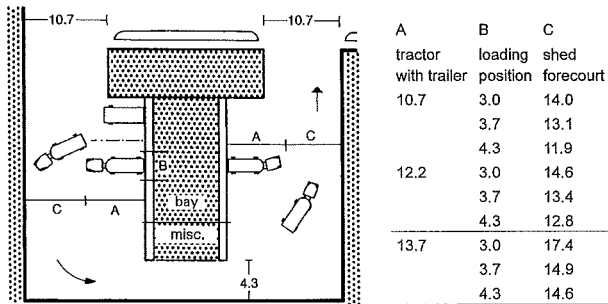


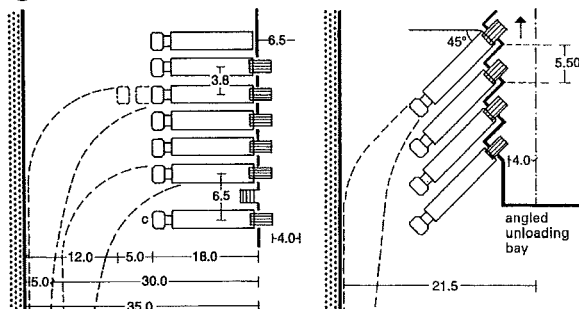
## LOADING YARDS

	Sales area (m <sup>2</sup> )			
	5000–10000	10000–15000	15000–20000	20000–30000
HGV standing places at the loading ramp	2–3	3–4	4–5	5–6
waiting area for delivery	100	120	180	250
no. and size of trucks with trailers	1: 2.00 × 3.00 1: 2.00 × 4.20	2: 2.00 × 3.00 1: 2.00 × 4.20	3: 2.00 × 3.00 1: 2.00 × 4.20	2: 2.00 × 3.00 2: 2.00 × 4.20
lift lobbies (m <sup>2</sup> )	20	30	40	40
area for disposal (m <sup>2</sup> )	30	30	50	100
empty packaging	20	40	60	80
waste paper bales	15	25	35	35
stationary press with container (m)	3.00 × 9.00 in front of the loading ramp			
channel baling press with container (m)	2.50 × 9.00 in front of the loading ramp			

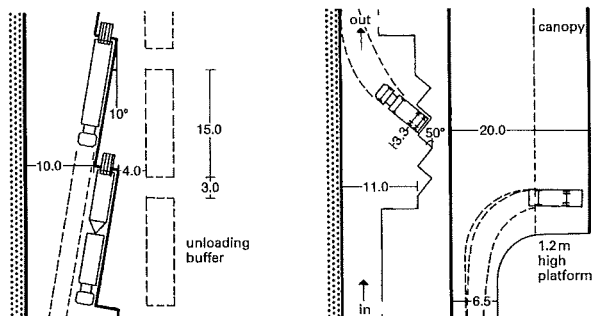
### 1 Loading yards of department stores and shopping centres



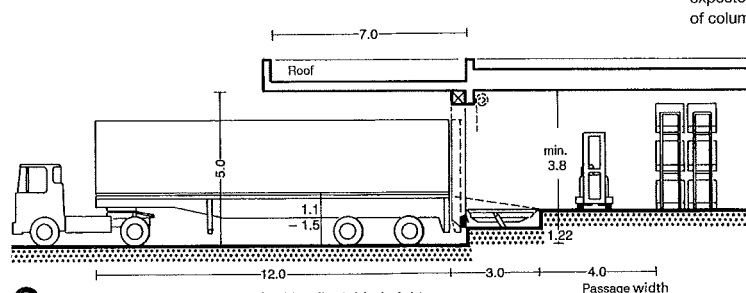
### 2 Loading and unloading in inner yard



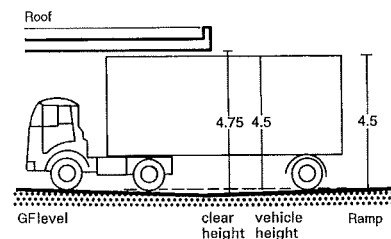
### 3 Loading and unloading ramp: very closely parked vehicles must drive forward a little before they can drive out



