construction and installation of lifts – Particular applications for lifts and goods lifts – part 70: Accessibility of lifts for all users, including the disabled), the Royal Decree of 9 May 1977 (MB of 8 June 1977) implementing the law of 17 July 1975 (MB of 19 August 1975) on disabled access to publicly accessible buildings, and the Order by the Brussels-Capital Region Government of 21 November 2006 (MB of 13 December 2006) adopting Titles I to VIII of the Regional Town Planning Regulation applicable to the whole of the Brussels-Capital Region, in particular Title IV thereof on access to buildings for people with reduced mobility (Art. 11 Lifts).

Lift cars must be made entirely of metal. No combustible materials are acceptable. Permissible materials: A1, A2 or B (EN 13501), or A0 or A1 (NBN S21-203).

Minimum size: horizontal clearance 0.90 m, height 2.10 m, width 1.10 m, depth 1.40 m, load capacity of at least 630 kg and compliant with the accessibility standard for people with reduced mobility.

The car interiors must contain:

- Stainless-steel control panels housing the various control modules - these must be placed on both sides of the entrance door and be accessible to people with reduced mobility.
- Sturdy (vandal-proof) pushbuttons. Inscriptions must be embossed or recessed. As a minimum there must be buttons for each floor, the alarm, closing the door and opening the door. The buttons must be arranged according to Art. 5.4.2.2 of European standard EN 81-70.
- A recess to house an emergency telephone allowing calls on the Commission's internal network and to the external emergency number (112). Its dimensions must be: 300 mm high x 200 mm wide x 100 mm deep. Its lowest part must be at least 80 cm above the car floor. If the recess is faced with a door, this must be fitted with a protruding or recessed button allowing easy opening for disabled people. The appropriate sign (see Section B.III.4) must be placed on the external face of the recess door, and its internal face must feature a plate indicating the emergency number (2 22 22) and the car number.
- Lighting providing illumination of 200 lux at 1 m above the floor in the centre of the car and 150 lux at 1 m above the floor in the corners. The car lighting must be connected to the emergency network. A self-contained emergency lighting unit must be fitted (minimum battery life 2 hours), capable of providing illumination of at least 5 lux at the height of the telephone touchpad and alarm button. Once the car has not been operated for a certain period (this must be settable to between 5 and 20 minutes), the lights in the car must be automatically switched off. However, power for the independent emergency lighting must never be cut.
- Mechanical ventilation for the car, connected to the emergency network. This ventilation must stop automatically once the car has been unoccupied for a certain period (settable to between 5 and 20 minutes).
- Preferably no metal grilles or glazing on the ceiling – where these are used, they must be securely fixed and easily removable in goods lifts.
- An evacuation alarm indicator (see paragraph 7.2.1 below).
- A digital indicator placed where it can be seen from all points of the car, showing the position of the car and its direction of movement.
- Key-switches for the reservation mode (type KABA 300).
- A KABA 900 key-switch (in each firefighter and evacuation lift).
- No mirrors or glass panels below the handrail on the inner walls of the car.
- A 'load weighing' style load-limiter featuring an optical and acoustic indicator to signal when car capacity is exceeded.
- Numbering: in addition to the manufacturer's identification plate, each car must be numbered using a sequential system to be determined by the Commission (e.g. 1, 2, 3,

4, etc.). This numbering must also be indicated at each lift lobby, marked on the inside of the reveal for the hoistway door. The identification plate must be made of stainless steel and have the dimensions 60 x 60 mm in the car and 25 x 15 mm in the lift lobby.

- A display panel capable of holding two A4 sheets in a ‘portrait’ orientation. The panel must match the car decor. It must have a protective cover made of transparent material.
- Hooks placed around the edge of the car interior near the ceiling, for hanging protective covers on. The hooks must be positioned at the same intervals in all lifts in the same block or compartment of the building.
- One set of protective covers per block or compartment of the building. These covers must be sufficiently durable to protect the walls of the car when it is used to transport equipment.
- Two rows of shock absorbers must be fitted at the bottom of service lift cars.

3.4 Lift car doors

The car doors must be fitted with a mechanism to ensure that they open quickly on arrival at a floor.

An infrared detection system, creating a protective area covering the whole height of the door, must be installed between the car door and the hoistway doors. If a person or any other obstacle is detected, the door must be set to reopen fully. It must then close again after a pre-set delay.

3.5 Hoistway doors

The hoistway doors must be telescopic sliding gates. **The entire mechanism must be fire-resistant as defined in standard NBN 713-020.**

The doors will preferably be centrally opening.

They must be made of AISI 304 brushed stainless-steel sheets.

Each must be fitted with a standard key-operated unlocking mechanism located in the upper part of the door.

3.6 Lobby fittings

A digital position indicator should be fitted in the most prominent position above each hoistway door.

On each floor an arrow must light up and a gong must sound to announce the arrival of a lift car. The gong must sound once for a lift going up and twice for a lift going down.

Each lobby must be fitted with two control panels that meet the conditions set out in Annex H to European standard EN 81-70. In buildings so equipped (voice synthesisers must be

installed if the Commission requests), these panels must be capable of emitting synthesised messages.

An alarm sounder must be placed in the main reception area, with a display showing the location of the car from which it is triggered (via the alarm button in the car).

For the purposes of evacuations, the location of the emergency lifts for the fire brigade and for evacuation must be indicated by a pictogram sign showing the appropriate direction, level with the key-switch in the lift lobby.

3.7 Hoistway fittings

The system of guide rails and cables must guarantee continuity of guidance and optimum smoothness of operation. There must be sufficient guide shoes to guarantee the safety of the whole system and ensure it is perfectly aligned.

The hoistway must be provided with lighting, with an indicator light in the machine room.

Audible and visual alarms indicating the need to evacuate the building must be installed in the hoistway and machine room; they must be audible and visible from all parts of the hoistway. The audible alarms must have the same sound as the building evacuation alarms.

Drip trays must be placed under the guide rails to catch surplus oil.

A separating grille at a height compliant with health and safety legislation must be placed in the pit, between the lift cars.

A fire detector must be installed in the hoistway.*

3.8 Machine room

The floor and walls of the machine room must have smooth, regular surfaces and be painted.

3.9 Remote control system

The system must, as a default, send at least the following information to the Commission technical control centre by zero potential contact:

- lift breakdown, passenger stuck (car alarm),
- lift machine fault.

3.10 Building Management Systems (BMS)

A Building Management Systems (BMS) system will be installed to govern the lifts, subject to Commission agreement on the need for such a system. Commission agreement will also be needed on the type of BMS, communication protocol and information to be handled. A description of the BMS system is given in Section B.II.1 Building Management Systems.

In buildings with a BMS system, it must be possible, at the Commission's request, for status information sent from the lifts to be viewable on one or more BMS workstations. This includes information such as: normal operation, override mode, evacuation mode, recall mode, fire service control, evacuation control, access control, car positions, door position

(open or closed), defects. From such computers, it must be possible to block access to certain floors (from either cars or lift lobbies) or switch to reservation mode.

3.11 Electrical power sources

The power cables for all lifts must be type F3.

If the normal current fails, an emergency power supply must be provided to the lifts from emergency generators, enabling a minimum service as laid down in Section B.II.5, point 8.

3.12 Recording lift use

Each lift system must be equipped with a system for recording its usage, either using a trip counter or by a remote control system.

3.13 Voice synthesiser*

The Commission will decide whether to install a voice synthesiser system and the type of system it requires.

Where buildings have lifts fitted with voice synthesisers, one must be located at the entrance to the reception lobby to provide easy access for the visually impaired on entering the building.

At least one car per group of lifts must be fitted with a voice synthesiser.

The voice messages must be in French or English, with adjustable volume.

On all floors, for each group of lifts, a special lift call system for visually impaired passengers, equipped with a voice synthesis terminal, must be placed close to the relevant lift. The voice synthesiser must be activated by pressing the appropriate button indicated by the pictogram for persons of reduced mobility and instructions in braille.

The voice synthesiser must confirm to the passenger the floor they have chosen, each successive floor reached during ascent or descent and their arrival at their chosen floor. An audible signal must indicate the lift's arrival and the opening and closing of the doors.

The equipment must also include the following functions:

- an adjustable time of between 5 and 20 seconds to give the passenger time to position themselves in front of the relevant lift,
- automatic announcement of lift arrival, +/- 2 seconds before the doors open. The audible signal must sound once for a lift going up and twice for a lift going down,
- reduced speed doors,
- once the passenger has exited the lift and the door has shut, the lift reverts to normal operation and the voice synthesiser function is deactivated.

The voice synthesiser terminal must also be capable of issuing other messages for a range of different situations, such as:

- ‘Attention! Ascenseur en panne’ or ‘Lift out of order’ (when lift is out of order),
- ‘Attention! Trajet direct vers la sortie’ or ‘The lift is now going direct to the exit’ (on recall of the lift to the designated evacuation floor when a fire or evacuation alarm has been raised),
- ‘Attention! Evacuez l’ascenseur s’il vous plaît’ or ‘Attention! Please get out of the lift now’ (when the lift arrives at the evacuation floor, just before the doors start to open).
- A back-up battery system must be provided in case of power failure.

3.14 Override operation for underground floors

Lifts serving both upper and underground floors must be secured to prevent unauthorised access to the building from the underground floors.

In addition, if they are goods lifts, the system installed must provide a reservation mode.

For this purpose, instead of simple call buttons, the underground lift lobbies must be provided with secure pushbutton locks equipped with indicator lights. The same type of secure pushbutton must also be installed instead of simple down call buttons in the reception desk lift lobby for calling lifts to access the upper floors.

In the lift car, the buttons for the underground floors on one of the control panels must be replaced by the same type of pushbutton locks equipped with indicator lights.

The control buttons for the underground floors on the second control panel will remain and be deactivated during normal operation. Reactivation from within the lift car will be possible solely by use of a KABA 300 reservation key (see paragraph 4.2 below).

4. GOODS LIFTS

4.1 General

All the goods lifts must also be capable of transporting people.

Each goods lift must be equipped with two rows of strong shock absorbers at the bottom and two rows of shock resistant handrails. The handrails must be designed so as to provide the least possible obstacle to the entry of loads into the lift.

Floor coverings in stone or similar material are not accepted. Coverings in structured or embossed-sheet stainless steel are authorised, but preference will be given to those made from mineral particles with a minimum 15-year life-time.

At least one goods lift per zone must be capable of evacuating a person lying horizontally without having to use the stairs.

4.2 Reservation mode^{*}

The goods lift must be fitted with equipment enabling a reservation mode.

Each lift lobby must be fitted with a KABA 300 pushbutton lock and a visual indication showing when the reservation mode is in operation. Reservation mode will be triggered from the lift car by the use of a three-position KABA 300 key on one of the control panels. The three positions must be marked '0', '1' and 'hold', together with the indication 'Réservation – Voorbehouden'.

Reservation mode must work as follows:

The goods lift is called to a particular floor using the KABA 300 key from the lift lobby. This action switches on the relevant indicator lights in all lift lobbies. The lift will respond to calls already made and then go to the floor from which it was called with the KABA 300 key, ignoring any subsequent calls to other lift lobbies.

The personnel in question then turns the key to position '1' on the KABA 300 lock in the car. From that moment on, they are in control of the car and can use it to visit whichever floor they choose by pressing the appropriate buttons. The relevant indicators will still light up on each floor.

When the user wishes to leave the car, he/she turns the key to the 'hold' position and removes it from the lock. The lift will then remain on this floor with its doors open until the user enters a new command by turning the key to position '1'.

The key must be able to be removed from the lock in positions '0' and 'hold'.

When the key is returned to position '0', the lift will return to normal operation and the indicator lights go out.

4.3 Transporting bulky material

The goods lift car must be large enough to transport internal partition elements at least 2.6 m high and 1.2 m wide. If not, the car must have an opening in part of its ceiling or a platform system on its roof.

The platform system must be fully compliant with the relevant technical standards (based on the prototype model) issued for the European Commission by the Ministry of Labour.

The platform must consist of:

- A base made of two separable parts, in structured aluminium, fixed to side walls and with holes for the lift cables to pass through. It must have a protective rim all around the base and around the cable holes to prevent small objects falling off the platform or through the holes. At the entrance to the platform, facing the lift lobby door, the base must be covered with a yellow and black hazard warning strip.
- Two side walls the same size as the car and 2.6 m high, equipped with horizontal and vertical reinforcing bars. The bottom of the walls must have legs that are secured to the roof of the lift car, guaranteeing complete stability. The bottom metre of the wall will be a solid protective barrier, with the remaining space from 1 to 2.6 m consisting of a semi-open barrier to prevent material protruding or falling.
- A rear wall must be installed with the same specifications as the side walls.

- It must attach securely to the other two and have a safety system that prevents any of the walls becoming detached.
- A stiffener must be attached at the front of the platform, 2.6 m up, to anchor the side walls.
- The platform must be guided by guide shoes which are adapted to the structure.
- A lashing system must be provided to prevent transported material slipping or moving.
- Each component must be numbered in the order of its assembly.
- Safety components: these must be specially designed to cover this modification of the standard lift, for all types of lift. Each lift must have at least the following safety features:
 - an inspection station attached to the top of the car, with its electric cable attached to prevent it catching on the structure when the car/platform moves,
 - all the safety devices at the top of the hoistway adapted to cater for the extra height of the lift car when the platform is attached and thus prevent collisions with the top of the hoistway,
 - a safety device (sensor) installed that will block the car from normal operation as soon as the first part of the platform is attached to it (for the prototype, this must be a sensor under the first section of the platform base to be placed).
 - the maximum authorised platform load based on the lift load capacity.
 - a wheel-mounted counterweight for placing in the car, to prevent the car being crushed at the top of the hoistway if the lifting mechanism fails.
- A detailed safety instruction sheet must be provided with each installation. It must instruct users on the steps to take to ensure the operation of the equipment is 100% safe, including in particular:
 - 1) Safety conditions for assembling the platform
 - 2) Safety conditions for using the platform
 - 3) Safety conditions for dismantling the platform.
- A summary sheet of safety instructions must be displayed on the platform, stating:
 - the maximum permissible weight of goods that can be loaded on the platform, including one accompanying person,
 - the maximum length of objects that may be placed on the platform,
 - the personnel authorised to use the platform.
- Each platform installation must be inspected by a SECT. The lift/platform will only be accepted from the supplier if accompanied by an inspection report authorising the use of the platform.

- Storage space for the platform components must be provided close to the lift on the floor on which the platform will be fitted to and removed from the car.

5. HYDRAULIC LIFTS

The use of hydraulic devices is not advised – they should preferably be replaced by electric lifts of the type that have no machine room.

Mechanical ventilation must be provided, with air from the machine room expelled directly to the outside of the building.

A system of automatic extinguishers triggered by temperature detection must be fitted in the machine room, as required by the relevant legislation.

An oil drip tray must be placed under all equipment containing oil. Its capacity must be fully compliant with the relevant legislation.

Lift operation during power failures - see Section B.II.5, point 8.

6. ANTI-INTRUSION MEASURES*

6.1 Operational arrangements

Depending on the composition of the building, a control device must be installed at the reception desk in the main entrance hall for calling all lift cars to that floor. If a building comprises several compartments or blocks, each equipped with banks of lifts which are not close together, each bank must be called consecutively, to avoid a surge in power demand.

For large buildings or those with a special function, the Commission may ask for more control points to be installed.

6.2 Control device

The control device must be a blue, ‘break-glass’-style pushbutton (of the same type as a fire alarm) with a lightweight cover and seal, which can be reset with a key.

6.3 Procedure

Pressing the control button will call the lifts to the main floor (where the security guards are stationed), where they will stay with their doors open. They can be returned to normal operation by resetting the call button (key).

All call buttons must be connected to the central security system (see Section B.IV.3).

The system must store all events related to the control button(s), so they can be easily traced afterwards.

7. FIRE SAFETY*

7.1 General

7.1.1 Definitions

7.1.1.1 Firebreak areas

A firebreak is an isolated area designed to limit the spread of fire and hot gases, access to which is controlled by fire doors.

Lift hoistways and lobbies must be defined as firebreak areas.

7.1.1.2 Evacuation floor,

Floor with an exit designated for evacuating building occupants.

7.1.1.3 Lift car evacuation indicator

Flashing visual signal installed in each lift car which warns passengers to exit the lift. It must be identified by a standard pictogram sign.

7.1.2 Criteria for lift use

7.1.2.1 Basic principle

Note that in the event of a fire in the building, use of the lifts is strictly prohibited. The only way to evacuate the building is via the emergency staircases.

The lifts can be used only when accompanied by authorised personnel.

7.1.2.2 Temperature conditions

The lift must be designed to operate properly up to the following temperatures:

- 1) 40°C in the machine room, or winch room if the drive machines are situated there.
- 2) 70°C on the outside of the lobby doors or in the winch room.
- 3) All electric and electronic components must be designed to operate properly at an ambient temperature of between 0°C and 40°C.

7.1.3 Automatic fire-safety systems

Neither sprinklers nor any similar system may be installed in the lift hoistway.

However, in the machine room, suitable automatic fire-fighting systems that are fully compliant with the applicable legislation may be acceptable.

7.2 Action to be taken in the event of a fire or evacuation alarm

For new and renovated buildings, the following automatic responses must be built into the system.

7.2.1 Evacuation alarm or double detection in the building or single detection in the lift lobby: ‘recall’ applies

Recalling involves bringing all the lifts in a firebreak area to the evacuation floor to enable any passengers in them to be evacuated.

In the event of single detection outside the lift lobby area, the lifts are not brought under automatic control but rather operate normally.

The following procedure must apply:

- (a) All lift call commands made by users are cancelled.
- (b) All floor selection buttons in cars and lift call buttons in lift lobbies are neutralised.
- (c) The door-opening mechanisms are neutralised, apart from the button in each car and the effort-limiting device (if fitted). Where doors have two closing speeds, the slower speed is used.
- (d) The in-car visual evacuation indicator is activated in all affected lifts as soon as the recall command is triggered.
- (e) All points in the lift hoistway, machine room and other areas accessible for maintenance must be fitted with both visual and audible warning devices to indicate when recall mode has been triggered.
- (f) The lights in the hoistway and the machine room are switched on automatically as soon as recall mode is triggered.
- (g) Any lifts moving away from the evacuation floor or which have already stopped at a particular floor will stop at the next technically possible stop without opening their doors and then begin moving directly towards the evacuation floor.
- (h) All lifts not in use at any floor will close their doors and immediately start moving directly towards the evacuation floor.
- (i) All lifts currently moving in the direction of the evacuation floor will continue towards this level without stopping at any floor in between.
- (j) On arrival at the evacuation floor, the doors open long enough to enable passengers to alight and then close. They are no longer usable, although the door opening button in the car still functions.
- (k) The lifts can be returned to normal operation by authorised personnel only.

7.2.2 Fire detected in the machine room – lift car must be evacuated

Evacuating the car involves removing - as quickly as possible - all passengers from all the lifts in a group where fire has been detected in the machine room for that group.

The procedure is identical to recalling, as described in point 7.2.1, apart from paragraphs (g)-(j) which are replaced by the following paragraph:

All the lifts in the lift group where the fire has been detected will stop at the first floor they come to in their direction of travel, enable passengers to alight and then close their doors after a certain time. They are no longer usable, although the door opening button in the car still functions.

7.3 Emergency lifts

There are two types of emergency lift, the **firefighter** lift and the **evacuation** lift, both operating in the same way.

7.3.1 Safety

Note that emergency lifts are no more able than other lifts to operate safely if fire has been detected in their machine room.

7.3.2 Firefighter lift

7.3.2.1 Function

Lift installed for normal use but which contains controls enabling firefighters to override its normal operating mode and control it directly themselves to fight a fire or evacuate building occupants. In this mode, this lift cannot be used by other users and is reserved exclusively for professional firefighters. Where possible, the lift set up for this use must be the goods lift.

7.3.2.2 Description

The dimensions of the firefighter lift must be fully compliant with the relevant regulations. It can be used for evacuation, must be spacious enough to allow a stretcher to enter horizontally, be capable of carrying a minimum nominal load of 1 000 kg and be at least 1.100 mm wide and 2.100 mm deep. The speed must be set so that a complete trip is no longer than 60 seconds and clearance must be at least 900 mm.

The firefighter lift must serve every floor in the building.

7.3.2.3 Overriding normal operation mode (going to firefighter mode)

To use the lifts in firefighter mode, the switch operated by the override key, next to the hoistway door in the evacuation floor lift lobby, must be activated. The only personnel authorised to use this quarter-turn KABA 900 override key-switch are firefighters, to take control of the lifts. Next, the same type of key-switch in one of the in-car control panels must be activated. Both steps must be performed in order to free the lift cars from others commands and enable them to be used in override mode by the fire brigade. The key, situated in the lift lobby, must be able to be withdrawn in its active position. In the lift car, the key must be able to be withdrawn only while in position '0'. The switch positions must be clearly indicated '0' and 'I'. A standard red pictogram sign must be affixed or engraved next to the key switches.

In override mode, the firefighter lift must be capable of serving all floors.

However, override mode must not be possible where an emergency has been detected in the machine room. The only way an exception to this rule may be permitted is if the relevant fire brigade provides clear and written indication to this effect.

Activating the key-operated firefighter switch in the evacuation floor lift lobby must trigger the following events, depending on the situation:

- If no fire emergency has been detected, all lifts in that group are recalled as described in point 7.2.1 above. The firefighter lift remains on the evacuation floor with its doors open.
- If the lifts in question have already been automatically recalled, activating this switch opens the doors of the firefighter lift.
- If an emergency has been detected in the machine room, activating the firefighter switch has no effect on the firefighter lift.

The firefighter override mode, which applies only to the firefighter lift, is as follows:

- When the firefighter switch is activated in the evacuation floor lift lobby, the firefighter lift must operate separately from all the other lifts in the group.
- The normal operation of the firefighter lift must be free from potential disruption by an electrical fault on any lift in the same group.
- The firefighter lift can not receive any commands “in car” until after the firefighter switch in the car has been activated – the car is then controlled entirely from the in-car control panel.
- It must not be possible to register a command for another floor other than by holding a control button in the lift until the doors are completely shut. If the button is released before the doors are completely shut, they must re-open immediately and the order must be cancelled.
- After reaching its destination floor, the lift must stay there with its doors closed. The opening of the car doors is activated by pressing on the door opening button until they are fully open. If the button is released, the doors will close again even if in the meantime a new double detection incident has taken place in the building.
- Where doors have two speeds, the slower speed must be used.
- For the whole time the lift is in firefighter mode, its position must be indicated both in the car itself and on the evacuation floor, whether it is moving or stationary.
- The firefighter mode must be able to be deactivated after the lift has returned to the evacuation floor, by turning the firefighter switch in the evacuation floor lift lobby from position ‘1’ to ‘0’. When this is done, the group of lifts returns to normal operation.

7.3.3 Evacuation lift

7.3.3.1 Function

Lift installed for normal use but which has controls enabling it to be used, under the supervision of authorised personnel in Commission departments HR.DS.06 (HASPAC) or

OIB.RE (SIPP) to evacuate injured, sick or disabled people. This must be a different lift to the firefighter lift.

7.3.3.2 Description

See description of firefighter lift.

7.3.3.3 Evacuation mode

For operation in this mode, see description of firefighter lift (Section 7.3.2.3).

8. LIFT OPERATION DURING POWER FAILURES

8.1 Emergency power supply

The power supply for lifts consists of a main and a secondary (emergency) supply. The two supply sources must be installed in fireproof conduits that are fully compliant with the relevant legislation.

Where the power provided by the emergency supply is sufficient, all the lifts must continue to operate normally.

Where it is not, the following functions must be provided, as a minimum:

- the emergency network must automatically recall all lifts to the evacuation floor in sequence,
- safety lighting in all lift cars,
- ventilation, smoke extraction or pressurisation,
- system for requesting emergency assistance,
- continued operation of the firefighter lift(s),
- despite switching between the normal and emergency power supply, the lift control system must be able to store all commands entered and execute them as normal. It must not require any dummy trips to reset the cars.

8.2 Emergency electrical power supply in the event of fire

When operating on the emergency supply, the automatic responses described in Section B.II.5, point 7 apply. The operation options for the emergency lifts should be limited to one of the following solutions:

1. If the power provided by the emergency supply is limited, automatic switch to the emergency supply and recall of all lifts to the evacuation floor (sequentially if necessary) and continued operation of the emergency firefighter lifts.
2. If the power provided by the emergency supply is sufficient, automatic switch to the emergency supply and recall of all lifts to the evacuation floor (sequentially if necessary) and continued operation of both emergency firefighter and evacuation lifts.

8.3 Hydraulic lifts (special case)

1. Where there is a power failure but no fire has been detected, hydraulic lifts must execute the command described in Section B.II.5, point 8.1. They are sent to the evacuation floor.
2. Where there is a power failure and fire has been detected, hydraulic lifts, after executing the actions described in Section B.II.5, point 8.2., open their doors to allow occupants to alight and then close them. Then, if they are not emergency lifts, they are sent to the evacuation floor.

9. DIAGRAM OF AUTOMATIC LIFT RESPONSES

See Section B.II.8, point 5.

10. LIFT TABLES

10.1 General

Lift tables must comply with the standards and national and European legislation in force, in particular:

- the machinery directives,
- the LOI/CODE/RGPT,
- the RGIE,
- rules of the trade,
- CE marking,
- the Regional regulations (Brussels-Capital Region) on the prevention and management of hazardous waste: the Order of the Brussels-Capital Region Government of 25 April 2002 (MB of 12 June 2002) laying down the list of wastes and hazardous wastes, and the Order of the Brussels-Capital Regional Executive of 19 July 1991 on the disposal of hazardous waste, as amended by the Order of the Brussels-Capital Region Government of 16 September 1999 (MB of 14 October 1999).

10.2 Description

Lift tables must have at least the following characteristics:

- in the event of a power failure or similar problem, the table can be manually returned to its lowered position,
- the compartment containing the oil tank and pipework must be completely oil-tight and sufficiently large,
- if the control unit is situated close to the lift table, it must have an IP55 protection rating,

- as a minimum, in the event of a general fault with the lift a message is sent to the Commission technical control centre via the remote control system (BMS),
- lift tables must be safe to use, i.e. they must have a protective lip to prevent loads on wheels or those likely to slip from falling; at the upper level, it must have an access gate or similar system to prevent objects or people from falling,
- trip counter (number of times used).

Supporting documents

The following documents must be provided: the layout plans and all the electrical wiring diagrams:

- provision of the instructions for use in one of the three languages (FR, EN, NL),
- **inspection and submission, before commissioning, of the report drawn up by a SECT,**
- submission of two complete as-built files.

11. ESCALATORS

11.1 General

Escalators must comply with the standards and regulations in force, including:

- EN 115,
- the machinery directives.

11.2 Mechanical equipment

11.2.1 Truss

Rigid construction of commercial steel sections, to be assembled according to the manufacturer's instructions.

As regards statics, EN 115 requires the truss to be designed to support a working load of 5 000 N/m² on the visible surface area of the steps. Truss deflection when bearing its working load must not exceed 1/1 000 of the distance between supports.

The whole length and width of the truss underside must be covered with sheet steel at least 3 mm thick, sealed by welding to make it oil-tight.

The truss extremities must rest on rubber supports to prevent noise being transmitted to the building.

The angle of inclination of each escalator must be 30°.

Escalators must be given an anti-corrosion treatment (zinc chromate, hot-dip galvanisation, etc.).

11.2.2 Drive system

A squirrel-cage drive with a gradual starting movement.

The compact drive unit must be mounted in the highest part of the truss, outside the step chain, and easily accessible for maintenance work.

Power transmission from drive to roller chains must be by flexible coupling rather than V-belt.

All the bearings must be self-lubricating or lubricated with gear oil. Where oil lubrication is used, the oil must be renewed after no more than 10 000 hours of operation. A gauge must be provided for checking the oil level.

The sound level of the whole drive unit, measured at a distance of 1 m in the test room, must at no point exceed 60 dB(A).

The drive unit must be equipped with a wheel for accurately measuring permissible braking distances according to EN 115.

To prevent the development of abnormally high centrifugal mass, the braking torque of the service brake must be a function of the escalator's direction of movement.

A band brake with a braking torque ratio of 1:3 should be used. This type of brake is activated by a drive, avoiding the need for complex mechanisms. The lining, which must not contain asbestos, must be sufficiently thick to withstand at least 100 000 applications of the brake with a test load. For this reason, disc brakes are not accepted.

11.2.3 Steps

The steps must have a usable width of at least 1 m.

The step faces must be grooved so that they enmesh with the next step leaving no large gap, preventing objects such as umbrellas, walking sticks, etc. from becoming entangled.

The escalator must be constructed to enable the step treads to be removed relatively easily in the bottom return station, without having to remove the balustrades or any parts of the skirt panel. The step treads must be interchangeable.

The steps must be guided laterally by rollers and skirt panels, with the maximum distance between skirt and step being 3 mm so that the steps do not scrape on the skirt panels if they are not properly aligned.

The side and back faces of the step treads and the side faces of the risers must have rims made of synthetic material guaranteeing a maximum total distance between steps and skirts of 7 mm.

11.2.4 Step chains

The steps must be joined to one another by two precision chains with a minimum breaking strength of 130 kN. The chain bushes and pins must have a hardness of RC 58. The minimum diameter of the bolts must be 14 mm.

11.2.5 Chain tensioner and track system

The chain tensioner must be easily accessible by removing the floor plate.

The tracks must be made of drawn steel and be easily replaceable.

11.2.6 Comb and floor plates

The upper and lower landing floor plates of the escalator must be equipped with comb plates with easily replaceable pressure-cast aluminium comb segments.

The comb teeth must fit between the step cleats to a depth of at least 6 mm.

The floor plates fitted at the top and bottom of the escalator over the machine space and tension station must be easily removable.

11.2.7 Handrails

The size of the handrail drive must be such that the speed of the handrail is no more than 2% faster than that of the step chain.

11.2.8 Balustrades

The balustrade must be made of 10 mm-thick tempered safety glass or stainless steel, no additional supports are acceptable. The joints of the various plates must be vertically positioned in relation to the step chain.

For outdoor escalators, the balustrade and all external panels must be made of stainless steel.

11.2.9 Skirt panels

Particularly rigid construction, composed of sheet steel at least 2 mm thick, backed with reinforcing sections. The surface covering must have a very low friction coefficient.

11.2.10 External trimming

The visible parts of the truss below the balustrade must be covered in stainless steel sheeting with rounded edges.

11.2.11 Machine spaces

The machine spaces must be equipped with a waste water drainage system. There must also be a device to prevent drainage of any lubricants (grease, oil, etc.) through this system.

Outdoor escalators must be equipped with a back-up heat supply to ensure continued operation during periods of low temperatures. The control panel must be placed outside the machine space. All electric connections must be watertight.

11.3 Electrical equipment

11.3.1 Drives

The drives must have at least IP 55 protection.

Escalators must be able to operate smoothly with a full load in the event of a power loss of up to 10%.

11.3.2 Control system

Microprocessor-based.

Escalator movement must be triggered by passengers passing a sensor when entering the escalator.

11.3.3 Electrical equipment

This includes all the cables and junction boxes between the master switch in the control panel and the escalator's various control, lighting and safety components.

All the electrical material in the escalator must be suitable for installation in damp areas, having at least IP 54 protection. This also applies to all safety switches and electronic equipment.

The machine space must be equipped with a power socket, as must the bottom return station.

11.3.4 Key-switch

On a flat part of the covering sections at each end of the escalator, a key-switch must be installed to control upwards and downwards motion of the steps, as well as a red emergency stop button.

11.3.5 Inspection cable

At each end of the escalator, a power socket must be installed where the inspection cable and control unit can be plugged in. When this is done, all other controls must be deactivated. The inspection cables must be at least 5 m long and equipped with buttons to move the steps up and down (dead man's switches) and a stop button.

11.3.6 Energy-efficiency

To reduce energy consumption, escalators must be equipped with an energy-saving system which adjusts drive power to the number of passengers.

Constant stopping and starting of the drive must be avoided so as not to give the impression that the escalator is out of order.

11.3.7 Fault indicator table

The table must be equipped with 10 numerical indicators, installed in the balustrade of the drive station.

11.3.8 Connection to BMS

Escalators' control systems and alarms (emergency stop and technical fault) must be connected to the building's BMS system.

The contractor must indicate which control protocol will be used for the remote control of the escalators, as well as the installation and initiation services associated with this protocol.

Where an evacuation alert is given, the escalators must be stopped and a transfer made to the BMS system.

11.3.9 Counter

An hourly trip counter must be provided.

11.4. Additional safety equipment

11.4.1 Comb impact sensor

Escalators must be fitted with a set of sensors at each end of the skirt panels to stop the escalator if any object becomes trapped between the comb and the steps.

11.4.2 Drive heatproofing

This system must stop the escalator if the drive temperature exceeds acceptable limits.

11.4.3 Handrail safety sensors

The balustrade must be fitted with these sensors at the handrail inlet. They must be set to stop the escalator if they sense any light pressure.

11.4.4 Broken step chain sensor

Fitted near the lower chain tensioner, this sensor must stop the escalator if the step chain stretches excessively or breaks.

11.4.5 Speed governor

This device must stop the escalator if it goes over or under speed, changes direction unintentionally or if the drive fails to reach the necessary speed.

11.4.6 Step sag sensor

This must stop the escalator if a step sags by more than 6 mm, before the step reaches the horizontal part of the escalator.

12. PLATFORM LIFTS FOR PEOPLE WITH REDUCED MOBILITY

12.1 General

Buildings must be designed to be accessible to all users, including persons of reduced mobility. Platform lifts should not therefore be included in new building designs, although they can be retrofitted to existing buildings as a corrective measure.

Platform lifts are intended to help persons of reduced mobility, including wheelchair users. The autonomy of the user is of utmost importance. **These installations must be fully compliant with the relevant standards and regulations**, in particular:

- the machinery directives,
- standards ISO 9386-1 and 2,
- standard NBN E 52-036,
- the LOI/CODE/RGPT,
- the RGIE,
- trade practice.

12.2 Description of equipment

12.2.1 Installation of the lift

The lift must be installed to ensure maximum stability. The method of fixing must be appropriate for the type of vertical wall involved and its finishing material (plasterboard, granite, marble, etc.). Where appropriate, the lift may be fixed to the steps or ramp. The platform guide rails can be placed against the vertical wall, on the steps, on the ramp or using the handrails.

All fixings (bolts) must be covered by stainless steel or metal cap nuts of a colour matching the lift colour.

The location of the lifts must on no account reduce the dimensions of passageways below what is prescribed by the standards and regulations in force.

If the lift has a swing door, an area for manoeuvring with a minimum diameter of 1.50 m must be provided in front of it. This area must be large enough to enable the user to access the call buttons easily without being hindered by the movement of the door.

12.2.2 Lift design

The appliance is designed for a wheelchair and must have the following characteristics:

- The dimensions of the lift must be suited to its location and to the requirements of users.
- The platform must have a non-slip floor covering.
- The working load must comply with the size-to-load ratio standards. The appliance must feature an overload signal.
- The lift must have at least the following controls: constant-pressure pushbuttons to go up and down, emergency stop and alarm button with audible alarm (adjustable volume of +/- 45 to 80 dBA). The pushbuttons must have a minimum diameter of 3 cm and be placed horizontally at a height of 0.80 m.
- If the local conditions do not allow the installation of fixed controls (classified areas, aesthetic reasons, etc.), remote controls are authorised. Two remote control boxes must be provided as a minimum.

- The platform must be as unobtrusive as possible and fold away to allow maximum clearance when the lift is not in use.
- Each side of the platform must be fitted with sections which allow easy access to it and also act as buffers during normal operation.
- The lift must be equipped with a handrail which also serves as a safety rail and folds away automatically to save space.
- The guide rails must be made of rustproof material.
- Any metal parts must be treated or protected with rustproofing paint.
- The lift must be offered in a range of colours in order to blend in with its surroundings.
- Simplified instructions must be available within the immediate vicinity of the lift.
- Appliances installed outside must have an IP protection rating in accordance with the current regulations.

12.2.3 Safety

The following considerations must be taken into account for all new platform lifts installed:

- The appliance must be equipped with a backup power supply. In the event of a general power failure, the lift must at least be able to complete one full trip. To avoid power being cut before the emergency generator starts up, a no-break power supply must be incorporated in the machine which will be continuously charged.
- It must be possible to lower or raise the lift manually to the nearest level.
- Battery-powered lifts must be fitted with a system to monitor remaining battery charge.
- The platform must be equipped with a safety system which automatically stops it in the event of a foreign body entering the liftway.
- The installation must be fitted with a circuit-breaker in the platform to allow the power supply to be cut.
- In hydraulic systems, the hydraulic unit must be installed in a sealed container in accordance with the regulations.

12.2.4 Remote control

The lift must be fitted with two potential-free contacts allowing it to be connected to the Commission's BMS. One contact is required for malfunctions (safety chain) and one for the alarm button.

13. AS-BUILT FILE

The as-built file must contain the sections and tabs described below and be completed by up to date documents. One file must be submitted for each lift. Documents common to a group of lifts or to several lifts need only be produced once in a binder (e.g. safety instructions, maintenance instructions, door fire approval certificates, etc.).

Documents issued and edited by the installer, conformity reports or certificates, diagrams and plans must be submitted in one of the working languages of the Commission, French or English, otherwise in French or Dutch (national languages); all other documents (e.g. descriptions, general documentation) must be either in French or English.

The label of the binder must reflect the content with the Commission No and the serial No of the installation (number which is displayed in the lift car).

Two copies of the file must be submitted, one for the archives of the Commission, the other to be deposited at the installation in an appropriate cupboard or case (after approval by the Commission).

These documents must also be submitted in digital format on a CD (1 copy).

A safety file, in addition to the as-built file, must be available at each installation (or kept together in a cupboard, depending on the configuration of the installation). See Royal Decree of 9 March 2003, as amended by the Royal Decree of 17 March 2005.

The summary technical datasheet must include the following information:

- serial number of the lift (the number displayed on the sign plate in the lift car),
- Commission No (from 1 to X),
- brand of the machine,
- installer,
- the year of commissioning,
- type (electrical system, electrical system without machine room, hydraulic system, coils, etc.),
- type of control,
- operation mode (simplex, duplex, triplex, etc.),
- location of the machine room (No of the floor or shaft),
- function (fire service lift, evacuation lift, service lift, normal lift, car-park lift),
- type of lock installed in combination with the function (e.g., fire brigade = KABA 900, priority = KABA 300, etc.),
- rated load,

- number of persons,
- number of floors,
- number of entrances,
- number of door operator,
- trip,
- rated speed,
- return on emergency power supply Y/N,
- functioning on emergency power supply Y/N,
- telephone No in lift car,
- remote alarm/information service,
- extension No of the remote alarm/information service,
- supply voltage,
- rated current,
- consumed power.

Acceptance reports for the installation:

- **either the final report (all remarks resolved) of a SECT**
- **or the report of the final inspection of the company (see Directive 95/16/EC) accompanied by the final check-up sheet of the inspector.**

DATED AND SIGNED acknowledgement of receipt of the documentation by owner

DATED AND SIGNED CE conformity declaration (see Directive 95/16/EC)

Various certificates (derogation, ISO certificates of the installer)

Wiring diagrams: complete and updated diagrams, including the power supply cabinet, adaptations specific to the Commission, nomenclature/legend (contacts, relays, switches, sensors, etc.)

Layout plans: layout of the lift shaft, machine room; vertical section; layout of the lobbies; layout of the lift cars; details of the control panel of the lift car and lobby button boxes; specific plans for different installations (pulley room, remote equipment, desktop alarm panels, etc.)

Approval certificates for the fireproof lobby doors

Certificates, calculations and documents regarding the safety features, e.g. brakes, cables, shock absorbers, speed governors, safety gears, hoistway door locks.

Documentation: motor, motor gear unit, unit of the pump motor for the hydraulic system, drive regulator, door operator, etc.

Safety instructions: general or specific instructions in case of special adaptations, instructions re safety operations.

Use and maintenance instructions

Structure of the roof of the lift car (where present). Plans, acceptance reports by an approved body, instructions for assembly, dismantling and use.

B.II.6. TELECOMMUNICATIONS

1. GENERAL

This section covers specifications for telephone and computer cabling and for the technical areas housing cabling installations.

The lay-out of the building's cabling system must comply with the standard single-line diagram described in Section B.II.6, point 2.

2. CABLING INFRASTRUCTURE

2.1 General specifications for the infrastructure housing the cabling

The infrastructure comprises:

- cabling concentration rooms (CCR),
- one or more fibre-optic concentration rooms,
- one main distribution frame (MDF),
- shafts,
- cabletrays,
- housing for sockets in offices (e.g. ring circuit - false floor).

2.1.1 Cabling concentration room

This is the area where the horizontal cabling from one or more floors is brought together.

2.1.1.1 Location

It should be located away from pressurised water pipes or paper storage areas, but close to existing shafts.

It must allow:

- ease of access to cable ducts or existing floor circuits;
- easy integration into building systems (HVAC);
- ease of operation.

Size will depend on the number of bundled points. The surface area per CCR room will vary from 8 m² (for 400 points) to 12 m² (for 900 points).

The number of CCR rooms will vary according to the size of the building.

At the moment that number is dictated by the need for the distance between a CCR room and the most distant socket not to exceed 90 m of cabling. Bearing in mind that constraint, a location study will be carried out and the work needed to create the rooms will be specified.

Also, all incoming connection points on a given floor must originate from the same CCR. If this is not possible for reasons of distance or architecture, the whole building must be divided into wings, in which case all points on the same floor/wing must originate from the same CCR.

2.1.1.2 Design of CCR rooms

See Section B.II.7 – Special-purpose areas

2.1.2 Main distribution frame (MDF)

This is the room where all the equipment is installed that is needed to interconnect the different floors of the building and to connect with the Commission's various telecoms networks, i.e.:

- PABX,
- switch router,
- operators' infrastructure,
- cable television,
- satellite reception.

2.1.2.1 Location

The same considerations as for CCR rooms.

Excessively long cabletrays in car-park areas are to be avoided.

Existing cable entries, e.g. for telephone or cable television operators, should be borne in mind. The MDF must not be located on the bottom floor or top floor. There must be no EMF equipment nearby.

Dimensions: minimum 40 m², depending on the size of the building and the role the building plays in the telecoms network structure (node or satellite).

2.1.2.2 Structural work on these rooms

See Section B.II.7 – Special-purpose areas

2.1.3 Shafts

2.1.3.1 Location

Location: as close as possible to the cabling concentration room.

The shafts should be behind the CCR.

A second shaft should be reserved for telephone and data redundancy.

Dimensions: shafts comprise cable ladders different from those used for electricity; these cable ladders must be a minimum 50 cm wide.

They must be of sufficient size for the amount of cabling to be run.

The shaft must be a minimum of 50 cm deep to comply with a minimum radius of curvature for the cabling to be run.

2.1.3.2 Design

The shafts must have the following characteristics:

- Holes (dimension study) - 15% spare
- Lighting
- Easy access,
- **FR 1 h.**

2.1.4 Cabletrays and floor circuits

These are used for:

- the junction between CCR rooms and the shaft,
- the junction between the MDF and the shaft,
- the junction between the MDF and cable entering the building from the outside,
- the junction between CCR rooms and the ring circuit or floor boxes.

All cable link connections between shafts and the PAX must be outside fire-risk areas. If not, cables must be protected by Promat-type casing.

Location: they must be easy to access and placed logically vis-à-vis other services according to the location of CCR rooms, the MDF, the external entry point and the ring circuit/floor boxes.

They must be easy to pull new cabling through.

Dimensions: 15% spare capacity should be allowed depending on the number of cables to be installed.

Free space between cabletrays and/or ceilings must be a minimum of 15 cm.

2.1.5 Ring circuit

Circuit containing the 230 V sockets and telecoms sockets.

Location: wall-mounted, ease of access. Sockets should be sited to avoid water ingress caused by condensation from fan-type heaters.

Dimensions: compartmented, bottom compartment reserved for telecoms cabling.

2.2. Cabling

2.2.1 Cabling type

The network is to comprise structured 100Ω Cat. 6a cabling, universal, supporting the various types of telephone (analogue, digital, ISDN) and computer (Ethernet, fast Ethernet, TPDDI, RS, Gigabit Ethernet) networks.

All installations and equipment to meet class Ea standards and the following directives:

Standards:

- **ISO/IEC DIS 11801 2nd edition, amendment 1, class Ea channel requirements (April 2008) and ISO/IEC 11801 2nd edition, amendment 2, Links and components: Information technology - Generic cabling**
- **EN 50173 2nd edition: Information technology - Generic cabling systems ISO/IEC**
- **ISO/IEC 60793-2-10 Multimode fibre and ISO/IEC 60793-2-50 Single-mode fibre**
- **EN 50167: : Screened horizontal wiring cables**
- **EN 50168: : Screened patching cabling**
- **EN 50169: : Screened backbone cables**
- **EN 50288-5-1**
- **EN 55022: Electromagnetic interference**
- **EN 50081-1: Generic emission standard**

- **EN 50082-1: Generic immunity standard**
- **CENELEC HD-608-51: Multicore symmetrical pair and quad cables for digital transmission.**

Directives:

- **92/31/EEC: Electromagnetic Compatibility (EMC), amending Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility**
- **93/68/EEC: Electromagnetic Compatibility (EMC), amending Directives 89/336/EEC (electromagnetic compatibility), 89/392/EEC (machinery), 91/263/EEC (telecommunications terminal equipment) and 73/23/EEC (electrical equipment designed for use within certain voltage limits)**

Sockets and their fixing systems must be designed to permit replacement of an individual socket without the need to disconnect or move another.

