Assessment of the occupational risks in the workplace (multiplicative method):

Appendix 2 - Biological risk

Foreword	This English version is translated from the original French reference version.

Contents

1 ASSESSMENT OF THE BIOLOGICAL RISK

Biological agents are microorganisms, including genetically modified microorganisms, cell cultures and human endoparasites likely to cause infection, allergy or intoxication.

1.1 Severity rating G

EU directive 2000/54/EC classifies biological agents in four groups, based on the effects on workers, the prophylaxis type and the existing treatment against infection.

In addition to the agents stated above, this part is also used to assess the biological risks to local fauna (examples: stings or bites of wasps, dogs, snakes, scorpions etc.).

Rating G	Biological agents	Biological hazards
40	Group 4	Biological agents that cause serious diseases in humans and constitute a serious hazard for workers; the risk of propagation in the community is high; there is generally no prophylaxis or effective treatment. E.g. Ebola, avian flu…
15	Group 3	Biological agents that can cause a serious disease in humans and constitute a serious hazard for workers; the risk of propagation in the community is existent, but there is generally a prophylaxis or effective treatment. E.g. HIV, hepatitis B, C, E virus, malaria, chikungunya, dengue, salmonella (typhoid fever), yellow fever, rabies, tuberculosis, influenza (H1N1) etc.
	-	Animals with potentially lethal venomous bites or stings (cobra, some species of scorpion or jellyfish...).
7	Group 2	Biological agents that can cause a disease in humans and constitute a hazard for workers; their propagation in the community is unlikely, but there is generally a prophylaxis or effective treatment. E.g. legionella, diphtheria, tetanus, hepatitis A, zika virus, measles, cholera, seasonal flu, herpes, scabies, turista, salmonella, listeria, biotoxins (molds), common illnesses: mycosis…
	-	Animals with bites/stings that trigger an allergic reaction (wasps, bees, caterpillars, centipedes, bedbugs) or an infection (dogs[1], monitors etc.).
1	Group 1	Biological agents not likely to cause disease in humans. E.g. baker's yeast

Table 1: Severity matrix.

The method of transmission of infectious agents varies:

- Transmission by inhalation: Legionella pneumophila etc.;
- Faecal-oral transmission, through food, drink, dirty objects or lack of hygiene (dirty hands, biting nails, smoking): hepatitis A, turista (diarrhea caused by various microbes including class 2 colibacillus);
- Transmission by stings/bites of mosquitos, flies, etc.: malaria, arboviruses (chikungunya, dengue, yellow fever, zika),
- Transmission by blood: hepatitis B/C, HIV

[1] Injury connected with a bite is an accident risk. The risk of infection or rabies is assessed here.

Examples of biological sources of hazard	Possible vectors
Agricultural installations, contact with animals	Dust, animal excretions
Sanitary assistance work	Blood, saliva, biological fluids
Work in waste disposal units (public hygiene, toilet cleaning etc.)	Contacts with contaminated waste
Work in residual water purification plants	Contact with contaminated residual water, inhalation (aerosol)
Maintenance of ventilation and air-conditioning systems	Inhalation (aerosol and dust)
Work in kitchens	Contact with contaminated waste
Work in refrigeration towers	Inhalation (aerosol and dust)
Maintenance work (unblocking sanitation pipes, etc.)	Contact with contaminated residual water
Work in endemic zones	Mosquitos, contaminated water, air, etc.
Presence in an area where clean-up work is being performed (vacuum pumping, high-pressure spray cleaning)	Inhalation of (aerosols and dust), contact with contaminated residual water

Table 2: Examples of biological sources of hazard.

Potential sources of legionella	
Installations with a high probability of legionella proliferation and dispersal	Refrigeration towers and refrigerant condensers
	Sanitary hot water systems with accumulator and return circuit or presence of dead legs
	Conditioned water systems with constant agitation and recycling through high-speed jets or air injection
Installations with a low probability of legionella proliferation and dispersal	Internal installation systems of cold water for human consumption (pipes, tanks) fixed and mobile tanks and sanitary hot water without return circuit
	Water-spraying refrigerant cooling equipment
	Water atomization systems
	Irrigation system by spraying
	Water systems to fight fires
	Refrigeration elements by production of aerosols in the open air

Table 3: Examples of sources of legionella.

1.2 Potential exposure probability rating P

The databases listing accidents/incidents and the associated medical care or other event on site constitute a useful source for this assessment (infectious diseases connected with the source, abnormal biological measurements, etc.).

Rating P	Probability of potential exposure to biological sources that can have effects
10	**Activities with a very probable source of biological contamination:** - Sanitary hot water systems with accumulator and return circuit and/or presence of dead legs - Aero-refrigerant towers - Conditioned water systems with constant agitation and recycling through high-speed jets or air injection - Maintenance work (unblocking sanitation pipes, etc.) - Work in residual / sanitary water purification plants
6	**Work in areas where running water is not drinkable**. **Work in the bush and in areas that are highly contaminated** by microorganisms carried by mosquitoes, etc.
3	**Work beyond the bush in areas contaminated** by microorganisms carried by mosquitoes, etc. **Activities with a certain source of biological contamination:** - Work in the kitchens: contact with contaminated waste, contaminated food (take account of bacteriological checks) - Internal installation systems of cold water for human consumption (pipes, tanks) fixed and mobile tanks and sanitary hot water without return circuit - Maintenance of ventilation and air-conditioning systems - Cleaning of sanitary systems (toilets) - Sanitary assistance work (contact with patients, handling of samples). **Work in areas that are contaminated to a low degree** by microorganisms carried by mosquitoes, etc.
1	
0.5	
0.2	**Activities without a possible source of biological contamination.**

Table 4: Matrix - Potential exposure probability P.

1.3 Residual potential exposure probability rating P'

Reduction of P	Means/measures of prevention/protection
-1	**At least two procedural or organizational measures from:** - Hygiene instructions (regularly washing hands, cleaning and disinfecting contaminated surfaces, smoking, eating and drinking ban in high-risk areas, protecting wounds, food instructions, ventilating spaces), signage (marking out the area), instructions in case of incidents (sting, cut, bite), preventive medical consultation OR - Use of specific PPE (FPP3-type respirators, gloves and protective bodywear). For malaria: Air-conditioning, mosquito net, repellents, full light-coloured clothing protecting the whole body, preventive chemo-prophylaxis For the legionella risk: intermittent bacterial treatment and monitoring of water treatment at least every three months, thermal treatment of sanitary water once a year. For meningitis, plague etc.: specific hygiene rules to be followed (space between people etc.).
-2	- Use of high-quality PPE (FPP3 masks for activities of short duration or powered air purifying masks for activities of long duration), sealed combination, eye protection, hand protection (gloves with biological resistance etc.) + operating modes in place - Technical measures for the reduction in the emission of aerosols in certain activities: high-pressure cleaning, aero-refrigerant towers (presence of drop screen etc.). - Preventive vaccination.
-3	- Closing of the area and removal of workers from the area - Complete isolation of the operator For the legionella risk: good design and appropriate management of equipment (filtering of exhaled air, absence of dead legs, sufficiently high speed of water circulation etc.), continual bacterial treatment systems and regular monitoring of water treatment at least every month, thermal treatment of sanitary water at least three times a year.

Table 5: Matrix - Reduction in potential exposure probability P.

2 TERMS AND DEFINITIONS

Mp type	Prophylaxis
Means/measures of prevention/protection type These are defined in paragraph 3.9 "Calculation of residual risk R'".	Set of measures to prevent the appearance or propagation of one or more diseases.