### 5 Loading and unloading dock with raised ramps and side unloading



### 9 Section through a loading dock with adjustable-height ramp

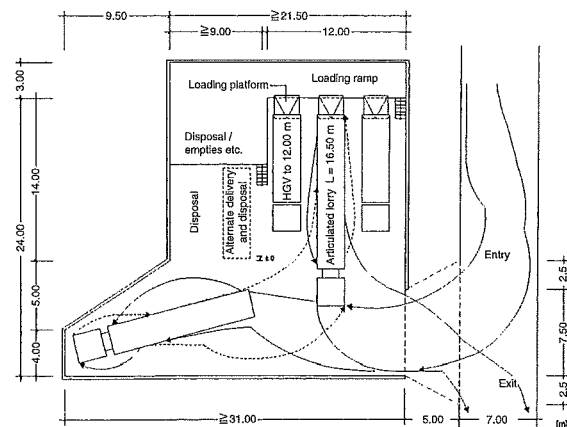


### 10 Dimensions of roofed-over loading dock

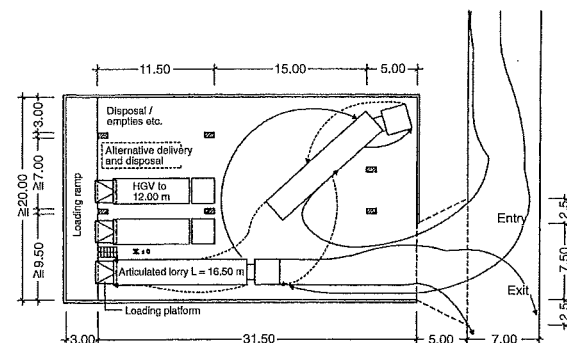
For shops up to approx. 200 m<sup>2</sup>, it is safe to assume smaller delivery vehicles, which can stop in normal car parks. Shops over 200 m<sup>2</sup> should provide a parking area of 3.5 m × 12 m for HGV deliveries. Vehicles should if possible be able to drive in and out forwards.

Average design values for loading yards are given for larger department stores and supermarkets in → 1. Yards which are built over should have a clear height of at least 4.90 m. The width of single-lane straight ramps should be min. 3.50 m, with two-way traffic min. 6.75 m. Ramps should not have a gradient of more than 10%. Changes of gradient of more than 8% should have a transition curve of radius 50 m. At changes of gradient, height supplements must be considered according to the length of the HGVs. Spiral ramps should be designed in accordance with the swept curves of the FGSV.

Safety distance between two trucks with trailers standing next to each other: on ramps min. 1.50 m, at loading hatches min. 3.00 m.



### 7 Open loading yard for a department store (FGSV → refs)



### 8 Roofed-over loading yard, space height min. 4.90 m, under lighting when rubbish containers have to be loaded and unloaded. The swept curves of the expected vehicles should be checked for feasibility. Also consider the location of columns (FGSV → refs)

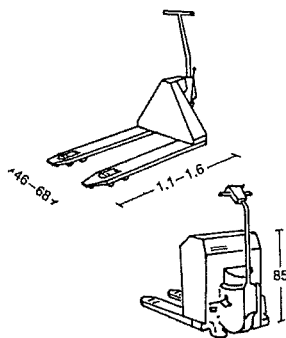
### SUPPLY AND DISPOSAL

Loading yards  
Loading ramps  
Rubbish chute systems  
Rubbish collection rooms  
Emergency power rooms

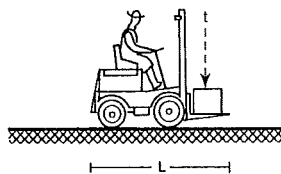
see also: Trucks – parking and turning pp. 387 ff.

