c) instructions on repair and correction of faults;

d) specification of the spare-parts to be used, when these affect the health and safety of operators (for instance products in scope of Directive 2014/34/EU, ducting for RPD connection), as well as their installation procedure;

e) safety measures to be taken in case of introduction of any kind of ignition sources into the spray booth (e.g. grinder, welding equipment);

f) material (e.g. filter) and tools recommended by the manufacturer;

g) required PPE (e.g. RPD when working in polluted atmosphere);

h) the procedure to be followed to safely unblock the machinery for blockages likely to occur;

i) cleaning intervals and cleaning procedures (i.e. dampers, scrubber systems, walls);

j) cleaning equipment (e.g. explosion protected vacuum cleaner with air exhaust outside of the building or with filter media adapted to powder in use);

k) cleaning and disinfection measures to prevent the release of aerosols containing microorganisms.

l) description of fixed guards which may be removed by the user for maintenance and cleaning purposes.

6.3 Marking

The machinery shall be marked with the following information:

a) business name and full address of the manufacturer and, where applicable his authorized representative;

b) designation of the machinery;

c) designation of series or type of the spray booth (see 3.1.1);

d) year of construction, that is the year in which the manufacturing process is completed;

e) serial number (if any);

f) intended use of the spray booth:

   1) type of coating material (e.g ignitable liquid, non-ignitable liquid, powder);

   2) type of operation (e.g. automatic, manual, automatic and manual);

g) power installed:

   1) electrical (kW);

   2) other;

h) maximum size of workpieces;

i) minimum size of workpieces if required that the workpiece covers at least 40 % of the air flow measurement plane;

j) required minimum exhaust flow rate at 20°C (m^3/h);

k) for spray booths for liquid coating material (see Annex C.2):

   1) maximum input of solvents (g/h);

   2) LEL of solvent or coating material (if unknown 40 g/m^3);

l) for spray booths for powder coating material (see Annex C.3):

   1) maximum input of coating powder (g/h);

   2) LEL of coating powder material (if unknown 20 g/m^3);

m) marking according to EN 12198-1:2000+A1:2008 referring to hazards generated by radiation, if applicable.

Annex A
(informative)

Hazards

Table A.1 lists all significant hazards related to spray booths.

Table A.1 — List of significant hazards

Origin	Potential consequences	Specific requirements of this standard
A.1 Mechanical		
a) Approach of a moving element to a fixed part (conveyor system, manipulator, doors, fans).	• crushing; • drawing-in or trapping; • impact; • shearing; • entanglement.	4.2.1 4.10 4.11
b) Falling objects (workpieces) e.g. from overhead-conveyors.	• crushing; • drawing-in or trapping; • impact; • shearing; • entanglement.	4.2.2 4.11
c) Height from the ground (elevated working areas, elevated maintenance areas, working pits).	• impact; • falling.	4.2.3
d) Moving elements (doors, conveyor).	• drawing-in or trapping; • impact; • shearing; • entanglement.	4.2.1 4.10 4.11 4.12
e) Rotating elements (fans, pumps, conveyors).	• cutting; • drawing-in or trapping; • impact; • shearing.	4.2.1 4.10
f) Slippery surface (working area floor).	• slipping; • tripping; • falling.	4.2.4

Origin	Potential consequences	Specific requirements of this standard
A.2 Electrical		
a) Electrical equipment (lights, distribution fuse-board, drying systems, electro-valves, etc.).	• burn; • electrocution; • fire; • explosion; • shock.	4.3 4.8 4.9
b) Charging of conducting elements (e.g. gratings, workpiece holding frame).	• consequences of electrostatic discharge (e.g. falling); • fire; • explosion.	4.3
c) Electrostatic phenomena.	• burn; • electrocution; • fire; • explosion; • shock.	4.3 4.10
d) Not enough distance to live parts (electrostatic application systems).	• burn; • electrocution; • falling, being thrown; • fire; • explosion; • shock.	4.3 4.10
A.3 Thermal		
a) Flame (direct heating system).	• burn; • fire; • explosion.	4.4
b) Radiation from heat sources (drying system, heating system).	• burn; • fire; • explosion.	4.4
c) Hot surfaces (motors, heating systems).	• burn; • fire; • explosion.	4.4