The type of patching unit should be modulable and normally have 24 connectors per unit.

Connectors must be easy to replace individually.

Each RJ-45 unit must be completely equipped with the 24 connectors.

The complete datalink, i.e. RJ45 socket, cable and RJ45 patch panel, must be certified Class Ea.

There must also be a system guarantee on the entire installation.

2.2.2 Cabling type

All cabling must be 'low-smoke' and halogen-free to standards EN 50167 and 50169.

- 4-pair F/FTP screened 100Ω cabling
- ISO/IEC 11801 2nd ed. Cat. 6a
- Depending on the number of cables per access point, 4-pair dual or multiple cables may be installed which meet the same standards.
- 4-pair F/FTP Cat. 6a screened 100Ω copper cabling for linking CCR and LSU
- Telephone cable: 10, 50, 100 and 500 pair 100Ω Cat. 3. 24 AWG
- Fibre-optic cable:
 - Multimode: type OM3

Cables to comprise 6 to 30 multimode fibres of 50/125 µm.

Cabling must have heat-shrunk tips at each end.

They must meet the following specifications at 25°C:

- Useful range: 850/1300 nm
- Bandwidth: 500 MHz for 1300 nm and 1500 MHz for 850 nm
- Attenuation: 850nm <3.0 dB/km, 1300nm < 1.0 dB/km.
- Single mode: type OS1

Cables to comprise 6 to 12 single mode fibres of 9/125 µm.

Cabling must have heat-shrunk tips at each end.

They must meet the following attenuation specifications:

- maximum 0.45 dB/km (1300 nm)
- maximum 0.30 dB/km (1550 nm)

2.2.3 Socket types

Sockets must be female RJ45 type, FTP cat. 6a to connect any type of telephone, fax or computer workstation (computer, terminal, printer, etc.).

Self-stripping contacts, connection of sockets in accordance with ISO/IEC 11801 2nd ed., amendment 1, Class Ea, and amendment 2. Sockets must guarantee continuity of screening.

Cabling type to be a system in which the modules are the same for sockets and patch panels.

If installed in floor housings or horizontally, sockets must be fitted with a protective hinged cover to prevent ingress of dust or any foreign body and with a space for labelling.

Also, their position or arrangement in floor housings must allow enough space for the lid to close without pressing on any patching cables connected there.

Depending on the free space available for installing the sockets, they may be double or triple.

In the ring circuit sockets are to be placed next to electricity sockets. If necessary they must be able to fit into the face-plate common to the electricity socket and/or be adapted to the latter's colour.

Socket connection must be in accordance with ISO/IEC 11801 2nd ed., amendment 1, Class Ea, and amendment 2.

2.2.4 Horizontal cabling

In office areas: 5 RJ45 connection points for two façade modules (see B.I.2, point 3 – Modular configuration of office space).

In archives areas: 3 RJ45 connection points per door fitted to the partition on the switch side, and 2 spare RJ45 connection points placed in the false ceiling.

In photocopier areas: 6 RJ45 connection points.

In corridor areas: 2 spare RJ45 connection points every 20 m (slack cabling length covering 4 offices).

In car-park areas: 1 wall-mounted RJ45 connection point per hydrant, located 1.20 m above ground.

All technical rooms must have 2 RJ45 connection points, one 1.20 m and the other 30 cm above ground. There must therefore be trunking or tubing.

For each lift lobby or stair landing, one wall-mounted connection point should be provided 1.20 m above ground.

In toilets for the disabled, 1 RJ45 connection point must be installed at a height of 0.80 m.

In the remote control room, there must be 12 RJ45 connection points in stand-by with 20 m slack cabling from the nearest CCR room.

2.2.5 Connections in the cabling concentration room

4-pair cables to be fitted to RJ45 patch panels meeting the same standards as for office sockets.

The patch panel sockets form part of a modular system per connection point in which the patch panel modules are the same as those for the office sockets.

The patch panels are to be fitted in a 19" chassis or rack.

Cables to be connected to the back of the RJ45 patch panels with a small loop of slack cable.

Two different floors must never be connected to the same patch panel.

For the organisation of the rack, plans are available from the OIB's 'Property projects' unit.

Cables enter through the base of the chassis and/or rack (leave a small loop of slack under the false floor) and are cabled to the back of the RJ45 patch panels.

The complete datalink, i.e. RJ45 socket, cable and RJ45 connection panel, must be certified Class Ea.

Description of rack: (Plans available from OIB's 'Property projects' unit)

All racks to be 80 cm wide and 80 cm deep with a 19" chassis.

They must have:

- a chassis with 4 verticals (19"), i.e. 42 usable units;
- a 19" panel (60/60);
- a fan (supply and extract);

- two sets of eight 230 V sockets, unswitched;
- vertical guide rings at the front and rear of each side of the connection panels;
- an organiser system for horizontal cable guiding.

Description of chassis: (Plans available from OIB's 'Property projects' unit)

It must have:

- 4 verticals (19"), i.e. 42 usable units;
- a 19" panel (60/60);
- two sets of eight 230 V sockets, unswitched;
- vertical guide rings at the front and rear of each side of the connection panels;
- an organiser system for horizontal cable guiding. Chassis may be interlocking, according to positioning;
- sufficiently large holes must be present under the chassis to allow Telco cables to pass between the chassis reserved for live equipment and those for patch panels.

2.2.6 Vertical cabling

In each cabling concentration room there must be:

- 6 multimode fibre-optic cables to be connected to the green SC connector panels, + 6 multimode fibre-optic cables per 240 active ports (one switch) (1 switch: 12 fibres, 2 switches: 18 fibres, etc.);
- 3 x 50 copper pairs, cat. 3 - 24 AWG per 240 connection points;
- 12 FTP 4-pair Cat. 6a cables between each consecutive CCR room.

In each computer room there must be:

- 24 multimode fibre-optic cables to be fitted to the SC connector panels;
- 1 x 50 copper pairs, Cat. 3 - 24 AWG;
- 12 FTP 4-pair Cat. 6a cables connecting to the nearest CCR room.

Vertical columns:

The 50-pair telephone, fibre-optic and inter-floor connection cables are to be bundled and fixed every 50 cm in a dedicated cabletray.

Copper and fibre redundancy is to be guaranteed by the shaft reserved for that purpose.

2.2.7 Vertical cabling connections

2.2.7.1 Fibre optics

These are to be connected to the connector panels; green SC connectors with anti-dust protection for multimode fibres.

2.2.7.2 Telephone cables

In the cabling concentration room, copper telephone pairs are connected to the back of the chassis and/or rack on type IDC Technologie.110 blocks (100 pairs on each unit) to permit bridging via patch cords to the RJ45 horizontal cabling connection panels.

2.2.7.3 Inter-floor cables

For CCR rooms:

Between CCR rooms, F/FTP 4-pair Cat. 6a 100Ω cables are to be connected to the front of the chassis and/or racks on RJ45 patch panels.

For computer rooms:

Between the CCR room and the computer room F/FTP 4-pair Cat. 6a 100Ω cables are to be connected to the front of the chassis and/or racks on RJ45 patch panels.

Description of the general distributor:

The plans are available from OIB's 'Property projects' unit.

Type of cabinet: Telephone distributor

Cabinets are to be metal with no doors, having 40W fluorescent tube lighting and three electricity sockets - bipolar with earth.

The verticals are mounted on slide rails.

They must always be mounted on the central axis of the connector blocks. Each connector block is to be fitted with a horizontal bracket for cable-bundling and metal 'pig-tail'-type rings through which the in-line wires pass.

There must be 15% spare for the verticals.

Cabinet cabling:

In all cases, cabling must enter through the base via the false floor.

Cabling must have sufficient slack to allow for movement of the cabinet.

Cables must have 'heat shrink' caps at each end.

Cabling connection must be on the left side on system-breaker and/or no-break blocks of the 'Miniverteiler' type. Each vertical and block is to be numbered and labelled.

2.2.7.4. In the main distribution frame room

An 800x800 19” active rack is to be fitted to accommodate the fibre-optic patch panels and 12 F/FTP cables to the closest CCR room (< 90 m) (CCR and LSU), for installation of live equipment (switches).

2.2.8 Documentation

2.2.8.1 Numbering

All cabling elements are to be numbered by permanent indelible marking. Direct marking on cables using a marker is not allowed.

For F/FTP cables, the jack number must be marked on the cable at each end next to the jack.

For sockets, the marking is made directly on the socket housing in a space reserved for that purpose. In the case of floor boxes, the numbering can be on the box instead to make it more legible.

2.2.8.2 Testing

All cabling is to be tested (reflectometry, tests under load).

All elements must meet the following test bulletin specifications:

- TSB 36. Technical support – Bulletin 36 –cabling.
- TSB 40. Technical support – Bulletin 40 – connectors.
- TSB 67. Certification of cabling systems.
- TSB 95. Certification of cabling systems.

The test results must be stored on computer.

2.2.8.3 Plans

AutoCad electronic design conventions on cabling, e.g. line layers, colours and types, are to be formalised in several templates. Details of the version of AutoCad to use and of the graphics guidelines applying to drawings should be requested from OIB’s ‘Property projects’ unit.

2.2.9 Cabletray fire protection

Fire protection standards must always be respected (grouped cabling, recreation of fire resistance properties after drilling of holes, use of packing products limiting the spread of fire via cabling).

See Section B.III - Health and Safety.

2.2.10 Implementation and finishing

In general terms, all cabling must be professional quality and materials used must meet the relevant standards.

2.2.10.1 Cable drawing

This is a critical stage in the installation.

It is important that the tension on the cables is as regular as possible over the entire bundle.

Cable tension must remain moderate. If cables are stretched too much the copper stretches and its transmission qualities are affected.

Maximum tension:

- 1 x 4 pairs → 50 N (5 kg)
- 2 x 4 pairs → 75 N
- 3 x 4 pairs → 100 N
- X x 4 pairs → $X \times 25 + 25$ N
- Maximum tension regardless of number of pairs → 200 N

2.2.10.2 Bending

When cables are bent a number of parameters must be scrupulously complied with.

Cables must not be pulled around a sharp angle or a ridge. Such an operation could affect their mechanical properties and, ultimately, their transmission capacity.

Once the cable is installed ensure that the bending radius is not too small, to avoid altering the cable's geometry. Otherwise the cable's electrical properties may be affected.

Minimum bending radius:

During installation: 8 x the external diameter of the cable.

Once installed: 4 x the external diameter of the cable.

2.2.10.3 Cable positioning

During positioning, the following points must be borne in mind:

- Cables must not remain stretched after positioning.
- Cables must not be pinched, even when fitting clips, in particular on cabletrays.

Clips used for bundling and fixing cables must be installed in such a way as to avoid pinching the cables (check the tension as the clips are tightened, or use a Velcro clip, etc.).

2.2.11 Spare capacity

There must be 15% spare capacity in cabletrays, floor circuits and connection panels.

2.3. Plant rooms connected to cable installations

2.3.1 Lifts

Lifts must have a telephone recess.

In each lift-gear room, two connections must be installed between the lift control panel and the main distribution frame. One 4-pair F/FTP Cat. 6a cable must also be installed per lift car.

At the lift gear end, the F/FTP cables are to be welded in a telephone distributor while the connection to the lift control panel will be made using screws. Connections must be clearly identified and tested on the cables and distributor.

At the MDF end the cables are to be connected to no-break blocks type IDC C39104-AG3-A1.

2.3.2 Remote control

12 F/FTP Cat. 6A cables with an RJ45 connection in a wireway in the remote control room are to be connected to the nearest CCR room. These cables must be connected to a dedicated RJ45 patch panel and marked 'GTC' followed by the floor of the CCR room and its socket number. Connections are also to be provided between various technical cabinets and the nearest CCR room, the number and location being decided on a project-by-project basis. These cables must be connected to a dedicated RJ45 patch panel and marked 'GTC' followed by the floor of the CCR room and the socket number.

2.3.3 Alarm centre

12 F/FTP Cat. 6A cables, with an RJ45 connection, with 20 m slack in the remote control room (or, where appropriate, in the alarm centre) are to be wired in the nearest CCR room. They must be connected to a dedicated RJ45 patch panel and marked 'DS' followed by the floor of the CCR room and the socket number.

3. LIVE EQUIPMENT

3.1 Data network

The services to be provided comprise all the works needed for complete finishing of the described installations, i.e. supplies, handling, assembly, adjustments, putting into operation, etc., starting from a network in which the cables and patch panels are already installed.

Telecoms equipment may only be installed once the premises have been dust-free, cooled by air-conditioning, with secured physical access and supplied with a stable power supply for at least two months prior to occupation of the building.

The external lines assuring interconnection of datacoms and telecoms networks are to be ordered prior to the date of occupation via a DG DIGIT Commission contract. The external

lines will enter the building via two different physical entry points to guarantee redundancy. The connection of the building network to these lines is not part of the contract.

Requests for special external connections which may be made by other Directorates General do not fall within the responsibility of DG DIGIT. For each project, a detailed technical description will be provided which will serve as the reference for the contract, taking account of special features of the building and its cabling. This detailed description will be based on the layout below.

3.1.1 Network layout

- All cabling to end-users is to be concentrated in patch panels installed in CCR rooms. Their number and siting in the building are to be optimised on the basis of the criteria specified in Section B.II.6.
- The CCR and MDF rooms are to be equipped with racks for fibre or FTP cables ('passive' racks) and racks for the installation of live equipment ('live' racks). The live racks will be interspersed between the passive racks in order to limit the distance between the live equipment and user connections.
- If one or more conference rooms are planned for a building these must be fitted with a certain number of communications sockets, which are generally concentrated in special patch panels.
- A fibre-optic backbone is to be available from each cabling concentration room. The backbone is to comprise multimode fibres and be routed to the MDF room. This room fulfils various functions:
 - 1) Housing the PABX,
 - 2) Housing the central data switch which interconnects all the switches in the building's CCR room.
 - 3) The MDF room is also the entry point for the external connections which interconnect the building's network to the Commission's inter-building network.
 - 4) Sometimes the MDF room may also serve as the cabling concentration room if the building's design enables the connection points to be concentrated there.

Material used for the same equipment must be supplied by a single supplier/manufacturer so as to make up an integrated system and offer the maximum guarantee of reliability and compatibility in relation to the infrastructure already in place in the Commission's other buildings.

The material must be approved by a SECT. The owner must guarantee the availability of spare parts for at least 10 years from the date of provisional acceptance of the installations.

The proposed material must bear the CE marking clearly affixed to it.

The network's live equipment is based on an Ethernet network switched at 10/100/1000/10000 Mbps. It is to be installed in the existing 19" bays and connected to the

230 V mains via socket terminals within the patch panels. The live equipment has redundant supplies so each must be connected to a different circuit (UPS and normal/emergency).

To facilitate patching between the ports of live equipment and the user connections, patch panels for the connections from the live equipment (Telco-RJ45) must be installed in the passive racks between the user patch panels. These panels will be connected to the live equipment via Telco cables which must be passed through the room's false floor.

The connection of these patch panels to the live equipment, and the fibre connections required to connect the live equipment as indicated in the specific technical description provided for a project, are included in the services to be provided.

It must be possible to configure the equipment with, e.g.: IP address, VLAN, etc., according to data supplied by the Commission.

Pre-patching the data network is to be defined according to building occupancy. The pre-patching operation consists in connecting the switches' active ports and the passive sockets.

3.1.2 Network specifications

3.1.2.1 Description of network

Switches are to be installed in the live racks of each CCR room to supply workstation connections at 10/100/1000 Mbps Ethernet switched. The switches are to be equipped with a maximum of 240 10/100BASE TX ports on Telco cards (RJ21) or 10/100/1000BASE-TX ports on RJ45 cards.

To allow vertical connection in the patch panels the switch ports will be extended to the passive racks using intermediate Telco-Telco and patch panel RJ45-Telco extension cables. This will allow vertical connection between end-users' sockets and switch ports.

In the MDF room a central switch will group together all the backbone connections of the switches installed in the CCR and computer rooms. All connections to be GigaBit or 10 GBASE Ethernet on multimode fibre optics.

Each CCR switch is linked via two fibre-optic links to the central switch in the MDF room. The two fibre-optics used for each switch must be selected so as to use the building's redundant shafts.

The central switch is also to be used to connect the connections to the external network.

A switch is to be installed in the LSU or computer room.

This will also be linked to the switch in the MDF using two multimode connections.

The connections between the switches described above may be changed at the request of the competent department of the Commission. The changes will be made with the agreement of the installer and will not affect the existing cabling infrastructure.

The building network is to be linked to the Commission's current inter-building network, the SNet.

For that purpose two independent fibre-optic entries are to be available, routed to the MDF. These must be on two different façades.

3.1.2.2 Technical specifications of the live equipment

The detailed technical specifications of the equipment to be installed and the required configuration will be communicated for each project. As a guide, the generic description is as follows:

The live equipment must be compatible with the existing Cisco installation (Catalyst 4500 and 6500 family) operating in the other Commission buildings.

A VLAN is to be linked to an IP sub-network with a 24-bit mask (255.255.255.0).

Workstations are spread out over all floors and each station is to be connected to a separate port on a switch.

For buildings where VOIP is to be deployed, the IP telephone will be connected to the switch port and the workstation to the telephone. In this case each switch port must be configured to allow 2 separate VLANs to pass through it.

The equipment must be supplied, installed, checked and delivered in operational state. The optical patch cords (fitted with SC/COMPUTER connectors at both ends) needed to interconnect all the building's switches will have to be fitted. All modules providing connection to users will normally have to be fitted with Telco connectors (RJ21). The intermediate Telco RJ45 patch panels must be supplied and fitted Category 5 FTP. These units must have 24 connectors and occupy no more than one unit in the bay; they must also be fitted with an earthing screw. The Telco-Telco leads must be Category 5 UTP and of sufficient length (as short as possible while still allowing them to pass under the false floor between the live and passive racks).

3.1.2.3 General specifications for patch panel equipment

Chassis in the CCR: The patching chassis in the CCR room house the horizontal switches. These directly serve the workstations.

One or more horizontal switches are installed in each chassis. The typical minimum configuration of such a switch is as follows:

- one chassis with two redundant power supplies capable of full operation with only one of them active,
- a non-redundant management card,
- multiple 48-port Ethernet cards via RJ21 or RJ45 connectors (according to project specifications),
- each port on the chassis must be able to supply IEEE 802.3af standard equipment. One chassis with all ports connected must be capable of supplying 40% Class 3 equipment and 60% Class 2 equipment (see the IEEE 802.3 af standard),

- a detailed description of this equipment will be supplied in the technical specifications of the project concerned.

Chassis in the MDF: The chassis in the MDF room houses the central switch which guarantees connection between all the building's switches and connections to external networks.

In the MDF room a central switch with at least the following configuration is to be supplied:

- one chassis with two redundant power supplies capable of full operation with only one of them active,
- two redundant management cards for advanced (level 3) routing functions (MPLS, BGP, etc.),
- at least 2 modules capable of receiving fibre-optic connections from other switches in the building,
- one or more modules fitted with RJ45 10/100/1000BaseTX connections,
- in some cases, to increase the physical redundancy, these modules will be split between two separate chassis configured as a single logical entity,
- a detailed description of this equipment will be supplied in the technical specifications of the project concerned.

Chassis in the LSU: The LSU switch is used to connect the computer servers. As for the horizontal switches, the LSU switch is connected to the central switch via two GigaBit Ethernet connections on multimode fibre-optics.

In the machine room an LSU switch with at least the following configuration is to be supplied:

- one chassis with two redundant power supplies capable of full operation with only one of them active,
- two redundant management cards,
- various RJ45 10/100/1000BaseTX connection modules,
- a detailed description of this equipment will be supplied in the technical specifications of the project concerned.

3.1.2.4 Spare parts

The installer will be responsible for supplying spares, which must be of the same type as that used for the live equipment to be installed in the various patch panels.

The installer must ensure that the spares are stored in the best possible conditions so as to preserve their properties.

3.1.2.5 Required tests

As a minimum, the following tests are to be performed:

- From a terminal linked to the console port on a switch, verify the status of the interfaces linked to the other switches: each configured interface must be active.
- Each module is to be equipped with 4 Telco connectors. The first and last ports of each Telco connector must be tested, i.e. ports 1, 12, 13, 24, 25, 36, 37 and 48. The tests consist in connecting a computer in auto-sense mode to the specified ports (also configured in auto-sense mode) and transmitting a sequence of at least 20 512-byte pings to the IP address of the central switch. When the tests are being performed it is also important to verify the status of the LED corresponding to the port being tested. For example, when port 36 is on test LED number 36 must be active. It is also imperative to verify that the computer's network card and the switch port are synchronised in auto-sense 100 Mbps full duplex.
- For each 48-port module (4 Telco connectors) a minimum of one port per Telco must be given a file-transfer test. The following points need to be borne in mind for this test:
 - A server computer must be installed and connected to one of the ports on the computer room switch (in 100 Mbps forced full duplex at server and switch);
 - The client computer from which the file transfer is to be initiated and the switch port must be configured in auto-sense mode;
 - The test consists in transmitting a 500 MB file from the client computer to the server computer;
 - The test must be performed by connecting the client computer to the network via a socket in an office;
 - Each test must be performed from sockets in different offices;
 - Before starting a test the error counters on the switch to which the client computer is connected must be re-initialised;
 - Once the test is complete the error counters must be read and attached to the test report;
 - It is also imperative to verify for each test that the client computer's network card and the switch port are synchronised in auto-sense 100 Mbps full duplex.

3.1.2.6 Pre-patching

Patching is the word used to describe connecting a passive socket to an active port. Both the live equipment connector and office socket connector are female RJ45 type. So, to make a patch, an FTP Cat. 5E cable with male RJ45 connectors at each end will be needed.

The proportion of sockets to be pre-patched will vary between 1/3 and 2/3 of the sockets reserved for computers, i.e. between 1/3 and 2/3 of the total number of sockets installed in the building.

The rule to apply for the selection of the sockets to pre-patch and the number of patching cables to purchase will be specified separately by the Commission for each project.

Pre-patching method: It is very important to do the pre-patching properly. For that purpose, the active ports (Telco patch panels) must be carefully placed to keep the patch-cords as short as possible. Pre-patching must be studied so that most of the patch-cords used are 20 cm.

The racks housing the passive sockets and the active ports are pre-equipped with pigtails and organisers. The pigtails are used to thread cables larger than 20 cm and the organisers accommodate the surplus cable length.

If a patch-cord longer than 20 cm is used labels must be added to the cable. The following rules must be complied with:

- A cable of the correct length must be used. The surplus cable length must not exceed 50 cm;
- An organiser comprises three sections for storing the excess cable. The two end sections must be used to store excess computer cables. The middle section is reserved for telephone service requirements;
- To avoid overloading the pigtails, cable distribution must be balanced between the two sides of the rack. From the passive end always go to the nearest side of the rack. From the active end, always try to choose the nearest patch-panel port.

Specifications of cords and quantity: The cords to be installed are those for connecting computers by Ethernet at 100 Mbps (100BASE-TX). They must be FTP Cat. 5E with a male RJ45 connector at both ends. The choice of connector is very important for guaranteeing good end-to-end connectivity and also for avoiding socket damage when the patch-cords are pulled out.

Cord labelling: Any patch-cord longer than 20 cm must be provided with two 'colson' labels; the number of the passive socket must be indelibly marked on each cable end. The socket number must be marked in its entirety so that the cord label is unique in the CCR room concerned.

The information must contain the source and destination points of the connection.

Required tests: Every patched socket must be tested to verify the end-to-end connection (from office socket to active port). The test may be done by using a portable computer to ping another computer connected in one of the CCR rooms.

Documentation: A list of patched sockets must be supplied to the Commission at the time the building is delivered (acceptance). It must be in Excel format and contain two columns indicating the correspondence between the passive socket connected to the switch's active port as in the table below.

Passive socket

Active port

00.A.02.003

Sw01/1/25

4. TELEPHONE NETWORK

4.1 General specifications

One or more PABXs are to be installed for the optimum secure handing of telephone traffic to and from the building.

The PABXs therefore constitute a local PABX network guaranteeing identical inter- and intra-site services, as supplied by a single PABX, without using prefixes or abbreviated numbers and without impacting on the Commission's private intersite network.

A VoIP-type platform (Voice over IP) may also be deployed in new buildings. This will be installed in each building in phases, gradually replacing the traditional PABX.

Each building will be given a VoIP gateway which will communicate with the central softswitch and at least one analogue gateway (depending on the size of the building) to manage connections from analogue telephones (lifts, halls, etc.).

Horizontal distribution is to be via structured cabling (see Section B.II.6.2).

4.2 Installation

DG DIGIT will be responsible for the installation of the PABX in the MDF room.

Telephone equipment may only be installed once the premises have been dust-free, cooled by air-conditioning, with secured physical access and supplied with a stable power supply for at least two months prior to occupation of the building (see Section B.II.7 – Special-purpose areas).

4.3 External connections

External connections to interconnect the Commission's telephone network are to be ordered before the date of occupation using DG DIGIT's contract. If the building is important they must enter at two different physically separated points to guarantee redundancy. In the case of a less strategic building one entry point will be sufficient.

For the purpose of connecting the various PABXs and for connection with the rest of the Commission network (SDH network) DG DIGIT will arrange for a Belgacom ADM of the necessary capacity to be installed in the relevant MDF room.

For connections between the various PABXs in the building and between the PABXs and the technical rooms DG DIGIT will arrange for the necessary cables to be installed using vertical shafts.

Only in the case of a major node in the network will connections be made to the networks of the public operators concerned, solely by means of Euro-ISDN (ETSI) channels.

5. CABLE TELEVISION

Installations will be limited to network infrastructure and rooftop dishes. The dishes are to be placed on a metal structure on the roof, the structure forming part of the building's infrastructure.

The local cable television operator will be responsible for supplying and fitting live and passive equipment.

The cable television entry point will be in the MDF room. The vertical coax cabling will be fed through the shafts to serve every floor. The network installed must provide at least one connection per 60 m² of offices. The maximum length of the horizontal connection must not exceed 50 m in accordance with the operator's specifications.

The electronic equipment for HF frequency and digital/analogue conversion will be installed close to the cable network entry point (PABX room).

B.II.7. SPECIAL-PURPOSE AREAS

1. COMPUTER ROOMS

1.1 Introduction

Computer resources fall into one of the following three categories: shared systems, local systems and stand-alone systems. Machines forming one local system serving a number of units should be concentrated in a single area, thereby enabling the power supply, communications, security, etc. required for such hardware to be rationalised.

The purpose of this present chapter is to define a standard environment that must be created in all such areas.

The choice of location must be based on prior internal agreement among the user departments.

1.2 Location

The site must not be located:

- behind a ground-floor window directly overlooking the street;
- near a car park or garage;
- above or near a potential source of fire;
- below or near a potential source of flooding;
- near a source of strong vibrations;
- near a source of strong magnetic fields;
- near a source of strong radio-frequency emissions.

The location must be identified only by the usual address system and not by a special notice (e.g. 'Local computer system for DG...').

1.3 General physical design

Rectangular shape, with a surface area not exceeding 100 m².

The external and internal walls enclosing the computer room must extend from the structural floor to the structural ceiling, have fire-resistance of at least one hour (FR 60/FR 1h/REI60/EI60) and be resistant to vandalism. All sides of the room (walls, ceilings, floors, doors, windows, etc.) must be able to resist the pressure increase resulting from the discharge of the extinguishing agent. To avoid an increase in pressure that would compromise safety in the room or building, provision must be made for excess pressure limiters.

The staff-access and emergency doors must be fitted with overhead closers and a bull's-eye window enabling surveillance but preventing unauthorised access. Doors will open in the direction of evacuation. They must unlock automatically in the event of the release of gas or an automatic detector alert but must be kept mechanically closed by a good quality bolt.

As far as possible, an LSA room enabling operators to work in good conditions (as regards noise, ventilation, etc.) should be integrated into the computer room; its area must not exceed 10 m², and it must form an integral part of the computer room as regards fire detection/extinguishing, air conditioning, etc.

1.4 False floor

Each floor tile's electrical resistance must be sufficient to prevent short-circuiting or electrocution in the event of accidental contact with live circuits (230 V or 400 V, 500 V maximum), but at the same time its conductivity must be sufficient (1 000 megaohms maximum) to dissipate static electricity.

The floor tiles (60 x 60 cm) must have good fire-resistance (e.g. A0 or A1 under Belgian standards) and mechanical resistance. They must be able to bear an evenly-distributed load of 20 000 N/m². Their local load-bearing capacity must be 4 500 N for a maximum deflection of 2 mm.

A quarter of the metal floor supports and all the other metal parts under the false floor - such as cable supports, inert-gas pipes, etc. – must be earthed by means of a VOB cable measuring at least 6 mm² connected to the computer earth.

Two suction grips for lifting the tiles must be available at all times.

All ferrous metals must be protected against corrosion.

Fitted carpet or vinyl must be covered with Masonite or similar.

Screed must be covered with two coats of anti-static paint extending 10 cm up the walls.

All dust must be carefully removed from the space under the false floor.

The principal characteristics are as follows:

- Pre-cut recesses must be provided for the base(s) of the air-conditioning cabinet(s),
- Overall height of the cavity floor: 24 cm minimum,
- Available height within the cavity floor: 20 cm minimum,
- Ventilation tiles: 400 m³/h/ventilation tile,
- The various cables in the floor must be arranged so as not to exceed two layers of cloth in height.

1.5 Access control

See Section B.IV. – Security and Protection of Property

1.6 Preventing fire and the spread of fire and smoke

Cables, ducts, etc., must be passed through the floor, walls and ceiling individually – i.e. not in bundles – so that the surrounding gaps can be properly sealed against fire and smoke. All openings, cracks, etc., which could allow fire and smoke to penetrate from outside the area must be sealed in order to preserve the fire-retardant properties of the walls, etc.

All ventilation ducts crossing the area must be re-routed or fitted with a fire-break at each point where they go through an internal wall. Failing that, a false ceiling with fire-resistance of 1 hour (FR 60/FR 1h/REI60/ EI60) may be considered.

The constituent materials of the ventilation ducts, suspended ceilings, cavity floors, partition walls, furniture, fittings and cabling must have good fire-resistant properties in compliance with the relevant national or European rules and standards (see Section B.III.1, point 3). Note that ventilation inside the room must withstand overpressure in the event of the discharge of an extinguishing agent.

1.7 Automatic fire detection and extinguishing*

1.7.1 General

Only stand-alone systems may be installed in computer rooms.

The installation must be carried out in accordance with standard operating practice and must be fully compliant with the following documents, standards and regulations in particular:

- **standard EN 12094-1 (2003),**
- **ANPI (Belgian National Fire Safety Association) technical instruction note 121,**
- **standards EN 15004 and ISO 14520 for inert-gas extinguishing systems.**

See Section B.II.8 – Fire detection

1.7.2 How fire detection works

Fire detection is based on two separate detector systems covering the three areas of the computer room, i.e. the false floor, the surrounding area and the false ceiling.

Detectors must be of the following types: ionisation detectors without a radioactive source, optical smoke detectors or detectors that use laser technology. A combination of types of detector is permitted.

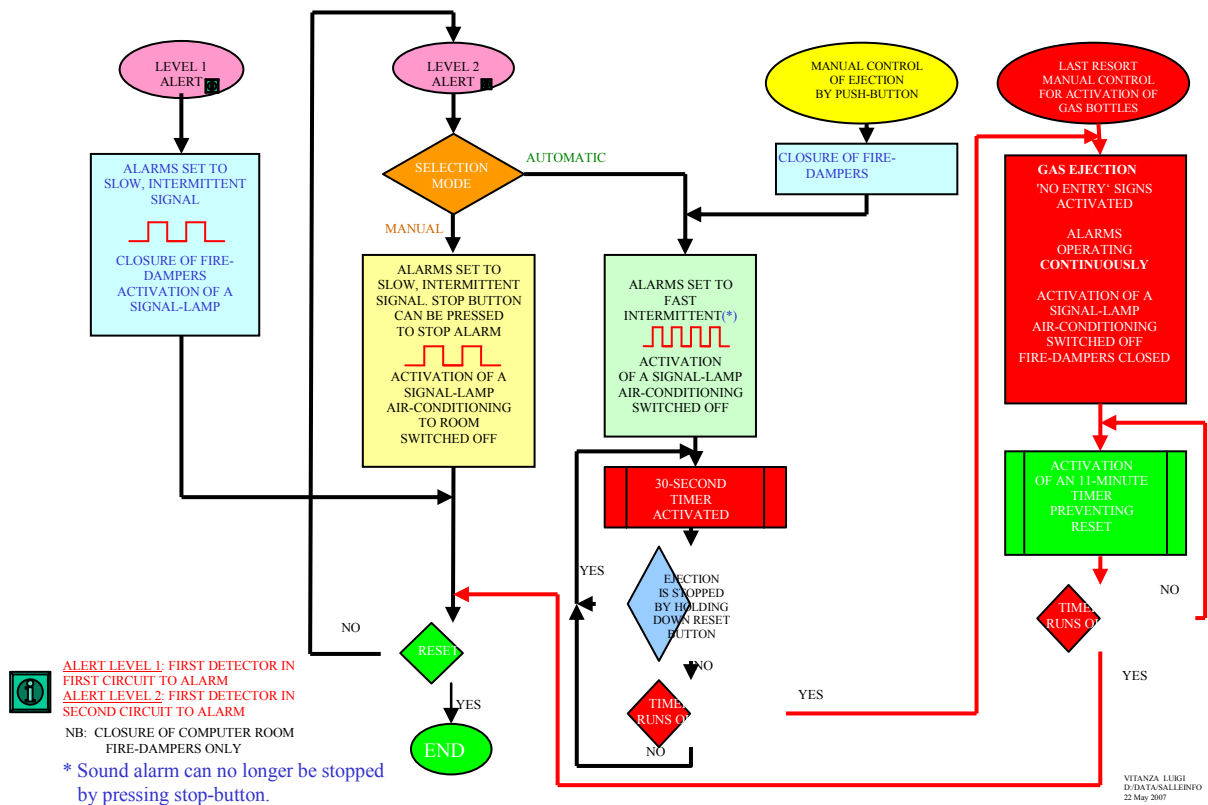
The operation is depicted in the flow-chart below.

The detectors concealed in the false ceiling or false floor must activate response indicators on a board with LED-type zone indicators. The board must be next to the fire control panel or on the panel if there are six or fewer detectors to report.

A manual control is to be provided at each entrance door (timed electric manual control). A non-timed emergency mechanical control, directly linked to the extinguishers, is to be provided outside each entrance door if the extinguishers are located inside the room. This control is to be installed directly on the pilot extinguisher of the group if the group is located outside the room.

There must be a control chain: level-1 alert, level-2 alert, turning off the gas, general default, automatic/manual override, closing the fire dampers, switching off the air conditioning.

OPERATION FLOW-DIAGRAM OF FIRE PROTECTION SYSTEM FOR A COMPUTER ROOM ADAPTED TO STANDARD EN 12094-1 (2003 version)



1.7.3 Equipment description

1.7.3.1 Detectors

See Section B.II.8 – Fire detection

1.7.3.2 Push-button or manually controlled extinguishing systems: break-glass type

These units may be recessed or not, depending on the type of wall. The alarm is to be set off by pushing on the pre-cut glass cover. Alarm buttons requiring a small hammer or a second operation to set off the alarm after breaking the glass are prohibited. The push buttons for manual control of the extinguishing system are to be fitted with a protective cover and allow for attaching lead seals. It must be possible to test the push buttons without opening the housing using a key.

1.7.3.3 Acoustic devices - alarms

See Section B.II.8 – Fire detection

1.7.3.4 Flashing lamp (optical signal in the room)

The lamp must be made of thermoplastic material with a red cover (IP 54). Its brightness must be 1.6 candela seconds, with a power of 5 W seconds.

1.7.3.5 ‘No entry’ sign

There is to be a ‘no entry’ sign at each entrance door in the event of gas emission. The lamps are to come on in the event of extinguishing. Each entrance door is to bear a sticker drawing attention to the fact that the room is fitted with automatic extinguishing equipment and giving the name of the inert gas used.

1.7.3.6 Summary board

A summary diagram of the location of the detectors installed in the false floor (and/or false ceiling) is to be provided on the central control panel (if there are less than six detectors) or in a separate cabinet. Diagrams on laminated paper are not permitted. The cabinet is to contain blocks of numbered LEDs and a compartment in which the installation plan can be placed. If detectors are added subsequently, this must not alter the cabinet’s layout (e.g. there must be no new front panel).

1.7.3.7 Central control panel

This must be housed in an IP44 metal cabinet for vertical assembly, with a cable access plate at the back. The cabinet door must have a key-operated lock and be watertight. The panel must be BELAC or EU-equivalent approved. All the optical signals and the various switches must be visible, and it must be possible to operate them without having to open the cabinet.

1.7.3.8 Electrical wiring

All the wiring is to be by telephone cable, twin-pair or more. For circuits monitored by the main control centre, provision should be made for:

- the detector and alarm button circuits;
- the circuits for signals to other systems.

Appropriate wiring is to be used to supply the air-conditioning system, for example. Where underground or open-air ducts are used, these must comply with the regulations in force. Fire-resistant wiring is to be used for the alarms and the group of extinguishers (FR type).

1.7.3.9 Relaying information

The following information is to be relayed to the building's control centre:

- initial alert;
- double detection;
- extinguisher override (automatic/manual position);
- gas emission;
- central default.

1.7.4 Gaseous extinguishing media

1.7.4.1 General

Only inert-gas-based extinguishing media complying with the relevant regulations on human and environmental protection are permitted.

The use of products with an Ozone Depletion Potential (ODP) > 0 is prohibited.

Extinguishing gases with a Global Warming Potential (PRG) > 0.5 are prohibited.

If there is a risk of the extinguishing medium causing dangerous decomposition products, the quantity (in ppm) must not exceed the limits stipulated for the safety of persons exposed to the risk. Such a medium must be used only in unoccupied rooms.

1.7.4.2 Description of extinguishing gases

The extinguishing media are to be mixtures of inert gases including: nitrogen, CO₂ and argon. The extinguishing effect is brought about by reducing the level of the oxygen in the room (from 21 % to <12 %). The medium used must not affect persons present; this is to be confirmed by:

- the product's medical certification (tests carried out on people);
- the system approval (VdS, UL, etc.);
- the product approval (VdS, LPC, ISO, etc.).

A maintenance and refilling proposal is to be included with the tender.

The requisite quantity of the extinguishing medium is to be calculated in accordance with standard EN 15004 or ISO 14520. The distribution-network calculation must be submitted for approval before the works start. Also, approval of the installation by a SECT (including a fan test to check that the room is airtight) will be carried out, as well as for all detection aspects.

Each extinguishing medium's effectiveness depends on its concentration being maintained for 10 minutes so that the fire cannot regain strength. Because of its composition, the gas will spread uniformly throughout the room and stabilise – provided that the room is sufficiently airtight. However, the emission of gas in a room could create excessive pressure. This must be discharged through correctly proportioned pressure relief valves into a volume equivalent to at least 1.5 times the volume protected. Discharge towards the outside is preferable.

In order to obtain a correct ratio between existing openings and openings to be created, it is important to be able to measure the existing openings. This must be done by means of a fan test to ascertain pressure in the room at risk. The data obtained are to be input into a program which will give us the correct ratio. The cost of the fan test is to be borne by the tenderer.

Sealing existing openings or making new openings is to be undertaken by parties specialising in works of this type.

1.7.4.3 Equipment description

Bottles: The bottles containing the extinguishing gas must comply with RGPT standards (Article 52). The bottles must be approved by a recognised Belgian body. The certificate must be supplied after installation. The approval date engraved on each bottle must not be more than eight months before delivery.

Each bottle must be fitted with:

- a gauge, with switch, to indicate loss of pressure;
- a covered bronze valve for the following:
 - a lever for manual mechanical control;
 - an electrical control (on the master bottle);
 - a pneumatic control.

It must be possible to remove the gauge and the control devices from the bottles without losing extinguishing gas. The bottles are to be connected to the network by a flexible tube so that they can be removed without having to touch the ejector network. Several bottles are to be connected to a manifold by means of flexible tubes and non-return valves.

Pilot bottle: the activating control system must be electromagnetic and not fire-activated.

The network: All the distribution pipework is to be specified by the installer. There must be a sufficient number of fixing clamps and these must be able to withstand the variation in pressure during ejection. All the clamps must be fitted with a base plate and two fixing points. The use of plastic plugs is not allowed. The pipework must be hydraulically tested. The pipework must be earthed (the tenderer is responsible for the point of connection).

The ejectors are to be made of brass and bear an identification number.

1.7.5 Commissioning the system

The installer must test all parts of the system, including:

- a physical test of each detector, alarm button and technical address,
- checks on their physical location, compared against the messages issued by the control panel,
- tests on all servo-mechanisms,
- the provision of a checklist in English or French for all these tests.

1.7.6 Technical file

At the provisional acceptance stage for the system, the contractor must provide the Commission with the technical file, in electronic form (AutoCad, Word or Excel - see OIB for the relevant release in each case), containing:

- the layouts approved by the BELAC-accredited inspection body, identifying all detectors, alarm buttons, loops and zones, as well as the wiring plan,
- a clean inspection report issued by the BELAC-accredited body,
- the single-line diagrams,
- the isometric calculations,
- the detailed block diagrams for the control panel and distribution frame,
- the manufacturer's specifications for all the equipment installed, and the names and quantities of all system components,
- the details of all the address messages on paper and in electronic form,
- the programming code for the cause and effect functionality on paper and in electronic form,
- the conformity certificate attesting that the system meets the requirements of the BELAC-accredited body in the case of Belgium, or its equivalent at EU level, based on competence criteria corresponding to European standards EN 45011 and EN 45013 (equipment and installer),
- a list of all the detectors indicating the analogue value determining their sensitivity on the date of provisional acceptance.

1.8 Lighting

The lighting must be sufficient to avoid staff eye fatigue (for lighting level, see Section B.II.3, point 2.2). It must be connected to an emergency power supply.

There must be self-contained emergency lighting units to enable staff to be evacuated.

Lighting for mobile surveillance: the room's main door must be fitted with a bull's-eye window so that the security guards can monitor the room from the outside, and there is to be a push button outside the room for switching on the room's normal timed lighting (for 30 seconds).

Lighting for the occupants: it must be possible to turn the equipment-room lighting on and off (via a normal, non-timer switch) from inside the room, and off only from inside the room.

1.9 Ventilation

Installation of a clean-air intake: flow rate: $1.5 \times \text{volume/h.}$

Installation of an air extractor: flow rate: $1.2 \times \text{volume/h}$.

If the fire alarm is activated:

- the fire dampers must close;
- the computer-room ventilation must shut down.

1.10 Air conditioning

Two identical cabinets set up in parallel are to provide air conditioning for the room; each cabinet must supply half the required maximum power (they are not to be redundant but complementary).

Maximum heat to be given off by the machines: 400 W/m^2 .

Ambient conditions: temperature: $21^{\circ}\text{C} \pm 1^{\circ}\text{C}$,
 relative humidity: $50\% \pm 10\%$.

The air-conditioning installation must restart automatically after a brief power cut.

An auxiliary switch must enable the fire-detection control centre to turn off the air-conditioning cabinet.

The air-conditioning cabinet in the computer room, with high extractors and blowers in the false floor, is to incorporate:

- electronic regulation, monitoring and control systems;
- an electrode-based or infrared humidifier;
- electrical heating resistors;
- a circuit for removing condensation;
- a mains-water supply circuit with a filter and a pressure reducer;

- linear – or, failing that, multi-point – humidity detection, on the floor under the cabinet and the water pipes.

The following indicators will feature on the front of the cabinet:

- cooling, humidification, dehumidification, heating, etc.;
- alarms. general, filters, relative humidity, temperature, water leak, etc.;
- general alarm linked to the BMS.

The air-conditioning cabinet must have an anti-vibration base.

No pipework is to be placed above the racks; pressurised pipework is permitted only in the false floor (this route will be the shortest possible). An evaluation of the risk of flooding will be carried out to determine whether a water sensor is required in the false floor.

1.11 Electrical installations

Cables supplying power in sensitive areas must be designed to supply non-linear loads (switch-mode power supply), the neutral wire thus becoming an active conductor; its section must be equal to that of the phases so that such disruptions will have to be taken into account when calculating the size of the circuit-breakers – which are to be of magneto-thermal type on the phase conductors and the neutral.

The power cables placed in the false floor are to be flexible and fitted with protective braiding (LIYCY-type); this must be connected to the board's earth bus. The conductors are to be connected using terminal spade tags.

Each active rack is to be fitted with three multi-socket buses supplied by three different circuits from the room's Data board (on UPS).