### Supply and disposal

LOADING RAMPS, BRIDGES, LIFTING PLATFORMS

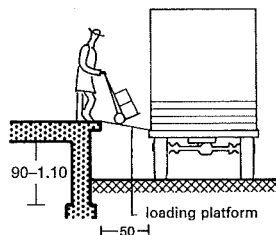


1 Pallet truck

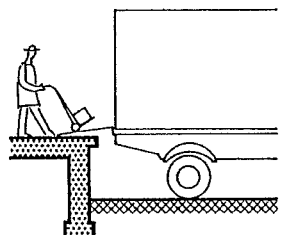


2 Forklift truck: dimensions

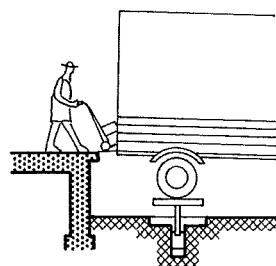
S.W.L. (t)	2.5	3.5	7	13
w (m)	1.0	1.0	1.2	1.5
l (m)	2.4	2.8	3.4	3.6



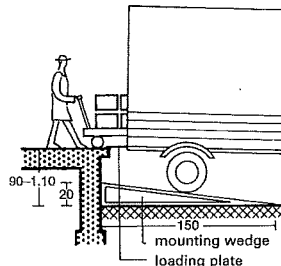
3 Mobile loading bridge, ramp height normally 1.10 m, larger vehicles 1.25 m



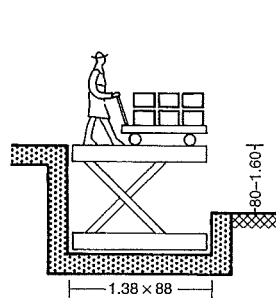
4 Bridging plate, flexible



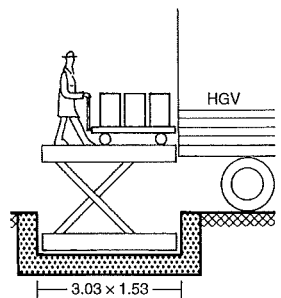
5 Lifting the rear axle



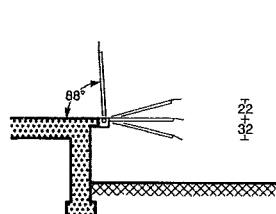
6 Permanent and mobile height adjustment wedges



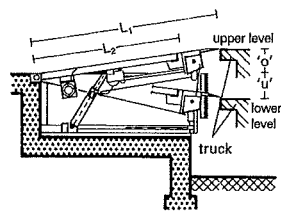
7 Hydraulic scissorlift to overcome level difference ramp/yard



8 HGV loaded using hydraulic scissorlift



9 Slewing loading bridge, adjustable sideways

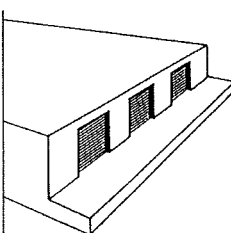


10 Loading bridge

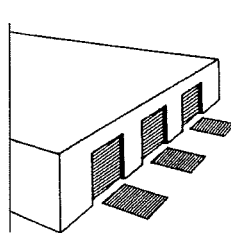
Length (mm)	Width (mm)	Load capacity (kg)
1500	1500	3000
1750	1500	3000
1750	1750	5000

Above (mm)	Below (mm)	Length <sub>1</sub> (mm)	Length <sub>2</sub> (mm)	Width (mm)	Load capacity <sub>kg</sub>
290	300	2300	2000	1500	3000
360	300	2800	2500	1750	4000
430	300	3300	3000	2000	5000

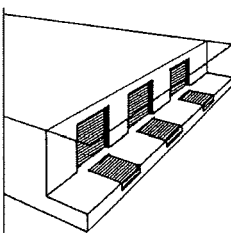
In order to load trucks safely, ramps and vehicles must be safely bridged. Loading bridges should connect to any vehicle or trailer in safety, and the loading surface of the vehicle can be higher or lower than the ramp → 3 – 4. Aluminium lifting wedges are ideal to lift lower vehicles up to ramp height → 6. Lifting wedges can be rolled easily to various locations for use. Slewing loading bridges of light metal can be adjusted sideways → 9 + 9. Mobile loading bridges can be rolled or carried and also used for loading railway wagons → 4. Automatic hydraulic loading bridge with projecting lip → 10. Hydraulic scissorlift platforms can overcome level differences between yard and vehicle → 8 or between yard and ramp → 7. Continuous adaptation to the truck level for loading and unloading → 10. Forklift trucks are available in electric, diesel, petrol or gas versions → 2.



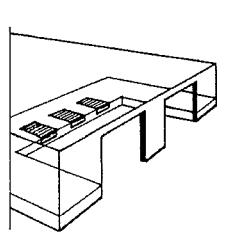
11 Simple ramp → 3 – 6



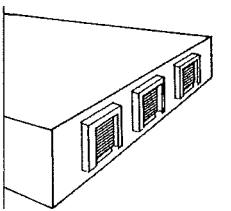
12 Yard level, loading with lifting platforms or loading ramps → 8



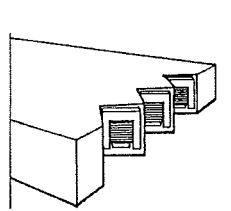
13 Roofed-over ramp with electrohydraulic loading ramps → 10



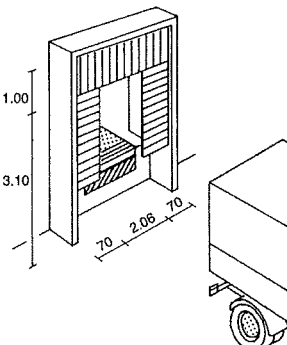
14 Indoor loading with electrohydraulic loading ramps → 10



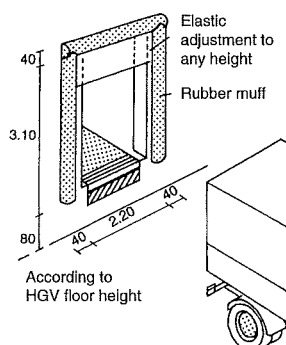
15 Integrated loading ramp and ramp weather protection system