The sockets and cables must be indelibly marked (at each end of the cable); as a minimum, the mark must state the number of the corresponding circuit.

1.11.1 Earthing

In order to protect the staff and computer equipment, the earth network must comply with the standards in force.

Work to be carried out:

- check that the impedance value measured at the earth is less than 3 ohms;
- construct a single, equipotential earth circuit dedicated to the computers. The equipotential wire must be at least 25 mm² in section. In the rooms, the telecommunication racks and cable ducts are to be connected to the earth bus by a green and yellow VOB cable measuring 16 mm² in section or a ground lead; The patch panels will be connected to the earth via their attachment to the 19" chassis and by a green and yellow VOB/ST cable measuring 2.5 mm² in section. Loops will be inserted between the patch panels to allow them to be removed from the 19" chassis for servicing without cutting the equipotentiality;

- earthing the cavity-floor jacks (minimum 6 mm² in section): one jack in four (one per floor tile);
- each earth wire must be correctly marked.

1.11.2 Distribution board

This will include:

- HPC fuse isolator;
- minimum delayed circuit-breaker controlled by an emergency stop button, a safety thermostat and fire detector;
- initial circuit-breakers (number to be determined for each case);
- three-phase voltage presence relay linked to the remote control;
- possibility of overriding the board (bridging the minimum current for a fire-detection test, placing the control centre in default mode).

1.12 Remote control

The following items must be connected:

- ambient-temperature and relative-humidity sensors,
- air-conditioning cabinet general alarm,
- no-voltage alarm (all three phases).

Specifications: see Section B.II.1 – Remote control

2. MAIN DISTRIBUTION FRAME

2.1 Introduction

The main distribution frame (MDF) is to house the equipment needed to interconnect the different floors of the building and the Commission's various telecommunication networks:

- PABX (telephone exchange);
- switches/router,
- operator infrastructure,
- cable television,
- satellite pick-up.

This room's sensitivity requires special technical installations.

2.2 Location

The area must not be located:

- on the top or bottom floor;
- behind a ground-floor window directly overlooking the street;
- above or near a potential source of fire;
- below or near a potential source of flooding;
- near a source of strong vibrations;
- near a source of strong magnetic fields;
- near a source of strong radio-frequency emissions.

The area must be located:

- near vertical cable shafts so that the cables do not have to pass through parking areas;
- near existing entries (telephone services, cable television, etc.).

2.3 General physical design

The room is to have a minimum surface area of 40 m²; it must be appropriate for the size of the building and for the building's role in the telecommunications networks' structure (node or satellite).

The external and internal walls enclosing the computer room must extend from the structural floor to the structural ceiling and have fire-resistance of at least one hour (FR 60/FR 1h/REI60/EI60).

2.4 False floor

Specifications identical to those under point 1.4, except:

- overall height of the cavity floor: 19 cm;
- available height within the cavity floor: 15 cm;
- no ventilation tiles (in-room air-conditioning).

2.5 Access control

See Section B.IV – Security and Protection of Property

2.6 Fire detection

See Section B.II.8 – Fire detection

2.7 Lighting

- Lighting level: see Section B.II.3, point 2.2,
- One switch per door,
- One self-contained unit per door.

2.8 Ventilation

Provision should be made for:

- a clean-air intake: flow rate: 130 m³/h,
- an air extractor: flow rate: 100 m³/h.

The clean-air intake is to be fitted with fused or motorised fire-breaks.

2.9 Air conditioning

Given the quantity of cables passing through this room's false floor, the air conditioning must be in-room; on a case-by-case basis, the options will be either an air-conditioning cabinet or fan convectors placed on the cavity floor.

The room's air conditioning is to be supplied by a chilled-water circuit dedicated to the specialised rooms.

Maximum heat to be given off by the machines: 300 W/m².

Ambient conditions: temperature: 21°C ± 1°C;

relative humidity: 50 ± 10% (if air-conditioning cabinet option).

The air-conditioning cabinet specifications are identical to those described under point 1.10 above.

No pipework is to be placed above the racks; pressurised pipework is permitted only in the false floor (this route will be the shortest possible).

2.10 Electrical installations

Specifications identical to those under point 1.11, except that each active rack is to be fitted with three multi-socket buses, two of which (coloured red) are to be supplied by the room's Data UPS board, the third (coloured differently) being supplied by the 'normal/emergency' board.

Live equipment that has to be installed in this room will be connected to both types of circuit and able to operate normally if only one is supplied. The availability of the electrical power supply for this equipment, given the above, must be at least 99.999% (planned maintenance included).

2.10.1 Earthing

Earthing requires:

- a wall-mounted earth bus is to be fitted in the room,
- that bus is to be supplied by a green and yellow VOB cable measuring at least 16 mm² in section (according to length);
- the construction of an equipotential earth circuit comprising:
 - one 16 mm² green and yellow VOB cable per rack; if several racks are linked by a metal structure, a single link is acceptable;
 - one 6 mm² green and yellow VOB cable to each earth bus of the boards located in the room;
 - one 6 mm² green and yellow VOB cable earthing the false floor jacks; earthing one jack in four (one per floor tile);
 - one 6 mm² green and yellow VOB cable earthing the cable ducts located in the room;
- each earth wire must be correctly marked.

2.10.2 Distribution switchboards

In general, the boards will comprise:

- a Data-UPS board supplying the active racks' multi-socket buses;
- a normal/emergency board supplying the room's air conditioning and the active racks' multi-socket buses;
- a board for each telephone or cable operator; these boards are to be supplied by the normal/emergency network.

2.11 Remote control/remote surveillance

The following points are connected:

- ambient-temperature sensor;
- air-conditioning cabinet general alarm.

Specifications: see Section B.II.1 – Remote control

3. CONCENTRATION ROOM

3.1 Introduction

This is the area where the horizontal cabling from one or more floors is brought together.

3.2 Location

- avoid proximity to pressurised water pipes or paper storage areas;
- near to existing shafts;
- facilitating:
 - access to cable ducts or existing floor circuits;
 - integration into building systems (HVAC);
 - operation.

3.3 General physical design

Dimensions: depending on the amount of cabling coming together and the number of racks to be installed, the area of each concentration room varies between 8 and 12 m². See Section B.II.6, point 2.1.1.

The external and internal walls enclosing the computer room must extend from the structural floor to the structural ceiling and have fire-resistance of one hour (FR 60/FR 1h/REI60/EI60).

3.4 False floor

See above point 2.4.

3.5 Access control

See Section B.IV – Security and Protection of Property

3.6 Fire detection

See Section B.II.8 – Fire detection

3.7 Lighting

As for an office area.

3.8 Ventilation

See above point 2.8.

3.9 Air conditioning

Maximum heat to be given off by the machines: 300 W/m².

Temperature: 21°C ± 1°C

The room's air conditioning is to be supplied by two fan convectors placed on the cavity floor, powered by a chilled-water circuit dedicated to specialised rooms.

No pipework is to be placed above the racks; pressurised pipework is permitted only in the false floor (this route will be the shortest possible).

3.10 Electrical installations

See above point 2.10.

3.11 Remote control/remote surveillance

The ambient-temperature sensor must be connected.

Specifications: see Section B.II.1 – Remote control

4. UPS

4.1 Characteristics

- Output > 90% from 25% load upwards;
- Total harmonic distortion (THD) < 10%;
- Input voltage: 3 x 400 V + N.
- Automatic testing of the batteries by reducing the floating voltage to below the batteries' voltage level; if the batteries are defective, the rectifier is to adjust the output voltage and set off a 'defective batteries' alarm, the operation having no effect on the charge. The test is to be carried out at least once a week at different working hours, and it must be possible to start the test manually. If the batteries are separated into two parallel banks, the test must be able to detect a fault in either bank;
- Floating voltage is to be adjusted according to the battery-room temperature.
- Batteries' discharge voltage is to be limited in order to prevent severe run-down.
- The UPS is to be fitted with at least two outputs enabling connection with the computer room server(s) so that the servers can be shut down at the end of autonomy. The software enabling this link is to be supplied in three copies and suitable for the operating systems used.
- A display panel at the front of the UPS must show the status of the main components (oscillator, batteries, rectifier, bypass).
- The wave supplying the charge is to be independent of the input signal (online system); the wave is to be synchronised on the bypass network.
- If the voltage entering the bypass is unstable (exceeds the 2 Hz tolerance), the synchronisation is no longer to be on the bypass but is therefore specific to the oscillator.
- The UPS is to be fitted with a manual bypass so that the rectifier/batteries/oscillator set can all be isolated for maintenance; this operation must have no effect on the charge.

4.2 Batteries

- The batteries are to be of the sealed lead type, and maintenance-free throughout their lifespan.
- The batteries must be placed in electrolyte-resistant sealed containers and have sufficient capacity to conform to legislation.
- The self discharge over a two-year period is to be less than 50% at 20°C.
- Eight-year guarantee (four-year overall guarantee + four years prorata).
- The batteries' lifespan is to be 10 years at 20°C, with 80% residual capacity at the end of that lifespan.
- The installer must undertake to supply the guarantee terms.
- Autonomy: 4 hours at full charge.
- The batteries are to be installed in a bank in the appropriate room (air-conditioning).

4.3 Alarms to be relayed (remote control)

- General alarm (UPS – batteries).
- Battery-room temperature.
- UPS-room temperature.

Specifications: see Section B.II.1 – Remote control

4.4. Alarms and measurements displayed (UPS front)

- Battery failure
- Rectifier breakdown
- Oscillator breakdown
- No voltage (or voltage outside tolerance) at bypass and oscillator inputs
- Output current
- Output voltage
- Output frequency
- Rectifier output voltage (batteries)
- Remaining autonomy when operating on batteries
- Alarm log (FIFO system).

4.5 Connecting an isolated UPS

The service continuity required of the UPS network is to be ensured by parallel redundancy of identical UPS's, with one of the UPS's providing that redundancy.

The UPS room is to be fitted with three separate electrical boards:

The normal/emergency UPS board:

- powered by the normal/emergency network;
- supplies the rectifiers of the various UPS's; the size of these circuit-breakers must take into account the maximum charge, losses and the batteries' charge.

The bypass UPS board:

- is powered by the normal network;
- supplies the bypasses of the various UPS's; the size of these circuit breakers must be +/- 115% of the maximum charge;
- a lockable circuit-breaker must make it possible to power the TEGUPS board without going via the UPS (external manual bypass).

The TEGUPS board (UPS general board):

- is powered by the UPS and the external bypass;
- supplies the various UPS network outputs (computer rooms, concentration rooms, control room, etc.);
- the board is to be fitted with a system allowing circuits to be added without a shut-down (Polybloc system), and sufficient spare capacity for this must be provided on the board;
- a multimeter is to be placed at the front of the board; the minimum information to be displayed comprises: voltages, currents, power levels, harmonics.

A communication bus is to enable the UPS to phase and distribute the charge.

If one of the UPS's has stopped or exhibits a fault, its charge is to be taken up evenly by the other oscillator(s) and an alarm signal transmitted. Since performing maintenance on one UPS must on no account affect the UPS network, the UPS placed in parallel must take up the charge via their rectifier and not their bypass.

Each UPS is to have a battery bank.

5. CHILLER

5.1 General

Since the specialised rooms must be air conditioned throughout the year independently from the rest of the building, a chiller dedicated to these rooms must be installed.

This chiller must have a free-cooling coil set to produce chilled water by using the low temperature in winter, and partial free-cooling in spring and autumn. If the chiller requires maintenance or breaks down, the hydraulic network is to be supplied by building circuit via an emergency exchanger.

5.2 General characteristics

- Coolant: The refrigerants used must have the lowest possible GWP (Global Warming Potential) to limit global warming by greenhouse gases. CFC and HCFC refrigerants are prohibited.
- Ranges: 12-17°C in spring, autumn + winter; 7-12°C in summer.
- MEG: 30% (protection to –20°C).
- Type Cu/Al air condenser, maximum temperature of input air: 40°C;
- Built-in free-cooling coil set with three-way valve controlled by the microprocessor, coil set power: 100% at 0°C.
- At least two separate refrigerating circuits with thermostatic expansion valves, liquid monitors, high/low pressure gauges and liquid tanks.
- Capacity control with at least 4 stages (2 per refrigeration circuit).
- Regulation of condensation pressure for low outdoor temperatures.
- Compressors equipped with shut-off valves, sump heater and oil separator.
- Anti-corrosion treated coil set (Blygold or similar).
- Acoustics: noise level below that stipulated by NBN 576 11 and NBN EN 60034-9:1995; free field noise level at 5 m: 55 dB(A).
- Anti-vibration bases.

5.3 Water system

5.3.1 Pipes

- Steel pipes, joined by welding or galvanised links.
- Lagging in Armstrong or similar material, supplemented by an external UV-resistant shell.

- PN10 ball valves for isolating, flushing out and draining the different parts of the installation.
- Automatic flushers with isolation valves at high points.
- Precision thermometer (0.5°C) on the outward and return pipes.
- Flow-measuring switch + minimum-pressure gauge at the chiller.
- Provision for thermometer wells in which to insert temperature gauges (outward-return) (remote control).
- Regulating valve on the return at the start of each loop.
- Chilled-water circuit supplied via an exchanger from the building's refrigeration unit (emergency exchanger).

5.3.2 Pump circuit

- Redundancy provision: one in operation, the other automatic.
- One starts in the event of a thermal fault in the other, with automatic weekly change-over.
- Differential pressure gauge.
- Fine-mesh stainless steel basket water filter.
- Non-return and isolation valves.
- FLEXCON-system (or similar) expansion circuit.
- Circuit-pressure gauge.
- Two safety valves.

5.3.3 Glycolised-water filler

- Supplied by electric pump (not a manual system).
- Mixing tank in stainless steel or PVC + 30% MEG;
- Protection of the chilled-water circuit down to an outside temperature of -20°C.

5.3.4 Remote control/remote surveillance

The chiller and water network must, as a minimum, be equipped with the following alarms, status controls and gauges:

- general chiller alarm (LP, HP, oil, etc.);
- pump heat alarm (P1, P2);

- no-flow alarm (flow switch);
- no-pressure alarm (in addition to the alarm, must enable timed shut-down of the pumps) (+/- 1 hour);
- chiller water input/output temperature gauge;
- emergency exchanger water input/output temperature gauge;
- compressor status controls;
- pump status controls;
- (possible) exchanger primary pump status control;
- two- and three-way valve status controls;
- free-cooling status control.

Specifications: see Section B.II.1 – Remote control

B.II.8. FIRE DETECTION

1. GENERAL

New and renovated premises must be equipped with a general fire detection system throughout the building*.

This section does not cover the detection of methane, carbon monoxide or LPG. See sections B.II.10, B.II.11 and B.II.12.

The system must be installed to ensure maximum reliability and compatibility between its component parts. The whole system must be provided by the same manufacturer.

Priority will be given to a detection system in which the control panel interacts with the sensors and address points by means of an 'open technology' communication protocol.

These will entail technical compatibility between the various control panels proposed of different makes and the address points connected to the detection networks (sensors, alarm buttons, input/output modules, etc.).

An attestation stating that the manufacturer is a specialist in automatic fire detection systems must be issued by BELAC or an equivalent European body.

The proposed equipment must also be certified by BELAC or a European counterpart.. All equipment installed must be compliant with the relevant standards and tests and certified by a type-approval certificate.

The installation must be carried out in accordance with standard operating practice and must be fully compliant with the following documents, standards and regulations in particular:

- the NORMES/BASE/INCENDIE (Belgium's basic fire prevention standards),
- standards NBN S21-100 and addenda, NBN S21-202, NBN EN54,
- the European standards EN45011 and EN 45013,
- the LOI/CODE/RGPT,
- the RGIE,
- the EU Directives relating to fire safety,
- Directive 89/106/EC on construction products,
- the standards and Ministerial and Royal Decrees relevant to the type of building in question,
- good practice.

Before any installation work starts, the implementation plans must be approved by a BELAC-accredited body. Before any of the premises are occupied, the same body must assess the work for final acceptance and produce an attestation to that effect with no caveats.

The detection system must comprise a connector in every other façade module and a detector in every office, meeting room, canteen, kitchen, printshop, storeroom, joinery workshop, corridor, windowless room, car park, archive, plant room, photocopier room, kitchenette, electrical switch closet, fire control panel alcove, etc.

2. TERMINOLOGY

Fire alert: Transmission of a signal (automatic detection) or message to the relevant department or monitoring centre to indicate a threat of fire.

Evacuation alarm: Order given to the occupants of a building to evacuate the building; this order is generally given by triggering alarms.

Public address (PA) system System of loudspeakers installed at various points inside a building for conveying messages to occupants.

Evacuation orders may be given via this system if the use of the alarms seems likely to pose problems and if the PA system is audible in every part of the building.

3. FUNCTIONS

The fire-detection system must have the following features:

- maximum reliability of information and commands, keeping the number of breakdowns and false alarms to an absolute minimum, by the use of non-deteriorating components,
- easy access to all connections and components. All terminal blocks must have an ID number,

- rapid reparability through the use of interchangeable components and modules and universal detector mountings,
- user-friendly display of signals on the fire control terminal, with easily readable and understandable information,
- precise identification, with no risk of error, of the location of the detected fire (see section 4.1.3 below),
- a minimum capacity reserve of 10% to allow the connection of new detection points over and above the basic installation.

An instruction manual in French clearly indicating the procedures to follow must be included with each system.

This must be placed in a 650 mm x 700 mm case made of 36 mm thick aluminium and with a lockable glass door or the like, big enough to hold two A3 sheets. This will be fitted near the reception together with the emergency procedures for the guards (the supply and fitting of this case are an integral part of the lot).

4. COMPONENTS

The system must contain the following components:

4.1 Fire control panel

4.1.1 Installation and description

If the fire control panel is not behind the reception desk in the building lobby, a passive repeater panel must be installed there, with its functions limited to stopping the acoustic signals and visually displaying all the events.

The fire control panel or repeater must be prominently mounted so it can be observed at all times by the desk staff. The reading angle of the display must ensure good legibility.

The microprocessor- or microcomputer-based fire control panel must be of the analog-addressable modular type. It must allocate to each detector, fire alarm button, etc. an individualised ‘user’ address in clear text at least 40 characters long (see point 4.1.3 below).

The programming for the various components and appliances is downloaded from a laptop computer.

The fire control panel must:

- enable zones, lines and components to be reorganised at any time without having to alter the panel’s internal wiring,
- provide the zero potential contact needed to trigger the necessary automatic responses in the system (see point 5 below),
- have a display interface capable of displaying signal texts on screens and other devices in at least two languages (one of which must be French) and which allows dialogue with the

fire control panel. All functions and signals must be unambiguous and easily understandable to all users,

- provide an LED display of standard messages and fire detection signals, as required by EN 54-2,
- give a real-time display of the sensitivity values of each detection sensor to help assess their level of soiling. These values must be printable at least for each network or according to a threshold value defined on the printer by the operator,
- give a precise indication on the display of the location of any short-circuit or broken cable,
- check and display the quantity of components installed in each network,
- comprise a time programming function enabling the system to be switched off in certain selected zones for a given period (annual programmer),
- include a diagnostics programme for testing each control (slave relays) on the master or peripheral control panels,
- store events recorded by addressable analogue detectors, addressable alarm buttons, addressable I/O modules, etc. The system must save in its memory at least the 50 most recent events involving every alert, fault or use of override mode, and must be able to display them in sequence on request.
- All alert or alarm signal messages must override all other types of signal (fault, override, etc.),
- If it is a decentralised system, it must be set up so that the slave units communicate with the central master unit by bidirectional data bus in a loop with separate cable routes. Any opening of this communication loop must send a fault signal to the main fire control panel.

A fault signal must also be sent to the main fire control panel in the event of a short-circuit on the loop. The loop must be equipped with an isolator module to prevent the loss of more than 512 address points where a short-circuit occurs.

Any faults with the slave units' local power supply must be signalled to the main fire control panel. The local supply must guarantee the same operating time as the main control panel.

The control panel(s) must be connected to the emergency power network. Autonomous backup capacity must be provided by gastight, maintenance-free, dry batteries. These batteries must be kept fully charged at all times, with automatic monitoring of their voltage, capacity and temperature. A malfunction alarm must be triggered if any of these are not at the required level. The batteries must provide a minimum operating time of 24 hours on back-up or alert mode and one hour in alarm mode (with sounder in operation),

- enable sounders, bells, alarms and other automatic responses to be triggered even in the event of a fault in the main governing microprocessor,
- enable the buzzer to be stopped without a key or code,

- be equipped with a printer which prints all information in clear text, without abbreviations or codes. The minimum number of characters per line must be 40. Minimum printing speed one line per second.

This printer must be equipped with a take-up reel governed by a control button and an ‘out of paper’ sensor.

The input buffer must be at least 1KB.

4.1.2 Software

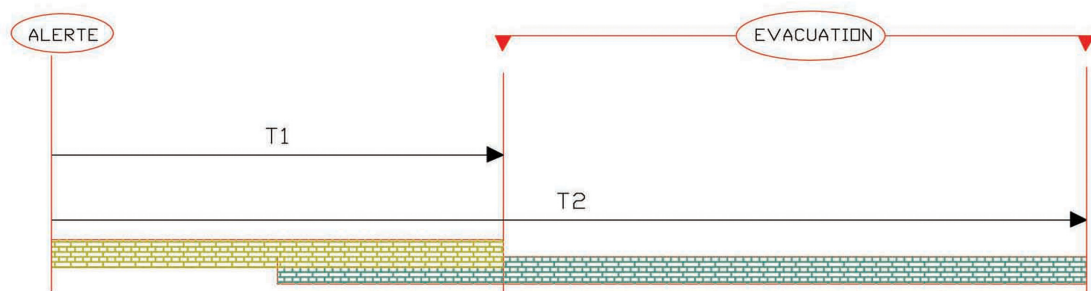
The hardware supplier must be fully conversant with the system software. A back-up copy of the installation software must be kept by the installer in secure premises.

As well as the user code, the installer code must be given to the Commission representative. No modifications may be made without the release number of the programme, the date and the details of the modifications being noted. These programmes must be consultable at all times by the Commission. All work performed on the system must be recorded in a log held in the fire control panel (to be provided by the installer).

The Commission will request one or other of these options for the programme:

- OPTION 1: day/night function for the signal transmitter.
- OPTION 2: dead man operation.

If the buzzer stop button is pressed, the fire control panel automatically goes into “checking” mode. This gives the person manning the panel a short time to go and check the location from which the signal was sent. If this check confirms the need for an alarm, this can be triggered by pressing an alarm button in the reception. If the operator fails to re-set the fire control panel within the programmed time, the fire control panel will trigger the alarm automatically.



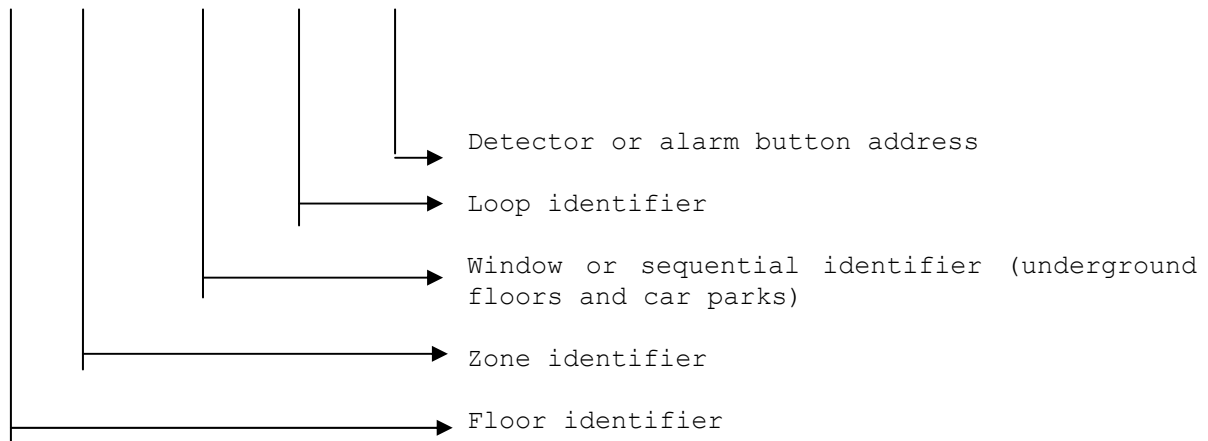
T1= time for person manning the control panel to cancel the fire alert buzzer; can be set to any time between 0 and 3 minutes.

T2= time for re-setting the fire control panel; T1 plus up to 10 minutes.

4.1.3 Identification of alert/alarm sources (evacuation signal)

For the purposes of identifying the sources of a fire alarm, an identifier must be allocated to each detector, action indicator, alarm button and technical address, in the following format:

EE / ZZ / NNN / XXX / YY



Fire alerts must be displayed as follows on the fire control panel:

FL--/Z---/WIN---/ LOCATION

FL-- :	Floor number
Z--- :	Zone number
WIN--- :	Window or sequential identifier (underground floors)
LOCATION:	Precise description of the fire location

By having a standard numbering system for floors, zones and window identifiers there will be at least 23 characters available for pinpointing the precise location of the fire. Thus the identification details given in the fire control panel display must match those on the detector identification label.

The example below illustrates these rules:

FL12/Z024/WIN085/ BLOCK A, COURTYARD SIDE

Alarms must be displayed as follows on the fire control panel:

FL--/Z---/WIN---/ EVACUATION

FL--	:	Floor number
Z---	:	Zone number
WIN---	:	Window or sequential identifier (underground floors)

4.2 Network

Each network must be looped, starting and finishing in the fire control panel.

The cables for the detection components must be two conventional telephone style conductor cables. This applies to a cabled network in a compartment, but the cabling must be type FR60/FR1h/EI60 in the corridors of compartments.

This must be done in such a way as to link all detectors and address points in a continuous sequential connection. The addition to or removal from the network of a detector must in no way affect the existing sequential numbering of the loop.

No intermediate junction boxes may be placed between two detectors or address points. The detector network(s) must be distinct from the alert button network(s).

Each network must be fitted with short-circuit isolators preventing the loss of more than one third of the network components in the event of a short-circuit (European standard EN 54).

All line disconnections and earthing failures must be isolated and signalled immediately, without interrupting the normal operation of the system.

All insulation faults and earth leakage must be signalled by the fire control panel.

It must be possible to fit buzzers in the mountings of detectors which can be programmed to the evacuation alarm signal.

4.3 Detectors^{*}

The installation of the detectors must be fully compliant with standard NBN S21-100 and the addenda thereto. They must be one of the following types: ionisation detectors without a radioactive source; optical smoke detectors; optical/heat detectors; standard heat detectors; rate-of-rise heat detectors; multi-sensor detectors; laser detectors; or infrared beam detectors.

The number and location of detectors must be appropriate to the areas at risk that need protecting/monitoring and there must be a sufficient number of detectors. This must be verified by the BELAC-accredited body prior to installation on-site.

All types of detector component must be easily interchangeable by virtue of a universal mounting, obviating the need to alter any circuit configurations.

Mountings must be made of synthetic materials resistant to mechanical shocks. They must be mechanically and electrically compatible with detectors from the same type of system. They must signal all faults automatically to the control panel. They must also enable the continuity of the loop to be checked in the absence of any detectors.

The fire detectors:

- must be completely static and not contain a radioactive source,
- must be set so as not to generate an alert as the result of a normal activity, normal variations in ambient temperature and humidity, electrostatic or electromagnetic radiation from other appliances in the zones under surveillance or normal levels of vibration,
- must be BOSEC-certified (Belgian Organisation for Security Certification) or certified to an equivalent EU standard.

Infrared beam type detectors are allowed in atriums, provided they are certified to the same standards as above.

4.4 Alarm buttons

The alarm buttons must:

- be mounted inside a glass-fronted case (break glass to open),
- be RAL3000 fire red,
- be individually addressed and separate from the detector networks,
- have the same operating characteristics as the smoke detectors,
- be clearly labelled with instructions for use,
- be provided in two types: surface-mounted or flush, depending on the specific requirement in each case. They are to be installed in corridors and lift lobbies with the bottom of the case 1.20 m from the ground,
- not be of the type that requires a hammer to break the glass, nor the type which requires an additional step once the glass has been broken,
- include address units in the case. They must be able to be tested with a special key, without opening the case.

4.5 Alarm sirens

(see point 6.4 below)

5. AUTOMATIC CONTROL PANEL FUNCTIONS*

- Selective starting and stopping of the comfort ventilation systems (air supply and extraction),
- Selective closing and opening of the fire dampers,
- Starting and stopping the smoke-extraction and pressurising systems,
- Closing fire doors,
- Unlocking all emergency exit doors,
- Controlling lifts and escalators with:
 - 1 contact per set of lift machinery if the machinery is in a separate room,
 - 1 contact per group of lifts in the event of an evacuation alarm,
 - 1 contact per group of lifts in the event of double detection (2 detectors or a combination of a detection and an alarm button in the building).

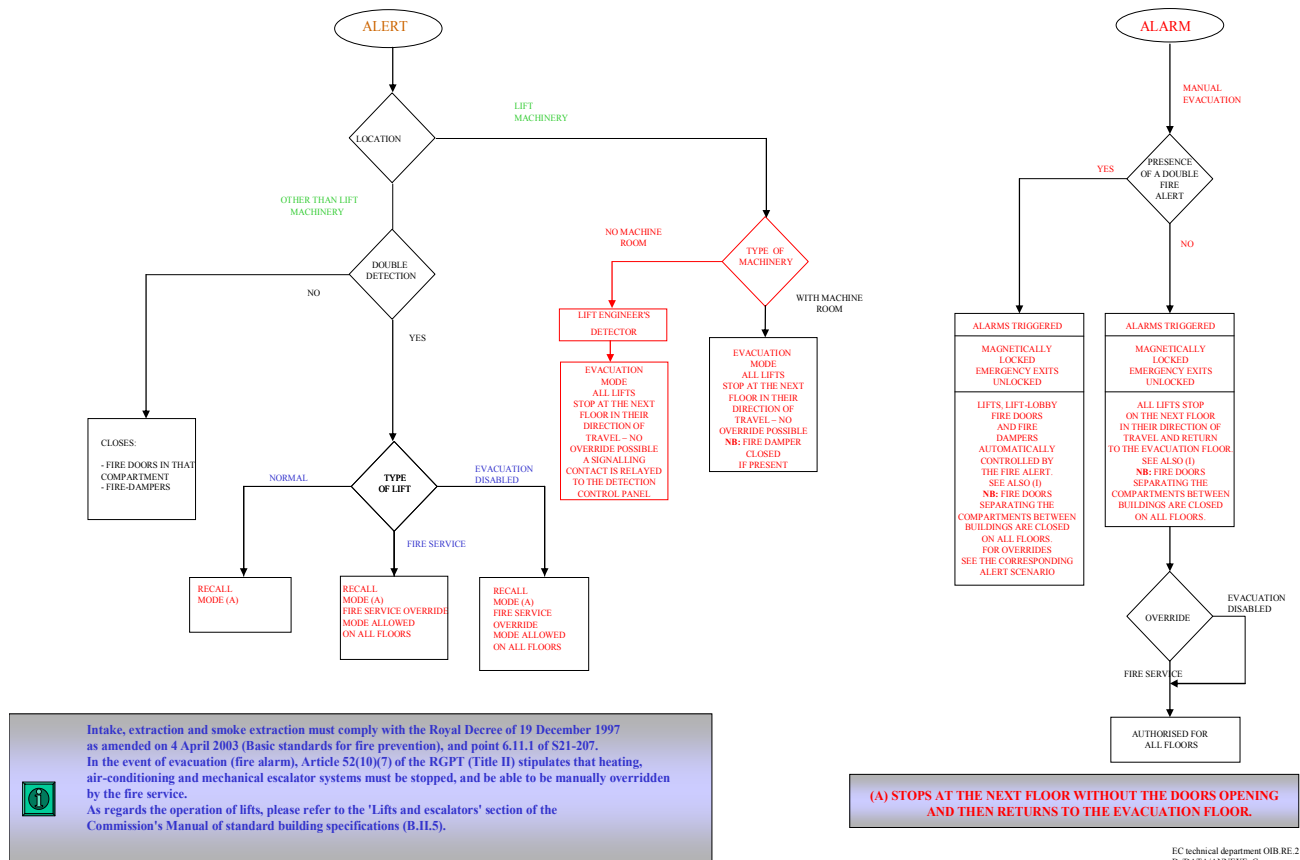
Note: if the lift gear is in the shaft, the detector will be installed by the lift engineer. The lift system must provide one potential-free contact per lift to the fire detection system which will transmit an alarm signal to the main detection control panel.

The wiring between the fire control panel and the lift machinery must be done using FR60/FR1H/EI60 cable, connected in a fail-safe configuration.

- Closing the smoke doors,
- Remote control sensors for the following:
 - fire control panel alert,
 - fire control panel fault,
 - blocking part of the fire control panel system (use of override mode),
 - building evacuation alarm.

If the slave units are decentralised, the communication link must have FR60/FR1h/EI60 type fire rating, be two-way and follow different physical paths.

DIAGRAM OF AUTOMATIC RESPONSES IN THE EVENT OF FIRE DETECTION



6. ALARM (EVACUATION SIGNAL)*

6.1 Alarm operating principle (evacuation signal)

It musts never be possible to set the alarms off automatically or by the accidental activation of an alarm button. The evacuation alarm must be configured so that it can be triggered only by a deliberate action, i.e. manually pressing the alarm button, unless the Commission decides to apply option 2 from point 4.1.2 above.

6.2 Alarm triggering command (evacuation signal)

The evacuation alarm signal control must comply with the following criteria. It must:

- be easily visible and identifiable as such, and impossible to mistake for something else,
- be accompanied by a symbol or labelling in clear text (next to the button),
- be easily accessible,
- be placed outside the panel or casing of the fire control panel,

- use type F3 fire-resistant wiring,
- be located at the reception desk, positioned so as to prevent accidental activation.
- Control box: see point 4.4 above.

6.3 Alarm push-buttons (evacuation signal)

To trigger the alarm (evacuation signal), a button of the ‘break-glass’ type must be provided, sealed with a protective flap to prevent accidental use. Pushing this button must send a text to the fire control panel describing the event, so the level of emergency can be calculated, as with automatic alerts. It must be able to be tested with a special key, without opening the case. In addition, cancelling the alert button must cancel the alert and automatically reset the control panel without any action required centrally at the control panel.

6.4 Evacuation alarm sirens

Preference must be given to electronic alarms.

Pneumatic alarms, generally more powerful than electronic models, must be reserved for very large areas (archives, storage facilities and indoor car parks).

When operating, the alarms must emit a continuous tone.

The sound must be loud enough to be heard properly by occupants at the maximum distance from the nearest alarm but not so loud as to risk damaging the hearing of or unnecessarily shocking people in the immediate vicinity of an alarm.

The alarms must have a sound pressure level of no more than 85 dB(A) measured at 1 m from the source. This specification can be achieved more easily with electronic alarms that have adjustable sound output.

Alarms located near emergency stairwells must be fitted with a green flashing light.

Supplementary alarms designed to give an alert signal (pre-alarm warning signal) are not required. The operational efficiency of the alarms must be fully compliant with standard ISO 8201: Audible emergency evacuation signal.

Alarms must not be placed in:

- lift lobbies,
- entrance halls (instead a red flashing light must be installed),
- stairwells,
- places where a sudden burst of loud noise is liable to disrupt the activity or work taking place there, such as telephone switchboards, radio and TV studios or children’s sleeping areas in crèches and after-school centres.

When positioning the alarms, the installer must take account of the normal whereabouts of building occupants, the size and configuration of the premises and any sources of ambient noise

Where alarms are placed in office corridors, every effort must be made to distribute them evenly, to avoid uneven concentrations of sound in certain parts of the corridor at the expense of others.

The same principle applies to canteens and large meeting rooms.

For noisy or very large premises (e.g. storage areas, indoor car parks, large print shops), more powerful alarms may be used, but the principle of even sound distribution and blanket coverage still applies.

In any areas of the building, principally offices or CCR rooms, where it is not possible to obtain sound levels of more than 65 dB because of the noise insulation in partitions, buzzers may be incorporated in the mountings of detectors and programmed with the building evacuation signal.

A study should also be carried out into the possibility of installing a system to alert all occupants.

6.5 Other alarm methods

PA system: see point B.II.8.2 – Terminology.

In some circumstances optical signals must be used instead of sirens. These are red flashing or revolving lights, synchronised with the general alarm system, for occupants with impaired hearing and in certain premises where loud alarms are inappropriate due to the type of work performed, e.g. crèches, telephone switchboards, radio and TV studios and, in certain cases, computer rooms, meeting rooms, etc.

Entrance hall of buildings: sirens are not permitted and must be replaced by red flashing lights.

Plant rooms: sirens are fitted with a flashing light.

7. COMPUTER-ASSISTED FIRE CONTROL PANEL

In large buildings the fire control panel must be computer-assisted. This must include a direct colour representation of the building plan on a touch-screen VDU, showing the zone where a fire has been detected and the status of the various automatic responses (see Section B.II.8.5, Automatic control panel functions). Such features will greatly accelerate identification and enhance the effectiveness of firefighting measures.

8. COMMISSIONING THE SYSTEM

The installer must test all parts of the fire detection system thoroughly, including:

- a physical test of each detector, alarm button and technical address,
- checks on their physical location, compared against the messages issued by the control panel,
- tests on all automatic responses,

- the provision of a comprehensive checklist in English or French for all these tests.

9. TECHNICAL FILE

At the provisional acceptance stage for the system, the contractor must provide the Commission with the technical file, in electronic form (AutoCad, Word or Excel - see OIB for the relevant release in each case), containing:

- the layouts approved by the BELAC-accredited SECT, identifying all detectors, alarm buttons, loops and zones, as well as the wiring plan,
- a clean pre-commissioning inspection report issued by the BELAC-accredited body,
- the single-line diagrams,
- the detailed block diagrams for the control panels and distribution frames,
- the manufacturer's specifications for all the equipment installed,
- the details of all the address messages on paper and in electronic form,
- the programming code for the cause and effect functionality on paper and in electronic form,
- the conformity certificate attesting that the system meets the requirements of the BELAC-accredited body in the case of Belgium, or its equivalent at EU level, based on competence criteria corresponding to European standards EN 45011 and EN 45013 (equipment and installer), including the EC certification of the equipment used;
- a list of all the detectors indicating the analogue value determining their sensitivity on the date of provisional acceptance.

B.II.9. SPRINKLER INSTALLATIONS

1. GENERAL

The sprinkler installation must comply with the standards, regulations and directives in force, in particular the following:

- EN 12845,
- NBN A 25-103,
- LOI/CODE/RGPT,
- RGIE
- good practice.

Installers must draw up the construction plans before starting work and submit to the Commission a full implementation file approved by a body certified by BELAC or an EU equivalent.

The above body must also issue a certificate confirming that the installer is a specialist in sprinkler systems and ISO9001 certified for the design, engineering, assembly, supply and maintenance of the equipment. With regard to safety issues, the installer must be able to provide a VCA certificate (Contractors' Safety Certificate).

2. EQUIPMENT

The materials and equipment comprising the installation must be new and of the highest quality. They must be of well-known brands and supplied by manufacturers which offer a well-organised repair service and spare parts' shop.

2.1 Control valve assemblies

The control valve assembly comprises:

- a PN16 shut-off valve with position indicator and signs on the control panel,
- an alarm valve,
- alarm equipment including a water motor gong, water flow indicator, alarm relay equipment,
- a drain valve and a test valve with waste fitting,
- two 0-16 bar pressure gauges, Ø 100 mm, DN20, fitted with a BSPT connection,
- mountings, pipes, valves, etc. for constructing a complete and compliant installation,
- a basic diagram indicating the protected area and with operational details of the assembly (to be hung separately),
- each system must also be fitted with a flow switch or pressure-sensitive switch with control-panel status display.

2.2 Overhead piping

All pipes must be painted RAL 3000 red and placed so that the system can be drained by means of the main drain valve, at the control valve or via one of the low point drains fitted with a purge valve. Pipes may have to be completely drained.

The minimum pitch is 4 mm/m for a diameter of DN65 or less, 2 mm/m for a diameter of over DN65.

All pipes will be assembled using mechanical connections as far as possible. However, they may be fitted with welded sleeves to connect the sprinkler pipes. If welded sleeves are used, they must be fitted in accordance with trade practice, i.e. adequate diameter, no tapping into the main pipe, etc.

Grooved pipes are preferably to be sealed using hemp or the like. This must be done to professional standards to ensure that no residue is left in the pipes that might block them.

The use of Teflon is recommended for sprinklers.

A valve with a diameter of DN50 or less will be fitted at the end of the main pipes to allow the system to be rinsed before commissioning.

Pipes will be attached by means of galvanised steel brackets or supports in accordance with current regulations in such a way that their movement is not restricted.

Provision should be made for fitting at least one bracket between two heads on a sprinkler pipe or between two sprinkler pipes on a distribution main.

The maximum distance between brackets or supports must be 4 m.

Fixing anchors (for floors and walls) are to be made of metal. The use of plastic or any other inflammable material is prohibited.

The attachment of pipes to beams or columns must under no circumstances weaken them. The means of attachment used must be submitted for approval.

The welding or drilling of the metal trusses of roofs or columns is not permitted.

Only approved clamps are allowed. Main pipes may not be attached directly to metal roofs.

Pipes and their attachments must support an additional vertical load of 1 kN per metre without significant deformation.

Given the length of pipes, account should also be taken of the building's expansion joints and of thermal expansion.

In places where several pipes are fitted side by side, aesthetics must be taken into consideration, e.g. the parallel alignment of the pipes, the choice of matching supports and fastenings, etc.

Pipes may not be laid directly on the ground. Wedges should be provided to prevent them from moving.

The layout of the pipes must conform to the approved plans. Any deviation that has not been authorised in advance may be refused. The layout must ensure ease of access for maintenance. Pipes that pass through walls must be placed in steel sleeves that project at least 2 cm beyond the wall and exceed the pipes in diameter (max. 2 cm). The sleeves must be dip-coated with two layers of anti-rust paint or galvanised. After the installation of pipes, holes must be sealed with a fire-resistant material.

Walls must be carefully repaired with masonry and concrete being restored to their original appearance.

3. TAPS ON OVERHEAD PIPES

All taps and valves must comply with the standards in force.

Taps must be sealable. They must be designed for a guaranteed life-time of at least 10 years and be replaceable without requiring sections of the system to be dismantled.

It must also be possible to replace them easily with an equivalent item.

Valves must be easy to control in every position, even after a long period of time.

An indicator disk should be provided to show when the valve is in the 'open' position at all times.

All valves must be fitted with a small plate (black) showing its ID number (engraved in white figures) as indicated on the diagrams.

Taps must be pressure class PN16. Lockable valves are to be equipped with chains, locks and keys.

Valves with a diameter of DN50 or less must be made of bronze and threaded. Valves of higher diameters are to be made of cast iron, with grooved flanges.

The diameter of ball valves may not exceed DN50.

All the main valves in the pump-room and on control valve units must be fitted with a signalling contact.

4. SPRINKLERS

Sprinkler heads will be ½", of the closed-head or spray type, and will comply with the risk classification. Their response temperature is 68°C. They must be arranged in a pendant or upright position depending on the application.

Where there are obstacles under the sprinklers which might delay their activation or obstruct their spray pattern, additional sprinklers should be placed under these obstacles as prescribed by the regulations.

Sprinklers with a response temperature of 93°C or 141°C must be deployed in rooms or areas where high temperatures may occur.

In accordance with the regulations, sprinklers must be installed under intermediary levels, e.g. flights of steps, closed platforms or any other such obstacle in general.

Sprinklers must also be installed, in accordance with the regulations, inside false ceilings, cavities and domes.

Protection must be provided in areas where sprinklers are likely to be damaged by accident (e.g. because they are too low).

5. AS-BUILT FILE

The as-built file must include the following, inter alia:

- detailed construction plans,

- the manufacturer's specifications for all materials and equipment used,
- detailed diagrams of the supports and of the layout of the control assemblies,
- the hydraulic calculations,
- the operating instructions,
- the instructions in the event of breakdowns,
- the maintenance instructions and test reports,
- the EC conformity certificates of all equipment used,
- all approval certificates.

If a detection control panel is used for the alarm signals, all the related documents must comply in every respect with Section B.II.8 – Fire detection.

B.II.10. LPG GAS DETECTION

1. GENERAL

The gas detection system must be designed to prevent explosions or poisoning caused by a high concentration of LPG gas in indoor car parks.

It must comply with the Royal Decree of 17 May 2007, the standards (notably NBN EN 50073), regulations and directives in force, and good practice in the field.

A quantity of air will be evacuated on each floor on the basis of the instantaneous concentrations as defined by the thresholds indicated in point 5 below (servo-systems).

This installation automatically controls the impulse and/or extraction ventilation systems, and audible and light indications.

2. DESCRIPTION

The system for measuring LPG gas levels is made up of an electronic alarm and measurement central unit managed by a micro-controller, preferably situated outside the detection zone, and several remotely positioned detection sensors covering the entire surface of the car park.