16 Saw-tooth ramps where manoeuvring space is limited



17 Rubber segment gate waterproofing



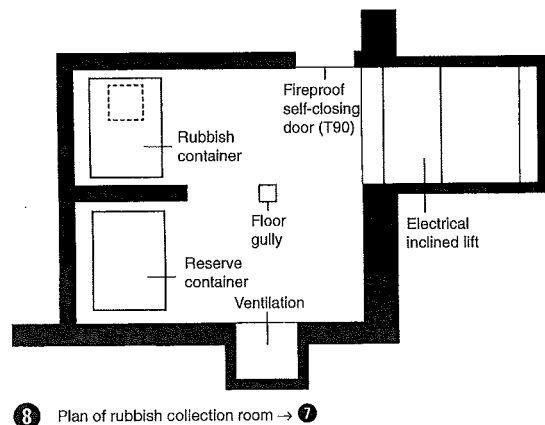
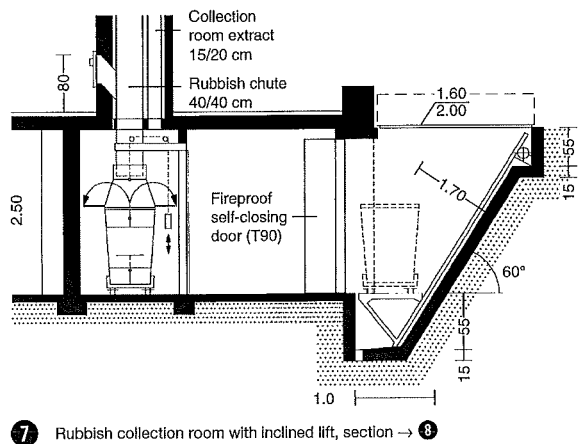
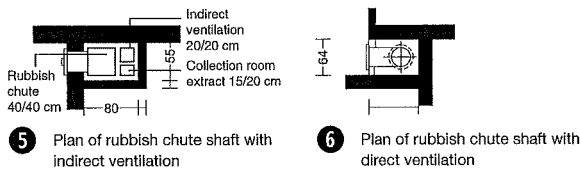
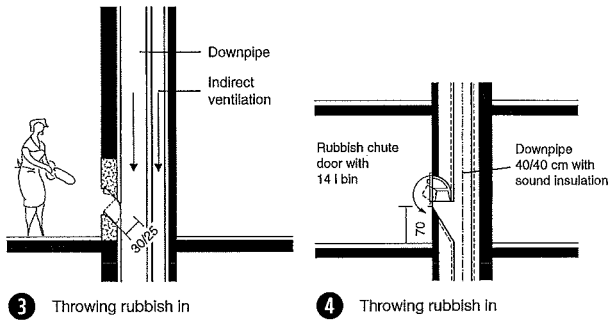
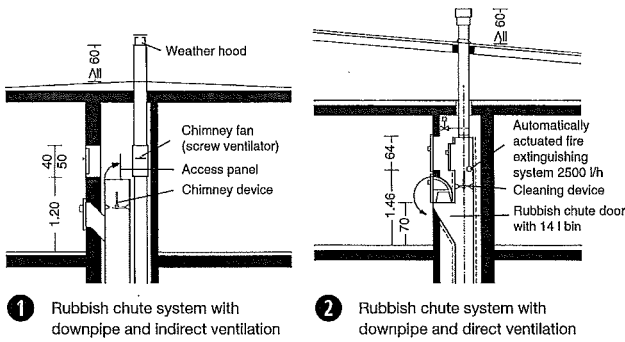
18 Rubber bead gate waterproofing

SUPPLY AND DISPOSAL  
Loading yards  
Loading ramps  
Rubbish chute systems  
Rubbish collection rooms  
Emergency power rooms

see also:  
Trucks – parking and turning pp. 387 ff.

Supply and disposal

## RUBBISH CHUTE SYSTEMS



Rubbish chute systems can be provided in multi-storey buildings to simplify the transport of waste from upper floors to waste collection bins. They were very popular for a time (particularly in high-rise flats) and were even a requirement for buildings of more than five storeys, but because of the maintenance costs and increased construction requirements (rubbish separation, fire protection) they are now provided only in special buildings.

**The design is normally undertaken by a specialist firm, and an appropriate maintenance contract should be agreed with them.**

Rubbish chutes can easily spread fire from one storey to another and therefore represent a **considerable fire hazard**. They are therefore forbidden in some (more recent) state building regulations, or are associated with appropriate construction requirements.

### Construction

Rubbish chute systems consist of the following elements: the drop chute with the rubbish intake location, the rubbish collection room with holding bins, rubbish presses, etc. and the ventilation system.

Type of rubbish	Chute diameter (cm)		Fire protection
	Rubbish	Ventilation	
loose domestic waste	40	25	fire-resistant
rubbish in sacks 110 l	50	30	
paper (office waste)	55	30	
laundry (one-family house)	30	15	
laundry (hotels, hospitals)	40-50	25-30	

9 Chute dimensions for rubbish chute systems (guideline values)

### Details

Rubbish chute systems must have **separate intake doors** for the various categories of rubbish. These must be away from occupied rooms.

Rubbish chutes and collection rooms must be constructed of **fire-resistant materials**. Cladding, insulation materials, internal wall skins and all equipment near the shaft and collection room must also consist of **non-flammable materials**. The installation of a **fire extinguishing system** may be required → 2.

The **drop shafts** of rubbish chute systems must fall from the uppermost rubbish intake location vertically and with no changes of cross-section. Constantly effective **ventilation** → 1 - 2 must be ensured. Rubbish chutes must be constructed so that fire, smoke, odour and dust cannot get into the building, waste is transported safely and the transmission of noise is prevented. The intake doors → 3 - 4 must be constructed so that no dust nuisance occurs and no oversize waste can be inserted. There should be a cleaning opening at the top of rubbish chutes. All openings must be fitted with doors made of non-flammable materials.

**Rubbish collection rooms** → 7 - 8 must be of adequate size. Their internal access must be through fire-resistant and self-closing doors. Collection rooms must be accessible from the open air for disposal and should have constant ventilation and a floor gully with odour trap. The waste should be collected in wheeled bins.

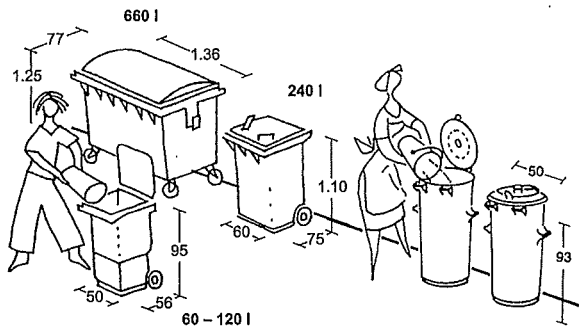
### SUPPLY AND DISPOSAL

Loading yards  
Loading ramps  
**Rubbish chute systems**  
Rubbish collection rooms  
Emergency power rooms

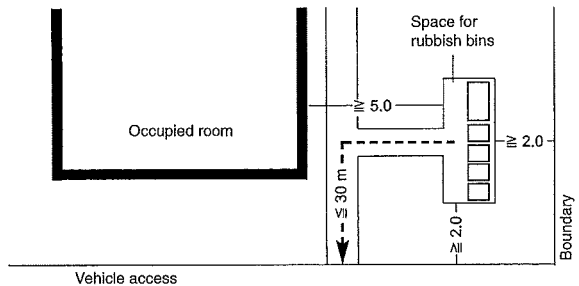
LBO

Supply and disposal

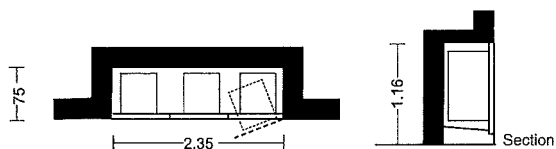
# RUBBISH COLLECTION ROOMS



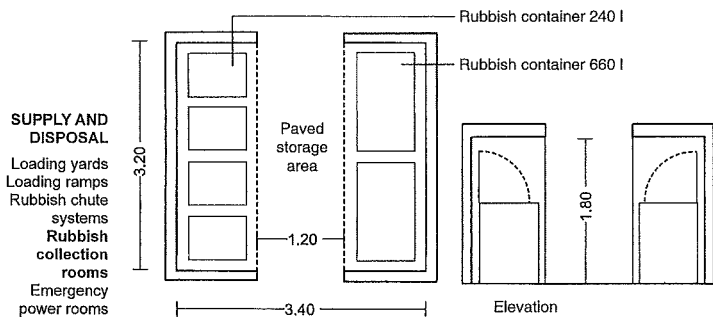
1 Rubbish bins (selection)