The concentration of gas measured by a detector head can be displayed on a digital display (as a percentage of LEL - lower explosive limit).

3. LOCATION OF DETECTORS

A sufficient number of LPG detectors must be provided on each level of the car park.

Detectors must be placed 15-30 cm from the ground, away from draughts, with at least 1 sensor per 400 m² minimum (including access ramps).

Detectors must be installed in such a way as not to be damaged by vehicles. Additional protection must be provided.

4. DESCRIPTION OF THE DETECTION CENTRAL UNIT

The central unit must be CE approved.

In a single enclosure the central unit consists of the following:

- a mother board consisting of the micro-controller, the detector connection terminals, the addressable relays with potential-free contacts and the unit management and supply electronics,
- a display board comprising the screen, the alarm LEDs and the programming components.

The minimum number of inputs will be determined according to the number of detectors.

It will possess at least two individually adjustable and programmable alarm thresholds per input. Each of these thresholds controls a potential-free inverter relay to which various types of servomechanism can be connected.

The display of measurements and alarm indicators must be digital, clear and accurate.

The unit's main power supply will be provided by the 230 V - 50 Hz network.

The unit must have an emergency power supply kept constantly recharged to its rated voltage by a 24V DC battery charger incorporated in it with a minimum of 8 hours battery life.

The gas detection system will be linked directly to the BMS.

The system will be reset manually and/or automatically.

5. SERVO SYSTEMS

By level, the servo systems are as follows:

- the first alarm threshold will command the activation of the slow ventilation system and sirens with a different sound to the fire alarms;
- the second alarm threshold will command the activation of the fast ventilation system and the illuminated panels.

Provision of the following contacts for the BMS:

- 1 contact 1st threshold 20%
- 2 contact 2nd threshold 40%

A contact for the BMS must also be provided for any faults originating in the central unit.

6. CHARACTERISTICS OF LPG GAS DETECTORS

The detectors will operate on the principle of catalytic combustion.

The sensitivity will be adjustable by means of a potentiometer in the central unit.

The measurement range will be from 0 to 100%.

They will be accurate to 1% LEL.

Adjustable alarm thresholds: A1 = 20%

A2 = 40%

7. COMMISSIONING

The commissioning and adjustment of the equipment, including tests on each head using a standard gas, will be performed by the installer.

8. TECHNICAL FILE

The as-built file will contain:

- the system's commissioning report and the calibration report for all sensors,
- the single-line diagrams and detailed wiring diagrams of the unit and sensors,
- a copy of the gas calibration certificate for the calibration of the sensors,
- the datasheet and instructions for the unit.

B.II.11. CARBON MONOXIDE (CO) GAS DETECTION SYSTEM

1. GENERAL

The gas detection system must be designed to prevent poisoning caused by high concentrations of gas. **It must comply with the standards, regulations and directives in force, with the basic recommendations of the Brussels Institute for Environmental Management (IBGE) relating to buildings in the Brussels region, and with trade practice.**

The air quality will be evaluated on each floor on the basis of instantaneous concentrations as defined by the thresholds indicated in point 5 below (servo-systems).

2. DESCRIPTION

The system for measuring toxic gas levels is made up of an electronic alarm and measurement central unit managed by a micro-controller, preferably situated outside the detection zone, and several remotely positioned detection sensors covering the entire surface of the car park.

This installation automatically controls the impulse and/or extraction ventilation systems, and audible and light indications. The concentration of gas measured by a detector head can be displayed on a digital display (as a percentage/ppm).

3. LOCATION OF DETECTORS

A sufficient number of CO detectors must be provided on each level of the car park.

Detectors must be placed 1.5 m from the ground, away from draughts, with at least 1 sensor per 400 m² minimum (including access ramps).

One of the detectors must be located at the most unfavourable location (e.g. close to the exit area).

4. DESCRIPTION OF THE DETECTION CENTRAL UNIT

The central unit must have CE marking.

In a single enclosure the central unit consists of the following:

- a mother board consisting of the micro-controller, the detector connection terminals, the addressable relays with potential-free contacts and the unit management and supply electronics,
- a display board comprising the screen, the alarm LEDs and the programming buttons,
- the minimum number of inputs will depend on the number of detectors.

It will possess at least three individually adjustable and programmable alarm thresholds per input. Each of these thresholds controls a potential-free inverter relay to which various types of servomechanism can be connected.

The display of measurements and alarm indicators must be digital, clear and accurate.

The unit's main power supply will be provided by the 230 V - 50 Hz network.

The unit must have an emergency power supply kept constantly recharged to its rated voltage by a 24V DC battery charger incorporated in it with a minimum of 8 hours battery life.

The gas detection system will be linked directly to the BMS.

The system will be reset manually and/or automatically.

5. SERVO SYSTEMS

By level, the servo systems are as follows: the first two alarm thresholds (50 ppm, 100 ppm) will command the activation of the ventilation systems (1st speed and 2nd speed, respectively).

Provision of the following contacts for the BMS:

- 1 contact 1st threshold 50 ppm
- 2 contact 2nd threshold 100 ppm
- the 3rd alarm threshold (150 ppm) will also command the illuminated alarm boards, via a flashing relay.

A contact for the BMS must also be provided for all faults originating in the central unit.

6. CHARACTERISTICS OF THE GAS DETECTORS

The detectors will function according to the electrochemical principle.

The sensitivity will be adjusted by means of a potentiometer in the central unit.

The measurement range will be from 0 to 300 ppm.

They will be accurate to 1 ppm.

Adjustable alarm thresholds: A1 = 50 ppm

A2 = 100 ppm

A3 = 150 ppm

7. COMMISSIONING

The commissioning and adjustment of the equipment, including tests on each head using a standard gas, will be performed by the installer.

8. TECHNICAL FILE

The as-built file will contain:

- the system's commissioning report and the calibration report for all sensors,
- the single-line diagrams and detailed wiring diagrams of the unit and sensors,
- a copy of the gas calibration certificate for the calibration of the sensors,
- the datasheet and instructions for the unit,
- the EC conformity certificates of all equipment used.

B.II.12. CH4 GAS DETECTION SYSTEMS

1. GENERAL

The gas detection system must be designed to prevent explosions or poisoning caused by gas leaks.

It must comply with the standards, regulations and directives in force and trade practice.

2. DESCRIPTION

The boiler gas installation will be monitored by a gas leak detection system, the central alarm unit of which will be located outside the boiler room.

The gas leak detection system will consist of an electronic alarm and measurement central unit with a minimum of 2 alarm levels and an appropriate number of detection sensors which may be remotely located.

The detection sensors will operate according to the catalytic combustion principle, will be ATEX approved and will constantly measure the gas present in the atmosphere.

The concentration of gas measured by a detector head can be displayed on a digital display (as a percentage of LEL).

The alarm levels may be programmed on each detector.

It will not be possible to reset the alarms until the concentration of gas measured is below the alarm level.

It will always be possible to switch off the alarm siren and the internal buzzer. Reset mode (automatic or manual) will be programmable on the central unit.

3. LOCATION OF DETECTORS

The boiler room and all ducts containing gas pipes must be fitted with gas detectors, and the following as a minimum:

- 1 sensor above each boiler if the size of the room justifies this,
- 1 sensor near the high ventilation grille,
- 1 sensor in the gas meter room (if allowed by the gas company),
- 1 sensor above the solenoid valve.

4. DESCRIPTION OF THE DETECTION CENTRAL UNIT

The central unit must have CE marking.

It will possess at least two individually adjustable alarm thresholds per detector or closed loop of detectors. Each of these thresholds controls a potential-free inverter relay to which various types of servomechanism can be connected.

The display of measurements and alarm indicators must be digital from 0 to 99%.

The unit's main power supply will be provided by the 230 V - 50 Hz network from a switchboard outside the boiler room.

The unit must have an emergency power supply kept constantly recharged to its rated voltage by a 24V DC battery charger incorporated in it with a minimum of 8 hours battery life.

The gas detection system will be linked directly to the BMS.

5. SERVO SYSTEMS

If gas is detected, the system must automatically close the solenoid valve on the building gas supply. The open or closed status of this valve must be reported to the fire control panel and the BMS.

1st alarm level:

Programmed at 20% LEL:

- activates the alarm siren located close to the boiler room entrance;
- contact available for the BMS.

2nd alarm level:

Programmed at 40 % LEL:

- The main gas feed is cut off by closing the gas solenoid valve. The gas leak detection system must provide the solenoid valve's electricity supply. The valve position will be relayed to the BTM.
- The electricity supply to the boiler room is cut off (all installations, including the BMS and lighting) by means of the main contactor on the boiler room switchboard.

A contact for the BMS must also be provided for all faults originating in the central unit.

6. CHARACTERISTICS OF THE GAS DETECTORS

The detectors will operate on the principle of catalytic combustion.

They must be ATEX approved and located on the ceiling.

The sensitivity will be adjusted by means of a potentiometer in the central unit.

The measurement range will be from 0 to 90 % LEL.

They will be accurate to 1% LEL.

T 90 response time: 3 to 5 seconds.

7. COMMISSIONING

The commissioning and adjustment of the equipment, including tests on each head using a standard gas, will be performed by the installer.

8. TECHNICAL FILE

The as-built file will contain:

- the system's commissioning report and the calibration report for all sensors,
- the single-line diagrams and detailed wiring diagrams of the unit and of the sensors,
- a copy of the gas calibration certificate for the calibration of the sensors,
- the datasheet and instructions for the unit,
- the EC conformity certificates of all equipment used.

* Condition with which all new fitted-out buildings must comply, unless otherwise stipulated.

B.III. HEALTH AND SAFETY

B.III.1. FIRE COMPARTMENTATION. FIRE RESISTANCE AND REACTION

1. GENERAL INFORMATION

The basic standards for fire- and explosion-proofing which new buildings must meet are prescribed by the basic regulations on fire prevention and the LOI/CODE/RGPT.

Commission Decision 2000/367/EC of 3 May 2000 implements Council Directive 89/106/EEC as regards the classification of the fire-resistance performance of construction products, construction works and parts thereof. This decision refers to the relevant European standards, and in particular to standard EN13501-1 :2002, which classifies building materials according to their fire performance.

2. FIRE COMPARTMENTATION

2.1 Primary compartmentation

Primary compartmentation is the sectioning of a building prescribed by the regulations and standards governing building structures. A primary section will often comprise a large area (2 500 m²) and cubic capacity. It is characterised by high fire-resistance.

Within these large compartments there may be a secondary system of compartmentation.

Indoor car parks, ducts and areas housing plant, foyers, stairwells and emergency stairways are other forms of primary compartmentation.

Where two contiguous buildings are joined by an airlock, this should provide FR120/FR2hr/REI120/EI120 fire resistance.

2.2 Secondary compartmentation*

Secondary compartmentation is covered by building standards, the LOI/CODE/RGPT and the basic regulations on fire prevention. Contained in one of the large primary sections, a secondary section comprises the internal walls of offices and other premises as well as the internal walls of the corridors which serve as horizontal emergency exit routes.

A secondary compartment will typically be less fire-resistant, generally providing 30 minutes' resistance (FR30/FR½hr/REI30/EI30), except in the case of premises with a considerable concentration of combustible materials, such as registries and archives, printshops and paper stores, or premises requiring special protection against external fire hazards (computer rooms), for which the fire-resistance time is increased to one hour (FR60/FR1hr/REI60/EI60).

2.3 Partitioning of office buildings*

Although fire separation between offices is not obligatory, partitions, apart from any glazed parts, have to provide 30 minutes' fire resistance (FR30/FR½hr/REI30/EI30) - see Section B.I. point 5, item 1 – Movable partitions.

Corridors

Walls between offices and corridors, on levels other than the emergency exit levels, should provide half an hour's fire resistance (FR30/FR½hr/REI30/EI30), as should doors giving onto the corridor. At emergency exit level internal walls should provide two hours' fire resistance (FR120/FR2hr/REI120/EI120) and doors should close automatically and provide one hour's fire resistance (FR60/FR1hr/REI60/EI60).

Glazing in or above doors is not allowed except in some special cases where it is necessary to be able to see through the door without opening it, such as computer rooms. In those cases the window should be made of 30-minute fire-resistant glass of the Pyrobel type (FR30/FR½hr/REI30/EI30).

If glazing is used for architectural reasons, the fire resistance of the glass should be equivalent to the compartment in which it is situated.

False ceilings and floors

False ceilings should meet stability criteria and ensure a good level of fire performance:

- A0 or A1 (NBN S 21-203) or A1, A2 or B (EN 13501) for the false ceiling, fastening devices and appliances inserted in it, e.g. light fittings, vents, grilles, blower/extraction ducts, etc.
- Its fire stability should last for at least 30 minutes.
- The fire compartmentation should form an unbroken link between the concrete structural floor and the concrete slab above the suspended ceiling. This system should be applied in all cases of secondary compartmentation, particularly for the protection of horizontal emergency escape routes.
- False floors should meet the requirements set out in Sections B.I. 3 and B.I.5.

It is strongly advised not to use false floors in office areas since the space thus created is liable to assist the spread of fire and smoke.

If the use of a false floor is unavoidable, it should meet the following requirements:

- the space between the subfloor and the false floor should be intersected by the extension of all the vertical walls demarcating emergency exit routes.
- there should be a fire-resistant barrier between sections under false floors where they come into contact with cavities and ducts for technical installations.
- the false floor should either have 30 minutes' fire resistance (FR30/FR½hr/REI30/EI30) or the space under it should be intersected by vertical partitions with the same fire resistance so as to form spaces that fit within a square whose sides measure not more than 10 m.
- if sound-proofing has to be installed under the false floor extending right up to the partitions between offices, the materials used should have a A0 or A1 fire performance (NBN S 21-203) or A1, A2 or B (EN 13501).

Compartmentation for photocopiers

Photocopiers should be sited in suitable rooms.

These should have walls providing at least half an hour's fire resistance (FR30/FR½hr/REI30/EI30) and be fitted with a fire door of the same quality (FR30/FR½hr/EI30C0 or EI30C5). This should be kept open by a magnetic device connected to the fire detection system.

2.4 Partitioning of service shafts*

The standards define the fire resistance specifications of service shafts as 2 hours (FR120/FR2hr/REI120/EI120).

In the case of gas pipes, gas detectors should be located in the duct. Their number will depend on the length of the duct and whether it runs horizontally or vertically. More detectors are necessary in horizontal ones than vertical ones, where only a few are required (see Section B.II.12).

If the gas in the duct is lighter than air, the lower part of the duct may be closed, but the upper part should be open and ventilated and should not contain any opening throughout its height. Any inspection trapdoors should be fire-resistant for at least one hour and should above all be fitted with an air- and gas-tight seal.

The presence of pipes carrying combustible gas in a conduit closed over by floor slabs (gully) should be avoided.

Pipes carrying combustible gas or liquid should not be placed in a duct containing electric cables.

2.4.1 Ventilated casing

The presence of pipes carrying combustible gas in a passageway or escape route should be avoided.

Where this configuration cannot be avoided, the gas pipeline should be insulated from the passageway by a ventilated casing.

The ventilation of the casing should be designed in such a way that, if a leak were to occur, the leaking gas would be channelled out of the building via the vertical duct carrying the gas pipe.

There should be no possibility of a gas leak spreading into any internal part of the building, particularly an escape route.

Where ventilated casings and gas pipes go through fire-walls, the integrity of the fire-wall should be preserved.

If the air intake of the casing is in contact with a fire-risk area, the wall of the casing should be:

- either fire-resistant for one hour (FR60/FR1hr/EI60), at least as far as the point where it joins the vertical duct,

- or fitted with a fire damper.

2.4.2 Vertical ducts containing power and/or telephone cables

There should be fire insulation on each floor.

2.4.3 Horizontal ducts

Horizontal ducts carrying electrical and telephone cables should not pass through premises with a high fire risk unless they are separated from such premises by effective fireproof insulation.

Areas with a high risk factor are generally located in the basement and at ground level: underground car parks, archives, waste-storage areas, joinery workshops, printshops, etc.

2.4.4 Routing of power cables and location of control panels

The basic idea is to reduce, or as far as possible, avoid routing cabling through unprotected areas and high-risk premises.

To that end, every effort should be made to:

- locate the control panel containing the switchgear and circuit breakers and the general low-tension control panel next to, or as close as possible to, the high- and low-tension transformers, and
- ensure that vertical cable distribution ducts are sited as close as possible to the low-tension control panel; if need be, in the case of larger buildings, each low-tension control panel may be situated in the immediate vicinity of the starting points of the vertical supply ducts.

Control panels should not be sited below ‘damp’ rooms. High-voltage control panels should be sited away from areas permanently occupied by staff.

2.4.5 Cable routes in high-risk premises

This problem generally concerns routing cables through indoor car parks. Various technical solutions are possible:

Normal cable route (in the ceiling or on the side of a wall) without fire protection:

This solution is only acceptable if the electrical cables in question do not supply any vital appliances. One example would be cables for general lighting.

This is a convenient solution but it gives no protection and thus no guarantee that these cables will function reliably, so every effort should be made to avoid it.

Cable route coated with a special fire-retardant solution:

Fire-retardant coatings designed for water pipes and/or electric cables should be applied directly onto the cables or onto a cable covering.

Disadvantages :

- whenever new cables are laid or old cables removed, this damages the coating and necessitates reapplication of the product;
- the coating creates thermal insulation around the cables, which can increase their internal temperature and can paradoxically increase the risk of fire breaking out in the cables;
- smoke and combustion gases can follow the cable route and will not be detected until they emerge in a duct or plant area quite far from their source.

For these reasons, this method should generally be avoided. It will only be considered for specific cases involving few cables or for crossing fireproof internal walls.

Protective encasement of cable routes:

This is the recommended solution.

The cable route is surrounded by a box formed by panels of an approved fire-proofing material (e.g. of the ‘Promatec’ type) with one hour’s fire resistance (FR60/FR1hr/EI60).

The panels of the casing may be attached to a metal rack or to a wooden rack with a metal exterior.

Casings should be screwed on so that they can be opened up to facilitate the addition of new cables.

Smoke detectors should be fitted inside the casing.

The detectors should be mounted on an easily removable or pivotable part of the panelling so that they will be easier to monitor and maintain.

Cable galleries:

In the case of major installations comprising a large number of cables which have to pass through large high-risk areas, the recommended option is the creation of a cable gallery to house cabling, insulating it from the fire risks in the areas such as car parks through which it passes.

The design and execution of the cable gallery should meet the following criteria:

- its dimensions (cross-section) should allow enough space for technicians to move and work within it;
- it should be easily accessible with working equipment and cables;
- it should be routed along masonry walls;
- it should comprise as few bends as possible;
- its walls should be fire-resistant for at least one hour (FR60/FR1hr/REI60/EI60), be made of masonry if possible and extend from the concrete structural floor to the concrete structural ceiling;

- it should contain trapdoors or access doors with fire resistance of 30 minutes (FR30/FR½hr/EI30) or one hour (FR60/FR1hr/EI60), depending on the risks presented by the immediate environment, and be fitted with an internal opening mechanism to avoid the risk of anyone being trapped inside;
- it should be ventilated, with air intakes which are not in contact with high-risk premises or escape routes;
- it should be equipped with a fire detection system;
- it should have normal internal lighting and emergency lighting.

2.5 Compartmentation of cable routes and telephone/data networks*

Each of the various functions performed by the telephone lines affects key aspects of the institution (information technology, security). In the event of failure of one or more of these links, entire areas of activity are liable to be paralysed; if security can no longer be guaranteed, persons and property might be endangered.

Hence the need to take protective measures against fire and, where appropriate, other risks such as water penetration, accidental or deliberate damage, electromagnetic induction (proximity to high-tension current), etc.

2.5.1 Location of cable routes and data networks

As in the case of power cables, every effort should be made to reduce the length of, or better still to eliminate, data networks passing through unprotected areas and premises with a high fire risk.

The principal elements of a telecom network should be sited at basement level:

- entry point of the outside telecom operator's cabling,
- Main Distribution Frame.

Vertical distribution in the building by duct should be as follows.

- The telecom operator's cables coming from the street should be routed straight into the Main Distribution Frame.
- The vertical duct(s) should start directly (or almost directly) from the Main Distribution Frame.
- The vertical ducts for data network cabling may be specially designed and confined to this use and additional to those containing power cables. They should meet the specifications set out in point 2.4.

This arrangement is recommended in large buildings and where a large number of lines is installed.

- Protection of data transmission cables crossing fire-risk areas.

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- All the data transmission, detection, etc. cables located in basements should be protected against fire hazards and against the risks of contact with water.
- The regulations (General Regulation on Electrical Installations, RGIE) concerning the physical separation of high- and low-tension currents apply.
- Telephone cable routes should be fire-protected and sectioned.
- The specifications in point 2.4. (horizontal ducts) apply.

Moreover, owing to relatively frequent interventions on data transmission cabling, the two vertical and side faces of the fire-retardant casing should be able to be opened and closed easily and quickly. It is advisable to fix the side panels with hinges and screws.

Particular attention should be paid to the risks of contact with water. In particular, the part of the casing located under water pipelines (toilet outlets, rainwater, etc.) should be protected against the risk of water penetration following a leak or a burst pipe.

2.5.2 Fire compartmentation and insulation of data transmission installations

The telephone installations in question are:

- concentration rooms
- fibre-optic concentration rooms
- Main Distribution Frames
- computer rooms

These should have the following characteristics:

- high and low horizontal partitions (ceiling/floor) - FR120/FR2hr/REI120/A1fl,
- vertical partitions – FR60/FR1hr/REI60/EI60.

Doors should have one hour's fire resistance (FR60/FR1hr/EI60) if there is no airlock and 30 minutes' (FR30/FR½hr/EI30) if there is a protective airlock with walls with 1 hours' resistance (FR60/FR1hr/REI60/EI60).

Airlocks should be installed in large rooms and/or where the room is likely to be reached by dust-laden air.

Air or air-conditioning intakes in the room should be protected by detector-triggered motorised fire dampers inside and outside the room depending on the layout.

The use of fire-retardant grilles is prohibited in this context.

Where personnel have to spend time in these rooms, provision should be made for a fresh-air inlet and an extractor meeting the specifications of the LOI/CODE/RGPT. Other health and safety specifications not relating to fire compartmentation are also applicable to these premises.

2.6 Compartmentation of premises with a high fire risk

For the specifications governing each type of room or area, please refer to Section B.I.6 – Special-purpose areas.

3. FIRE RESISTANCE

3.1 Compartmentation and fire resistance

The concept of ‘fire resistance’ relates primarily to building legislation and standards and to the materials intended for use in the fireproof compartmentation of a building.

The minimum level of fire resistance of a compartment is determined by the various standards, statutory regulations (the LOI/CODE/RGPT and the basic regulations on fire prevention) and legislative provisions imposed by the various bodies with responsibilities in the building field.

3.2 Fire resistance

The shell of a building should not contain combustible or non-fire-resistant materials. Wooden floors and staircases and glass roofs are therefore out of the question.

Floors have to have two hours’ fire resistance (FR120/FR2hr/A1fl) whatever the type of building. The roof must comply with the provisions set out in the Royal Decree of 19 December 1997 mentioned in the basic regulations on fire prevention.

3.3 Doors, partitions and other fireproof elements

Fire doors

All fire doors providing an airlock protecting foyers should be kept open by a magnetic device connected to the fire detection system. A manual release button should be visible and accessible.

In the case of doors forming an airlock between two buildings, doors should be kept open by a magnetic retaining device linked to the fire detection system and the evacuation alarm.

Also in the case of doors forming an airlock between two buildings, an intermittent red light signal should be placed above or beside the door frames. This signal should light up on the non-dangerous side to indicate the danger when the alarm is raised.

Trapdoors in cable and pipework ducts and computer-room doors

Since cold smoke-proofing is not ensured, for these applications at least fire doors should be fitted with a peripheral sealing profile made of neoprene or any other suitable flexible material offering the requisite protection against the spread of smoke and fumes associated with the outbreak of a fire.

Fire dampers:

Fire dampers should meet the following criteria:

- they should be as airtight as possible and hence as impervious to smoke and fumes as possible,
- they should be activated by the fire-detection system,
- they should close as quickly as possible,
- they should be fitted with an indicator showing the position of the damper (open/closed).

For the type of damper to be installed, see the basic regulations on fire prevention.

Fire-retardant grilles made of intumescent material:

This type of equipment is prohibited. Even if certified, it does not offer really effective protection against smoke, particularly in premises with small quantities of combustible material where fires tend to produce cold or low-temperature smoke, such as computer rooms, areas housing air-conditioning plant, telephone distribution frames, etc.

3.4 Penetration of fire partitions

No drilling or modification of a fire partition may alter the fire-resistant quality of the wall. For that purpose, various installations or equipment are produced or are applied. The main solutions are as follows:

Penetration by ventilation ducts:

- The fire damper should be located as close as possible to the fire partition, and the section of duct between the damper and the fire partition should offer the same degree of fire resistance as the wall.
- The use of a damper system may be avoided if the duct is thermally insulated throughout its entire length in the room or the fire-resistant compartment. The thermal insulation should be designed to provide a level of protection that is equal or superior to that afforded by the internal walls. The space between the wall and the duct should be impervious to smoke, fumes and flue gas.

Penetration by pipes containing various fluids (water, non-combustible gas: CO₂, Freon, etc.)

- Metal or plastic pipework should be thermally protected against the effects of fire over a sufficient distance on either side of the wall through which they pass, so that a deformation of the pipes will not result in a lowering of fire resistance at the point where the pipe passes through the wall. Airtightness should also be preserved to prevent the escape of flue gas, smoke and fumes.
- Every appropriate step should be taken to ensure that the heat generated by a fire will not cause the pipes to collapse or to buckle significantly. One of the consequences of a collapsed pipe would be a mechanical reaction affecting the firewall, which could result in its partial destruction or collapse.

- Wherever possible, liquid and gaseous fluids should be placed in horizontal or vertical pipe galleries isolated from the rest of the building by walls with at least one hour's fire resistance (FR60/FR1hr/REI60/EI60) and if possible by masonry walls affording two hours' fire resistance (FR120/FR2hr/REI120/EI120).

Penetration by power and data transmission cables

In order to meet requirements in terms of fireproofing, preventing the spread of fire and excluding fumes, smoke and flue gases, cables should be arranged in the following way:

- Where cables pass through a firewall, they should not be bundled together but arranged in non-abutting layers so that they can be coated with a fire-resistant solution.
- Various coating products are specially designed for this kind of application. Preference is given to those products combining the best performance as regards sealing and fire resistance and ease of use. In particular, these products must allow cables to be removed or added without difficulties.
- In addition to coatings, there also are special devices fulfilling the same role. Choices should be made on the basis of fire-protection rating and cost.

4. FIRE PERFORMANCE OF MATERIALS

4.1 Definition

This expression concerns the behaviour of a material or product when subjected to heat and fire.

This property is not to be confused with fire resistance.

4.2 Objectives - recommendations

The aim is threefold:

- to eliminate the risk of the outbreak and spread of fire (i.e. fire safety),
- to eliminate the risk of smoke or gas inhalation or poisoning resulting from the heating or combustion of materials (i.e. to avoid a health hazard), and
- to limit the risk of impairment or loss of a function performed by a material or mechanism (e.g. the fixtures holding a suspended ceiling in place).

Materials with insufficient fire performance characteristics should therefore be avoided in order to attain and ensure optimum fire performance.

Statutory provisions and standards often lay down precise values for certain materials and/or equipment in relation to buildings. These standards apply.

In most cases, therefore, rating A0 and A1 (NBN S21-203) or A1, A2 or B (EN 13.501) are required for materials forming part of the following construction elements:

- ceilings, false ceilings,

- false floors and floor coverings,
- wall linings.

4.3 Special cases

Filters and materials in contact with the flow of conditioned air

These criteria should be met in the case of filters and other items used inside ventilation ducts, especially for installations serving the following premises:

- restaurant kitchens,
- printshops,
- high fire-risk areas in general,
- areas presenting fire risks inside extraction ducts.

B.III.2. FIREFIGHTING EQUIPMENT

1. MOBILE AND FIXED EQUIPMENT

1.1 Water and carbon dioxide spray extinguishers

Standards NBN EN 3-3, NBN EN 3-6 and NBN EN 3-7 apply.

Only air-pressurised water extinguishers are being installed. Dry chemical extinguishers will only be installed where there is a specific risk of freezing.

They should be approved for use on electric conductors up to 1 000 V.

Preference will be given, wherever possible, to appliances to which a special extinguishing agent of the film-forming emulsifier type can be added or to appliances containing a flame-retardant agent intensifying the extinguishing power of the water. The additives added to water should not give off fumes harmful to users.

Air-pressurised water extinguishers should be installed in all areas except where there are specific technical installations needing a different extinguishing agent. Suitable special equipment should be placed in areas containing technical installations. The locations and number of extinguishers are determined in accordance with the standards laid down by OIB.RE SIPP. In general, this is at a rate of one extinction unit per 150 m², and one unit for every ten car parking spaces, as required by the Assuralia (Belgian Professional Union of Insurance Companies) and depending on the nature of the risk.

Manual carbon dioxide extinguishers are intended for protecting electric equipment and computer facilities.

1.2 Hose reels with axial feed, hydrants

Standard NBN EN 671.1 applies.

Provision should be made for a sufficient number of indoor hydrants to allow easy access with the nozzle of a water hose to any part of a building, with the exception of high-tension and low-tension electrical installations.

Reels and hydrants should be approved.

Storage areas (archives, joinery workshops, paper stores, etc.), computer rooms, warehouses and indoor car parks should be within easy reach of at least two hose reels. The normal length of a fire hose is from 20 or 30 metres.

Provision should be made for the installation of additional hose reels where they will be needed (labyrinthine passageways, large concentrations of combustible items, etc.).

The installation of hoses fitted with water nozzles (in sections of 20 or 30 m) in place of a hose reel with axial intake is prohibited.

1.3 Pillar hydrants and other types of fire hydrant

The vicinity of the building should be equipped with pillar hydrants and other types of fire hydrant.

These must conform with standard NBN S21-019 and standard NBN S21-026 for pillar hydrants and NBN S21-034 for other types of fire hydrant.

2. INSTALLATION AND PROTECTION

Firefighting equipment must be installed in a clearly visible location. It must also be indicated by pictograms which comply with the regulations and with Section B.III.4. If it is positioned laterally in a corridor (the usual case) and is not directly visible, a second pictogram indicating its position must be placed perpendicular to the corridor, near the ceiling.

2.1 Extinguishers

Wherever there is a possibility of appliances gathering dust or deteriorating, or where the appliance is a risk in itself (for example, in crèches), it is recommended that they be enclosed in a case or cabinet provided for that purpose. The case should have a lid made of transparent plastic through which the extinguisher is visible.

As far as possible extinguishers should be placed in recesses so as not to constitute an obstacle.

Cabinets or cupboards used to house both an extinguisher and a hose reel should have a transparent door panel allowing the contents to be seen or a sign indicating that they contain an extinguisher.

If necessary, extinguishers may be placed on walls so that they protrude and can be clearly seen from a distance.

2.2 Hose reels

Hose reels should be placed in cases, cabinets or purpose-built fixtures. These should be painted red (RAL 3000). They should not protrude into the corridor.

The hose-reel housing may also be used to accommodate one or more extinguishers if there is sufficient space inside it.

Hydrants should:

- be used solely for fire prevention;
- comply with the relevant standards;
- be painted red (RAL 300) throughout their length to distinguish them from other pipes;
- be of the wet type, i.e. at the required water pressure at all times: at least 2.5 bar head pressure;
- be constantly supplied with a sufficient flow of water to allow the simultaneous operation at full power of at least two water hoses;
- not be dependent for their operation on a valve located at the foot of the hydrant or near the water meter or on manual activation of pressurising pumps.
- have a pressure gauge with three-way valves at the top of the hydrant; another pressure gauge should be below the general gate valve. These pressure gauges should allow a pressure reading of up to 10 bar.

3. AUTOMATIC EXTINCTION FACILITIES

3.1 Automatic inert gas extinction

See Section B.II.7. - Special-Purpose Areas

3.2 Sprinklers

Overhead sprinklers may be used wherever an area contains a large concentration of combustible material and there is no risk of the objects or appliances there being damaged by the water.

Apart from the sprinklers themselves, the system requires:

- smoke detection,
- treatment of the floor to make it watertight,
- treatment of the joints fixing the vertical partition walls to the structural floor of the premises and raising of thresholds to prevent water from sprinklers spreading outside;
- water runoff at floor level by means of gullies leading to the drainage system.

The system is especially recommended for the following purposes:

- protection of areas where wastepaper and dustbins are stored,
- protection of underground car parks, and

- protection of sizeable stocks (joinery equipment, paper, paint, carpeting, etc.).

Nevertheless, these specific facilities will only supplement the fire-safety mechanisms stipulated for such premises, such as fire dampers and fire doors, smoke-detection systems, fire-resistant walls, etc.

Sprinkler systems featuring a dry hydrant are recommended as far as possible.

See Section B.II.9.

B.III.3. FIRE-DETECTION AND ALARM GUIDELINES

See Section B.II.8.

B.III.4. SIGNS. EMERGENCY LIGHTING

1. GENERAL

Safety signs in a building are intended to inform the occupants of risks and of hazards to health or safety. They may take one of the following forms, as circumstances warrant:

- a particular colour,
- a notice containing a sign, symbol or pictogram,
- a verbal communication, recorded or otherwise.
- emergency lighting.

This chapter lays down the minimum requirements for safety signs and/or signposting of workplaces.

If necessary, an additional warning system may be used in certain high-risk situations.

2. LEGAL BASIS

The specifications in this chapter reflect and/or supplement those laid down in:

- **Belgium's Royal Decree of 17 June 1997 on health and safety signs at work, which transposes Council Directive 92/58/EEC on the minimum requirements for the provision of safety and/or health signs at work,**
- **the LOI/CODE/RGPT .**
- **the standards relating to the identification of vessels and pipes containing gases or liquids, and**
- **the rules on road signs (for car parks/car park entrances and exits).**

3. GENERAL SIGNS

This type of sign has not been codified or standardised and is primarily designed to indicate the location of appliances and/or specific premises such as:

- toilets (men's and women's toilets, toilets for persons of reduced mobility), on doors and on double-sided signs hung from above. For toilets for persons of reduced mobility, the signs must be visible from the lift lobby,
- showers, on doors,
- utility sink, on doors,
- meeting rooms, on doors,
- cafeterias, on doors and on double-sided signs hung from above,
- lifts, in corridors and on double-sided signs hung above the entrance,
- registries and archives, on doors,
- technical areas, on doors,
- firefighter lift, at the evacuation level and in the lift,
- lift for persons of reduced mobility, at the evacuation level and in the lift,
- lift numbering at the evacuation level, on the landings and in the lift cars,
- pictograms indicating directions to these areas may be needed to guide staff and/or visitors.

General signs can also be used to give instructions and information relating to health or safety:

- switch on headlights (indoor car parks),
- lift out of order/repairs in progress/lift closed,
- WC closed;
- prohibition signs: 'No [...]';
- no entry for unauthorised persons.

By indicating the location of particular facilities, general signs help the occupants to find their bearings. In particular, they provide information on the purpose and content of a room or area, which sometimes serve as an invitation to users of the building to show due consideration for the requirements of such premises, for example:

- by refraining from smoking in a printshop or file registry or in archives,
- by not blocking doorways but keeping doors closed in file registries and archives, in paper supply stores, etc.

Through these informative, instructional and prohibitive functions, such signs serve as a useful supplement to the safety warning notices.

Wherever possible, general signs must avoid the use of text and words, but like warning notices should display signs, symbols and pictograms which are simple, unambiguous and universally understood. General signs must avoid colours, shapes or symbols which are used in safety signs and might give rise to confusion, except where the indication relates to a health or safety requirement or to emergency drills. In fact, where a sign indicates a prohibition or warning relating to a health or safety requirement, or in the case of emergency arrangements for which there are no standardised signs, elements from conventional safety notices should be used.

Where unambiguous communication through symbols or pictograms is difficult and it is impossible to avoid a written message, the problem is which language(s) to use. If it is not possible to communicate in all EU official languages, the text must be displayed in two languages wherever possible: (in Brussels) in French and Dutch where the message applies primarily to maintenance staff, and in French and English where the message applies to the occupants of the building.

4. PICTORIAL SAFETY SYMBOLS

Permanent safety messages are mainly conveyed by means of pictograms.

Sirens, PA systems and lighting must be reserved for messages of an occasional nature.

4.1 General principles - Colour codes for safety messages

Under Council Directive 92/58/EEC of 24 June 1992 on the minimum requirements for the provision of safety and/or health signs at work, and subsequent amendments, all safety notices, except those relating to vessels and pipework, must use the following colour code:

Colour	Meaning or purpose	Information
Red RAL 3000	Prohibition sign Danger alarm Firefighting equipment	Dangerous behaviour Stop, shutdown, evacuation Identification and location
Yellow Amber RAL 1003	Warning sign	Be careful Take precautions
Blue RAL 5005	Mandatory sign	Specific behaviour or action Wear personal protective equipment
Green RAL 6032	Emergency escape, first-aid sign No danger	Doors, exits, routes, equipment, facilities Return to normal

4.2 Minimum specifications for signboards

4.2.1 Intrinsic characteristics

Signboards must be made of a material offering resistance to the shocks, climatic conditions and stresses associated with their surroundings.

The dimensions, colour and design of the signboards must be selected to guarantee that they can be easily seen and understood.

4.2.2 Conditions of use and installation

Signboards must be installed at an appropriate height taking into account any obstacles, either at the access to an area in the case of a general hazard or in the immediate vicinity of a specific hazard or of the object to be indicated, and in a well-lit and easily accessible place.

In poor lighting conditions, luminous colours and reflective materials must be used. Emergency lighting may supplement the signs. These provisions are to be applied primarily in the following cases:

- signposting of escape routes in the basement, and
- signposting in maintenance areas, indoor car parks, computer centres and warehouses.

4.2.3 Size of pictograms

The size of pictograms must take into account the distance at which they must be visible, based on the following formula:

$A > L^2/2000$, where A is the area of the sign in m² and L the distance in metres at which it must be visible.

5. DESIGN RULES FOR DIFFERENT TYPES OF SIGN

5.1 Prohibition signs

- round,
- black pictogram on white background,
- red border and diagonal band.

The colour red must cover at least 35% of the surface area of the sign.

5.2 Warning signs

- triangular,
- black pictogram on yellow background, black border.

The colour yellow must cover at least 50% of the surface area of the sign.

5.3 Mandatory signs

- round,
- white pictogram on blue background.

The colour blue must cover at least 50% of the surface area of the sign.

5.4 Emergency exit or first-aid signs

- rectangular or square,
- white pictogram on green background.

The colour green must cover at least 50% of the surface area of the sign.

5.5 Signs relating to firefighting equipment

- rectangular or square,
- white pictogram on red background.

The colour red must cover at least 50% of the surface area of the sign.

6. SIGNPOSTING OF ESCAPE ROUTES

6.1 General principles

Pictograms indicating escape routes, especially in office areas, must be displayed in a way that makes them easily visible and guides the flow of occupants to the emergency exit nearest their place of work.

The term ‘emergency exit’ in this context refers to a door or an equivalent protected passage leading to:

- an emergency stairway,
- a foyer (insulated from the rest of the building),
- an exit leading directly, or by a safe route, to the public highway,
- a terrace or flat roof designed as an escape route leading directly or indirectly to the public highway.

6.2 Positioning of signs

Pictograms must not be placed too high (range of view) and could usefully be backed up by other pictograms displayed on the lower part of the external or internal walls of the escape route. Where technically feasible, pictograms should be placed at skirting board level indicating the route to be followed. In such cases the paint and the medium must be highly resistant to heat, handling, abrasion and cleaning materials.

An evacuation sign no more than 15 m away must be visible from any point. Pictograms may be wall-mounted or suspended (single or double-sided).

At each change of direction (turns in corridors), at least one pictogram must be displayed on the cladding of the external wall or on the internal wall facing staff who are following the escape route. Pictograms must also be displayed at the intersections of corridors.

Where a corridor has a stairway at both ends, which is normally the case, two escape routes must be indicated symmetrically from the midpoint of the corridor, one leading to each of the stairway access doors.

Emergency exits located along a corridor must be indicated by pictograms suspended from the ceiling, back to back, at right angles to the longitudinal axis of the corridor indicating the location of the door.

Internal stairways, as the vertical escape routes, must be signposted with pictograms displayed on each landing in such a manner as to be visible to people already on the stair and to those entering the stairwell. The floors must be identified in the stairwells in such a way that people on the staircase can see the floor letter, even if the door to the stairway is open. The floors must be labelled from A to Z and the pictograms indicating the direction of the emergency exit must be displayed alongside.

On the evacuation level, the ‘emergency exit’ pictogram must be displayed where it can easily be seen by people ascending and/or descending the stairway. It is recommended that one sign be affixed to the exit door itself and another above or beside the door.

Where an escape route crosses an internal courtyard, indoor car park, terrace or flat roof, the signs must be positioned to make the route extremely obvious, eliminating any risk of deviation, especially at any point where the route changes direction.

Signs must be positioned in the best-lit areas and close to emergency lighting, if there is any.

In the lobby approaches protecting stairways, the two doors giving consecutive access to the stairways must be painted green on the side leading towards the emergency exit.

The floor letters in the lift lobbies must be the same as those in the stairwells.

6.3 Evacuation levels

A building must generally have only one evacuation level but may, if it is a long building flanked by sloping streets, have two or more.

In that case, the numbering of the evacuation level will be particularly important. To avoid any misleading information which might endanger occupants and visitors evacuating the building, it is recommended that:

- the lowest floor of the building with direct access to the street be designated Level 0 (ground floor);
- all the other floors in the building be numbered accordingly, including the other evacuation levels;
- no floor which is too low to give direct access to the street should be designated Level 0.

6.4 Illuminated and photoluminescent signs

6.4.1 Illuminated signs

Pictograms affixed to the face of self-contained lighting units reduce the lighting provided by the unit and should therefore be avoided. It is recommended that pictograms be mounted on a backlit panel, suspended on the self-contained lighting unit.

There should be a guaranteed power supply in the event of a power cut (emergency circuit) without loss of intensity for a period of at least one hour.

Provided that it meets the above criteria, this type of signposting is recommended in locations such as:

- technical and maintenance areas,
- computer rooms, and
- meeting rooms.

6.4.2 Photoluminescent signs

These signs are more especially recommended in the following places:

- indoor car parks,
- technical and maintenance areas,
- meeting rooms (exits),
- reprographics centres,
- escape routes in the basement,
- lifts, particularly for displaying emergency telephone numbers and showing where the telephone is, and
- the lower part of corridors, to indicate the escape routes (luminous strips).

The products used for such signposting must not contain radioactive substances.

6.5 Signposting for persons of reduced mobility

See Section B.III.9.

6.6 Door colours

In the case of the doors and emergency exits:

- of indoor car parks,
- of basement escape routes,
- of technical and maintenance areas containing several doors,

- of meeting rooms,
- of kitchens,
- giving access to fire escapes, etc.

which open onto an escape route or emergency stairway, the side of the door facing those who are evacuating the premises must be painted green (RAL 6032). The other side of the door and all other doors must be painted in another colour (any colour apart from the prohibited colours: green, red, black and dark blue).

This will enable anyone in a large room with several doors to identify immediately the door or doors which lead to a protected area.

7. SIGNS ON PICTURE WINDOWS AND GLASS DOORS

Glass doors and full-length picture windows must be marked to prevent collisions, by means of two strips of self-adhesive decorative pictures placed at 1 m and 1.50 m from the ground.

8. FIREFIGHTING EQUIPMENT

8.1 Extinguishers

The existence and location of fire extinguishers must be indicated as follows:

8.1.1 Positioning of appliances

Extinguishers must be placed where they can be most easily seen.

In passageways, therefore, extinguishers must not be placed behind or beside a pillar or any other visual obstacle.

Corridors often have all or most office doors on one side only, in which case extinguishers must be located on the opposite wall so that they are seen by the occupants as soon as they come out of an office.

For the above reasons, the appliances intended for the protection of specific premises must, where possible, be placed outside these premises, next to the entrance door, avoiding any need to search a smoke-filled and/or, in the case of a lighting failure, darkened room for a hypothetical extinguisher in the event of fire. One or more additional extinguishers may also be located in such areas so that an extinguisher can be found easily even if the electric lighting fails.

8.1.2 Appropriate and carefully placed signposting

If an extinguisher is located at one end of a corridor and is visible along the full length of the corridor, a special sign displayed on the wall above the extinguisher is useful as a means of drawing attention to the possible absence of the extinguisher from its mounting. If the appliances are on one side of the corridor or in a housing that does not protrude from the wall, their presence must be indicated by a pictogram symbolising a fire extinguisher, accompanied by an arrow pointing in the direction of its location.

These signs must be suspended from the ceiling at right angles to the longitudinal axis of the corridor and must display the pictogram on both sides so that they can be identified at a distance by a person proceeding along the corridor in either direction.

This sign may be combined, where appropriate, with the sign for a hose reel or hydrant. In this case the pictograms for the extinguisher and for the hose reel or hydrant must be displayed side by side and be accompanied by an arrow or arrows indicating the location of each.

The use of luminous/phosphorescent signs is recommended where a particular risk connected to the nature and content of certain premises requires rapid and reliable deployment of firefighting equipment.

Examples:

- indoor car parks,
- reprographics centres,
- waste-storage areas,
- key archives,
- in general, all high-risk premises located in the basement.

Signs suspended at right angles to the longitudinal axis must be used wherever an appliance or emergency exit is on the side of a passageway and is in the direct line of vision. This applies not only to corridors but also in every other place where the configuration of the building obscures an appliance or lateral signboard from the direct line of vision.

8.1.3 Adequate lighting in the vicinity of appliances

If lighting levels are inadequate, provision must be made for brighter lighting. Wherever possible, emergency lighting should be fitted near firefighting equipment so that it can be found easily even if the normal lighting fails.

8.2 Hose reels and hydrants

Hose reel and hydrant location must comply with the following conditions:

- close-up identification: the door or casing containing the appliances must be red. The pictogram must be displayed on the door.
- identification at a distance: the position of the appliances must be indicated by a signboard, which must be double-sided if it can be seen from both directions or single-sided if it can only be seen from one direction. The pictogram must be suspended perpendicular to the housing in the corridor and must indicate the presence of the hose reel and the extinguisher, if any. **The pictograms must comply with current legislation (EU directive, the LOI/CODE/RGPT).**

Please note that high-pressure risers and rising mains supplying water to these appliances must be painted red (RAL3000). This condition also applies to supply pipes for sprinkler systems.

8.3 Automatic extinguishers (water, foam, inert gas)

Extinguishers must be signposted as follows: the pipes to which they are connected must be painted red, and special notices must be displayed inside and outside the protected premises informing occupants of the presence of such devices and of the code of conduct in such premises.

8.3.1 Sprinklers

It is recommended that the presence of a sprinkler system be indicated by a pictogram showing the shape of a sprinkler head with water emerging. This sign may be affixed inside the premises if they are fairly large (stores, indoor car parks) or on the outside of the entrance door in the case of smaller premises (wastepaper storage areas).

Intermediate shut-off valves are prohibited.

8.3.2 Water sprays

The presence of extinguishing agents must be indicated on the outside of the entrance door to the premises by means of an appropriate notice and/or pictogram.

8.3.3 Automatic extinguishers for deep-fat fryers (kitchens)

The manual activation mechanism must be clearly indicated.

9. INDOOR CAR PARKS

9.1 Escape routes

These signs must comply with the specifications of point 6 of this section, and in particular points 6.2, 6.4 and 6.6.

It is recommended that 40% of all pictograms be illuminated and/or photoluminescent (see point 6.4).

Signs must be repeated at floor level as required under the basic regulations on fire prevention.

A plan of the basement floors or, in the case of large underground car parks, several plans must be displayed near emergency staircases. Emergency lighting must permit the plan to be consulted without difficulty.

The plan, which may be luminous, must clearly indicate its own position, the escape routes leading to the outside of the building and the location of firefighting equipment.

9.2 Special signs for the disabled in indoor car parks

The route to be followed from the entrance to the car park to the parking spaces for persons of reduced mobility will be marked out by “P” pictograms together with the international symbol for accessibility for persons of reduced mobility and directional arrows.

The specifications in Section B.III.9 below must be complied with.

9.3 Firefighting equipment

In addition to the indications on the plan(s) referred to in point 8.1 above, all firefighting equipment must be signposted in accordance with Section B.III.2.

9.4 Road signs at the entrance to and inside car parks

9.4.1 Underground car-park entrances

The following signs must be placed at the entrance to underground car parks:

- no entry for pedestrians,
- height restriction: X m (maximum permitted height),
- the letter P followed by an international sign for accessibility for persons of reduced mobility (indicating that the building has access for persons of reduced mobility through the underground car park) and the level of the car parking spaces reserved for persons of reduced mobility,
- LPG permitted or not permitted (if it is permitted, a sign must direct drivers of LPG vehicles towards reserved parking spaces on the lowest level of the car park, indicating the level as ‘LPG – x’),
- access for two-wheeled vehicles permitted, and the level of the spaces reserved for such vehicles if they are not located at the entrance.

If the access to the car park is by a straight or curved ramp, this group of signs must be placed in a visible position before the ramp on the street side.

The signboard must be at least 40 cm high, with its lower edge at the authorised height level and fixed to its support medium by flexible attachments (stainless-steel chains or cables). It must be made of metal so that it makes a noise if hit by a vehicle which exceeds the maximum authorised height. It must be placed in front of, thus replicating, the sign with oblique yellow and black stripes specially designed to show the maximum authorised height.

Three more signs must be placed at a distance from this first group and before entering the car park itself:

- speed limited to 5 km/h,
- ‘no naked flames’, and
- ‘please switch on headlights’ (HR.DS.6 HASPAC – OIB.RE SIPP model)

These signs may be placed on vertical supports: walls, columns, metal supports fixed to the ground or walls, provided that they are in the line of vision of drivers and perpendicular to this line. They may exceptionally be placed to the left of the pathway or ramp giving access to the car park, if this is advantageous, provided that they are beside a wall with no windows.

9.4.2 Inside the car park

- No entry, if required,

- One way,
- continuous or interrupted lines, as required,
- special signs for speed bumps,
- speed-limit reminders (5 km/h)
- no stopping in front of the emergency exits
- No naked flames / No smoking

9.4.3 Direction signs for vehicles

The direction of travel must be marked by yellow or white arrows painted on the ground and by the road signs listed.

The route must be laid out, marked and signposted in such a way that it can be followed easily without any risk of error and must guide the driver from the entrance to the various parking areas.

9.5 Other warning and prohibition signs

9.5.1 Car-park entrances and exits: blind junctions

To supplement the road signs listed above, traffic lights must be installed at entrances and exits to indoor car parks as well as on any other narrow bidirectional roadway where the configuration of the car park makes it impossible for two vehicles to pass simultaneously.

Overhead mirrors must also be affixed at blind junctions and at points where vehicles emerge from indoor car parks onto the public highway, to enable drivers to see whether other vehicles and/or pedestrians/bicycles are about to cross their path.

9.5.2 Indication of vertical and horizontal obstacles

The edges of interior pavements and projections at ground level must be indicated by a strip of yellow paint or by yellow and black or red and white stripes.

The above also applies to overhead horizontal objects (beams, ducts, cable routes, etc.) and abrupt changes of level (steps, edges of loading platforms).

Vertical obstacles in the form of corner walls which protrude onto a roadway or pavement and constitute a hazard to vehicles or pedestrians must be indicated by oblique yellow and black or red and white stripes painted on the obstacles in question. Luminous paints may be used for this purpose.

9.5.3 Pillars and walls of car parks

To prevent accidental collisions, a yellow stripe about 40 cm wide must be painted on walls and pillars; the top of the stripe must be approximately 1.5 m above ground level. This stripe must be applied to every visible surface of the pillars.

To make these stripes more prominent, the rest of the wall and pillar surfaces must be painted white.

10. SAFETY SIGNPOSTING IN TECHNICAL AND MAINTENANCE AREAS

Each technical and maintenance area must be signposted (low or high-voltage electricity stations, stationary batteries, gas expansion chambers, electrical generators, cleaning areas, archives, rubbish bins), whether these areas lead on to corridors or car parks.

Moreover, specific signposting must be provided in the following cases:

10.1 Electrical

Particular attention must be taken in respect of cables connected to high-tension conductors (11 000V).

The routes of such cables must be equipped with signs, which can be read from at least three metres away, bearing the electrical hazard symbol accompanied by the figure '11 000V'. These signs must be repeated at regular intervals so that the high-tension cables can be identified as such at all points along their route.

10.2 Signposting of the fluids contained in vessels and pipework

Signposting must comply with current legislation in this domain, especially for dangerous fluids such as paraffin, combustible gases and liquids, pressurised air or vapour, toxic materials or irritants (ammonia, polychlorinated biphenyl - PCB), etc.

These signs must be positioned as follows:

- on the visible side(s) of the pipe or vessel,
- in rigid, self-adhesive or painted form.

Colour

The choice of colours and the colour coding must be in line with the relevant Belgian legislation and standards applicable.

The colour must either be along the entire length of the pipe or in the form of ring-shaped bands applied near the places containing special elements (valves, connecting points, etc.) in a sufficiently repetitive fashion. The colouring must be on either side of, or on, each valve of a network, together with a movable label where applicable.

The coloured-ring option should be used where the pipe has an insulating sleeve, and the entire pipe painted if there is no sleeve.

10.3 Special cases

Pipes carrying combustible gases:

The gas pipes inside a building, especially those linking the expansion chambers with the furnaces, must be painted in yellow (RAL 1003) along their entire length (legal obligation).

Horizontal and vertical water pipes used to fight fire

These supply stationary firefighting equipment. They must be painted red (RAL 3000) along their entire length, even where they are inside vertical and horizontal ducts.

B.III.5. ESCAPE ROUTES AND EMERGENCY EXITS

1. ESCAPE ROUTES

1.1 Horizontal escape routes

Horizontal escape routes must comply with the specifications laid down in the basic regulations on fire prevention and with the LOI/CODE/RGPT.

Escape routes must also comply with requirements relating to the access and movement of persons of reduced mobility within the building (see Section B.III.9).

Corridors should be 1.50 m wide. Emergency exits should have a clearance width of more than 0.90 m and be on the same level as the pavement outside. The route between the lifts for disabled persons and the emergency exit must not include any stairs.

Entrance halls

Entrance halls must be separated from the rest of the building by two-hour fire-resisting partitions (FR120/FR2hr/REI120/EI120) and one-hour fire-resisting doors (FR60/FR1hr/EI60) or double-entrance firebreak vestibules.

Combustible materials inside the entrance hall should be kept to an absolute minimum. Synthetic materials, plastics, rubber, etc., should be avoided altogether or confined to what is strictly necessary.

Electrical or telephone cable ducts should be sealed off from the hall by means of two-hour fire-resisting partitions (FR120/FR2hr/REI120/EI120).

The floor surface of escape routes, particularly external escape routes, must comply with the following specifications:

- they should be non-slip: see Section B.I.5, point 6.1.
- they should not be made of steel grating or contain perforations which could impede or endanger persons using a walking stick or wearing stiletto heels.

In addition, external escape routes must comply with the following specifications:

- they should be at least 1.5 metres wide,
- there should be a railing on both sides of the escape gangway,
- they should have a hard, non-slip surface (see Section B.I.5, point 6.1),
- they should not pass along a windowed façade of the building, but should be routed as far away as possible away from such façades.

Where the façade does not contain windows, an escape route near the building should be avoided as far as possible. However, where the layout of the premises prevents this specification from being met, an escape route may skirt a façade provided that it contains no windows and presents no particular risk of fire or explosion.

In principle, an external escape route must not lead to another passage through the building being evacuated. If the layout of the building makes this unavoidable, for example in the case of an internal courtyard, provision should be made for at least two passages through one or more adjacent buildings in the form of internal escape routes leading to the public highway via two emergency exits.

These escape routes must meet the normal fire-safety criteria for tall buildings.

1.2 Vertical escape routes - emergency stairways

1.2.1 General

Vertical escape routes must comply with the same regulations and standards as horizontal escape routes. Edges of stairs must be treated to make them non-slip. The colour of the edges of the first and last stairs in each flight must contrast very strongly with that of the rest of the stairs (e.g. yellow nosing/grey stairs).

If there is no service lift (see Section B.II.5) which would accommodate a stretcher, the stairs should be wide enough to allow an injured person lying on a stretcher to be transported without difficulty.

Doors providing access to the stairway should not project on to the landing, but should open in the direction of the escape route.

Where doors providing access to emergency stairs have locks, they should be equipped with a single cylinder. This will preserve their fire-protection qualities and prevent them from being locked.

Landings on emergency stairs also serve as refuge areas for persons with reduced mobility. They must therefore be designed so that there is enough space for a wheelchair to be parked and for persons evacuating the building to use this route at the same time (see Standard BS 5588, part 8).

Landings on emergency stairs should be equipped with a telephone at around 0.8 metres from the floor, bearing the legend SOS and displaying extension number 22222, so that persons of reduced mobility taking refuge in such areas can report their whereabouts.

The gradient of the stairs must comply with normal building standards, i.e. around 30°. The width and height of the steps should be determined by the equation $2H + I = 63$ to 64 cm, where I is the width of the tread and H is the height of the riser. Recommended value: I = approx. 27 cm.

1.2.2 Location of emergency stairs

As a rule, stairs should be located inside buildings. No emergency stairs should be located in front of the outside wall of the building. The only permissible exception is a stairway located at the end of a building, next to a blind wall which has no windows and does not present any particular risk of fire or explosion.

The location of emergency stairs must comply with the specifications for the evacuation of persons of reduced mobility.

Stair landings must fulfil the criteria listed in Section B.III.1 above and, in particular, must be wide enough to allow at least one wheelchair to be parked and manoeuvred without obstructing passage through the doors.

1.2.3 Spiral staircases

Spiral staircases are prohibited. Where there is no alternative to a spiral staircase, it must satisfy the following conditions at least:

- there should be sufficient space to allow an injured person to be evacuated on a stretcher where the service lift (see Section B.II.5) does not accommodate a stretcher,
- in its vertical axis there must be an area in which the stairs are replaced by a coaxial cylindrical section of a diameter of at least 60 cm,
- this cylindrical section must contain a banister or handrail, positioned at the regulation height (+/- 1 m), to provide a means of support for persons using the stairs,
- the first and last steps in each flight of stairs must be fitted with non-slip nosings in a colour which contrasts very strongly with that of the rest of the step (e.g. yellow nosing).

The cylindrical central section of the staircase may be used for pipes carrying non-combustible fluids (water pipes, rainwater drainage) and possibly for electrical or data transmission cables, provided that the safety rules laid down in the LOI/CODE/RGPT and the relevant standards are observed (fireproof sectioning).

The edges of the stairs must be treated to make them non-slip.

In addition to the above specifications, emergency staircases must fulfil the following criteria:

- they should not have slippery surfaces or surfaces capable of retaining water, in order to eliminate the risk of frosting or icing-over in winter,
- they must not contain any holes or openings which could impede or endanger persons using a walking stick or wearing stiletto heels. For that reason, any openings must be less than 8 mm in diameter.
- they must contain railings with a handrail at a sufficient height and intermediate rails to eliminate any danger of an accidental fall.

2. EMERGENCY EXITS

Emergency exits must comply with the specifications of the LOI/CODE/RGPT and the associated standards, as well as the requirements relating to the movement of persons of reduced mobility.

2.1 Locking of emergency exits

Emergency exits must comply with Council Directive 89/654/EEC of 30 November 1989 concerning the minimum safety and health requirements for the workplace, and subsequent amendments thereto, and in particular Annex II, point 4.4, which stipulates that emergency doors must be closed in such a manner that they can be opened easily and immediately by anyone who needs to use them in an emergency.

Revolving doors, even if capable of being released, must under no circumstances be used as emergency doors.

Emergency exits may be locked, provided that there is an electric or electromagnetic (magnalock – see Section B.IV.3) opening device. Such devices must be installed in such a way as to meet all three of the following requirements:

- they should unlock automatically when the alarm signal is activated,
- they should unlock automatically as soon as the power supply is interrupted,
- they should have an emergency unlocking mechanism in the form of a punch switch protected by a break-glass casing or any other equivalent device. Activating this device should set off a siren near the door, which should have a different and less powerful sound than the alarm sirens in the building.

No lock or bolting mechanism should be located at the foot of a door at ground level.

2.2 Panic bars

The panic-bar system for opening doors is not necessary for emergency exits leading directly to the outside, provided that such exits can be opened from the inside at all times.

This emergency opening system is to be used only in the specific cases for which it was designed. The few places where a panic bar might be used within Commission buildings include electrical control centres (high and low tension), computer rooms, major storage areas containing large quantities of combustible materials, such as very large archives, stores, reprographics workshops, reprographics storage facilities, etc.

3. DIRECTION IN WHICH DOORS OPEN AND SIGNPOSTING

Doors must open in the direction of the escape route. Doors and emergency exits opening onto the street should be set back from the building line so that passing pedestrians are not hit by the opening doors.

The horizontal and vertical escape routes must be equipped with safety signs conforming to the specifications laid down in Section B.III.4 above.

B.III.6. EXTRACTION AND DETECTION OF SMOKE AND GAS

1. GENERAL

The extraction of smoke and gases is of prime concern in premises which:

- contain sufficient quantities of combustible materials (in solid, liquid or gas form);
- house internal combustion engines (electricity generators, car parks);
- contain batteries;
- may emit foul smells: toilets, places where perishable waste (kitchen waste) is stored.

2. SMOKE AND GAS EXTRACTION SYSTEMS

2.1 Smoke extraction systems

The law lays down a number of smoke-extraction measures specific to certain areas of buildings, in particular:

- emergency staircases, and
- stores,

for which special mechanisms suited to the likely volumes of smoke (smoke outlets), are provided.

In other cases, the extraction of any smoke is dealt with by the ventilation and gas-extraction systems: underground car parks, boiler rooms, etc.

2.2 Smoke and gas extraction methods and systems - Ventilation

The basic principles to be applied are as follows:

- smoke and gases should be extracted by natural ventilation wherever such a system guarantees efficient and adequate renewal of the air supply,
- the ventilation of premises should consist of low-level and high-level ventilation, preferably situated at diagonally opposite extremities of the room, comprising openings wide enough for the required air flow.

There are precise legal provisions on this matter for most high-risk premises, i.e. those containing gas installations, high tension/low tension transformers, boiler rooms, etc.

In the case of heavier-than-air gases or vapours, a powerful system of mechanical ventilation is indispensable as a means of expelling such pollutants from the building to a place where there is no danger of their being sucked in again by a fresh-air intake or entering the building through various openings (ventilators, windows, doors). Care will also be taken to avoid the release of gases, vapours or smoke into an enclosed space such as an internal courtyard.

The extraction points for heavier-than-air vapours (e.g. solvent or LPG fumes) should preferably be located at or near ground level. A system of vertical air renewal in the room, from top to bottom, distributed uniformly at a variety of points, must be installed to facilitate the expulsion of the gases and vapours and to eliminate any risk of stagnation of these pollutants. The extraction of heavier-than-air vapours should not take place in the upper part of the room, and so the suction points (extractors) should not be located in the ceiling; these

extractors should be located in the lower part of the room, as close as possible to the source of the pollutant.

N.B. In cases where the gases or vapours to be extracted are inflammable or explosive, it will be necessary to install a mechanical ventilation system and a flameproof electrical system (see General Regulation on Electrical Installations).

2.3 Outlets

Outlets are the points at which gases and smoke are discharged into the atmosphere (e.g. boiler-room chimneys).

They are also the points at which the air extracted by the air-conditioning system is expelled from the building. They should be located in a place where their emissions cannot constitute a source of annoyance or potential pollution to people, whether that place is situated away from the building, next to the building or on the building itself. Special care should be taken to ensure that gas emissions cannot find their way back into the building through openings such as windows, doors, ventilators and fresh-air inlets.

Enclosed spaces, such as inner courtyards, must not in principle house outlets of smoke, gas or pollutant vapours.

The air-conditioning circuits must be designed in such a way that, in the event of a fire, they will emit the resultant smoke into an area and in a direction where it cannot harm people.

If, for reasons of energy-saving, part or all of the extracted air is normally directed towards the basement (underground car parks), an automatic mechanism activated by the fire-detection system must divert air polluted by combustion gases and smoke from a fire inside the building towards an outlet which fulfils the criteria set out above.

3. USE OF SMOKE AND GAS EXTRACTION SYSTEMS IN VARIOUS TYPES OF PREMISES

3.1 Premises with a high fire risk

All high-risk premises have their own specific systems for ventilation and for the extraction of gases and smoke. It is, however, necessary to specify the particular features of certain types of premises.

3.2 Particular premises

3.2.1 Underground car parks

Underground car parks must be ventilated in a manner consistent with the relevant standards.

Where natural ventilation is inadequate, provision must be made for mechanical ventilation. Depending on local circumstances and the required airflow, the ventilation may operate continuously or intermittently. The airflow must be measured by a CO sensor. In the latter case, a timer switch or gas-detection system should be installed to activate the ventilation.

Extraction rates must allow the efficient removal of exhaust gases, so that the atmosphere inside the car park cannot exceed the threshold limit values (TLVs) for pollutant gases, especially carbon monoxide (CO).

The intake of air to purify and freshen the atmosphere in the car park should be calculated in such a manner that the air within the car parks complies with health and safety standards at all times. In addition, where extracted air is directed towards the car parks (see point 2.3 above), there must be a mechanism to eliminate the risk of smoke from within the building erupting into the car park.

It must also be possible for the air-conditioning system in the car park to be used as a means of extracting smoke from a fire breaking out inside the car park (vehicle fire).

3.2.2 Cable and pipework ducts

Cable and pipework ducts must be ventilated. This is particularly true of ducts containing combustible-gas pipes. See in this connection the specifications listed in Section B.III.1 (Fireproof sectioning). For ducts containing cables, see Section B.III.1, point 2.4.2.

3.2.3 Lift machinery

It is essential for lift machinery to be equipped with ventilation openings in order to be able to extract the heat generated by the machinery and any smoke which might result if, for example, a cable were to catch fire.

3.2.4 Archives – Copy/print paper stores

It must be possible, in the event of a fire in these premises, to extract smoke through the extraction ducts; the blower circuit must stop operating while the extraction circuit functions on override.

In the case of recycled air, fire breaks must automatically cut off the supply of recycled air so that it is diverted directly out of the building.

3.2.5 Computer rooms

See Section B.II.7.

3.2.6 Printshops using offset presses

Solvent vapours must be extracted via a ventilation system that is separate from the circuit used for extracting air from the building. The circulation of fresh air must be guaranteed. The extraction system for solvent vapours and other pollutants must fulfil the criteria listed in point 2.2.

3.2.7 Printshops using only dry-copying methods

Suction devices must be located at the ventilation outlet of the photocopiers in order to expel hot air, toner-cartridge and paper dust, and gas or vapours generated by the operation of the machines (ozone). The suction duct must lead to an outlet which meets the specifications set out in point 2.3 and be independent of the air circuit of the building. The air-conditioning circuit of the building must serve the printshop premises in a manner consistent with prescribed health standards, especially as regards the supply of fresh air. If the air-suction

mechanism of the photocopiers is incapable of extracting all the heat which those machines produce, an air-conditioning unit must be fitted in the printshop in order to absorb the residual heat output.

B.III.7. HEALTH AND HYGIENE RECOMMENDATIONS

1. GENERAL

This section describes the health and hygiene recommendations applicable in buildings occupied by the Commission. The description is divided into two parts, the first part dealing with office areas and the second with toilet and washroom facilities.

Commission buildings are subject to all the European Directives on health and safety at work, and those located in Belgium are also subject to Belgian welfare legislation, in particular the LOI/CODE/RGPT.

2. HEALTH AND HYGIENE RECOMMENDATIONS FOR OFFICES

2.1 Natural light

Natural light is required for all permanent work stations and for restaurants. It is not required for work stations which are occupied only intermittently.

Some work stations without natural light require the presence of staff for lengthy, albeit intermittent, periods. These work stations must be combined with relaxation areas which have natural light.

An area may be considered to have natural light if the intensity of the light at desktop level under normal conditions is adequate.

2.2 Artificial lighting

The purpose of artificial lighting is to ensure an adequate intensity and quality of light for work stations and passageways in the building, whatever the natural lighting conditions. Artificial lighting also serves a decorative purpose.

The use of incandescent bulbs is prohibited.

The use of fluorescent tubes is recommended on condition that they are inserted into light fittings which ensure a perfectly even light distribution over the work station. Those fittings must be of the highest quality in terms of light distribution and absence of ambient noise. The tubes should have the technical characteristics indicated in Section B.II.3 (Electricity).

2.3 Office space

General health and hygiene standards also depend on the overall layout of the office space. The modular nature of the office space, the allocation of surface areas inside the building and the various types of floor coverings all affect the quality of the working environment. The features of the office space are dealt with in Section B.I.2 (Architectural aspects) and those of the floor coverings in Section B.I.5.6.

2.4 Ventilation and air conditioning

Air quality is a key element in the health standard of work stations.

The greatest care must be taken, in both the design and the everyday operation of the air-conditioning system, to guarantee excellent air quality.

The technical characteristics of the air-conditioning system which are capable of meeting the health specifications are described in Section B.II.2 (HVAC).

2.5 Horizontal and vertical surfaces

The surfaces delimiting work stations are a key consideration in defining health standards. The main features to be taken into account are as follows:

- sound absorption,
- soundproofing,
- optical reflectivity,
- colours,
- ease of maintenance,
- presence or absence of toxic components, and
- humidity level.

3. HEALTH AND HYGIENE RECOMMENDATIONS FOR TOILET AND WASHROOM AREAS

3.1 Types of toilet and washroom areas

The following may be distinguished:

- toilets,
- changing rooms, with or without showers,
- washbasins for a specific purpose, other than those located in changing rooms and toilets.

3.2 Toilets

The positioning and configuration of toilet facilities have an indirect effect on health and hygiene standards.

3.2.1 General

In office areas, toilets must be provided on every floor and for each structural unit. They must not connect directly with a corridor or entrance hall.

A secondary access corridor or a double-entrance vestibule must separate the toilet area from the office area and from the main passageways.

Toilets should preferably be located in central areas. Where the number of offices requires several toilet areas to be provided, they will be set out in such a way as to minimise the average distance between the offices and toilets; in other words, the facilities will be distributed evenly along the length of the building and will be located in the central section.

3.2.2 Special cases

Toilets for persons of reduced mobility

See specifications in Section B.III.9, point 5.

Kitchen toilets

Each restaurant kitchen must have its own toilet and washroom facilities specifically reserved for kitchen staff and equipped in accordance with the most stringent hygiene regulations applicable in that domain (e.g. hands-free taps).

These toilets must be located close to the kitchens, on the same level, but must not have a door connecting directly with the kitchen area (see Section B.I.6, point 9).

3.2.3 Other particular cases

Toilets and washrooms in other places, such as:

- crèches and after-school centres,
- sports facilities and leisure clubs,
- workshops (printshops, joinery workshops),
- stores, etc.

are not dealt with in this section since they are not in office areas.

3.2.4 Number

For office areas: see Section B.II.4, point 2.3.

For particular areas such as:

- meeting, conference and videoconference rooms,
- restaurants, cafeterias,
- projection and training rooms, broadcasting studios

a study should determine the precise number

3.2.5 Design of toilet facilities

3.2.5.1 Tiling

The toilet walls must be covered with light-coloured tiles up to a height of 10 cm above the false ceiling.

The joint between these tiles and the floor tiles must comprise a row of rounded floor or wall tiles set into the angle between the vertical surfaces and the floor.

This arrangement is designed to facilitate the cleaning of surfaces and to prevent an accumulation of dirt in re-entrant angles.

The floor tiles must be grouted with a water-repellent, non-porous product with anti-adhesive properties. Where it is technically possible, it is advisable to provide for the installation of a floor drain equipped with a gully and with a grill in stainless steel or a resistant plastic material.

All floor tiles must be non-slip and must afford a good grip, even when damp.

3.2.5.2 Sanitary appliances and equipment

Washbasins

Washbasins must be of a type which allows the hands to be washed easily without too much splashing over the edge and without the hands having to touch the sides of the washbasin during rinsing.

Taps

Tap handles must be designed in such a way that they do not retain water and are easy to clean. Triangular shapes should be preferred to round, fluted shapes. Tap handles in the form of a lever are also recommended. Opto-electronically controlled taps are also a possibility.

The tap outlet must be fitted with a spray or anti-splash device and be located at least 5 cm from the side of the washbasin and at least 15 cm from the bottom, so that the hands do not come into contact with the sides of the washbasin or with external projections during use.

Hot or warm water (through a mixer tap) is prohibited on account of the increased risks of contamination by Legionella bacteria, particularly where it is supplied via a mixer from an electric water-heater located at some distance from the toilets.

Liquid-soap dispensers

It must be possible to operate liquid-soap dispensers with one hand by means of a push or pull mechanism. Capacity must be approximately one litre. Pull mechanisms are generally preferable since they are easier to operate, by persons of reduced mobility inter alios. The pressure or pulling motion required should involve the exertion of light to medium force. Preference should be given to those mechanisms which are least difficult to manipulate. Such models could also be used in toilets for persons of reduced mobility.

Mirrors

Mirrors must not have a projecting lower edge at the front and/or back where water or cleaning products might collect. It must be possible to clean them with ammonia-, alcohol- or acid-based products without any risk of damaging the silvering in the short or medium term.

Urinals

The urinals must be installed at a height suitable for persons of average size.

Urinal flushes should preferably be automatic systems controlled by an optoelectronic device which avoids manual contact and permits sufficient cleaning, at least after each use during office hours, in order to prevent odours.

Toilet bowls

Where toilet bowls are floor-mounted models, the bottom edge of the base must be caulked with a mould-resistant silicon or equivalent mastic designed to facilitate cleaning and prevent deposits collecting in the angle and gap between the base and the floor tiles.

The flush must be fitted with a control device which enables the user to save water by selecting the volume required. It must be incorporated in the wall and placed at a certain height in order to enhance the efficiency of the toilet-cleaning process. The noise created by the flushing water and refilling of the cistern must be as low as possible.

Toilet doors

Toilet doors must afford a high degree of soundproofing, must not contain an opening with a grille or be fitted with round handles, must have a latch indicating on the outside whether the cubicle is vacant or engaged, and must have a square pin or other device allowing the door to be unlocked from the outside.

Ventilation of toilets

The minimum air flow per toilet which will ensure the effective elimination of odours is 50 m³ of air per hour. The air must be extracted diagonally from bottom to top.

The air must enter through a space of a few centimetres under the door, producing an evenly distributed laminar flow.

Air pressure in the toilet area must be kept lower than in the corridors from where the air comes.

Changing rooms

Changing rooms must be provided for persons performing dirty work or work requiring considerable physical exertion and for those who are required to wear special working clothes.

Staff working in the

- kitchens,

- stores,
- locksmithing or joinery workshops, and
- printshops

must be provided with changing rooms equipped with toilet and washroom facilities comprising showers and washbasins with a hot-water supply. It is advisable to have a water-heater which is located as close as possible to the washing facilities and is not equipped with a mixer at the outlet.

Staff working in the:

- cafeterias,
- maintenance services (cleaners, technicians), and
- security service

must have a changing room equipped with washbasins but not necessarily with showers.

The changing-room areas must comply with health and hygiene standards and have ventilation and heating systems which maintain the temperature between 20 and 25°C.

Prevention of Legionella bacteria: see Section B.II.4, point 3.

The design specifications should be identical to or comparable with those laid down for toilets and washrooms in point 3.2.5 above (Design of toilet facilities).

Changing rooms must have specific furnishings and fittings. These will include:

- a number of lockers for working clothes exceeding the number of users,
- two additional lockers to allow for a subsequent increase in staffing,
- a table,
- some chairs suitable for use in a changing room, containing no synthetic-foam, fibrous or porous coverings,
- possibly, if the shape and size of the premises permit, a space for a small refrigerator.

Changing rooms equipped with showers must be fitted with a sufficiently powerful air-extraction system to prevent a build-up of steam and dampness.

Protection against electric shocks resulting from the proximity of live conductors must comply with the provisions of the General Regulation on Electrical Installations (RGIE).

In particular, the type of electrical equipment used, and casings of electric circuits with residual current breakers with overcurrent protection, must comply with the specifications laid down in the RGIE for damp places.

The area must be equipped with emergency lighting. Where there are male and female staff, separate changing rooms will be provided.

Changing rooms for kitchen staff must be equipped with washbasins with hands-free taps. Different types exist,

- foot-operated,
- knee-operated,
- optoelectronic.

Independent washbasins: Some specific activities require a washbasin to be provided, e.g.:

- medical activities,
- printing, photocopying, microfilming, etc.,
- crèches and after-school centres, and
- workshops.

The installation of such washbasins must comply with the health and safety rules. A light fitting must be installed above the washbasins.

B.III.8. SPECIAL HEALTH AND SAFETY PROVISIONS

1. SAFETY OF HOISTING INSTALLATIONS

See Section B.II.5.

2. SAFETY IN COMPUTER ROOMS

See Section B.II.7.

3. HEALTH AND SAFETY AND SPECIAL FACILITIES IN CONFERENCE ROOMS

3.1 Fire safety

All facilities must comply with statutory requirements, in particular those concerning:

- **fireproof compartmentation,**
- **the characteristics of doors (number, width), of horizontal and vertical escape routes and of emergency exits, and**
- **display of safety signs.**

A smoke-detection system must be installed in the conference room. If it is a plenary chamber containing a podium or tiered seats, the entire space must be equipped with a fire-detection system. It is recommended that a light air current be created in this area, comprising an air intake and outlet diagonally opposite each other. The air outlet must be fitted with a fire detector.

Reduction of combustible content:

Combustible materials in conference rooms must be kept to the absolute minimum in accordance with of the following:

- If a podium or tiered floor is made of timber boards, the boards must be treated with a fire-retardant solution to give them a class A1 or A0 (NBN S21-203), or A1, A2 or B (EN 13.501) reaction to fire.
- Curtains or drapes must also be treated with a fire retardant or be made of a flameproof material such as glass fibre fabric.
- The covers used for the seats and backs of chairs must not contain polyurethane or any other synthetic foam. The fabrics used and, if necessary, the padding foam must be non-inflammable and have class M1, A1 or A2 fire-reaction qualities for EN 13.501. Floor covering materials must be of class A0, A1 or A2FLs1 for NBN S21-203.

Lighting systems:

Independent circuit or circuits protected by a differential circuit-breaker. Do not use high-powered halogen lights. If there are compelling reasons for not observing this restriction, care must be taken to ensure good ventilation around such equipment and to keep materials such as plastic, wood or paper at a distance.

A system of safety lighting must be installed.

Conference rooms must have a PA system linked to the reception desk of the building, which can also be used for broadcasting emergency evacuation instructions in the event of fire.

3.2 Health and hygiene:

Acoustic comfort:

For the internal walls, do not use materials which produce sound reverberations.

Materials used on the ground, vertical partitions and false ceilings or floors must provide a good acoustic performance in terms of sound absorption.

Visual comfort – lighting:

Avoid powerful lighting units which create an uneven light flux in the body of the conference room.

Preference should be given to lighting systems which provide a good even spread of light, such as luminaires with fluorescent tubes or bulbs. It is recommended that dimmer switches be provided to adjust the intensity of the lighting, if possible by distinct areas: wall lighting, ceiling lighting, etc.

The lighting level must conform to the specifications that are customary for such premises.

Toilets:

Toilet facilities must conform to the legal specifications and to those given in Section B.III.7.3.

3.3 Facilities for persons of reduced mobility

Conference chambers must be designed to accommodate persons with reduced mobility who use wheelchairs or crutches and persons with impaired vision. To that end, there must be specially designed areas to accommodate wheelchair users. The gangways leading to those areas, and those leading from those areas to the podium, must not have any steps and must include ramps with a gradient in conformity with the Regional Urban Planning Regulation (RRU)

The podium or speakers' table must be accessible by wheelchair and must be designed so that wheelchair users can easily take their place at it. Access to this space must be via a wheelchair rotation area of at least 1.50 metres.

The gangway for wheelchair users must be sufficiently wide (at least 120 cm) and must not contain objects in the vertical plane on which wheelchairs might catch or changes of level at the edges of the gangway that might cause a fall.

The areas and gangways provided for disabled persons must be indicated by special signs on the ground and possibly also at a low height. Lifts adapted for use by persons of reduced mobility must enable them to travel to and from the conference room without any difficulty.

Toilets equipped for the disabled must complete these facilities.

All of the above facilities must comply with the specifications laid down in Section B.III.9.

4. HEALTH AND SAFETY IN UNDERGROUND CAR PARKS

The information given below supplements that contained in other chapters. It relates to arrangements that are specific to underground car parks.

4.1 Fire safety

Underground car parks must comply with the specifications laid down in the relevant standards and statutory provisions, especially in respect of:

- fireproof compartmentation,
- firefighting equipment,
- safety signs,
- evacuation routes and emergency exits,
- ventilation.

A special effort must be made to improve certain functions, of which the most important are as follows:

Firefighting equipment. Each point in the car park must be accessible with the jet of at least two hose nozzles, and hence there must be enough hose reels to allow their ranges of action to overlap.

Extinguishers must also be distributed on the basis of one appliance per 10 parking spaces (1 per 150 m²). They must be water-spray extinguishers, or powder extinguishers if there is a risk of freezing.

These extinguishers must be protected by a transparent plastic casing equipped with a seal as evidence of their having been opened.

The pictorial safety signs must conform to the specifications in Section B.III.4.9, supplemented by the indications listed below. They must be placed mainly in low positions - on the ground and on walls and pillars - to mark out the escape routes, at a height not exceeding 1.5 m. Pictograms suspended from the ceiling must also be used, particularly where the route changes direction.

About 40% of these signs must be luminous or illuminated.

Doors in car parks which lead to emergency stairways or outdoors are regarded as emergency exits. To identify them as such, they must be painted green on the car-park side only, to distinguish them from other doors (plant areas, etc.), and the standard “emergency exit” pictogram must be affixed to the door, not above it. Luminous strips must be applied to left and right of these doors to indicate their position in darkness.

Where a long row of vehicle parking spaces obstructs pedestrian access to the lifts and/or stairs, a pedestrian passage must be created within the row to facilitate pedestrian movement at normal times and especially during an emergency evacuation.

This passage must be created and indicated by the following means:

- red and white stripes painted on the ground;
- no-parking signs painted on the ground and possibly also on vertical surfaces (pillars, walls, etc.);
- protection comprising metal railings and/or low walls or concrete blocks bordering the passage at critical points;
- safety pictograms showing the direction of the escape route.

Doors leading to lifts that can be used by persons of reduced mobility must be motorised and controlled by an optoelectronic mechanism.

Where there is a fireproof airlock, the first door must open automatically, and the second be fitted with magnetic retention and stay open at normal times but close in response to:

- the fire alarm being triggered (signal for evacuation),
- fire alert (a fire being detected nearby), or
- a power cut.

Smoke detectors fitted in the areas adjacent to the airlock, one on the car-park side and the other on the inside of the building, must control the closure of the fire doors with magnetic retention if smoke is present in either of those adjacent areas.

4.1.1 Lighting

Lighting level in the car parks: see point 2.2 of Section B.II.3.

Brighter lighting must be provided at parking spaces for persons of reduced mobility and along the route leading from those parking spaces to the lifts (see Section B.III.9).

4.1.2 Smoke ventilation

The car-park ventilation system must be designed to extract vehicle exhaust fumes efficiently under normal conditions and to be capable of evacuating smoke in the event of a vehicle fire.

A manual control switch for this extraction system must be provided for the use of the fire brigade.

4.1.3 Gas safety

Where there is a manual or electromagnetic slide valve in a car park, no parking space or storage place for combustible material may be located below it.

The gas pipework must be painted yellow (RAL 1003) along its entire length, from the expansion chamber to the attic boiler room, as required by legislation.

The gas pipework must be installed in ventilated premises and ducts. It must not cross premises used as file archives or waste-storage areas. The pipework in the car parks must be installed at a certain distance from the electric cable routes and at a height at which there can be no risk of contact with vehicles moving within the car park.

4.2 Health, hygiene and the environment

High standards of health and hygiene can be maintained in car parks thanks to various facilities, especially:

- good ventilation of the car-park area;
- provision of fixed bins with fire-resistant lids near the entrance doors;
- absence of waste-storage facilities which open onto the parking area;
- presence of taps with hose connectors for cleaning purposes (one water point for every 300 m²). In this case the tap must be identified by a ‘Not drinking water’ pictogram;
- drains, with removable gratings designed to withstand vehicular traffic, to make cleaning easier;
- smooth ground surface treated with a coating that must not retain dust and must resist oil and petrol as well as being highly abrasion-resistant.

5. SAFETY IN HIGH-RISK AREAS

5.1 General

‘High-risk’ premises house items involving one or more of the following key risks:

- fire,
- explosion,
- corrosion,
- intoxication,
- electrocution.

The severity of the risk varies depending on the type of product or equipment, the type of packaging, the quantity, and in the case of gas, the pressure.

All high risk areas must have:

- appropriate signposting,
- effective ventilation,
- means of detecting gas and fires,
- fire-resistant walls and/or walls which are resistant to the products contained within them.

Firefighting equipment is generally available inside these areas and/or outside near the access points.

In large premises, emergency lighting inside the premises must show the exit(s) in the event of fire if the electric lighting is cut. Alarms must be placed in the immediate vicinity, near the access points. In the case of large premises, alarms must also be placed inside the premises.

The alarms provided are primarily telephone sets and pushbuttons which send an alarm signal to a manned location or monitoring station (the building’s reception area, control centre, emergency post, etc.)

5.2 Key high-risk areas

The table (in point 5.2.7) below gives an overview of the main high-risk areas and the characteristic hazards. Premises exposed to particular fire risks, such as the kitchens and underground car parks, are not included in this table as specifications are laid down for such premises in other chapters.

5.2.1 Fire risks associated with the presence of large quantities of solid combustible products

Storage premises for:

- paper waste, paper shavings (shredders, printshops): easily inflammable products

- printer paper (IT), ream paper (photocopiers), rolls (printshops),
- toilet paper, paper napkins,
- key archives,
- floor coverings,
- partitions, furniture, woodwork.

5.2.2 Risks associated with the storage of liquid fuel products

Premises containing:

- products for offset presses (printshops), solvents, paints, glues: risks to health, of fire, of explosion, in the event of confinement of vapours;
- oil tanks: risks of leaks, fire;
- power supply electricity generators (gas oil): risk of fire;
- cleaning products (solvents): risks to health, of fire;
- inflammable-liquid stores;
- storage of wine and alcohol: risk of fire if bottles of alcohol (spirits) are broken.

5.2.3 Risks associated with the storage or use of specific liquid products

- Storage of sodium hypochlorite, hydrochloric acid for water treatment purposes (corrosive products and irritants): health risks and risks to materials (corrosion) in particular for electrical installations and equipment. Risk of explosion in the event of a reaction between two products.
- Storage and use of products for microfilms (ammonia) or air-conditioning units: health risks (irritant and toxic products).
- Storage and use of acid products for cleaning and maintenance of the components of air-conditioning units and other fixed equipment (corrosive products): health risks and risks of corrosion of materials.
- Storage of organic and chlorinated solvents: health risks (irritation, toxicity).

5.2.4 Risks associated with the presence of combustible gases

Combustible gases under pressure present a risk of explosion and fire. They are found in:

- gas boiler rooms,
- gas expansion chambers and pipework ducts with gas pipes,
- fitters' and mechanics' workshops: oxy-acetylene welding material,
- storage of bottles of combustible gas under pressure (butane, oxygen, acetylene, etc.).

5.2.5 Risks associated with specific electrical installations

Premises for HT/LT electrical transformers = electrical danger, fire hazards (short-circuits, power surges), risk of coolant leakage (health risks).

Premises for charging electrical batteries for lifting trolleys: printshops.

Premises with batteries for the telephone switchboard, no-break systems:

- risks of explosion as a result of hydrogen accumulation during charging (insufficient ventilation),
- risks of leaks or spillage of electrolytes (risk of corrosion),
- electrical hazard.

5.2.6 Risks associated with specific premises

1) Printshops using offset presses:

- risk of irritants or toxic products,
- electrical hazard,
- fire risk due to the presence of paper, oil (machines, presses) and organic solvents (blanket wash),
- risks of injury (machines, trolleys).

2) Salt storage:

- risks of brine leaking outside the premises,
- risks of environmental pollution where stored in the open air (brine leakage into the ground).

3) Premises for electricity generators:

- fire hazard (gas oil),
- risk of air pollution,
- health risks (combustion gases),
- noise (noise levels, vibrations).

4) Premises containing filters for air-conditioning systems:

- filter fire risk.

5) Fitters' workshops, mechanics' workshops:

- fire risks associated with welding material, oils and solvents,

- risks associated with the release of welding fumes, metallic fumes,
- risks associated with the production of intense light (harmful to eyesight) and harmful radiation (infrared, ultraviolet) during electric welding.

6) Storage of putrescible material (kitchen waste):

- risk of unpleasant smells,
- fire risk, where packing boxes or other combustible materials are present,
- invasion by rodents.

5.2.7 Measures designed to eliminate or reduce dangers in high-risk premises

The rules and specifications for different premises are summarised in the following table. The premises are those identified in points 5.2.1 to 5.2.6.