2 Layout of storage space for rubbish bins (according to building regulations in Berlin)

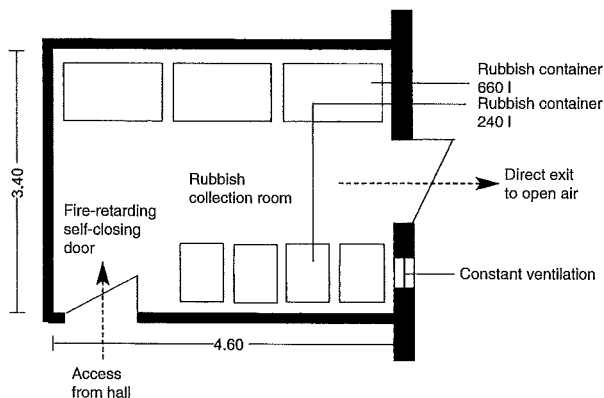


3 Built-in rubbish box for 360 l of domestic rubbish (diagram)



4 Paved and roofed storage for 1680 l of domestic rubbish (diagram)

## Agriculture



5 Rubbish collection room for 2940 l of domestic rubbish (diagram) inside a building of class 3-5

**Waste** must be collected separately in suitable containers and be disposed of appropriately. This objective can be achieved by the provision of rubbish collection rooms, which are easily and safely accessible for the waste disposal provider either within the building or in corresponding areas outside the building, for the temporary storage of waste materials. Either option should be equipped with tightly closed rubbish bins in different sizes for the various categories of waste → 1.

On account of the high fire load of solid rubbish (and the associated odour nuisance), the **model building regulations** include the following provisions:

Solid waste can be temporarily stored **inside** the building. Waste can be stored temporarily inside buildings with more than two flats or a usable area of 400 m<sup>2</sup> (building classes 3-5) only if the **rubbish collection room** complies with the following requirements:

1. The partition walls and ceilings are constructed as room-forming elements according to building regulations with the fire-resistance of load-bearing walls.
2. Openings from the inside of the building into the collection room should have fire-retarding, self-closing closures.
3. The rubbish collection rooms can be emptied directly from the open air.
4. Constantly effective ventilation is provided.

production of domestic rubbish (kg/resident/day)	approx. 0.5
suitable for recycling (%)	approx. 74

6 Production of domestic rubbish (guideline values)

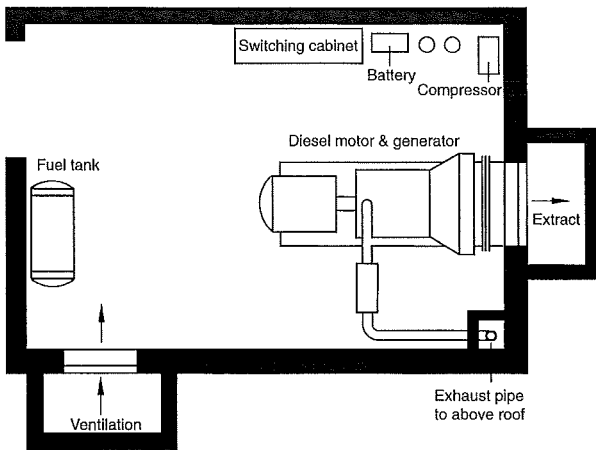
Some **state building regulations** include further provisions regarding the storage of solid waste **outside** the building. Storage spaces for rubbish bins should be at least **5 m** from openings into occupied rooms and flammable building elements, and at least **2 m** from property boundaries. Areas for mobile rubbish bins are to be paved. The distance from accessible roads should not exceed **30 m** → 2. It is also important that areas for rubbish bins outside buildings can be reached easily in bad weather; they may require lighting and roofing.

## Commercial refuse

Collection rooms for the disposal of commercial refuse should be at ground level and near the delivery area. Their size varies according to the size of the business; it would be about **90-200 m<sup>2</sup>**. If skips are used and collected by truck, a clear ceiling height (under sprinklers or lights) of at least **4.80-4.90 m** should be provided.

If the quantity of waste is large, then the use of waste crushers or waste presses is worth considering. Offices and administration buildings will also need a paper shredder. Collection rooms for foodstuff waste (wet rubbish) must be cooled. In large buildings, rubbish collection rooms should be provided on the floors (near the lift) if possible, to avoid the lift lobby being used as a waste collection centre.