B – Technical descriptions – Health and safety

PRECAUTIONS (4)	TYPE OF PREMISES											
	5.2.1 (1-6)	5.2.2 (1-6)	5.2.3 (1-4)	5.2.4 (1-4)	5.2.4 (4)	5.2.5 (1)	5.2.5 (2)	5.2.6 (1)	5.2.6 (2)	5.2.6 (3)	5.2.6 (5)	5.2.6 (6)
Fire-resistant walls FR/REI/EI	2h	2h	1h	2h		2h	2h	2h		2h	2h	1h
Fire-resistant doors, trapdoors FR/EI	1h	1h	1/2h	1h		1/2h	1/2h	1h		1/2h	1h	1/2h
Fire dampers	1h	1h	1/2h	1h		1/2h	1/2h	1h			1h	1/2h
2-hour fire-resistant airlock FR/EI	2h	2h	2h	2h				2h			(1)	
Smoke outlets	X	X						X		(2)	(2)	
Specially-coated floor		X	X			X	X	X	X	X	(1)	X
Drains	X							(1)	(1)			X
Raised thresholds	X	X	X			X	X		X			
Dry-powder extinguishers	X	X	X	X	X	X	X	X		X	X	X
- CO ₂ extinguishers						X	X	X		X	X	
- water-spray extinguishers	X	X	X				X	X			X	
Nearby fire hose	X	X	X	X	X			X			X	X
Sprinklers	X		(1)									X
Fire detection	X	X	X			X	(1)	X		X	X	X
Gas detection				X								
Emergency lighting	X	X	X	X	(1)	X	X	X		X	X	
Mechanical ventilation	(1)	X	X					X	(1)		X	X
Natural ventilation	X		X	X		X	X	X	(1)	X	X	X
Signposting:												
No naked flames	X	X	X	X	X	X	X	X				
No smoking	X	X		X	X		X	X				
Risk of explosion			(1)	X	X		X					
Inflammable materials		X	(1)					X				
Toxic materials		(1)	(1)			(1)		(1)				
Corrosive materials		(1)	(1)									
Electrical hazard						X	X	(1)				
Other precautions			(3)									

- (1) Where applicable.
- (2) Extraction of combustion gases through piping (chimney).
- (3) Special provisions for 5.2.6.
- (4) Fire-retardant grilles made of intumescent material are prohibited in all buildings and for any type of fireproof premises and walls.

6. SAFETY, HEALTH AND HYGIENE IN KITCHENS

6.1 Fire safety

6.1.1 Origin and nature of risks

The combustible materials to be found in kitchens are:

- fats and oils used for frying or roasting food,
- grease containers,
- food-packaging waste: wood, cardboard, paper and plastics,
- kitchen linen: napkins, working clothes, where such linen is stored in appreciable quantities, and
- paper napkins, where stored in large quantities.

The hot spots posing heat hazards are:

- ovens,
- deep-fat fryers,
- the electrical installations supplying these appliances (switch cabinets/ sectional distribution boards),
- appliance motors, especially those of refrigerators and cold storage facilities, and
- storage of putrescible waste (food waste), which, if stored for a long period in a non-refrigerated environment, may undergo humid fermentation, producing gases and a substantial rise in temperature.

6.1.2 Precautions/ firefighting equipment

The measures to be taken must be adapted to the nature and extent of the risks created by the coexistence in close proximity of a combustible substance with a hot spot or with the potential source of a hot spot.

Automatic extinguishing of deep-fat fryers:

The system must not contain any extinguishing agent comprising carbon dioxide or dry powder. The selected extinguishing agent must be effective in putting out fat and oil fires and safe to use in the presence of food.

The operation of the extinguishing mechanism must not cause burning oil to spit out of the fryers and must not endanger personnel in any way.

Preference must be given to extinguishing agents such as water with a special flame-retardant additive which is neither harmful nor irritant. After operation of the automatic extinguishing system, it must be possible to continue food preparation without any difficulty.

The extinguishing mechanism must be triggered by fuse switches designed to withstand fairly low temperatures compatible with the normal operation of deep-fat fryers and reacting rapidly in the event of a fire or by any other equivalent device.

As soon as the extinguishing system is activated, the electric current to the machine must also be cut.

Manual extinguishing of deep-fat fryers:

A number of judiciously placed ‘pop-out’ emergency stop buttons must be provided to cut electric installations. The buttons must be clearly indicated.

Before being put into operation, the system must be inspected by a SECT, which must check that it works properly and conforms to current regulations and standards.

Instructions for use must be displayed nearby.

Other firefighting equipment:

- two easily accessible and permanently visible 6 kg water-spray extinguishers with an additive must be located near the deep-fat fryers;
- other extinguishers of the same type, or 5 kg carbon dioxide extinguishers, the number and location of which must be laid down by OIB.RE SIPP, must be kept in the kitchens;
- a fire blanket must be kept permanently in a visible and accessible position.

6.1.3 Fire detection

The fire-detection system inside the kitchen must be located in places where the operation of appliances such as ovens, deep-fat fryers and cookers is not liable to interfere with the operation of the detectors.

The type of detector must be adapted to the particular atmosphere of kitchens (steam, hot-air flows) to avoid untimely activation.

6.1.4 Ducts and shafts of extractor hoods

The extraction ducts and shafts evacuating steam from extractor hoods must be isolated from the rest of the building by a wall with two hours of fire resistance (FR120/FR2hr/REI120/EI120). They must comply with standard NBN S21-207.

On the roof, the duct outlet must rise for more than one metre above the sloping or flat roof surface. The distance between this outlet and any fresh-air inlets must be as great as possible - at least ten metres.

Trapdoors must be fitted in the duct at each level so that it can be properly cleaned, particularly as regards the removal of greasy deposits which might have formed in it, and to facilitate cleanliness checks on the inside of the extraction duct.

6.1.5 Waste-storage areas

Provision must be made for two waste-storage areas - one for putrescible waste and one for combustible waste.

Storage facility for combustible waste:

See B.III.8.5 for the applicable provisions. This facility must be used for the following types of refuse:

- cardboard, various types of packaging,
- wood: pallets, packing crates and boxes, etc.
- plastic,
- paper.

Storage facility for putrescible waste:

Apply the provisions laid down in Section B.III.8.5. This facility must be used for the disposal of food waste and all other items that will putrefy.

6.1.6 Lighting; electrical installation

Kitchen premises must be equipped with fluorescent tubes which are designed for damp conditions, are airtight and conform to the General Regulation on Electrical Installations (RGIE). See also Section B.I.6.9.

The lighting circuits must be protected by quick-acting differential circuit-breakers.

6.2 Health and hygiene:

6.2.1 Ventilation

The ventilation system in the kitchen should ensure the extraction of the various cooking vapours and the smells associated with them.

This function must essentially be performed by suction through the extractor hoods. The power and airflow of the extraction system must be strong enough to prevent any stagnation of greasy or damp vapours in the kitchen and to renew the air effectively.

Air intake could be carried out by locating intake openings at suitable points in order to ensure effective renewal of the air volume used for cooking operations.

6.2.2 Floors

The kitchen floors must have the following characteristics:

- be easy to clean,
- have an antiskid surface,
- not be dark-coloured to facilitate cleaning and to diffuse light,
- be cleanable with common detergents,
- contain drains with a grille and conduit in resistant plastic material or stainless steel. Non-stainless steel and cast iron must not be used for grilles and conduits,
- contain drainage grilles and culverts linked to a conduit of adequate dimensions to take waste water from large cooking pots without causing splashes in the surrounding area.

Sufficiently wide gangways must be provided to allow easy movement of the various trolleys used in kitchens.

6.2.3 Sinks

The sinks in which dishes are washed must be made of materials that are easy to clean, with smooth surfaces to which food scraps must not adhere, such as stainless steel or vitrified ceramic materials.

They must be fitted with hot and cold mixer taps above the sink and with quarter-turn isolating valves in addition to the taps above the sink.

6.2.4 Extraction of greasy water - grease trap

The system for the disposal of greasy water must comprise a grease trap located at a level below that of the kitchen. The grease trap must be fitted with a reheating mechanism, a motorised agitator, a level indicator and a temperature indicator. Fats are to be removed by pumping through a suitable system of pipes, valves and joints and discharged into the gully emptier.

The residual water must be carried towards the main sewer by a gravity conduit. The premises where the grease trap is located must have internal walls with a fire resistance of two hours (FR2hr) and have its own independent ventilation through a direct link with the exterior.

6.2.5 Toilets and changing rooms

Toilets and changing rooms must be located near the kitchen premises and comply with the specifications listed in Section B.III.7.3.

Please note that, for reasons of hygiene, the water taps above washbasins must be operated by a ‘hands-free’ mechanism comprising an optoelectronic operating mechanism or knee-activated lever.

Other essential facilities, such as liquid-soap and paper-towel dispensers, must also be installed.

7. HEALTH AND SAFETY IN ROOMS AND CENTRES USED FOR CULTURAL OR LEISURE ACTIVITIES

These premises must be equipped with the facilities they require; the assessment of these requirements must be based primarily on the potential number of users of the premises and the type of activity.

Premises used for leisure activities involving physical exertion must be equipped with toilets, washrooms and showers in accordance with the specifications laid down in Section B.III.7.3.

The other health and safety provisions must be analogous to those laid down for premises such as meeting rooms and itemised in Section B.III.7.

8. HEALTH AND HYGIENE RECOMMENDATIONS FOR FIRST-AID POSTS AND REST AREAS

8.1 Role of a first-aid post and rest area

The role of a first-aid post must provide good conditions in which a sick or injured person from the building or its immediate vicinity can be accommodated for the purpose of receiving first aid.

This area can also accommodate pregnant women and breastfeeding mothers who may need to lie down.

8.2 Location

The post must be located on the ground floor or one of the lower floors of the building, near a lift for persons of reduced mobility or a goods or passenger lift, and near a toilet.

It must be easily accessible by lift or stairs from any point in the building.

It must also be in a location from which an injured person can easily be taken to an ambulance through a ground-floor exit or via the underground car park, if the latter is accessible to the ambulance.

8.3 Signposting

The location of the first-aid post must be indicated by the pictograms laid down by health and safety legislation (the LOI/CODE/RGPT).

These signs indicators must be displayed in the following places:

- along a route leading from the entrance foyer to the first-aid post in the form of direction indicators, and
- at the level of the building on which the post is located, particularly from the lift lobbies and stair landings.

8.4 Equipment

The first-aid post must be equipped with the following items:

- a first-aid box,
- means of transporting a sick or injured person, i.e. a wheelchair and/or stretcher,
- one woollen blanket,
- one thermal insulation blanket,
- one long seat or low bed on which a sick or injured person can be laid,
- one cabinet with additional equipment/first-aid box,
- one table and one or two chairs,
- one washbasin with hot and cold water, and
- one telephone and a list of emergency numbers, such as SOS 22222 and the number of the Poison Centre (070/245245).

Where there are several long seats or low beds, these must be separated by curtains.

The door to the first-aid post must be one metre wide.

9. SAFETY OF WINDOW-CLEANING AND FACADE-CLEANING OPERATIONS

9.1 Legislation and standards

The following provisions apply:

- **Belgian Royal Decree of 12 August 1993 on the use of work equipment, as amended by the Royal Decree of 4 May 1999 amending the Royal Decree of 12 August 1993 on the use of work equipment, the Royal Decree of 17 June 1997 on health and safety signs at work, and the Royal Decree of 28 August 2002 designating officials to monitor compliance with the Welfare at Work Act of 4 August 1996 and its implementing decrees,**
- **the LOI/CODE/RGPT Articles 42 – 43 – 43a – 51b4 – 54b – 269 – 434.7.1 – 434.7.2 – 434.7.3 – 434.7.4 – 434.9.1 – 434.9.2 – 434.9.3 – 434.9.4 – 452.16 – 453.1 – 465 – 541 (N.B.: except for points 2 and 15, Article 453 has been repealed for apparatus put on the market and put into service after 31 December 1996, with the exception of cradles or similar equipment suspended from a crane),**

- **Belgian standard NBN – S34 – 001,**
- **European standards:**
 - **NBN-EN-795**
 - **NBN-EN-795 – A1**
 - **NBN-EN-353-1**
 - **NBN-EN-353-2**
 - **NBN-EN-354**
 - **EN ISO 14122 - 1**
 - **EN ISO 14122 - 2**
 - **EN ISO 14122 - 3**
 - **EN ISO 14122 - 4**

9.2 Cradles*

All new buildings must be equipped with cradles for cleaning the windows and façades.

A cradle suspension attachment must be installed on the terraces of the building. It must contain tested anchorage points guaranteed by an official document attesting the conditions of use and in particular the maximum dynamic load.

Movable swivelling support attachments over 20 kg in weight are prohibited.

Attachments comprising a trolley on suspension rails and arms are recommended.

9.3 Lifelines**

Lifelines must be examined for compliance with the requirements of standard NBN EN-795 for people working at heights of at least three metres.

Lifelines must be approved by a SECT.

9.3.1 Key information

- Spacing of the intermediate supports: every 10 metres.
- Maximum dynamic force in the event of a fall: 600 daN vertically and 1 700 daN horizontally.
- Intermediate brackets: 304L stainless steel with a breaking strength after complete deformation greater than 1 500 daN. This serves as a fall indicator in the event of an incident on the line.
- Cable: 316 stainless steel with a breaking strength greater than 3 800 daN.

- Connecting pieces (tensioner/absorber) made of 316L stainless steel with a breaking strength greater than 4 000 daN.
- Trolley: 316L stainless steel with a breaking strength greater than 2 500 daN.
- The line supports must be made of galvanised steel or 304 stainless steel.

The lifeline must have been subject to tests in accordance with standard EN-795 class C.

9.3.2 Installation instructions:

- Ensure that the supports for the end and intermediate brackets are able to accept the required load.
- Tests after installation: 500 daN for 15 seconds on each joint.
- The various components may be installed in one of three different ways (depending on the characteristics of the structure):
 - welding: directly onto the metal structure,
 - clamping: self-clamping onto the metal structure, or low-density materials,
 - bolting: directly onto the metal structure or into the concrete (chemical or mechanical anchoring).

In all cases the lock pins must have a minimum diameter of 12 mm.

9.3.2.1 Intermediate attachment points

The stainless steel intermediate attachment points must have a breaking strength of 1.5 tonnes and take up the cable every 10 metres at most. The trolley must be able to bypass the intermediate attachment points automatically without manual intervention.

9.3.2.2 Tensioner

The tensioner is provided to regulate the tension of the cable. It must be fixed between the anchorage point and the cable. It must be made of 315L stainless steel, with 5 tonnes breaking strength.

9.3.3.3 Trolley

The trolley must be made of stainless steel, with three tonnes breaking strength. It must be specially designed to bypass the intermediate attachment points of the cable. Rapid positioning.

9.3.3.4 Cable

The cable must be made of 316 stainless steel with a minimum 8 mm diameter. With 7 strands of 19 wires, its breaking strength must be greater than 3 800 daN.

The company in charge of cleaning the windows and/or facade must designate a competent safety coordinator in accordance with the LOI/CODE/RGPT. The coordinator must draw up

the procedures for cleaning in complete safety, draft the safety instructions, train the staff, carry out monitoring of safety rules and keep a register of the controls carried out.

10. SAFETY OF TERRACES AND ROOFS**

Flat roofs which are accessible by maintenance staff must be equipped with lighting points designed to make their work safe.

Flat roofs accessible by maintenance personnel must be equipped with a pop-up button or breakable box linked to a permanent monitoring post, to allow rapid signalling of any danger, accident or accidental trapping. An emergency call button must be fitted.

B.III.9. FACILITIES FOR PERSONS OF REDUCED MOBILITY

This chapter contains the rules referred to in the Code of Good Practice for the Employment of People with Reduced Mobility.

1. GENERAL

The building must be designed to meet the needs of persons of reduced mobility, whether they are staff members or visitors.

The facilities to be provided are as follows:

- **those deriving from the laws, regulations and standards applicable in Belgium at the time of construction, and in particular Title IV of the Règlement Régional d’Urbanisme (Belgian regional regulation on urban planning, RRU) on the accessibility of buildings to persons with reduced mobility,**
- **those prescribed by Community directives, and**
- **those indicated in the present chapter*.**

The facilities must make Commission buildings accessible to everybody, including those with reduced mobility, by putting into place all the means needed to ensure that disabled people can enter, leave, and move around the building conveniently and be evacuated in an emergency.

Such facilities relate to all people with disabilities, in particular those with reduced mobility, the blind and partially-sighted, and the deaf and hard-of hearing.

The recommended rules (<http://ec.europa.eu/social/main.jsp?catId=430&langId=en>), and in particular, the principle of accessibility referred to in Commission Communications COM(2003)650, COM(2005)604 and COM(2007)738 must allow each and every person with disabilities, irrespective of the nature of their disability, to enter, circulate within and leave a Commission building on their own, autonomously and safely in normal situations (Special situation in the event of evacuation of persons with reduced mobility).

2. ACCESSIBILITY AIDS

2.1 Position of access points

The building must be accessible through at least two entrances which can be easily used by persons with reduced mobility (main entrance and underground car parks).

2.2 Access point at the entrance to the building

Facilities for persons with reduced mobility

The main entrance to the building must be easily accessible to persons with reduced mobility.

To that end:

- the edge of the pavement must be lowered sufficiently near the entrance to the building to provide smooth passage between the roadway and pavement (projections must not exceed 2 cm and must be rounded or chamfered and clearly indicated); this must be extended where necessary by means of a ramp;
- access from the pavement to the foyer must be across a flat surface or, where they are on different levels, by means of a ramp built to the specifications in the RRU.
- doorway clearance must be at least 95 cm.

Facilities for the visually impaired

Any obstacle which represents a danger to the visually impaired must be removed from passageways.

Entrances/exits and access points must be designed for safer movement by the blind and partially sighted. To draw attention to the presence of possible dangers, such as staircases leading downstairs etc, concrete tiles with raised bumps must be placed along the width of the obstacle. Tiles with raised bumps in lines must show changes in directions at right angles, while tiles with raised bumps in a staggered pattern must show where to stop before an obstacle.

2.3 Controlled access points

All measures to control access to the building must be designed so as not to prevent persons of reduced mobility from entering. A technical solution must be devised to overcome the difficulties inherent in each control mechanism.

2.4 Reserved parking spaces

A minimum of two parking spaces must be reserved for persons of reduced mobility in underground and other car parks. If these spaces are in an underground car park, they must be on the highest car decks. The number of disabled parking spaces must depend on the size of the building and the number of occupants. An opinion on the matter must be sought from the Commission medical and social services.

The parking spaces must be identified by at least two international symbols indicating accessibility for persons of reduced mobility, one painted on the ground and the other suspended above the parking space or affixed to a wall.

The spaces must be wide enough to allow persons of reduced mobility to enter and leave their vehicles easily (minimum width: 3.30 m) and must be located in a place which is easily accessible from the access doors to the building or the lifts.

2.5 Access to the interior of the building from the car park

2.5.1 Direction signs

There must be access for persons of reduced mobility to the offices by means of a lift. The route from the parking spaces to the lift must be marked out by international symbols indicating accessibility for persons of reduced mobility, accompanied by an arrow painted on the ground and affixed to walls or pillars or, where there are none, suspended from the car-park ceiling.

A plan of the building, indicating the point at which the plan is displayed, must be affixed near the shaft doors of the lift at a height at which it can be consulted by a person seated in a wheelchair.

2.5.2 Lighting

The parking space and the route from parking spaces for the persons of reduced mobility to the lift must be lit by lighting of at least 200 lux at one metre above ground level.

Emergency lighting must be installed next to disabled parking spaces, along the route leading to the lift and in front of the lift.

2.5.3 Telephone, call button - CCTV surveillance

A telephone must be installed in the enclosed lift lobby, at a height at which it can be easily used by persons of reduced mobility to enable them to report any problems (such as the unavailability of the lift) to the reception desk or elsewhere.

The telephone numbers of the reception desk of the building and the emergency service (22222) must be clearly displayed.

The call button for the lift for persons of reduced mobility must be positioned at a height at which they can easily reach it.

In large buildings it is recommended that a CCTV camera be installed in the lift lobby and linked to a monitoring post so that staff can see if a person of reduced mobility using the lift is experiencing problems.

2.5.4 Movement through doorways

Normal doors, and more especially fire doors fitted with automatic closers, are difficult for persons of reduced mobility to operate.

The clearance through doorways must be at least 85 cm wide

To facilitate movement through the doorway between the lift lobby and the car park, where persons of reduced mobility are generally alone, an automatic door must be installed which is triggered by a photoelectrical sensor or an equivalent mechanism.

Motorised sliding doors are preferable to automatic swing doors, as they are less liable to cause accidental collisions. Whatever door is selected, it must always be easy to open manually if the automatic mechanism fails, even by a person of reduced mobility.

Automatic doors must have a mechanism that prevents them from closing while somebody is in the doorway.

An appropriate sign must indicate the presence of an automatic door.

2.5.5 Horizontal movement

Routes followed by persons of reduced mobility must not contain any sudden changes in level (grooves or holes) deeper than 2 cm. Where changes in level are unavoidable, ramps must be provided in conformity with the provisions of the R.R.U.

The installation of stair-lifts or vertical lifts for persons of reduced mobility on or next to staircases is not advised. Such appliances may only be installed if it is impossible to provide a ramp.

Routes used by people with reduced mobility must not contain any floor features that might cause them to collide, fall or become jammed, such as a gutter, grating, gully or platform edge. Any such obstacles close to the route intended for persons of reduced mobility must be highlighted by additional lighting and appropriate markings - black and yellow or red and white stripes.

2.6 Route from the entrance foyer to the upper floors

The following special facilities are designed to make it easier for people of reduced mobility to use the lifts.

Facilities to be provided in the lift lobby:

For people with impaired mobility:

- the call buttons must be positioned at a suitable height for persons in wheelchairs, and
- the useful width (clearance) of the doorway must be 95 cm.

For people with impaired hearing:

- conventional visual signals (see Section B.II.5, point 3.6. Lobby fittings)

For people with impaired vision:

- an audio signal must be installed: (see Section B.II.5, point 3.13. Voice synthesiser)

Lift cages and internal fittings (see Section B.II.5. Hoisting installations).

3. EVACUATION AIDS

Persons of reduced mobility must be provided with the means of evacuating a building threatened by fire in complete safety, without assistance if need be. Generally speaking, they must be able to evacuate the building from any floor by using the lift in the company of another person or persons.

In exceptional cases it must be possible to evacuate persons of reduced mobility by carrying them down the emergency stairs following removal to a safe part of the building. See Section B.III.5, point 1.2.1.

Persons of reduced mobility must be able to reach safety in a lift lobby with closed fire doors.

The space available on the landing of the emergency staircase must be wide enough for a wheelchair to be parked and manoeuvred without being obstructed by either of the two doors opening onto the landing.

The lifts, more specifically the lifts for persons of reduced mobility, must therefore be located next to the emergency staircases.

The refuge area must consist of:

- the lift lobby protected by walls with two hours' fire protection (FR120/FR2hr/REI120/EI120) and by two fire doors forming a double security door (both with fire resistance FR60/FR1hr/EI60).
- the landing of the emergency staircase, enlarged to the required dimensions and protected on one side by the lift lobby and the access fire door and on the other side by a normal fireproof approach lobby or by a single fire door if the type of building permits that configuration.

The audible alarm system must be supplemented by a visual mechanism to inform those with a hearing disability that they must evacuate the building.

To that end, a flashing (or revolving) red light must be placed in the offices of people with a hearing disability. The trigger mechanism must be linked to that of the general alarm system.

The same visual mechanism must be located in the corridors used by the person concerned.

4. AIDS TO MOVEMENT WITHIN THE BUILDING

4.1 Movement

The different parts of the building must be accessible to persons of reduced mobility through corridors and passages with ramps and lifts providing access to different levels.

The corridors must be wide enough (1.50 m according to the RRU) for wheelchair-users to manoeuvre at the same time as able-bodied persons, without any obstruction or collisions.

4.2 Office doors

Doorway clearance must be at least 85 cm wide (see Section B.I.5. point 2: with door frames 93 cm) so that wheelchairs can enter and leave offices and manoeuvre (turn in and out of doorways).

Doors must not contain an automatic closing mechanism so that they can be more easily used by persons of reduced mobility.

5. TOILET FACILITIES

Toilets for persons of reduced mobility must meet the criteria listed below:

5.1 Distribution

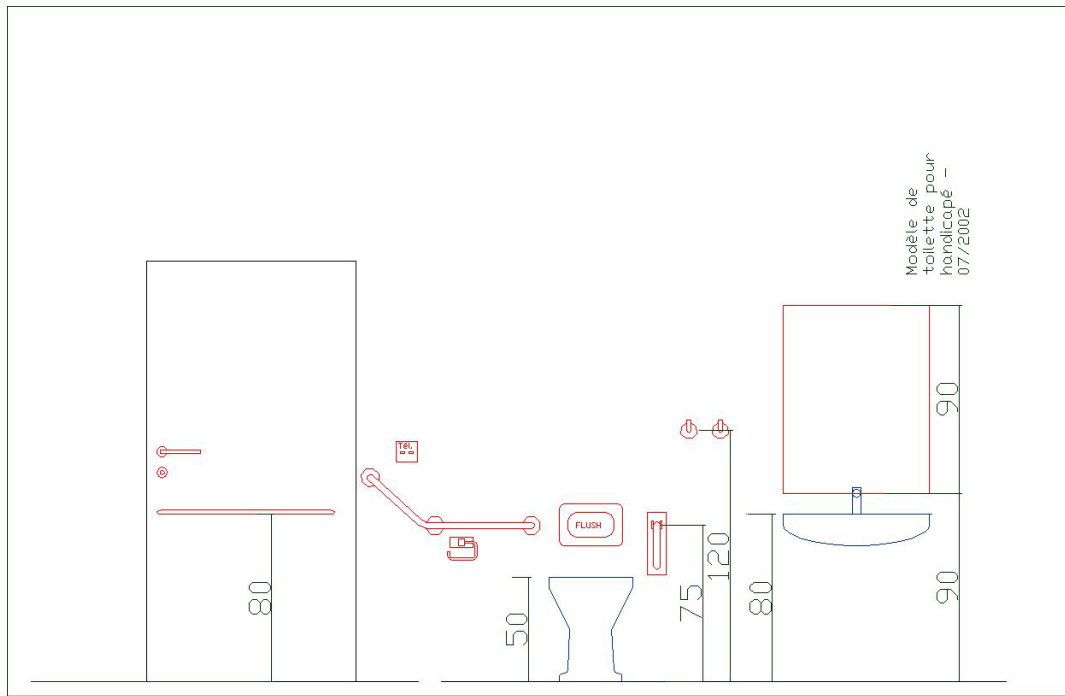
Toilets for persons of reduced mobility must be installed on every other floor of the building, with a minimum of one toilet for persons of reduced mobility for every 20 standard toilets (see RRU). These toilets must not be installed below the level of the main entrance, unless one of these lower levels has an office area accessible to persons in wheelchairs.

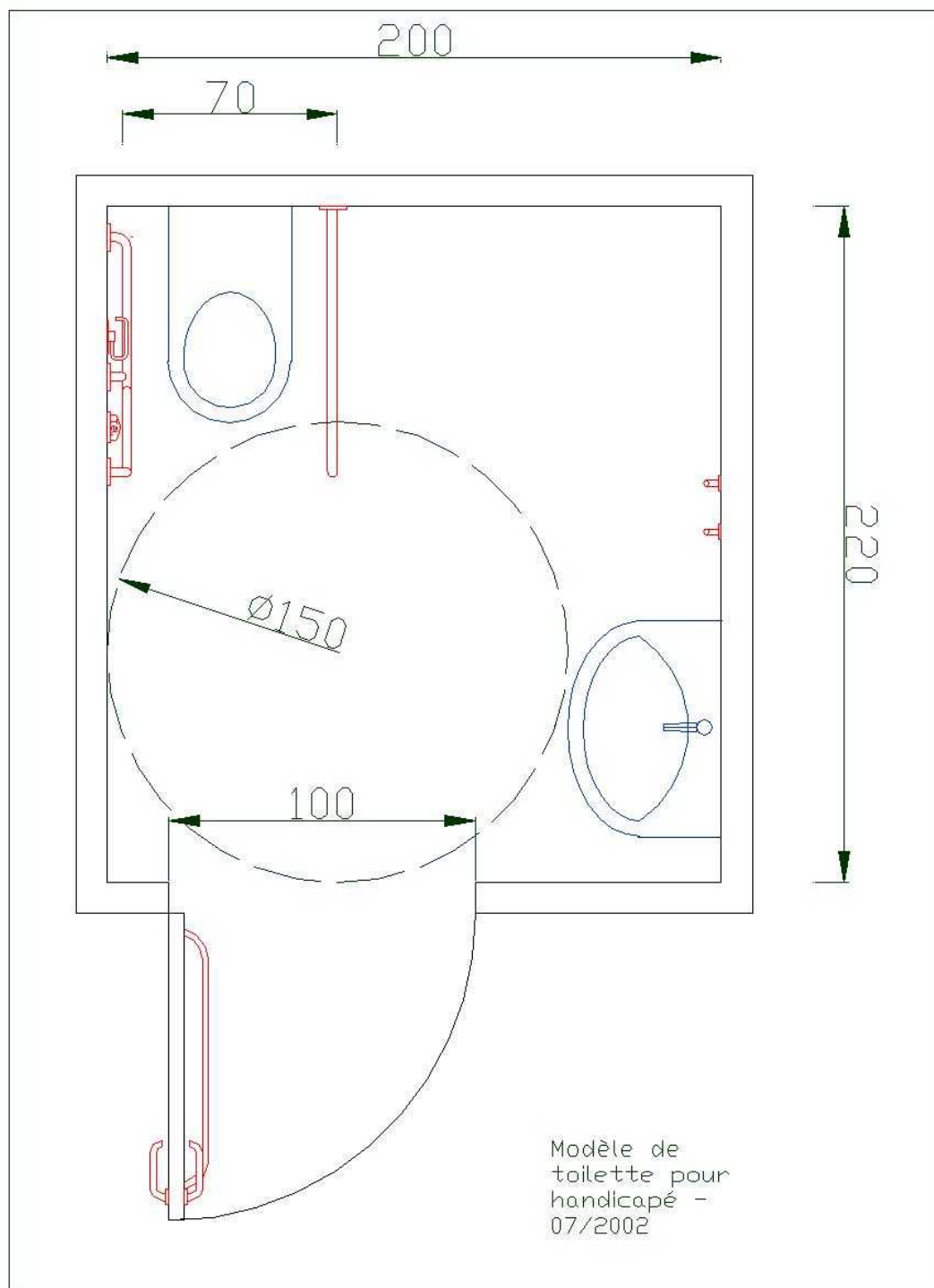
Toilets must be located with due regard to accessibility, i.e.

- there must be direct access from a passageway or from a communal sanitary entrance area (e.g. sink area),
- breadth of passageways: the toilets must be accessible via corridors and foyers with a minimum width of 1.5 metres,
- horizontal clearance of doorways en route to the toilets: minimum 95 cm,
- there must be no steps or changes of floor level in excess of 2 cm,
- there must be no obstacle or mechanism that would constitute a hindrance or hazard to a disabled person in a wheelchair or to any other person with a mobility handicap.

To indicate the location of the toilets for persons of reduced mobility, international symbols indicating accessibility for persons of reduced mobility, accompanied by the pictograms for men's and ladies' toilets and followed by a directional arrow, must be displayed in the lift lobbies on the floors where such toilets are installed and along the route leading from there to the toilets.

The following plan describes a model toilet for persons of reduced mobility which meets the RRU criteria and these requirements.





The toilets may be installed as a mirror image (left-right) of the above model. It is recommended that toilets be installed in alternate fashion: the above layout and its equivalent mirror-image. The position of the toilet bowl and the door (left or right) is important to wheelchair-users who have difficulties with a specific upper limb.

5.2 Dimensions

The internal dimensions of the toilets for persons of reduced mobility must be equal to or exceed the following values:

- length ≥ 1.80 m
- width > 1.80 m

The relative positions of the washbasin and toilet seat must allow easy movement of a wheelchair through 360° and easy positioning of the wheelchair in front of the washbasin or next to the toilet seat.

5.3 Fittings

5.3.1 Toilet bowl

The toilet bowl must have a seat 50 cm above ground level. The handle or button for the flushing mechanism must be easily accessible to the persons of reduced mobility. It must support a stationary load of 150 kg. The toilet bowl must be wall-hung.

5.3.2 Fixed and mobile supports

Support bars, at least one of which must be hinged, must be placed on either side of the toilet seat in order to facilitate movement from the wheelchair to the seat and vice versa. Length: 80 cm. Height: see plan.

The hinged support bars must be simple to manoeuvre and use.

5.3.3 Washbasin

The washbasin must be so designed as to enable a wheelchair-user to place his or her knees underneath it. The space below the bowl of the washbasin must be free and contain no protruding parts.

The taps must be operated by easy-to-use levers. A control mechanism incorporating an optoelectronic sensor which operates the tap as soon as a hand is underneath it is recommended.

5.3.4 Mirror

The mirror must be set at a distance of 90 cm from the ground so that a person sitting in a wheelchair can see himself or herself easily.

5.3.5 Liquid-soap dispenser

Liquid-soap dispensers must release soap in response to light pressure or traction so that they can be used easily by persons of reduced mobility. It must be possible to operate the mechanism and collect the soap with one hand.

The dispenser must be affixed at a height at which it is easily accessible to a person of reduced mobility.

5.3.6 Towel dispenser

Towel dispensers must also be fitted at a height at which they can easily be reached by persons of reduced mobility.

5.3.7 Telephone

A telephone extension may be installed in the toilets for persons of reduced mobility to enable users in difficulty to call for help. The emergency telephone numbers must be displayed next to the telephone. The bottom of the telephone must be between 80 and 90 cm from the ground.

5.3.8 Door

The cubicle door must allow a free passage of at least 95 cm, open outwards and allow easy access to the toilet, even if a wheelchair-user has to make a quarter turn. Once the disabled person is inside, there must be sufficient space for the door to be closed without being obstructed by the wheelchair. The hinged support bars must not contain any locking mechanism. A tubular handle must be placed between 80 cm and 85 cm from the ground on the inside of the door.

The door must have a vacant/engaged indicator (red/green) at the level of the lock and a square pin with which the toilet can be unlocked from outside.

Door handles must not be round to avoid manipulation difficulties. The locking mechanism must be easy to manoeuvre and have a small lever so that it can be easily used by someone with physical difficulties.

* Condition with which all new fitted-out buildings must comply, unless otherwise stipulated.

B.IV. SECURITY AND PROTECTION OF PROPERTY

B.IV.1. RISK ASSESSMENT AND IDENTIFICATION

All new projects will be subject to a specific security study. The purpose of this is to study the building and its environment to identify the risks pertaining to it and the measures to be put in place to eliminate or reduce such risks.

The study must be submitted to the Commission Security Directorate which will assess the risks and decide in consultation with the participants what specific security measures need to be put in place for the building.

The study must cover at least the following aspects:

- site of the building in relation to the environment (urban, contiguous to other buildings, isolated, shared, etc.)
- location of access points (pedestrian, vehicular, delivery, public transport, etc.),
- location of external fire protection devices,
- structural and architectural features,
- maximum number of persons to be evacuated,
- design of the entrance,
- layout of the entrances to the car park.

B.IV.2. PHYSICAL SECURITY

1. GENERAL REQUIREMENTS

It is vastly preferable to have buildings which are exclusively for the use of Commission departments.

However, if the use of the building is shared with other tenants or commercial entities, the area used by the Commission must be physically and architecturally separate from the other tenants, with its own entrances, including the entrances to car parks and technical areas and delivery entrances. Access to the area occupied by the Commission must be separately controlled.

An assessment of the risks (fire, security, intrusion, etc.) and problems associated with any potential constraints will be carried out by the competent services.

The Commission Security Directorate will define and validate the security equipment to be installed.

B – Technical descriptions – Security and protection of property

Where there is no option other than to have connecting zones between areas belonging to the Commission and other areas, these must be designed in such a way as to guarantee physical security and ensure access control.

The Commission building or area will be designed so as to be distinct from other areas, with an easily discernible perimeter that is delimited as clearly and simply as possible.

For buildings with an inner courtyard, deliveries will not be allowed via that area to other occupants, and in particular to commercial entities.

Escape routes and emergency stairways and exits will be separate and independent of those used by the other occupants of the building.

The different occupants of the building will have their own fire-detection unit, with alert and alarm transmission and transmission of the status of the unit to the Commission's unit.

2. EXTERNAL REQUIREMENTS

Façades must not contain crevices or protrusions that might serve as footholds for anyone climbing up or along the façade.

Dark corners with access to the public highway, consisting of a recess leading to doors or windows giving access to the building, will be permanently lit as soon as daylight fades.

The building will not be accessible by the roofs or balconies of neighbouring buildings. Roofs adjoining those of neighbouring buildings not occupied by the Commission and accessible from those roofs will be protected by railings and infrared beams at the edges between the two buildings.

The building will have only one pedestrian entrance and preferably only one entrance for vehicles.

There will be no external stairways.

The main entrance to the building will consist of one or more sets of double security doors which must be lockable from the outside. The security doors must be designed in such a way as to allow single person access, particularly out of hours.

3. INTERNAL REQUIREMENTS

The general principles set out below apply to all new projects. They will be adapted on a project-by-project basis depending on the future use of the building and the level of danger, as assessed at the planning stage.

External glazing (doors, windows etc.) and the metal frames on street-facing façades may be explosion resistant within the meaning of standard EN13541-ER3. The number of floors to be protected will be determined on the basis of the structure of the façade and the project risk analysis.

B – Technical descriptions – Security and protection of property

For the ground floor and the other façades accessible to pedestrians, and the areas where access is possible by another means (roof, courtyard, terrace, balcony, etc.), glazing must be at least of security standard PB6 within the meaning of standard EN 356.

The security doors and window frames in the security area must comply with standard ENV 1627, class 4.

Access to the roof and to terraces and plant areas must be subjected to a control system.

Doors, garage shutters and openable window frames accessible from the ground floor on all sides of the building or from accessible platforms and terraces will be fitted with key-operated locks. They must be fitted with a magnetic contact linked to the building's intrusion alarm system and be remotely controlled from the Commission control room.

With regard to hoisting installations and stairways, the car parks and basement floors must be served separately with an arrival point directly in front of Commission access control security in the main entrance hall. Anyone proceeding from the car parks to the upper floors via stairs or lifts will be required to cross the foyer through access control.

The different zones (such as administrative, conference, garage, restaurant etc.) must be physically separated by architectural measures. Ideally, the zone in front of access control at the main entrance will be the cross-over point.

Commercial premises located in Commission buildings, such as shops, bookshops and other commercial activities, must be located in front of the control point at the main entrance.

Proprietors of commercial premises not managed by Commission departments must undertake to comply with the opinion of the Security Directorate as regards the nature of their proposed business before renting the premises.

B.IV.3. ELECTRONIC SECURITY

The buildings occupied by the Commission in Brussels are equipped with the following security systems recommended by the Security Directorate:

- Access control: NEDAP (AEOS) system.
- Building Management Systems: HONEYWELL (EBI system), SIEMENS (Visonik system) or ENTELEC (Skywalker) for alarm transmission and the management of local installations;

For new buildings, the access control system must be the NEDAP (AEOS) system. It must be used for points of entry and exit, including the garage. It must also be possible to use the access control system to remotely manage security equipment and CCTV.

Communication with the Security Directorate's systems will be via the Commission's network, which is based on Ethernet TCP/IP.

Security Directorate systems must be able to work autonomously and independently of the central management system.

The following principles must be respected:

B – Technical descriptions – Security and protection of property

- doors, openable windows and garage shutters which are accessible from the ground floor are equipped with an electronic system with which their status (open/closed) can be individually monitored.
- emergency-exit doors opening onto the exterior of the building must be at least 2.1 metres high. They will be equipped with mechanical opening/closing mechanisms and electromagnets capable of resisting a tensile force of 600 kg. The system will be powered by the emergency electricity network of the building.
- emergency-exit doors opening directly onto the inside of the building on the ground floor must be of security standard and comply with current standards.

Such mechanisms must be installed in such a manner that they meet all of the following criteria:

- information (display screen) on the status (open/closed) and power supply must be transmitted to the security desk in real time,
- each door must be individually unlockable and lockable,
- in an evacuation, the doors must unlock automatically,
- all emergency doors may be unlocked by pressing a button on the control desk,
- next to each door on the inside, a break-glass box with a green-button type buzzer will be installed,
- operation of a local alarm will indicate that the door has been open for longer than an authorised period or has been opened by means of the green button.
- all building entrances either have a security guard or are linked to an access control system to monitor access and compliance with the procedures for accessing the building.
- all other entrance and exit points, including emergency exits, must be monitored around the clock by the anti-intrusion alarm system.
- management of electronic equipment is centralised in the control desk/point at the main entrance and at the central control room. This area, which will be lockable, will contain all the monitoring equipment.

The space needed for the equipment to be installed must be identified during the technical solution study phase, to ensure that there is no risk of the space being earmarked for other purposes.

A network connected with the Commission network must be installed in the building to enable provisional acceptance of the functioning of security equipment.

To this end the supplier must install a local network and ensure at his own expense that the premises containing the equipment are secure until the provisional acceptance agreement is signed.

When acceptance of the equipment is taking place, the data network must be up and running without yet being connected to the Commission network (Snet).

B – Technical descriptions – Security and protection of property

The provisional acceptance procedure will allow all the equipment to be tested in local mode and will give rise to general remarks on connection to the Commission network.

After the provisional acceptance agreement has been signed, and the building is under Commission occupancy, the local network can be connected to the Commission network (Snet).

At that point, tests on connections with other buildings can take place.

The provisional acceptance procedure may be extended in the future to include connection with the Commission network.

B.IV.4. CONFIGURATION OF INTERNAL AREAS

The best way of defining the various security devices to install is to divide up the building on the basis of the activities to which the various premises are allocated. This will make it easier to describe the measures that have to be taken so that an acceptable level of security is created in each area.

The following system of categorisation has been selected:

- car parks,
- sensitive areas,
- premises for security guards,
- public area/entrance lobby,
- the administrative area, and
- areas with a potential risk occupied by staff.

The protection of each building will be subject to a security assessment to determine specific points and which security measures (physical, human and/or electronic) will be installed given the circumstances.

1. CAR PARKS

- Car parks will be entered and exited at the same place.
- The entrance and exit ramps will be separate, not partitioned, and limited in number.
- The pedestrian exits must be lockable by means of gates with security systems that are sufficiently effective to avoid any accidents.
- The shutters of the car park will be of the sectioned type with manual and automatic control and with secure locks operated from the inside as well as from the security guard's cabin (the same type of security locks as those on the exterior doors of the building). The system for opening and closing these doors will be operable from the main reception desk. The system to unlock the doors must be out of reach of pedestrians.

B – Technical descriptions – Security and protection of property

- A video door phone between the building entrance and the garage exit will be used when leaving the building outside opening hours. This video door phone operates the opening and closing of the garage shutters.
- Car parks access doors/shutters without a security guard during the night are monitored outside office hours by the anti-intrusion alarm system and CCTV
- There will be barriers controlling access to and exit from the car parks (level with the security guard's cabin). The barriers must operate in accordance with current regulations; the barrier mechanism must, in particular, open the barrier to incoming vehicles for an adjustable length of time then close it automatically, and open and close automatically when vehicles leave the car park. Opening must be controllable from the security guard's cabin and at the barrier itself. Closing is always automatic. The barrier must have photoelectric safety cells and floor loops
- However, it will be possible to block the barrier in the open or closed positions by means of a control panel.

2. SENSITIVE AREAS (COMPUTER ROOMS, MDF AND CCR ROOMS AND CATEGORY I AND II AREAS)

The site of a sensitive area must not:

- be located behind a street-level window directly overlooking the public highway,
- be located near a car park,
- be located above or near a potential source of fire,
- be identified other than by the customary addressing system.

Physical design:

- The internal and external walls will extend from the structural floor to the structural ceiling.
- The internal and external walls will have at least one hour's fire resistance and will be resistant to vandalism.
- There will be no external windows.

Staff access door:

- The door will be a single 2.1 metre swing door opening in the direction of exit from the room and installed in such a way as not to impede evacuation into the corridor.
- It will be fitted with two bolts or a mechanism providing a similar level of resistance to attack.
- An overhead closer will be fitted to the door on the inside.

Access control:

- by personal card and appropriate card reader, preferably a proximity reader,
- number pad for the cardholder to key in the validation code for his or her card,
- biometric recognition,
- connection to the central access control system.
- The access control system must provide for multiple levels of access to be programmed and for the introduction of time slots adapted to the various existing categories of staff.
- For normal access (entry and exit), the identification of an authorised card will deactivate the electromagnetic locking mechanism (with or without requesting a validation code).
- The emergency unlocking mechanism for evacuation purposes will comprise a green-button style switch.
- Autonomous battery-powered operation for 24 hours must be guaranteed for all the aforementioned mechanisms.
- The protection of sensitive areas must correspond to the risk rating defined for the area (special walls, anti-intrusion doors and windows, separate alarm system, special security locks, etc.).

CCTV:

- Cameras will be placed at a sufficient height to prevent them from being vandalised.
- The CCTV will be connected to the NEDAP AEOS access control system
- Cameras will be positioned in such a way as to allow the recognition of individuals through the recorded images.
- Surveillance cameras positioned outside the building and in the garages will be placed in protective boxes, with heating if necessary.
- The system will be connected to the electrical power supply of the emergency circuit.