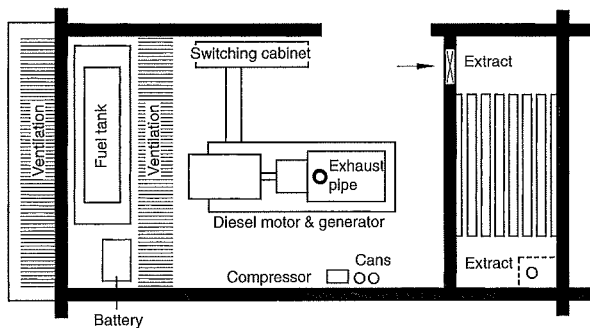
## EMERGENCY POWER ROOMS



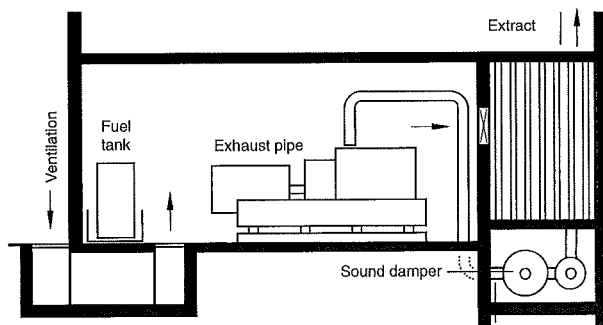
1 Room for diesel emergency generator set with separate air supply and extraction

Generator capacity (kVa)	20–60	100–200	250–500	650–1500
Room size (m)	5.0–4.0	6.0–4.5	7.5–5.0	10.5–5.5
Room height (m)	3.0	3.5	4.0	4.0
Door width (m)	2.0–1.5	2.0–1.5	2.2–2.0	2.2–2.0

2 Dimensions of emergency generator rooms



3 Room for diesel emergency power generator with separate air supply and extraction



4 Section → 3

### Emergency power supply systems (diesel generator sets)

Emergency power units are combustion motors (usually diesel) which are coupled to generators to produce electricity. They are used for a limited time in case of a power cut (and are thus not for constant power supply) and supply emergency and safety lighting, lifts and other critical usages (e.g. in operating theatres in hospitals, server rooms and industrial processes etc.). They consist of a diesel motor and a generator mounted on a base frame (e.g. steel) on a foundation with elastic supports between machine set and frame, and a starter and battery → 1.

There are mobile (container generator sets) and permanently installed diesel generator sets including switching gear. The performance range is between 5 and 2000 kVA (kilovolt amp) according to specification.

The design starts with the determination of:

- motor power
- sound insulation
- exhaust system

### Emergency power rooms

The required dimensions, height and openings of the room for a generator set vary according to the power and configuration of the motor → 2. Air supply and extraction can be through forced ventilation (shaft) → 1. It is also possible to run the extract air together with the exhaust of the diesel motor up a vertical shaft to exit above the roof → 3 – 4. In this case, sufficient sound insulation should be provided with a silencer in the ductwork → 3 – 4. The manufacturers of the motors give information about the required quantity of air and thus the size of the supply and extract ducts.

On account of the high noise level involved in running a generator set for testing and maintenance, it is recommended not to place it near inhabited rooms which should be particularly quiet (e.g. the care rooms of a hospital). Measures should also be undertaken to keep the noise level as low as possible. Another measure is to position the frame, on which the generator and motor are mounted, on spring dampers to reduce the sound transmission into the structure.

### Uninterruptible power supply (UPS) systems

There is normally a gap of at most 15 seconds between the power cut and the switching to emergency power. UPS systems are used to continue power supply without interruption during this time. Static UPS systems are bridging battery power devices, whose batteries are constantly charged from the mains.

According to equipment and requirements, a UPS system should be able to protect the connected consumer from the following risks: power cuts, voltage fluctuations, voltage peaks, low voltage, excessive voltage, lightning effects/switching peaks, interference voltage and frequency fluctuations.

While UPS systems are designed to cope with a power cut of at most 30–60 minutes, diesel-powered emergency generators can supply power during much longer interruptions.

### SUPPLY AND DISPOSAL

Loading yards  
Loading ramps  
Rubbish chute systems  
Rubbish collection rooms  
Emergency power rooms

### Supply and disposal