3. PREMISES FOR SECURITY GUARDS AND/OR RECEPTIONISTS

3.1 Access areas to the buildings

3.1.1 Main reception area

- The hall area must be designed in such a way that the guard can monitor access to the open area and the administrative area (lifts and stairways) at the same time.
- It must be possible to install a messenger station in front of the access control point.
- There will be a waiting area in front of the access control point which can be supervised by the guard.

B – Technical descriptions – Security and protection of property

- No special security measures are recommended for the potential-risk administrative areas or areas reserved for staff for the time being. Ad hoc measures may be devised to meet specific needs once the building is occupied.
- The reception desk area will have a minimum surface area of 6 m² (depending on the size of the building) and be designed so as to ensure acceptable working conditions (no draughts). A protective glass structure must be installed if necessary.
- If possible, the reception desk must be positioned in such a way as to allow the main entrance and the car park entrance to be monitored simultaneously.
- It will have a 10 cm cavity floor.
- The communication desk must have a minimum surface area of 0.5 m² per security guard, a minimum length of 1 metre and a minimum depth of 0.35 m.
- The guard's desk must be at least 2 metres long and at least 0.65 m deep, with an unobstructed view of the entrance.
- The whole area must be at least 2 m long and 1.5 m wide.
- The desk area and counters will be equipped with a locking device.
- The desk at the main entrance must have a key case for 30 keys.
- The desk must be suitable for receiving wheelchair users. The lower edge of one section of the desk must be at a minimum height of 0.75 m from the ground and the upper surface must be between 0.80 m and 0.85 m from the ground. The depth of this section must be such that the free space under it is at least 0.60 m.

3.1.2 Security guards' cabins/garage

- The area will be at least 6 m².
- A guard's booth will be provided at each car park entrance.
- It will have a 10 cm cavity floor.
- The whole area must be at least 2 m long and 1.5 m wide.
- A window of at least 1 m² will be fitted in the observation wall at a minimum height of 0.8 metres from the ground.
- A door of at least 0.7 metres wide will be fitted in the observation wall. This door may not cover more than 35% of the length of the wall.
- If the surface of the cabin is less than 5 m², it will have only one door that is either sliding or that opens outwards.
- The door must be lockable.

Equipment:

- An intake of clean air and an independent heating system will be provided in the cabin.
- The area will be fitted out with at least three telephone sockets, two data sockets and five 230V sockets (or more, depending upon the size of the building). Connections must be made from the ground.
- There will be space for two standard computers and a 17 inch CCTV screen with a recorder and quad.
- A shelf (at least 1 metre long by 0.4 metres wide) will be placed beneath the observation window.
- The cabin will be equipped with an additional table at least 0.3 metres x 1 metre and two coat hooks.
- The five sockets, lighting and heating will be connected to the emergency electric circuit available 24 hours a day.
- The floor will be covered with a waterproof material (linoleum), not a fitted carpet.
- Office equipment (chairs, dustbins etc.).
- If the cabin is located outside, it should be insulated and have a reflective or tinted film on the windows.

3.2 Security guards' canteen/cloakrooms

- The area provided for the sole use of the caretakers will have the following zones:
- a ladies cloakroom fitted with a sufficient number of cupboards (depending upon the size of the building),
- a gentlemen's cloakroom with the same features as above,
- the area used as the canteen will have a table, four chairs and a wash basin (hot and cold water).

Given the use of these types of areas, they would be best located in well-ventilated space with windows.

A linoleum-type floor covering should be laid.

C. EARLY CHILDHOOD CENTRES

C.I. CRECHES

The information given here refers to a crèche accommodating 360 children, which constitutes an optimal capacity within the operational limits. For a crèche with a smaller capacity the dimensions or capacities of certain areas or spaces (e.g. car parks, store rooms, etc.) should be calculated pro rata based on the given capacity. The number of crèche/nursery-school groups will depend on actual requirements and should be fixed in advance.

In any event there should be a ratio of six crèche groups (accommodating twelve children aged between 0 and 3 years) to one nursery-school group (accommodating eighteen children aged between 3 and 4 years).

The distribution of children by age group in a crèche accommodating 360 children should therefore be as follows:

- 96 children aged 0 to 1 year
- 96 children aged 1 to 2 years
- 96 children aged 2 to 3 years
- 72 children aged 3 to 4 years (nursery level).

The crèche should meet the strictest childcare standards as defined by Belgian monitoring agencies (ONE and *Kind & Gezin*).

The building should conform to the requirements of the Flemish Government Decree of 5 October 2001 laying down standards for the prevention of fire and explosions, to which registered childcare facilities are subject, as amended by the Flemish Government Decrees of 15 July 2002, 13 June 2003 (which amends the Flemish Government Decree of 5 October 2001 laying down standards for the prevention of fire and explosions with which approved after school centres must comply) and 30 March 2007 (setting up a technical committee on fire safety in after-school centres, after-school reception initiatives and mini-crèches).

C.I.1. LOCATION

The crèche should be located:

- in the vicinity of European Commission buildings, and
- possibly also close to a European School.

In any event the crèche should be located near to public transport amenities and/or an overflow car park.

Its location should take into account the circulation of local traffic.

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The site intended to house the crèche should be eligible to receive the licences required to operate the crèche.

External background noise should be less than 70 dB, even during peak traffic periods in the surrounding roads. Background noise is measured in accordance with Belgian Standard NBN S 01-41. The noise outside the crèche should be equivalent to that in a category 3 zone, as defined in this Standard under paragraph 5 (external noise).

Atmospheric pollution should be lower than the IBGE (Brussels Institute for Management of the Environment) recommended maximum, particularly with regard to levels of:

- dust;
- asbestos;
- total bacteria;
- mould
- chemical contaminants
- ozone.

C.I.2. SITE AREA

The Commission's current crèches provide a gross surface area of +/- 30 m² per child (including areas used for administrative and medical purposes). The surface area of the crèche should therefore be around 10 000 m², to accommodate 360 children.

The crèche should provide around 100 parking spaces, subject to planning rules.

The crèche should be equipped with secure outdoor play areas such as gardens, terraces and covered playgrounds.

In compliance with current legislation the occupants of neighbouring buildings should not be subjected to aggravating noise pollution as a result of the noise generated by the children and technical installations.

For the purposes of facilitating evacuation the number of floors in the building should be kept to a minimum, within the parameters of the architectural project.

The building should be compartmented by means of fire walls in compliance with the Flemish Government decree of 5 October 2001 laying down standards for the prevention of fire, as amended by the Flemish Government Decrees of 15 July 2002, 13 June 2003 and 30 March 2007. This compartmentation should take into account the evacuation plan set out in Section C.I.7.1. The principle behind the evacuation strategy should be to move horizontally into a safe compartment before going down the stairs to evacuate.

Multiples of 1.2 metres are the recommended unit dimensions for façades and internal spaces.

C.I.3. CONSTRUCTION MATERIALS

The materials used for constructing and finishing the building should be suitable for children. The type of materials used should meet legal standards and no prohibited materials should be included (see Section D.III).

Materials should be durable, easy to maintain, safe and ecologically sound.

Any wood used should comply with PEFC (Pan European Forest Certification), FSC (Forest Stewardship Council) or equivalent guarantees. See Section B.I.4.

Wood used for constructing fixed outdoor play facilities should not have been treated with any product that may cause poisoning if it comes into contact with a child's hands or mouth.

Under no circumstances should fitted carpets be used to cover the floors of premises occupied by or accessible to children; smooth flooring materials such as linoleum may be used (see Section B.I.5.6.). Floors should be edged using rounded skirting boards to facilitate cleaning and protect against allergies. Thresholds between different rooms (for example bathrooms and playrooms) should be watertight.

C.I.4. ACCESS

Access for deliveries, pedestrians, bicycles and private cars should be planned so as to prevent any risk of collisions or accidents between pedestrians and vehicles. The parking and/or unloading area for delivery vans should not be accessible to children or adult visitors.

Ramps leading into the garage should have a safe and practical pitch for use by cyclists: see Section B.I.6.7.

All doorways should have no less than 95 cm of free passage. Corridors, landings and double security doors must have a minimum width of 1.50 m.

The building should be accessible to persons with reduced mobility, in compliance with Section B.III.9.

1. ACCESS FOR PERSONS

Routes connecting the street and the inside of the building, and the car parks and other parts of the premises should be accessible without the need to use stairs. The threshold at the entrance should vary from floor level by a maximum of 2 cm.

An area for parking bicycles should be provided. Facilities for cyclists should conform to the description given in Section B.I.6, point 4, on car parks and B.II.4, point 3.2, on washing facilities (showers).

The premises of the crèche should provide a sufficient number of parking spaces for vehicles bringing children into school and collecting them during peak hours, and for staff. Drop-off parking spaces should exceed the standard width to facilitate access for children getting into and out of cars.

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At least two parking spaces should be provided for persons with reduced mobility. There should be automatic (sensor-operated) doors connecting the areas between these parking spaces and the entrance hall and lifts.

The building should satisfy access requirements for the emergency services (fire and ambulance).

A parking space for coaches which conforms to safety requirements should be provided close to the entrance of the premises (for transporting children to swimming pools or on day trips). Ideally, this coach-parking space should be situated on the grounds of the crèche, for example on a service road.

A security desk should be situated adjacent to the entrance hall to allow all persons entering or leaving the premises to be checked.

The lifts serving the ground floor and upper floors should be separate from the lifts serving the ground floor and parking levels, so that persons entering the crèche through the car park are required to pass the security desk.

2. ACCESS FOR GOODS

The crèche should offer easy access for a diverse range of goods deliveries including those being made to the kitchen area. Provision should be made for:

- parking facilities for delivery vehicles including an unloading zone or platform;
- at least one service lift (soiled circuit) with a load bearing capacity of 1 275 kg (1.4 m wide x 2 m deep), serving all floors, in the vicinity of and with unobstructed access to the unloading area;
- a service lift (clean circuit) not accessible to parents or children, for carrying goods and meals;
- facilitating the internal transferral of goods by designing the building so as to avoid horizontal variations in level;
- scales bearing up to 150 kg and two stainless steel platform trolleys close to the goods reception area.

C.I.5. SECURITY PROVISIONS

The crèche should be equipped with security posts (at pedestrian and vehicle entrances and exits) and security access facilities (car park barriers etc.). See Section B.IV.

C.I.6. SITING OF SPECIFIC ROOMS

In the case of a multi-storey building specific rooms should be sited with a view to facilitating the evacuation of children in an emergency. Medical facilities should be situated on the ground floor close to the entrance.

Administrative offices should preferably be located on the ground floor.

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Other offices should preferably be located on the upper floors.

1. ROOMS ACCOMMODATING CHILDREN

Children should be accommodated in independent units separated by FR30/FR $\frac{1}{2}$ hr/REI30/EI30 fire walls. Each crèche unit should have provision for 12 children aged between 0 and 3 years in the care of 2 nursery nurses. Each nursery-school group should have provision for 18 children aged between 3 and 4 years in the care of 2 teachers.

There should be 24 rooms accommodating 12 children each at crèche level, and 4 rooms accommodating 18 children each at nursery-school level.

Rooms intended for children aged 0 and 3 years should be of similar design (in terms of surface area, play/dining areas, separate dormitories, bathrooms and balconies) so that they can be used for all the groups in that age.

Rooms for the nursery school should be larger.

Electric sockets should be installed at a height of 1.5 m and should be covered with standard child protection devices.

All rooms should be well lit and should receive daylight. They should be ventilated, heated and easy to clean.

The interior comfort levels should be as follows:

Area	T°		RH %		NR
	Winter	Summer	Winter	Summer	
Crèche section					
Dormitory	18	NC	45	NC	25
Activity/dining room	22	NC	45	NC	35
Bathroom	22	NC	45	NC	35
Reception	22	NC	45	NC	35
Passageways	22	NC	45	NC	35
Corridors	18	NC	NC	NC	45

NC: not checked

T°: $\pm 1.5^{\circ}\text{C}$

RH: $\pm 5\%$

Suitable and effective protection from direct sunlight should be installed to prevent rooms from heating up during sunny periods, while allowing daylight to penetrate living/dining areas.

No air-conditioning is to be installed in crèche or nursery school sections.

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The minimum surface area of each locality intended for the children's use should conform to the strictest childcare standards defined by Belgian monitoring agencies (ONE and *Kind & Gezin*).++

As the children have to be surveyed at all times care should be taken to create a visual and organisational link across the space.

Each activity/dining room should open up onto an outside area so that rooms can be extended directly outdoors.

2. UNITS

Each unit is designed as an independent area and should incorporate at least the following facilities:

2.1 Activity/Dining room

The minimum surface area is at least 4 m² per child for each crèche group and 6 m² for each nursery-school group. Each activity/dining room should have cold running water facilities with a washbasin at a height suitable for children.

2.2 Rest room/dormitory

The rest room must be:

- separate from activity and dining areas;
- equipped with window blinds for darkening the room;
- large enough to provide at least 2 m² per child;
- well ventilated;
- directly accessible from the activity/dining rooms.
- equipped with general purpose lighting and low-level lighting which allows visual contact between staff and children.

It should be able to accommodate 12 beds measuring 125 x 70 cm (or 18 in nursery-school accommodation) or 12 stretcher-beds measuring 130 x 54 cm (or 18 in nursery-school accommodation). The beds and stretcher-beds should be placed 50 cm apart to allow the teacher to move around the room.

There should also be enough space in each dormitory for three evacuation beds (125 x 70 cm) in crèche accommodation and one evacuation bed in nursery-school accommodation.

2.3 Bathroom: toilets and washbasins/changing area

The bathroom should be adjacent to the activity/dining room. Staff should be able to see this room from the bathroom through a glass partition at a height of 1.20 m.

The floor should have a non-slip surface, preferably tiled.

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The bathroom should contain two bathing/changing areas separated by a small bath (supplied with hot and cold water).

The bathing/changing areas should be private but should allow the adult to remain visible and within earshot of the other children. A suitably effective ventilation system should be installed.

The bathroom should be equipped with:

- a small bath for 0-3 year-olds, with internal dimensions of 70 x 35 cm;
- two changing tables (in crèche accommodation only) 90 cm wide and 80 cm deep surrounded by a railing 60 cm high, with the bath situated between them. In addition there should be enough space in the bathroom for a mobile changing table (also surrounded by a railing) measuring 75 x 50 cm and 60 cm high, with a small, non-slip, foldaway stepladder so that a child can climb up onto the table, with enough space around the table for the nursery nurse to face the child;
- a sufficiently large changing area for the children [with space for 12 lockers (18 in the nursery-school) measuring 40 x 40 cm, at an appropriate height for children];
- two small toilets separated by a low partition wall;
- two small handwashing basins at an appropriate height for children ;
- the nursery-school does not need to be equipped with fixed changing tables, but a space should be provided for a mobile changing table;
- the nursery school should have one toilet located separately from the bathroom, with a small washbasin at an appropriate height for children designed to be used independently. This toilet should be directly accessible from the activity/dining room.

2.4 Adult toilets

Staff working in any unit should have close access to an adult toilet with a washbasin. Each of these toilets should have enough space for the member of staff to get changed and for lockers.

The toilet is to be shared by a maximum of four units, with at least one toilet per floor.

2.5 Entrance hall

Each entrance hall should give access to two units.

The entrance halls should be designed to accommodate several rows of lockers for storing rigid baby-carriers (infant car seats) or backpack-style baby-carriers. There should also be space for a table for helping children to remove outdoor clothing. This area may be used as a reception room for greeting parents. There should be a line of vision between this room and the activity/dining room.

The activity/dining room and corridor should be directly adjacent to the entrance hall.

2.6 Kitchenette

The kitchenette should be furnished with a refrigerator incorporating a freezer compartment (optional) and a digital temperature indicator, a sink with hot and cold water and a cupboard with an integrated microwave oven.

The kitchenette should be located within the activity/dining room and the entrance should be gated to prevent children from gaining access. This area should not be included in the area set out above for children's activity/dining rooms.

2.7 Balcony

The balcony should be accessible directly from the activity/dining room and the direction of the sun should be taken into account in its location. The size of the balcony should be at least 15 m² and it should be enclosed by a safety barrier of a sufficient height to prevent falling. The barrier should ideally be made of laminated glass. Two adjacent terraces should be separated by a gate. This gate should be high enough to prevent children from moving between the balconies and only supervisory staff should be permitted to open it. Balconies should be designed to have a non-slip, easy-to-clean floor surface. Balconies are not mandatory in nursery-school units.

Wood should not be used in the construction of balconies.

3. PLAYROOMS FOR USE BY ALL CHILDREN

The crèche should have four playrooms of minimum 60 m² each of which should be arranged adjacently in groups of at least two. Each group of two rooms should be separated by a mobile partition wall allowing them to be transformed into one large hall.

Playrooms should have running water and a washbasin at a suitable height for children. Flooring close to the washbasin should be non-slip.

Electric sockets should be installed at a height of 1.5 m and should be covered with standard child protection devices.

A sufficient number of toilets should be located close to the playrooms.

4. GARDEN(S)/COURTYARD(S)

It should be possible to separate the garden into two areas so that younger children can play outside at the same time as older children.

Plants with thorns, berries or poisonous leaves are prohibited.

A covered area should be provided under which bicycles and other outdoor toys can be stored.

Fixtures that are attached to the ground (kerbs, benches, tubs, etc) and surrounding fences should not have any sharp edges or projections liable to cause injury.

There should be a sufficient number of children's toilets located close to the garden/courtyard.

5. COVERED COURTYARD(S)

The covered courtyard should be constructed so as to allow children to play outside when weather conditions are poor. It may also be designed to serve as a safe/assembly area during an evacuation of the building. In this case the covered courtyard should be:

- as far as possible from the building;
- enclosed by a stone or brick wall;
- designed to include an external access point onto an area accessible to the fire brigade and ambulances.

6. DUTY OR LOGISTICS ROOMS

7. ENTRANCE HALL, RECEPTION AND MEETING AREAS

8. KITCHENS AND AUXILIARY PREMISES

8.1 Children's and staff kitchen

Kitchen and auxiliary premises should be constructed to comply with the hygiene and food safety standards described in Section B.I.6, point 9.

The kitchen should be situated so as to allow efficient and hygienic food preparation. Electric light fixtures should be covered in order to protect foodstuffs from being contaminated if a glass fitting breaks.

The layout of the kitchen should allow a distinct separation of clean and soiled zones and should be designed to enable the logical progression of products through the various stages of preparation.

The kitchen is located so as to facilitate the rapid and easy distribution of meals. An area should be provided close to the kitchen for storing trolleys and crockery. There should also be a separate vegetable preparation room.

The kitchen should be located so as to facilitate access for deliveries and allow easy disposal of waste.

Each stove unit should have a separate stainless steel cooker hood. The ceiling should be made of washable material and the floor covered with a non-slip surface (preferably without joins) – both of these should be easy to maintain. Large-capacity stainless-steel settling tanks should be provided.

The area should be finished in compliance with the requirements set out in Section B.I.6, point 9.

At least one washbasin with hot and cold drinking water should be provided. There should be sufficient sources of running water and water-supply fixtures should be conveniently located for cleaning the premises and equipment and for staff to wash their hands.

All kitchen furniture should be stainless steel.

Electricity distribution should be via a conduit with the capacity for 10 x 230V and 10 x 380V sockets and a floor-level disposal gutter measuring 1000 x 400 mm.

The kitchen should have the following equipment:

- 2 x 100 litre cooking pots
- 2 enclosed heated units with work surfaces and doors on either side
- 1 cooking range with 6 hotplates on a supporting base
- 2 x 15 litre deep fryer pans
- 2 stainless steel work benches
- 2 combination ovens, 10 GN 1/1
- 4 stainless steel store cupboards
- 1 stainless steel shelving unit
- 2 x 600 litre chill cabinets
- 2 x 650 litre refrigerators
- 1 set of 5 kg/10 kg scales
- 1 stainless steel tin-opener
- 1 meat-mincer
- 1 microwave oven.

A 15 m² cold zone should be provided within the kitchen, separated from the rest of the area by a glass partition wall.

The cold zone should contain the following equipment:

- 1 display-refrigerator with a work bench and a stainless steel container
- 2 mounted stainless steel cupboards
- 1 pre-flush chef's basin (sink)
- 1 vegetable cutter.

8.2 Bottleroom (minimum 20 m²)

Rooms designed for the preparation and storage of infants' bottles should be arranged so as to facilitate the efficient and hygienic distribution of foodstuffs, and should include separate clean and soiled circuits.

These premises should be designed to include:

- a washable ceiling
- floor-level stainless steel disposal outlets
- 230V/380V conduits

The bottle room should be equipped with the following:

- 1 knee-operated washbasin
- 1 x 600-litre chill cabinet
- 1 work bench with drawers
- 2 stainless steel cupboards with doors
- 1 bottle-washing machine
- 1 steriliser for +/- 80 bottles
- 4 trolleys with three levels each
- 1 x 50-litre pre-flush sink + work surfaces
- 1 microwave oven
- 1 x 5 litre soup mixer.

8.3 Dishwashing room (+/- 50 m²)

This area should be connected to the rooms described above.

It should incorporate:

- an exit for clean items
- an entrance for soiled items
- a washable ceiling
- a floor-level disposal gutter.

The dishwashing room should be equipped as follows:

- 1 extractor hood
- 2 large-capacity hood or tunnel dishwashers
- 2 sinks, 1 with a pre-flush hose
- 1 inlet table with a pre-flush sink, and a delivery table

- 2 dishwashing sinks, +/- 50 litres
- 1 set of GN 1/1 – 1/2 - 1/4 – 1/3 – 1/6 containers with clips and a cover
- 1 stainless steel cupboard
- 1 x 80 litre soup mixer
- 3 x 5 litre soup mixer
- 1 vegetable mixer
- 1 x 1 litre emulsifier
- 1 x 5 litre emulsifier
- 1 digital thermometer.

8.4 Vegetable room (located close to delivery reception area)

The vegetable room should be around 30 m² in size and should be kept at a temperature of 14°C. It should have an entrance for soiled items and an exit for clean items.

The vegetable room should be equipped with the following:

- 1 x 1 250-litre chill cabinet
- 2 x 600-litre chill cabinets
- 3 sinks, one with a hot and cold pre-flush hose
- 1 x 220V spinner machine
- 2 stainless steel work benches with 2 drawers each
- 1 stainless steel cupboard
- 1 trolley with 3 levels.

9. REFUSE-COLLECTION ROOM

The refuse-collection area should:

- be a minimum of 20 m² in size;
- be ventilated and cooled, see Section B.II.2, points 3.2. and 3.7.;
- be sufficiently far from the kitchen and storage areas to prevent any contamination of foodstuffs;
- be located on the ground floor with easy access to the street;

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- house four 1100 litre bins. The door leading into the premises should be of appropriate dimensions.

The floor should be washable and a water supply should be installed.

10. DISPOSAL AREA FOR DISCARDED OIL

This should consist of an area measuring 5 m² adjoining the refuse-collection premises.

11. LINEN ROOMS

The linen rooms should be divided into the following areas:

- a room for clean laundry, stitching and ironing, with a minimum area of 35 m² - this room should not be located at basement level;
- a room for soiled laundry, with a minimum area of 5 m², which may be at basement level.

A well-ventilated, basement-level room with a domestic washing machine and a dryer should be provided for washing small items of laundry or soft toys (other laundry is washed by a subcontractor).

12. WORKSHOP

A repair workshop should be:

- provided for maintenance staff, equipped with a three-phase electric current;
- situated at basement level well away from any rooms occupied by children in order to avoid the children from being exposed to noise from the workshop.

The premises should include an FR60/FR1hr/REI60/EI60 compartment and should be equipped with an air intake and extraction system that is independent of the system serving the rest of the building.

13. MAIN DISTRIBUTION FRAME, CONCENTRATION ROOM AND INTERCOMS

An MDF concentration room of about 30 m² should be provided for housing a telephone switchboard, the live equipment of the data network and the intercom system. The room and its equipment should conform to the standards set out in Section B.II.7.

Intercom equipment is included in the project. See Chapter C.1.7., point 4.

14. CENTRALISED TECHNICAL MANAGEMENT ROOM, FIRE DETECTION UNIT

A room of at least 9 m² located near to the security desk should be provided for housing the centralised technical management and the fire detection units.

15. UTILITY SINK

There should be a utility sink room with a tap on each floor for use by cleaning staff. This room should be integrated in the toilet block.

16. COMMUNAL FACILITIES FOR STAFF

16.1 Washrooms

Washrooms should be provided on the ground floor and close to the changing rooms.

Men's and women's toilets should be provided close to the kitchens but should not have doors or windows which connect directly to the kitchen area. Taps on sinks in the toilets should be opto-electronically controlled.

16.2 Changing rooms

The following rooms must be provided:

- men's/women's changing rooms for teaching staff [the majority of the staff is female (+/- 90%)] and security staff;
- a men's/women's changing room for the use of kitchen staff, close to the kitchens and without any directly connecting doors or windows;
- a men's/women's changing room for maintenance staff.

16.3 Canteen

The canteen should meet the following specifications:

- the area should be large enough to accommodate around 45 people;
- provision should be made for the installation of self-service canteen fittings;
- the design should facilitate efficient and hygienic meal service.

Fittings in the canteen should comprise the following:

- a self-service unit with a conveyor belt;
- a cash register;
- a coffee machine;
- a 4GN 1/1 heated display cabinet with a plate heater;
- a chiller display unit;
- a 3GN 1/1 display unit for drinks with a drinks refrigerator;
- a stand designed to support trays and glasses;

- two salad bars equipped with 4 GN ¼ basins;

16.4 Common room/library

The common room must be a no-smoking area.

16.5 Showers

Showers must be provided in each changing room.

17. ROOMS FOR EDUCATIONAL-PSYCHOLOGY STAFF

Three offices of at least 12 m² should be provided, capable of accommodating at least three people at any one time for consultations. These rooms should be properly soundproofed.

18. MEETING ROOMS

- One small, properly soundproofed meeting room for 10 people (25 m²)
- One large meeting room for 35 people (87.5 m²) with space for video and projector equipment.

19. ROOMS FOR ADMINISTRATIVE STAFF

- An office measuring 18 m² should be provided for the crèche manager.
- An office measuring at least 20 m² should be provided for two secretaries.

There should also be space for four separate offices for the other administrative staff.

20. CARETAKER'S AND BUILDING MANAGER'S PREMISES

Each of these should measure at least 10 m².

21. MEDICAL SERVICE PREMISES

These rooms should offer the doctor a suitable level of privacy for meeting parents.

The medical service should consist of adjacent rooms, preferably laid out as follows:

- the sickbay should connect to the paediatrician's office, the multipurpose room and the waiting room;
- the paediatrician's office and the multipurpose room should connect to the sickbay and the waiting room.

21.1 Nurses' office: sickbay

This room should accommodate three nurses and enable them to receive parents and their children.

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The room should be equipped with a treatment area containing a unit with a work surface approximately three metres long, a washbasin with hot and cold water and four electric sockets. The washbasin should be built-in and should be deep enough to hold a bucket or bowl without being obstructed by the head of the tap, which should be elbow-operated or operated by photoelectric sensor. The unit is also equipped with a small, non-slip, built-in foldaway stepladder.

In addition, there should be sufficient space and electric sockets in the sickbay to accommodate a photocopier, a fax machine, three telephones, three computers, a few items of medical equipment supplied by the relevant department, two filing cabinets with deep drawers, one cupboard for medication and one cupboard for supplies.

The room should have a good level of natural light and should be sufficiently well-lit for carrying out medical examinations.

21.2 Paediatrician's office

The office should be equipped with a treatment area identical to that in the sickbay, except that the built-in washbasin should be of a normal depth and should be equipped with an automatic, sensor-operated hot- and cold-water tap.

There should also be a play area of +/- 3 m² inside the office.

The electricity supply and cabling should allow for the installation of a telephone, a computer and a few pieces of medical equipment supplied by the relevant department.

The room should have a good level of natural light and should be sufficiently well-lit for carrying out medical examinations.

21.3 Multipurpose room (paediatrician's office/sickbay/rest room)

This room should be equipped with a washbasin with a automatic, sensor-operated tap with hot and cold water.

The room should be arranged similarly to the paediatrician's office, but the treatment area should be replaced by a sickbed (+/- 100 x 200 cm).

22. WAITING ROOM, ADULT AND CHILD TOILETS

The waiting room should be situated reasonably far from the main entrance route into the crèche, but should be easy to find.

This area does not necessarily need to be lit by daylight.

There should be enough space for a play area (+/- 4 m²), four adult chairs, a low table, and a children's table with four chairs.

The adult and child toilets should be accessible from the waiting room. The child toilets should be equipped with a small children's hand-washing basin fitted at a height of around 40-50 cm from the floor.

23. STORAGE AREAS

Storage areas should be designed in compliance with the fire safety requirements set out in Section B.III.8., point 5.

24. BUGGY AND PRAM STORAGE AREA

A room measuring around 40 m² should be provided close to the entrance to the building for the storage of infants' pushchairs.

25. NON-FOOD STORAGE

A space measuring at least 70 m² should be provided for this purpose.

26. STORAGE OF TOYS / LEARNING MATERIALS

A space measuring at least 70 m² should be provided for this purpose.

27. CHILDREN'S FURNITURE STORAGE

A space measuring at least 100 m² should be provided for this purpose.

28. FOOD STORAGE

At least the following storage facilities should be provided:

- 30 m² for three cold storage rooms connected to a freezer room measuring at least 15 m².
- one area measuring no less than 50 m² for storing deliveries.

Each of the coldstores and freezer rooms should be fitted with a temperature gauge/thermometer.

29. STORAGE OF CLEANING PRODUCTS

A space measuring at least 15 m² should be provided for this purpose.

30. STORAGE OF CLEANING TROLLEYS

A space measuring at least 15 m² should be provided for this purpose.

31. STORAGE OF EVACUATION BEDS

Areas should be provided for storing baby-evacuation beds. These should be situated on the ground floor and on all floors designed to accommodate babies. Provision should be made for storing around 36 evacuation beds on the ground floor, requiring an area of around 40 m².

Two areas in close proximity to the lifts and measuring around 20 m² each are recommended for storing evacuation beds.

32. ARCHIVES

33. STORAGE ROOM FOR MEDICAL MATERIALS

This room must be reserved for the medical service.

C.I.7. FIRE SAFETY

The crèche should be designed to include:

- emergency exits and emergency staircases suitable for use by children;
- equipment for detecting and fighting fire in compliance with the regulations for school buildings and as set out in Section B.II.8.;
- an emergency generator capable of supplying all emergency and safety installations;
- large lifts to facilitate the evacuation of babies in beds and/or an effective alternative system (the fire brigade's advice should be sought on this subject);
- an intercom alert system.

PROVISIONS FOR EVACUATION

The height of the building, as defined in the safety study, should take into account the structural problems involved in carrying out an evacuation.

Buildings should be brick-built and should not include any structural materials that are combustible or liable to release noxious substances if they catch fire.

Stairs must meet emergency staircase requirements and should be arranged so as to generate a balanced stream of people when the building is being evacuated.

The assembly point for children and babies should not be in the street, as is the case for office buildings, but at a point separated from the crèche building by a sufficiently large open area (courtyard or garden).

The assembly point should provide shelter from adverse weather conditions and should be large enough to accommodate all the occupants of the crèche.

In order to evacuate the building staff must lead children to safety by first moving out of the compartment comprising the danger and evacuating horizontally into a safe compartment. Once a safe compartment has been reached children are evacuated vertically towards the assembly point, by means of either the lifts or the stairs.

Wheeled beds should be used in an evacuation, with several babies placed in each bed. It is essential that the routes to be used by wheeled beds are entirely even and without steps or changes in level, especially with regard to the route leading to the assembly point.

It is important that the lift cages should be able to accommodate at least four evacuation beds and that their dimensions allow them to be loaded easily, with enough space being left for two adults. It must be possible for the lifts to operate with power supplied by an emergency generator in the event of a power failure.

2. FIREFIGHTING EQUIPMENT

Firefighting equipment should comprise only the following items:

- axial-feed hose reels (see Section B.III.2, point 1.2.);
- water-spray extinguishers with an additive, supplied and installed by the Commission (see Section B.III.2, point 1.1.). Additives mixed with the water must not emit any noxious substances;
- a sprinkler system in the refuse collection area (see Section B.III.2, point 3.2.).

Installation of the above equipment must be approved by the SIPP.

3. DETECTION

See Section B.II.8.

4. ALARM SYSTEM

This should consist of:

- an intercom network linked to the reception desk and the secretariat;
- a siren network.

The order to evacuate is usually preceded by a brief activation of the sirens (as a warning signal) followed by a message read out over the intercom system (alarm).

Sirens may be activated again after the children have left the building. The sirens are also used to substitute the intercom system if it fails and to bring the evacuation phase to an end.

It is therefore essential that the intercom system is:

- comprehensive and serves the entire building complex, including technical premises;
- reliable;
- equipped with speakers with an adjustable volume control mechanism.

Alarm sirens: see Section B.II.8, point 6.4.

5. SIGNPOSTING

Signs should be affixed with the bottom of the pictogram positioned at a height of 1.4 metres where there is a support such as a wall or pillar, or suspended from the ceiling where there is no such support or where a direction perpendicular to the line of vision is to be indicated. Safety signs should be affixed a lower position – 40 cm from floor level - on the ground floor, in technical premises and on basement levels.

In all other respects, signs must conform to the specifications laid down in Section B.III.4.

6. ELECTRICITY

See Section B.II.3.

In addition to the usual measures, safety is ensured by differential circuit breakers installed within each network on each level.

7. TELEPHONE/DATA SYSTEMS

See Section B.II.6.

The bottom of the wall sockets must be 1.20 m from the ground.

8. HVAC

See Section B.II.2.

C.I.8. ACCIDENT PREVENTION

The main purpose of accident prevention is to avoid the following types of accident:

- falling
- becoming trapped or crushed
- being caught on or colliding with hard or sharp objects
- ingesting harmful substances
- electrocution.

1. PREVENTING FALLS

Railings should be designed in such a way that it is impossible to climb them or walk along the top of them. To this end, railings or gates with crossbars or horizontal elements forming a ladder that children can easily climb are prohibited. The space between vertical bars should be less than 6.5 cm. They should have a diameter of at least 1.25 cm and a height of 1.25 m. Laminated glass barriers are preferable.

Staircases must be equipped with double-height handrails.

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Windows should be equipped with an adjustable, sturdy mechanism that limits how far they can be opened. The opening mechanism should not be of the type that used projecting levers.

Flooring materials should be non-slip and easy to clean. In the bathrooms the flooring must remain non-slip when wet. Outdoor flooring/paving materials should be non-abrasive.

Railings measuring at least 1.25 m in height or other equivalent protective means should be installed in all places where there is a risk of falling.

2. PREVENTING TRAPPING

Doors should be fitted with a device which prevents fingers being placed between the jamb lining and the leaf of the door on the hinged side.

The gap between the floor and the door should be greater than the norm.

3. PREVENTING COLLISIONS AND BUMPS

Any sharp, protruding features must only be installed at a height somewhat greater than that of child, viz. 1.3 m. Door frames, metal railings, etc. must therefore be free of these.

4. PREVENTING INGESTION OF HARMFUL SUBSTANCES

Medicines are potentially harmful substances and should therefore be stored in a place inaccessible to children, such as a high, locked cupboard.

Paint or varnish on furniture, floors, walls, doors, etc. may also be potentially noxious and care should therefore be taken to avoid paints which might release harmful substances when they come into contact with the skin or the mouth.

Harmful substances are also contained in cleaning products. A locked room, situated outside the area in which children are present, must be specially reserved for the storage of these items. It should fulfil the specifications for high-risk areas listed in Section B.III.8, point 5.

Play areas and playgrounds are subject to the precautionary requirements set out above.

5. PREVENTING ELECTROCUTION

Electric sockets must be situated at a minimum height of 1.5 m from the floor. If it is essential to situate a socket at a lower level it should be fitted with a device which protects against electric shocks.

6. WINDOWS/PARTITIONS

Windows in partitions must be made of safety glass or must be covered with safety film on the inside. The window will not be placed less than 1.20 m from the floor.

C.I.9. LIFTS

Provisions relating to lifts are described in general terms in Section B.II.5.

1. INTERNAL DIMENSIONS

Lifts should be large enough to accommodate four evacuation beds and two adults.

As a guide, evacuation beds should measure 125 cm x 70 cm.

2. FITTINGS

In addition to the specifications set out in Section B.II.5., each lift should be fitted with an intercom point linked to the building's central intercom system (see Section C.I.7, point 4 above on the intercom system).

C.I.10. FURNITURE

The crèche project should include fitted furniture which is custom-made and incorporated into the structure of the premises. This relates in particular to changing-room furniture, bathroom and treatment room fittings, kitchenette fixtures and fittings, and garden features and toys.

Wooden fittings must not have any protruding or sharp features that may cause injury.

Varnish and paint applied to wooden fittings must be non-allergic and non-toxic in case children touch them with their mouths.

Outdoor wooden features (such as fixed toys, wooden huts, etc) should meet the same criteria, particularly with regard to products used to impregnate natural wood (such as logs).

All wooden elements should hold PEFC (Pan European Forest Certification), FSC (Forest Stewardship Council) or equivalent designations.

C.II. AFTER-SCHOOL CENTRES

An after-school centre should consist of the following rooms:

C.II.1. ACTIVITY ROOMS

The minimum surface area of each room intended for the children's use should conform to the legal standards defined by Belgian inspection agencies (ONE and *Kind & Gezin*). The number of children per room should be 14 with a minimum of 12 m² gross per child.

The number of rooms will depend on the project.

Electric sockets should be installed at a height of 1.5 m and should be covered with standard child protection devices.

Each activity room must be equipped with a cold water tap with a sink at a height suitable for children.

All rooms should be well lit and should receive daylight. They should be ventilated, heated and easy to clean. The shape of the room should facilitate the positioning of furniture.

Suitable and effective protection from direct sunlight should be installed to prevent rooms from heating up during sunny periods, while allowing daylight to penetrate living areas. The rooms should be designed so that the temperature does not exceed 28°C, even on sunny days.

C.II.2. STUDY ROOMS

A study room must be provided. The room must be well soundproofed as the children need silence to do their work.

The size of the room will be determined according to the project.

C.II.3. CHILDREN'S TOILETS

The size and installation of these toilets must be adapted to the needs of small children (4-6 years).

The sizes are similar to those described in Section B.II.4, but changes may be requested depending on the project.

D. TECHNICAL ANNEXES

D.I. MEETING ROOMS/CONFERENCE CHAMBERS

D.I.1. MEETING ROOMS/CONFERENCE CHAMBERS

1. MEETING ROOMS/CONFERENCE CHAMBERS

Initial remark: the meeting rooms described below are not those planned within or near office areas and reserved for the use of the departments occupying the building. These are dealt with in Section B.I.6.2.1.

The meeting rooms in this section are rooms designed as such in the original structure of the building and equipped with all the technical installations required for the staging of international conferences

Depending on their size and purpose, they may take different forms, from an auditorium in which seminars can be organised to multi-purpose meeting rooms. Most of them will be configured as meeting rooms.

The equipment for these chambers must include:

- interpreting booths,
- air-conditioning and electrical installations,
- a sound amplification system,
- a projector,
- blackout blinds,
- special furniture, which should be fixed and/or have built-in equipment.

In meeting rooms/conference chambers, particular attention must be given to the solution of acoustic problems such as liveness and sound insulation both to and from the outside.

For safety reasons, where the number of occupants is more than 80, these rooms must have at least two access doors in diagonally opposite corners of the room.

Meeting/conference tables must have space for technical equipment.

Each room must have natural light.

Space must be provided around meeting rooms for coffee breaks and lunches. The floor covering in these areas must be smooth.

2. INTERPRETING BOOTHS

Booths for simultaneous interpreting situated around the edge of conference chambers must comply with the latest version of standard ISO 2603. Control booths are dealt with separately.

Particular attention must be given to the construction of the booths and the quality of the materials used in them with a view to ensuring that the quality of their sound insulation and air-conditioning is maintained over the course of time and that the covering for the different parts of the booth (floor, walls, ceiling and worktop) is resistant to wear and tear. Walls must be covered with glass fibre veil and not with wall fabrics. The use of solvent-based glues and similar materials that leave persistent odours in small premises not aired other than when in use is to be avoided.

The air-conditioning must be fully adjustable for each booth from a central control unit. In addition, the temperature must be adjustable from within each booth.

3. FIXTURES

3.1 Conference table

The table must be designed to fit as closely as possible into the architectural configuration of the room. It must be positioned so as to afford the participants a clear view of the speakers, the lectern and the projection screens. The table may be rectangular, elliptical, triangular (delta shaped) or any other shape and may be arranged in one or more rows.

- The minimum length of table per occupant must be 0.65 m and the maximum 1.20 m.
- The table may be of fixed size or be composed of interlinked conference desks.
- The central area must be accessible.
- Seated participants must be clearly identifiable for other participants and the interpreters (name plates, screens, etc.). Similarly, speakers must be clearly identifiable.
- Equipment to be built into the table:
 - Cabling is to be integrated invisibly in a cable run, in which the different types of cable are kept apart (mains current, conference bus, data) and which must have 30% free space to accommodate microphone interfaces. Cabling must be easily accessible at all times by technical staff.
 - A space must be provided for IT equipment (for audiovisual presentations).
 - The following equipment is required for each participant at meetings where interpretation is provided:
 - a high-quality microphone (1 for the chairperson and one between two participants),
 - a push-to-talk button with indicator light,
 - a language selector,

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- a volume control for the headphones,
- a set of high-quality headphones,
- a 230V socket.
- an RJ45 socket (IT network or telephone),
- an HD15 socket (for laptop).
- an audio socket for the headphones (jack socket).

In certain cases, there should be a specially equipped listening area with fixed seats. These should have facilities for listening and possibly for speaking. The seats must have a folding writing tablet.

3.2 Signs

The panel displaying the interpreted languages must be visible and legible and may be an LED screen.

An electronic display panel may be affixed outside the room to indicate the title of the meeting or other information. This may be a plasma screen.

3.3 Telephones

Telephones with indicator lights (no ringers) must be provided, either in the room or on the clerks' desks.

3.4 Messengers

A desk for one or more persons with telephone facilities must be provided at the entrance to the meeting room/conference chamber.

4. LIGHTING

Lighting must be adjusted to provide a maximum uniform level of 600 lux. It must be possible to dim the lights for audiovisual presentations requiring lower lighting.

The lighting must be controlled manually from a control panel in the local control booth. This must enable each circuit to be controlled individually, pre-programmed lighting settings (a minimum of five) to be selected and the blinds and screens to be controlled. The lighting, blinds and retractable screens must be controllable from the control panel in the local control booth even when the interpreting facilities are switched off.

A local control panel must allow pre-programmed lighting settings (a minimum of three: low, normal and cleaning) to be selected. Lights must be switched off automatically after a freely programmable period.

5. SPECIAL LIGHTING FOR BROADCASTS

Where TV cameras are to be used in the meeting room/conference chamber, special lighting for broadcasts must be installed in addition to the normal lighting system.

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Such lighting must provide 700 lux, 4 200°K.

6. AUDIOVISUAL EQUIPMENT

In order to allow audiovisual presentations to be given in the room, depending on its size, video projectors, large plasma screens or integral/table-top LCD screens may be installed.

7. ACCESS FOR PERSONS OF REDUCED MOBILITY

The room and the interpretation booths must be accessible to persons of reduced mobility. See also Section B.III.9.

8. LECTERNS

8.1 General

Lecterns should generally be fixed but in certain cases may be mobile.

8.2 Description

- Lecterns in meeting rooms
- Lecterns must be arranged to provide the best conditions for speakers. They must have fixtures for an audio panel, gooseneck microphone and reading light, and must match the conference furniture.
- In certain cases, the lecterns must comply with strict audiovisual criteria.
- They must be positioned so as not to obstruct projection.
- Depending on the audiovisual equipment in the conference chamber, they may have:
 - a well-designed microphone, with an on/off switch, on a gooseneck holder,
 - an audio panel equipped with headphones,
 - a reading light,
 - a suitable cable run, which must be easily accessible by a technician,
 - space for a computer (for running presentations),
 - where they are to be moved frequently, four suitable lockable castors,
 - where the projection screen is behind the speaker, an LCD screen.

D.I.2. VIDEOCONFERENCE ROOM WITH INTERPRETING BOOTHS

1. GENERAL POINTS

Videoconference rooms with interpreting booths must comply with the following criteria.

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These rooms must be planned in such a way as to facilitate as much as possible the laying and maintenance of power and data-transmission cables. They must also have advanced sound insulation.

Where necessary, they must have interpreting booths.

2. INTERPRETING FACILITIES

In view of the rapidly changing technology in this field, technical specifications will be provided by DG Interpretation (DG SCIC) as required.

These rooms should be divided into two parts:

Studio: This must contain a table for a minimum of six persons with, for interpreting purposes, flush-mounted microphones with press-to-talk switch and audio panels.

Extension: An overspill area must be provided for a certain number of extra persons, which, for interpreting purposes, must have fixed seats, each equipped with an audio panel. Every other seat must also feature an audio panel with a built-in microphone, which participants can use to speak. Participants will speak via an audio panel with an incorporated microphone for every two seats.

A removable partition must be provided so the configuration of the room can be changed to permit interpretation and/or a larger audience.

The conference equipment must allow the remote audio signal from the transmission codec to be broadcast via the audio panels (floor channel) and the room's loudspeakers. It must be possible to direct the audio signal from the interpreting system to the codec by selecting the interpretation channel.

The conference equipment must also enable automatic control of the cameras and the Pan&Tilts.

D.I.3. LOBBIES

Where there are lobbies, these must meet the following criteria.

1. LIGHTING

Lighting must be controlled by an automatic timer. The circuit design must enable independent control of 1/3 and 2/3 of the total lighting. It must be possible to control circuits and select pre-programmed lighting settings from a control panel in the office of the messenger for the floor concerned.

Outside normal working hours, lights must turn off automatically after a freely programmable time period.

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2. ELECTRICAL INSTALLATIONS IN LOBBIES

An electrical system must be installed that is suitable for the type of meeting room/conference chamber to which the lobby is attached.

- Floor boxes
- RJ45 sockets
- 220 V wall sockets, etc.
- Telephone sockets for messengers and the public, fax, etc.

3. TELEPHONES

Telephone niches with RJ45 sockets must be provided in lobbies. These telephones are for taking calls received by the messengers for participants in meetings and a suitable number of them must be provided.

4. SOUND SYSTEM

Lobbies must be fitted with a local sound system to provide background music, for example during receptions.

D.I.4. SPECIAL FACILITIES FOR DG SCIC

Special facilities for DG SCIC must meet the following criteria.

1. INTERPRETERS' ROOM

A room or rooms must be provided near the booths, which interpreters may use when not on immediate duty. This room (or rooms) must be sufficiently large to accommodate at least as many persons as there are working positions in the booths. It/they should have a private entrance, natural light and a direct view outside.

It is preferable to divide these rooms into areas serving the following purposes:

- study of documents, posting of notices, relaxation and stand-by,
- the installation and connection of a sufficient number of computers.

The following equipment and facilities must be provided:

- easy chairs, chairs and tables,
- cloakroom or coat-rack,
- telephone (inside and local outside lines) and fax machine,
- notice boards.

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A photocopy machine should be available nearby.

2. ROOMS FOR TECHNICIANS AND LOGISTIC SUPPORT STAFF

Every building containing meeting rooms with interpreting facilities must have a room for conference technicians, a room for logistic support staff and adequate storerooms.

Technicians and logistic support staff must have easy access to showers.

3. INTERPRETING BOOTHS

3.1 Position

Booths must be located away from any outside sources of disturbance, such as kitchens, public passages, halls, etc.

3.2 General

Booths must be located at the sides of the room, ensuring good visual contact between all booths and with the control booth.

They must be raised no further above the floor of the room than is necessary for a clear view of the room, i.e. all delegates, speakers, the chairperson, etc., and all visual aids (projection screen, etc.). The view from the booths into the hall must not be obstructed by persons in the room standing in front of them. Thus, the booth floor should be at least 60 cm above the room floor assuming a level floor. This height may vary according to the size of the room. Steep viewing angles must be avoided (particularly with regard to projection screens). In larger rooms the furthest distance from booth to lectern, projection screen, etc. must not exceed 30 m.

The booths must be grouped as far as possible to facilitate visual contact and cabling between them. Where booths are on two or more sides of a room or on two levels, there must be easy and rapid contact between them.

3.3 Local control booth

The control booth must be placed close to the interpreters' booths to facilitate access and visual communication between them and provide the operator with a clear view of all proceedings, speakers, projection screen, etc.

The operator must have safe, quick and easy access to both the booths and the room.

3.3.1 General

Local control booths must be laid out in such a way that the operator can easily operate the equipment. The layout must meet the following criteria:

- the operator must have a clear view of the room,
- the operator must have a clear lateral view of the interpreting booths,
- the working surface must be ergonomically designed (shape, size),

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- the racks must be easily accessible from behind without the need to move them,
- the air conditioning must be suited to the heat output of the equipment,
- acoustic criteria, e.g. by paying particular attention to the equipment-cooling system,
- lighting criteria.

3.3.2 Visibility from the local control booth

Equipment must not stand more than 25 to 30 cm above the working surface. Monitors must be integral to the working surface and inclined, but still allowing access to their control panel.

3.3.3 Ergonomics of the working surface

In order to keep the amount of equipment on the operator's working surface to an absolute minimum, some equipment should be integrated in the racks.

The ends of the table must curve back towards the rear of the booth to form an inverted "U".

The 19 inch monitor is to be positioned in front of the operator, while allowing a clear view over the meeting room/conference chamber. The synoptic console must be positioned in front of the operator, with the interpreting system control screen to his or her right.

3.3.4 The following equipment should be rack mounted:

- CPUs,
- recording units and their VOX module,
- DVD and S/VHS recording units,
- amplifiers,
- power supply cables,
- digital analogue interfaces,
- projection control panel,
- 19 inch sound mixer.

The number of racks will depend on the function of the room and its multimedia facilities. The racks must have 20% to 30% spare capacity for any other equipment.

3.3.5 Equipment to be built into the operator's working surface

- interpreting system control monitor (or touch screen) and mouse,
- synoptic console,
- monitoring loudspeakers,

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- VU meter,
- RMS touch screen,
- reading lamp,
- telephone,
- preview monitors for the video system,
- camera-control console,
- back-lit audio panel and set of headphones.

See Annex A – sketch showing layout of local control booth

3.3.6 Access to the rear of the racks

Access to the rear of the racks in all local control booths is essential. To that end, a door must provide access, for example from the corridor.

Where the size of the booth permits a minimum of 80 cm behind the racks, an access door is not required but lighting should be provided behind the equipment (500 lux). Removable racks must not be used.

See Annexes A and B for a sample layout of the local control booth.

3.4 Doors

Doors must provide satisfactory acoustic insulation (see Section D.I.4.3.9 - Acoustics) and operate silently (in particular, the closing apparatus must not include a bolt and doors must be equipped with a device to muffle the noise when they close).

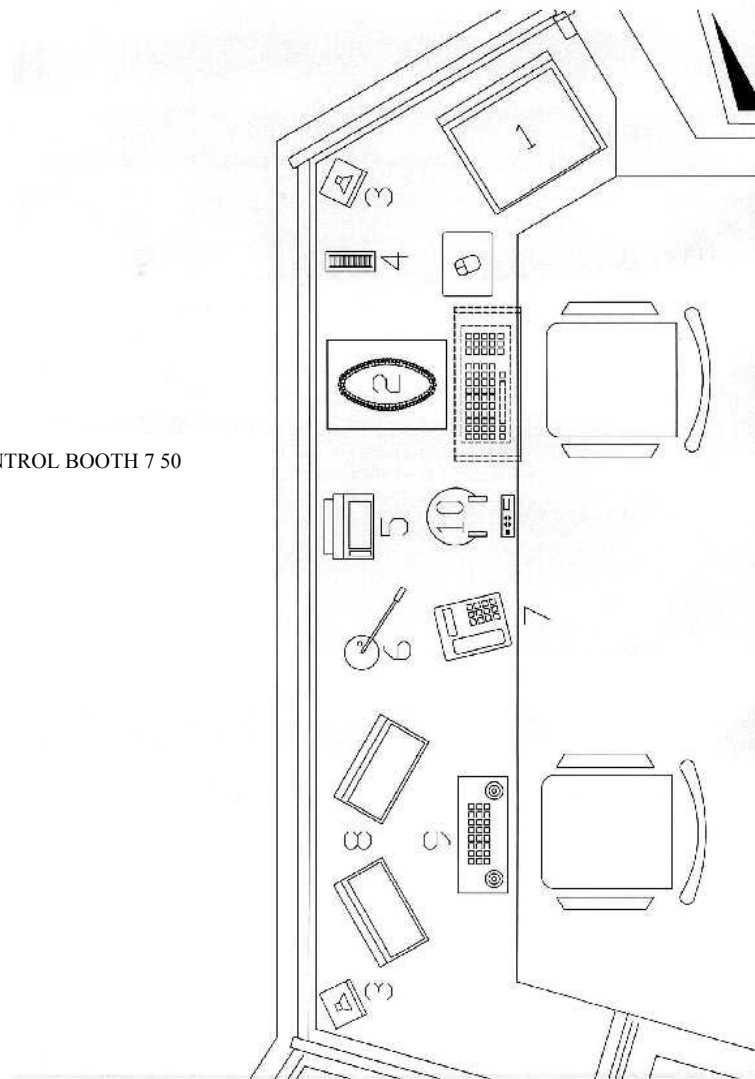
To that end, it is recommended that a casing with a jamb and a buffer seal be used together with a sill fitted with a buffer seal. Doors must be equipped with a silent, gradual automatic closer. They must not interconnect booths through side-walls. The door of the booth must have an observation window (0.20 m x 0.22 m minimum) at head height.

The control booths, unlike the interpreting booth, must be fitted with locks.

The languages and the channels on which they can be heard must be indicated on panels, either on the doors or to the side of them and at the entrance to the corridors leading to the booths.

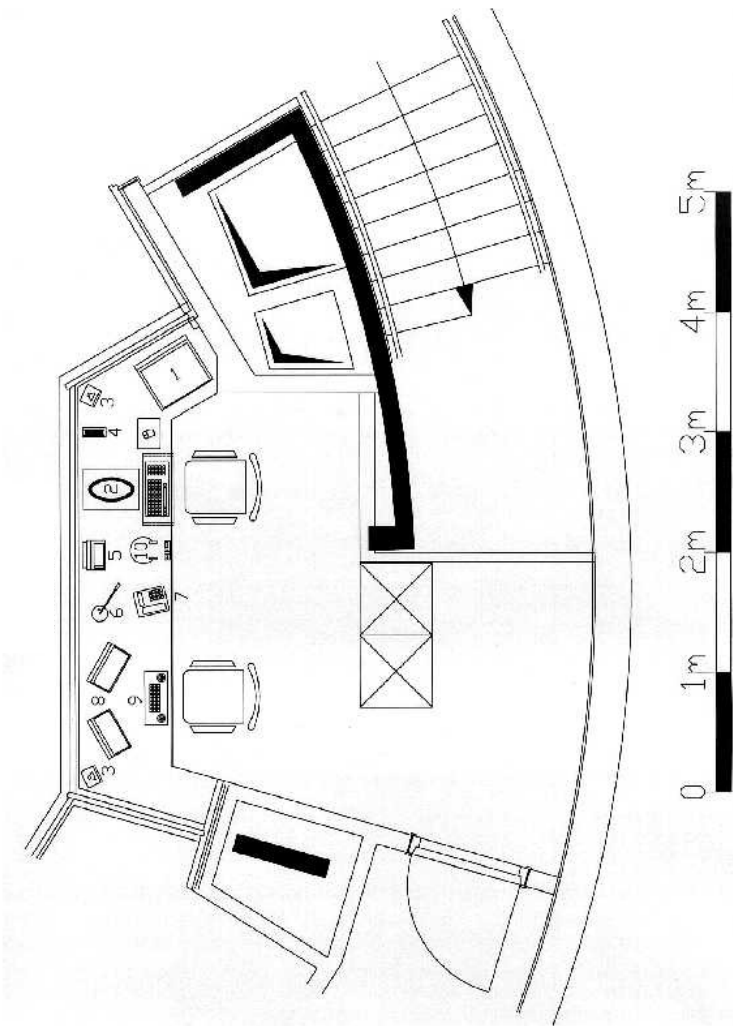
ANNEX A

LOCAL CONTROL BOOTH 7 50



ANNEX B

LOCAL CONTROL BOOTH 7 50



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3.5 Access

The booths must have easy access through a separate entrance (reserved for interpreters) from outside the hall, to avoid interpreters disturbing the meeting when coming and going. The access corridor to the booths must be at least 1.50 m wide to allow for safe and quick passage. Stairs, if any, must be safe and easy to negotiate, bearing in mind emergencies, persons of reduced mobility, the need for quick distribution of documents and the transport of equipment. Emergency exits must be readily accessible and escape routes clearly marked. There must be rapid access from the booths to the hall.

3.6 Minimum dimensions of booths (see Annex C)

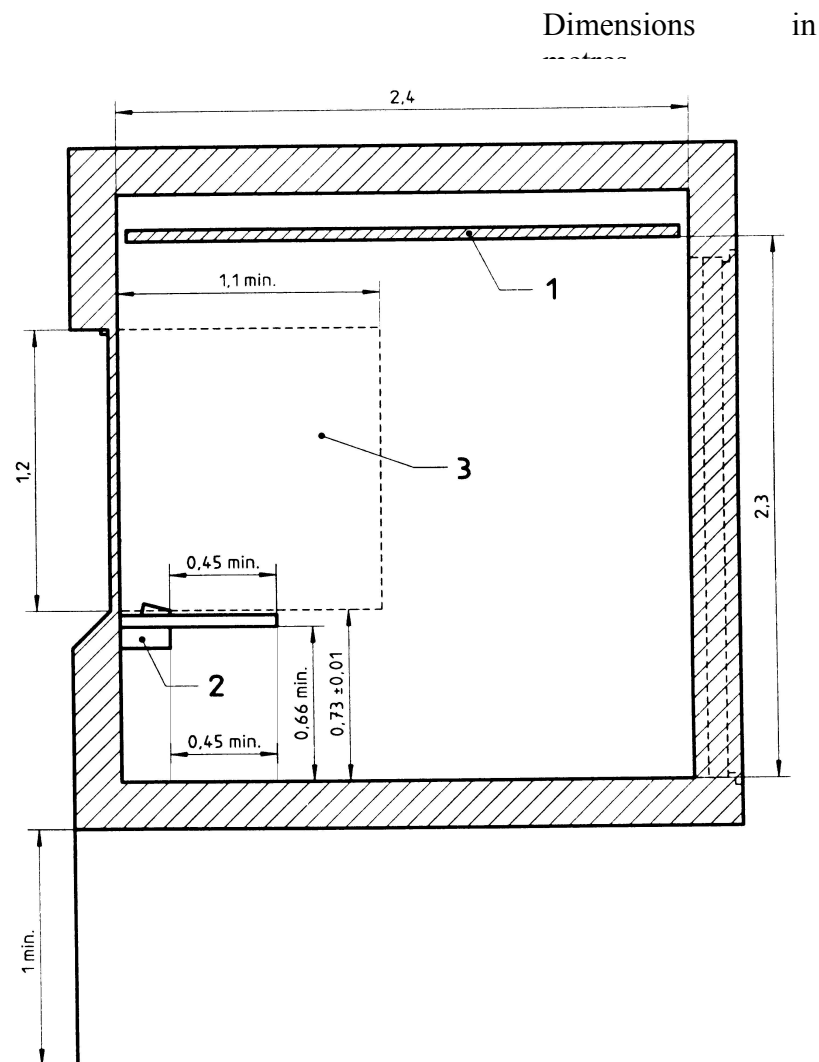
The size of a booth is governed by the need to provide sufficient work space and air volume per interpreter. The following minimum dimensions are required:

- width: 3.20 m
- depth: 2.40 m
- height: 2.30 m

Where feasible, additional height can be an advantage for draught and temperature control.

To avoid as far as possible resonance effects, the three dimensions of the booth should be different from one another and, to avoid standing waves, the two side walls should not be exactly parallel (see Annex C).

ANNEX C



Legend

1. False ceiling for air conditioning.
2. Cabling.
3. Side panel.

3.7 Visibility

A direct view of all the delegates and the entire conference room, including the projection screen, is essential.

In very large halls, where the lectern or projection screen is more than 30 m away or where there is no screen or the screen is not easily visible, visual support may be used, in the form either of one or more enlarged video display screens or of video/data display panels in or immediately outside the booth.

3.8 Windows

Front windows must be across the full width of the booth. The height of the pane must be at least 1.20 m from the working surface upwards. Its lower edge must be level with the working surface of the table, or lower (see diagram in Annex C).

Side windows of at least the same height must be provided and must extend from the front window for a length of 1.10 m along the partition between booths.

To ensure an unobstructed maximum range of view from the booths, vertical supports must be avoided.

Front and side windows must consist of untinted anti-glare glass satisfying the sound insulation requirements (see point 3.9 – Acoustics and ISO 140-4). Panes must be mounted in such a way as to avoid vibration, acoustic leaks, glare from hall lighting and mirror effects from inside the booth.

In the present state of glass technology, good results are obtained by using one vertical pane of laminated glass of adequate thickness in combination with work-lighting in the form of overhead spotlights.

Depending on the type of work lighting used and the room's acoustics, front panes may have to be slightly inclined outwards.

The joints between panes should use a clear and transparent material and be made using the utmost care so as to avoid marks on the glass and to ensure that there are no acoustic leaks.

3.9 Acoustics

The booths must open onto an area not normally used by delegates, members of staff or the public. They must not be adjacent to any noise source. Floors and walls in booths and corridors must in any case be covered with sound-absorbent material.

Where flooring is hollow, care should be taken to prevent sounding-box effects from footsteps.

Particular attention must be given to sound-proofing between:

- the interpreters' booths;
- the interpreters' booths and the control booth;

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- the booths and the conference chamber.

The following values must apply (including air ducts, cable ducts, etc.):

- chamber/booth: $R'_w = 48$ dB
- booth/booth: $R'_w = 43$ dB
- booth/corridor: $R'_w = 41$ dB

R'_w is defined in ISO 717-1; for measurement see ISO 140-4.

Air ducts must be properly sound-proofed to prevent noise transmission from booth to booth. The A-weighted sound pressure level generated by the air-conditioning system, lighting and other sound sources must not exceed 35 dB.

Reverberation time (see ISO 3382) inside the booth must be between 0.3 s and 0.5 s measured in the octave bands from 125 Hz to 4000 Hz (booth unoccupied).

3.10 Air conditioning

As booths are occupied throughout the day, adequate ventilation is required.

The air supply should be 100% fresh (i.e. not recycled). The air-conditioning system must be independent from that of the rest of the building and of the conference chamber.

Air renewal must be seven times per hour or 75 m³/h per person and the carbon dioxide concentration must not exceed 0.1%. The temperature must be controllable between 19°C and 23°C by means of an individual regulator in each booth. Relative humidity must be between 45% and 65%.

Air velocity must not exceed 0.2 m/s. Air inlets and outlets must be placed in such a way that interpreters are not exposed to draughts.

Good results can be obtained by introducing the air through a perforated ceiling and extracting it through vents at the rear of the booth, in the floor or the rear wall.

Air ducts must not transmit sound from booth to booth or from other sources. They must not pass through walls separating booths. To comply with acoustic requirements, noise-generating appliances such as expansion chambers, fire shutters, etc. must be located outside the booths.

The values set out in Section D.I.4.3.9. – Acoustics above must be respected.

The air conditioning in the local control booth must be suited to the heat output of the equipment and a separate extraction system should be provided for the racks.

3.11 Cable ducts

Ducts suitable for looping cables and associated connectors from booth to booth must be provided. After insertion of cables, the openings must maintain the sound insulation values of the walls they cross.

Access to ducts should be made easy and should not require the use of special tools.

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3.12 Booth interior

3.12.1 Wall and floor coverings

Booth surfaces must be non-reflecting, fire-resistant and non-toxic. They must be appropriately sound absorbent and must neither attract nor harbour dust (pile carpeting on walls should be avoided) and be easy to clean. The floor covering must be laid in tiles made of an anti-static material.

3.12.2 Lighting

The lighting in the booths must be independent of that in the hall, as the latter may have to be darkened for projections.

The booths must be provided with two different lighting systems: one for work and the other for general purposes.

Both systems must have an on/off dimmer switch.

The general lighting will be on the ceiling in the rear third of the booth. The lighting for the working surface will be on the ceiling in the front part of the booth.

The working surface must be lit by non-fluorescent lighting, for which a switch should be available by the booth door. The dimmer switches should be within reach. The light source must not cause reflections on booth windows. The lighting systems, including dimmers and transformers, must not cause magnetic interference or audible noise.

The switch for lighting, within easy reach of the interpreter, should give continuous intensity control over a minimum range from 100 lux to 500 lux (all values to be achieved at working surface level).

The working surface available to each interpreter must have an individual adjustable compact table lamp of a least 300 lux, connected to a low voltage circuit.

Table lamps and the range of tilt of their reflectors must be so designed as to avoid glare in adjacent working positions or into the hall and to allow them to be handled without the risk of burns. The combined work-lighting must provide coverage of the required intensity over the whole working surface of the booth, taking account, in particular, of the increasing use of grey, recycled paper.

All light sources must generate as little heat as possible and be of a suitable colour.

Lighting systems, including dimmers, must cause no inductive electrical interference in neighbouring microphone circuits. Switches should be mechanically silent.

The overhead work-lighting must be so positioned as to avoid shadows being cast by the working interpreter on the working surface, documents, equipment, fixtures, etc.

The lights on both circuits must be switched off automatically after a freely programmable period.

3.12.3 Colours

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The colour scheme in the booth must be appropriate for the restricted working space. Matt finishes should be used for all surfaces and equipment in the booth.

3.12.4 Working surface

The working surface must be firm enough for use as a writing table and for studying documents, reference books, etc.

It must be horizontal and covered with shock-absorbent material to deaden noise that would otherwise be picked up by the microphones. The under surface must have a smooth finish and the edge must be rounded.

The characteristics of the working surface must be as follows:

- position: at the front of the booth across the full width, affording the seated interpreter an unobstructed view of the proceedings in the hall, care being taken to avoid transmission of vibration through booth walls;
- height: 0.73 m +/- 0.01 m from the floor level of the booth;
- useable depth (i.e. clear of equipment, fixtures, etc.): 0.45 m in relation to the interpreters' angle of vision into the hall;
- leg room: minimum depth 0.45 m, minimum height 0.66 m and should not be obstructed by working surface supports.

In order to provide the maximum unobstructed space, the working surface may be supported either by right-angle brackets affixed to the front wall of the booth, or by a single structure running the whole width of the booth and affixed to the side walls, which must comply with the characteristics set out above.

The total depth of the working surface must be calculated taking account of the space taken up under the table by the built-in equipment and the leg room.

3.12.5 Electricity sockets and connections for data transmission

Each working position in the booth (up to a maximum of four) must have one electricity socket and one connection for data transmission. These should either be built flush into the working surface or placed in banks on the two side walls of the booth at the same height as the working surface.

3.12.6 Control booth

The working surface must be able to bear the weight of the equipment without sagging.

The equipment must be placed on the working surface or built into it in such a way as not to obstruct the operator's view of the room or the diagonal or lateral view of the interpreters in the neighbouring booths (see Section D.I.4.3.3 – Local Control Booth).

For connecting equipment, at least the following must be provided: four banks of two electricity sockets, four banks of two data sockets, one telephone socket, one UPS electricity socket (to be sunk into the false floor) for the rack.

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A preview monitor must be provided for the video system.

3.13 Intercom system or internal telephone system

In order to facilitate communication between booths, which may be far apart within the same room, an intercom system or internal telephone system must link all booths within the same room, including the local control booth.

The equipment must be telephone-receiver type rather than direct-speech type. Receivers must have a quiet, adjustable-volume ringer. There must be a flashing indicator light on the interpreter's console to indicate a call over the intercom.

They should be affixed to the inside of the back wall of the booth.

3.14 Telephones

Independently of this intercom/internal telephone system, a telephone for outside calls will be required. There must be a flashing indicator light on the interpreter's console to indicate an incoming call on this telephone, which must be installed in the corridor behind the interpreting booth. Cabling must be installed for that purpose between the telephone and the consoles in the interpreting booth.

4. INTERPRETING SYSTEM

4.1 General

The interpreting system must be digital and must use the multiplexing principle. All equipment in the system should be linked to a computer by a single cable.

With a view to meeting future linguistic requirements, the simultaneous interpreting equipment must allow at least 40 languages to be covered as a default. It must be interchangeable and interoperable.

4.2 Equipment in the interpreting system.

In view of the rapidly changing technology in this field, technical specifications will be provided by DG Interpretation (DG SCIC) when the project is being planned.

5. VIDEO SYSTEM

This comprises motorised cameras to be installed in meeting rooms in line with specific needs. The video systems form a closed network completely independent of the building monitoring system.

5.1 General features

The main functions of the system are, by order of importance:

- To guarantee good quality video even in low-light conditions for video links to meeting rooms.
- To provide video input for the centralised video recording system.

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- To provide video input for the video-conference transmission systems.
- To monitor activity in the rooms.

5.2 Video system components

Technical specifications will be provided by DG Interpretation (DG SCIC) as required.

6. PICTURE PROJECTION AND BROADCASTING SYSTEMS

General

Each meeting room is to be equipped with a large-screen AV projection and broadcasting system.

Cinema and video-conference rooms are to be equipped with projection systems adapted to their specific needs.

The components of the AV projection and broadcasting system are:

- video-projector
- delegates' monitors
- interpreters' monitors
- monitors for the local opsroom
- monitors for the central opsroom
- electrically retractable projection screens
- source selector switches
- DVD players/recorders
- document scanners
- slide transfer devices
- AV panels

Technical specifications will be provided by DG Interpretation (DG SCIC) as required.

7. RMS (ROOM MANAGEMENT SYSTEM)

The purpose of this equipment is to permit the operation of all AV equipment, remote-controllable and others, via a touchscreen interface. Two minimum 15-inch touchscreens will be installed, one for the operator in the local opsroom and the other in the meeting room for the delegates.

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The screens are to be programmed to control the following, amongst others, from the room or the local or central opsrooms:

- meeting room lighting (dimmable),
- video equipment operation (DVD, video-projectors, S-VHS, interpreters' LCD screens, etc.),
- source selection for projection,
- darkening facilities (blinds, curtains)
- projector screens and video-projector lift,

Exclusively from the local or central opsroom:

- amplifier equipment (volume),
- projection source selection, with technical displays in the form of detailed menus and possibility of picture-in-picture for the preview picture from the projection source,
- turning on and off of the interpreting, AV and lighting equipment,
- switching the meeting room to closed session.

Technical specifications will be provided by DG Interpretation (DG SCIC) as required.

8. SIGNAGE

8.1 Description

The conference signage is a system permitting the display of three types of information:

- 1) The language arrangements (managed by SCIC), in the meeting room.
- 2) The titles and times of the meetings (managed by SCIC), outside the meeting rooms (outside the room and at the entrance to the building).
- 3) Other displays (managed by SG and DG COMM), outside rooms where the Commission, Chefs de Cabinet and press are meeting.

8.2 Components

- Control computer in central opsroom
- Local control computer for press, Chefs de Cabinet and Commission information
- Display screens
- Dedicated network

Technical specifications will be provided by DG Interpretation (DG SCIC) as required.

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9. CENTRAL OPSROOM

Technical specifications for the central opsroom will be provided by DG Interpretation (DG SCIC) as required.

10. NETWORK OF CONNECTIONS

This is vital to permit the exchange of A/V signals. It must guarantee signal communication between:

- local and central opsrooms
- local opsrooms and meeting/conference rooms
- central opsrooms and the exterior: OB truck, video-conference, inter-building looping, etc.
- audio and video loop connections between meeting rooms
- connections for certain specific rooms to the phone network
- central opsroom connections to cable TV network.

Technical specifications will be provided by DG Interpretation (DG SCIC) as required.

11. VIDEO-CONFERENCING INSTALLATIONS

Technical specifications will be provided by DG Interpretation (DG SCIC) as required.

12. AS-BUILT DOCUMENTS

At the time the work is provisionally accepted the installer must supply ‘as-built’ plans showing the installations as actually installed.

The installer must also supply the technical specifications for all the equipment installed.

The as-built documents must be supplied in sufficient number as per the instructions in the general technical clauses.

The installer must also supply a file containing maintenance and service instructions for all installations, as provided for in Article 54c of the General Regulation on Labour Protection (RGPT).

All as-built documents are to be supplied in English and French.

The as-built documents must also contain the installation CDs for the various control stations (interpreting, signage, etc.) and a CD-ROM back-up for all components requiring programming (RMS, etc.).

The back-ups are to be supplied password-free.

Extremely precise rack cabling diagrams must also be supplied:

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- video electrics diagrams,
- audio electrics diagrams,
- RMS electrics diagrams, etc.,
- user manuals for all audiovisual equipment (interpreting, recorders, projectors, etc.),
- technical manuals for all equipment installed including all electronics diagrams (voice-activation module, recorders, listening controls, etc.).

13. EQUIPMENT SUBJECT TO RAPID TECHNOLOGICAL DEVELOPMENT

Given its experience in running its conference rooms, the Commission must have the latest generation of equipment.

Some equipment which is subject to rapid technological development risks being obsolete before even being installed.

An equipment series can be targeted so that it can be selected no earlier than six months before the conference centre is accepted.

All equipment to be based on computerised technology.

14. SPARES

Spares permitting SCIC's technical conference department to have an operating stock in the event of emergencies.

This will require a range of interpreting and multimedia components, viz.:

- 5% of the total number of headphones for delegates and interpreters,
- 2 to 3% of the table and chairperson's microphones,
- 2 to 3% of traditional channel selectors,
- 4% of the total number of interpreters' stations,
- 6% of the total number of interpreters' lights,
- 4% of the total number of LCD screens for delegates/interpreters,
- 4% of the MiniDisc or CD recorders depending on the equipment selected,
- microphone interfaces and other modules, etc.

D.II. CATERING

The lists of equipment below must be read in conjunction with Chapter B.I.6.9

D.II.1. SELF-SERVICE RESTAURANT

1. EQUIPMENT OF THE FREE-FLOW AREA

The free-flow area must contain the following:

- display case for exhibiting dishes
- salad bar (where possible with an electrically-regulated protective cover)
- dessert counter
- cold-dish counter
- distribution counter
- dish of the day counter
- vegetarian dish counter
- grill counter
- pasta counter (including a pasta cooker)
- hot entrée counter
- automatic pasta cooker, with a timer switch
- deep-fat fryer
- grill, roasting and pasta fixtures, placed under an extractor hood strip allowing direct extraction of smoke and steam through extractor hoods
- plain counter for collection of bread/cutlery
- cash desk
- weighing machine
- cash register
- Proton reader
- glass distributor

- 650-litre refrigerator
- condiments table (in the dining room)
- chilled water fountain (in the dining room)
- microwave oven (in the dining room)
- glass cabinet
- electrical sockets in sufficient numbers to supply ‘Tempo-bus’ mobile refrigerators, etc.

The dining room must be laid out so as to create a convivial atmosphere, in terms of décor, soundproofing, etc. It must be equipped with tables for four and tables for two (+/- 120 x 80 cm and +/- 80 x 80 cm respectively).

It must also contain dispensing points for water, sauces and condiments, equipped with microwave ovens; there must be two to six such points depending on the size and capacity of the canteen (one per 200 seats).

Crockery must be cleared by a conveyor belt taking trays directly to the dishwashing area; it must be spacious enough to avoid bottlenecks.

2. KITCHEN EQUIPMENT

The kitchen is generally equipped with the following items (small appliances, shelving, trolleys, mixers, weighing machines and scales and other easily movable equipment – excluding mobile tables, vacuum-packing machines and other basic essential items – are not considered as fixtures and are not automatically to be provided, only the electricity connections needed to operate them):

- 150-litre cooking pot
- frying pan
- stove with four hotplates
- wall shelving
- knee-activated hand basin
- extractor hood
- combined fan/steam oven
- refrigerator
- freezer
- chef’s table
- deep-fat fryer

- bain-marie
- sink unit with two sinks
- professional food processor
- floor gutter
- sterilisation cabinet
- slicing machine
- table-top cutting machine
- weighing machine
- scales
- paper towel roll dispenser
- vacuum packing machine
- conveyor-type chilling unit, between the cooking area and the cold meal area
- stainless steel storage cupboard
- cold cabinet
- cold cabinet for trolleys
- insect killer
- soup mixer
- cleaning point by washer with an automatic rewind mechanism
- movable central table.

3. TROLLEYS

The trolleys used in the kitchen are as follows:

- lifting trolley with platforms
- heated plate trolley
- plate trolley (unheated)
- dish-rack dollies/for stacking bowls
- trolleys with guide rails
- bain-marie trolley 3 GN 1/1

- plate trolley (with dividers)
- platform trolleys
- dish-rack dollies
- hot food trolleys
- cold food trolleys
- serving trolley
- condiment trolley
- plate transport trolley
- bin-bag holder
- clearing trolley.

4. DISHWASHING AREA

The dishwashing area must be equipped with the following:

- stainless-steel shelving
- storage cabinet (h = 2 000 mm)
- hood-type dishwasher
- conveyor-type dishwasher
- sink with flexible shower rinser
- sink unit with single sink and draining board
- UV insect killer
- wall-mounted telephone.

D.II.2. CAFETERIAS

1. COUNTER

The counter must be equipped as follows:

- refrigerated table
- stack of drawers
- cash register and Proton reader

- ice machine
- table on cupboards with sliding doors
- espresso coffee machine + grinders
- bin-bag compartment and disposal slot for coffee dregs
- refrigerated display case
- refrigerated cabinet with glass door
- pastry warmer
- glass-fronted shelf unit on racks (3 levels)
- microwave oven
- neutral cupboard
- single sink unit on neutral cupboard
- upright freezer with glass door
- micro-perforated electrical shutter with control device behind the counter and manual unlocking mechanism
- UV insect killer
- wall-mounted telephone.

2. PANTRY

The pantry must be equipped as follows:

- refrigerated table for the preparation of sandwiches
- slicer
- weighing machine
- knife sterilising cabinet for ten knives (ozone)
- refrigerated cabinet with glass door
- UV insect killer
- shelf unit designed to hold 2 semi-industrial coffee percolators (water and electricity connections must be provided)
- knee-activated hand basin
- floor gully

- wall-mounted telephone.

3. DISHWASHING AREA

The dishwashing area must be equipped as follows:

- stainless-steel shelving
- storage cabinet (h = 2 000 mm)
- hood-type dishwasher
- sink with flexible shower rinser
- sink unit with one sink and draining board
- UV insect killer
- wall-mounted telephone.

4. STOREROOM

The storeroom must be equipped as follows:

- stainless-steel shelving
- UV insect killer
- storage cabinet (h = 2 000 mm)
- wall-mounted telephone.

D.II.3. SNACK BAR

1. COUNTER

The counter must be equipped as follows:

- refrigerated table
- stack of drawers
- cash register and Proton reader
- ice machine
- table on cupboards with sliding doors
- espresso coffee machine + grinders
- bin-bag compartment and disposal slot for coffee dregs

- refrigerated display case
- refrigerated cabinet with glass door
- pastry warmer
- glass-fronted shelf unit on racks (3 levels)
- microwave oven
- neutral cupboard
- single sink unit on neutral cupboard
- upright freezer with glass door
- electrical shutter with control device behind the counter and manual unlocking mechanism
- UV insect killer
- wall-mounted telephone
- counter for the preparation and presentation of sandwiches if there is a ‘sandwich bar’.

2. PANTRIES

2.1 Cold pantry

The cold pantry must be equipped as follows:

- refrigerated table for the preparation of sandwiches
- slicer
- weighing machine
- knife sterilising cabinet for ten knives (ozone)
- refrigerated cabinet with glass door
- UV insect killer
- knee-activated hand basin
- floor gully
- wall-mounted telephone.

2.2 Warm pantry

The warm pantry must be equipped as follows:

- refrigerated table for the preparation of sandwiches
- slicer
- weighing machine
- knife sterilising cabinet for ten knives (ozone)
- refrigerated cabinet
- upright freezer
- stove
- regeneration oven
- UV insect killer
- shelf unit designed to hold 2 semi-industrial coffee percolators (water and electricity connections must be provided)
- knee-activated hand basin
- floor gully
- wall-mounted telephone.

2.3 Cocktail kitchenette

The cocktail kitchenette must be equipped as follows:

2.4 Dishwashing area

The dishwashing area must be equipped as follows:

- stainless-steel shelving
- storage cabinet (h = 2 000 mm)
- hood-type dishwasher
- sink with flexible shower rinser
- sink unit with one sink and draining board
- UV insect killer
- wall-mounted telephone.

2.3.2 Storeroom

The storeroom must be equipped as follows:

- stainless-steel shelving

- UV insect killer
- storage cabinet (h = 2 000 mm)
- wall-mounted telephone.

D.II.4. COFFEE-SHOP

1. COUNTER

The counter must be equipped as follows:

- refrigerated table
- stack of drawers
- cash register and Proton reader
- ice machine
- table on cupboards with sliding doors
- espresso coffee machine + grinders
- bin-bag compartment and disposal slot for coffee dregs
- refrigerated display case
- refrigerated cabinet with glass door
- pastry warmer
- glass-fronted shelf unit on racks (3 levels)
- microwave oven
- neutral cupboard
- single sink unit on neutral cupboard
- upright freezer with glass door
- electrical shutter with control device behind the counter and manual unlocking mechanism
- UV insect killer
- wall-mounted telephone.

2. PANTRIES

The pantry must be equipped as follows:

- refrigerated table for the preparation of sandwiches
- slicer
- weighing machine
- knife sterilising cabinet for ten knives (ozone)
- refrigerated cabinet with glass door
- UV insect killer
- shelf unit designed to hold 2 semi-industrial coffee percolators (water and electricity connections must be provided)
- knee-activated hand basin
- floor gully
- wall-mounted telephone.

3. DISHWASHING AREA

The dishwashing area must be equipped as follows:

- stainless-steel shelving
- storage cabinet (h = 2 000 mm)
- hood dishwasher
- sink with flexible shower rinser
- sink unit with one sink and draining board
- UV insect killer
- wall-mounted telephone.

4. STOREROOM

The storeroom must be equipped as follows:

- stainless-steel shelving
- UV insect killer
- storage cabinet (h = 2 000 mm)
- wall-mounted telephone.

D.III. LIST OF PROHIBITED MATERIALS

The list of prohibited materials is set out below. This list is subject to update. At the date of drafting this document, the list of prohibited materials was as follows:

- Asbestos, in accordance with Council Directive 76/769/EEC of 27 July 1976 on the approximation of the laws, regulations and administrative provisions of the Member States relating to restrictions on the marketing and use of certain dangerous substances and preparations, as amended by Council Directive 85/610/EEC of 20 December 1985 amending for the seventh time (asbestos) Directive 76/769/EEC and Commission Directive 91/659/EEC of 3 December 1991 adapting to technical progress Annex I to Council Directive 76/769/EEC (asbestos).
- Arsenic compounds, for the uses described in Council Directive 76/769/EEC, as amended by Council Directive 89/677/EEC of 21 December 1989 (amending for the eighth time Directive 76/769/EEC).
- Benzene, in accordance with Council Directive 89/677/EEC (amending for the eighth time Directive 76/769/EEC).
- Chlorinated solvents, in accordance with European Parliament and Council Directive 94/60/EEC of 20 December 1994 (amending for the 14th time Directive 76/769/EEC).
- Heavy carbonates and sulphates, in accordance with Council Directive 89/677/EEC (amending for the eighth time Directive 76/769/EEC).
- Mercury compounds, in accordance with Council Directive 89/677/EEC (amending for the eighth time Directive 76/769/EEC).
- Polychlorinated biphenyls and terphenyls, in accordance with Council Directive 89/677/EEC (amending for the eighth time Directive 76/769/EEC).
- Methanes (Ugilec 141, Ugilec 121 and DBBT), in accordance with Council Directive 91/339/EEC of 18 June 1991 (amending for the eleventh time Directive 76/769/EEC).
- Carcinogens, mutagens and toxic substances, in accordance with Council Directive 76/769/EEC, as amended by European Parliament and Council Directive 94/60/EEC of 20 December 1994 (amending for the 14th time Directive 76/769/EEC).
- Phenolic salts, benzenoid salts and 2-naphtylamine and its salts, in accordance with Council Directive 76/769/EEC, as amended by Directive 89/677/EEC (amending for the eighth time Directive 76/769/EEC).
- Cadmium and its compounds, for the uses listed in Directive 91/338/EEC (amending for the tenth time Directive 76/769/EEC).

- **Creosote, in accordance with Directive 94/60/EEC of 20 December 1994 (amending for the 14th time Directive 76/769/EEC).**
- **Pentachlorophenol, in accordance with Council Directive 91/173/EEC of 21 March 1991 (amending for the ninth time Directive 76/769/EEC).**
- substances liable to cause ozone depletion,
- ceramic fibres and all fibres less than 3 µm in diameter,
- non-encapsulated mineral fibres,
- formaldehydes,
- urea-formaldehyde foams,
- polyurethane and polystyrene foams in areas of the building occupied by staff,
- all substances whose radioactivity levels exceed the maximum permitted by Belgian and/or European standards, where these exist.

Where no standard is laid down, the material must meet the “activity concentration index” criterion described in the document “Radiological Protection Principles concerning the Natural Radioactivity of Building Materials” published by DG Environment in 1999 (ISBN 9282883790, internet link: http://ec.europa.eu/energy/nuclear/radiation_protection/doc/publication/112.pdf). A European Directive exists in draft form.

GLOSSARY

This glossary contains a number of acronyms and abbreviations used in the manual.

AFNOR	French standards association (Association française de normalisation)
ANPI	Belgian National Fire Safety and Intrusion Protection Association (Association nationale pour la protection contre l'incendie et l'intrusion)
ARGB	Royal Belgian Association of Gas Suppliers (Association Royale des Gaziers Belges)
ATEX	Potentially explosive atmosphere
ATG	Building standards (Agrément technique)
BELAC	Belgian Accreditation Body
BMS	Building Management Systems (BMS)
BOSEC	Belgian Organisation for Security Certification
BREEAM	British Research Establishment Environmental Assessment Method
CAMM	Computer-assisted maintenance management
CCR	Cable concentration room
CE	Marking indicating compliance with all the safety requirements set out in European directives.
CEA	European insurance committee (Comité Européen des Assurances)
CEE-EI	International Committee on the Conformity of Electrical Equipment (Commission internationale de conformité de l'équipement électrique)
CEN	European Committee for Standardisation (Comité européen de normalisation)
CENELEC	European Committee for Electrotechnical Standardisation (Comité européen de normalisation électrotechnique)
CFC	Chlorofluorocarbon (gas known to damage the ozone layer)
CoBAT	Brussels Town Planning Code (Code Bruxellois de l'Aménagement du Territoire)
CSTC	Belgian Centre for Building Science and Technology (Centre Scientifique et Technique de la Construction)
DIN	German standardisation body (Deutsches Institut für Normung)
DDC	Direct Digital Control

DS	Security Directorate (European Commission)
ECISS	European Committee on Iron and Steel Standards (Comité européen de normalisation du fer et de l'acier)
EEx	Flameproof (potentially explosive atmosphere)
EFTA	European Free Trade Association
EMAS	Environmental management audit scheme
EN	European Standard
ENV	CEN pre-standard
EOTA	European Organisation for Technical Approval
FR30/FR ¹ / ₂ hr/EI30/REI30	30 minutes' fire resistance
GN	Gastro Norm
HQE	Haute Qualité Environnementale (high environmental quality)
HR.DS.6	Commission unit in DG HR – Health and safety policy
HR.DS.6 HASPAC	Health and Safety Policy and Control section of HR.DS.6
HV	High voltage
HVAC	Heating – Ventilation – Air conditioning
IBDE	Brussels Intercommunal Water Distribution company (Intercommunale Bruxelloise de Distribution des Eaux)
IBGE	Brussels Institute for Environmental Management (Institut Bruxellois pour la Gestion de l'Environnement)
IBN	Belgian Institute for Standardisation (Institut Belge de Normalisation)
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
LOI/CODE/RGPT	Belgian Act of 4 August 1996 consisting of the Welfare at Work Act (LOI), the Welfare at Work Code (CODE) and the General Regulation on Labour Protection (RGPT)
LPG	Liquefied petroleum gas
LPU	Local processing unit
LV	Low voltage
MB	Moniteur belge (Belgian official gazette)

MDF	Main distribution frame
MS	Management systems
NBN	Standards registered by the Belgian Institute for Standardisation
NIT	CSTC publication (technical information sheet)
OIB	Office for Infrastructure and Logistics – Brussels (European Commission)
PCD	Belgian Local Development Plan (Plan communal de développement)
PPAS	Belgian Individual Land-Use Plan (Plan particulier d’affectation du sol)
PRAS	Belgian Regional Land-Use Plan (Plan régional d’affectation du sol)
PRD	Belgian Regional Development Plan (Plan Régional de Développement)
RGIE	Belgian General Regulation on Electrical Installations (Règlement général sur les installations électriques)
RGPT	Belgian General Regulation on Labour Protection (Règlement Général pour la Protection du Travail)
RH	Relative humidity
RRU	Brussels Capital Regional Urban Planning Regulation (Règlement Régional d’Urbanisme de la région de Bruxelles-Capitale)
SCIC	Joint Interpreting and Conference Service (European Commission)
SECT	External Technical Inspection Service (Service Externe De Contrôle Technique).
SIPP	Internal Health and Safety department (Service Interne de Prévention et de Protection au travail)
TLV	Threshold Limit Value
UBAtc	Belgian Building Standards Federation (Union Belge pour l’Agrément technique dans la construction).
USHT	Health and Safety at Work Unit (European Commission)
VDE	German Association for Electrical, Electronic & Information Technologies (Verband der Elektrotechnik, Elektronik und Informationstechnik)
VIVAQUA	Water distribution company

NOTES

STANDARD BUILDING

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