Origin	Potential consequences	Specific requirements of this standard
A.4 Noise		
a) Forced ventilation system; b) Leakage of pressurized gas; c) Spraying machinery; d) Unbalanced rotating parts; e) Whistling pneumatics; f) Scrubber system.	• discomfort; • stress; • tinnitus; • tiredness; • decrease of hearing capacity; • any other (for example, mechanical, electrical) as a consequence of an interference with speech communication or with acoustic signals.	4.5
A.5 Radiation		
a) Optical radiation (infrared, visible and ultraviolet).	• burn; • damage to eyes and skin.	4.6 4.10
A.6 Material		
a) Aerosol (atomized paint); b) Dust (coating powder); c) Fluid (solvent, liquid paint); d) Vapour (formed by solvent); e) Gas (combustion products).	• breathing difficulties; • suffocation; • carcinogenic, mutagenic or reprotoxic effects; • poisoning; • respiratory or cutaneous sensitization; • asthma.	4.7 4.10
f) Flammable (paint, coating powder, combustion media).	• explosion; • fire.	4.8 4.9 4.10
g) Biological and microbiological (viral or bacterial) agent; (air conditioning system, scrubber system).	• asthma; • infection; • respiratory or cutaneous sensitization.	4.7
h) Fibre (filters, insulation).	• breathing difficulties; • cancer; • irritation.	4.7

Origin	Potential consequences	Specific requirements of this standard
A.7 Ergonomics		
a) Access; b) Design or location of indicators and visual displays units; c) Design, location or identification of control devices; d) Effort; e) Insufficient lighting (flicker, dazzling, shadow); f) Posture; g) Repetitive activity; h) Visibility; i) Air flow.	• discomfort; • fatigue; • musculoskeletal disorder; • stress; • any other (for example, mechanical, electrical) as a consequence of a human error.	4.12
A.8 Hazards associated with the environment in which the machinery is used		
a) Dust (from other processes).	• insufficient supply air resulting in exposure to hazardous substances.	6.2.2
b) Gas (from other processes or recirculated from spray booth exhaust).	• breathing difficulties; • suffocation; • poisoning; • respiratory or cutaneous sensitization; • asthma.	4.7.1
c) Moisture.	• discomfort.	4.12
d) Temperature.	• discomfort.	4.12
e) Wind.	• malfunction of exhaust system resulting in exposure to hazardous substances; • recirculation of exhaust air resulting in exposure to hazardous substances.	4.7.1
A.9 Combination of hazards		
a) Mechanical obstacles and emergency situation (e.g. fire); b) Missing means of escape and emergency situation (e.g. fire).	• trapping; • any other (for example, fire) as a consequence of missing possibility to escape.	4.11 4.13

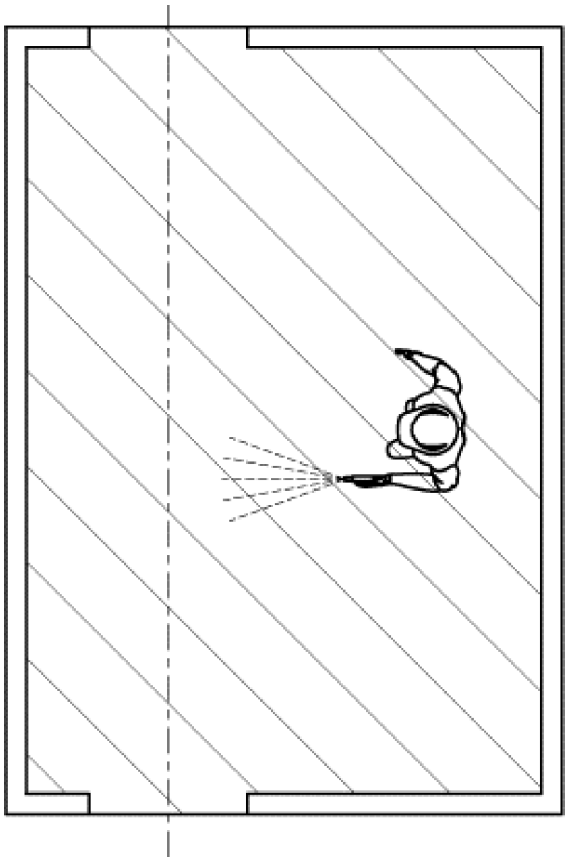
Annex B
(informative)

Examples of classification of hazardous zones

B.1 Example 1

Figures B.1 and B.2 show the hazardous zones for a manual spray booth for liquid coating material with

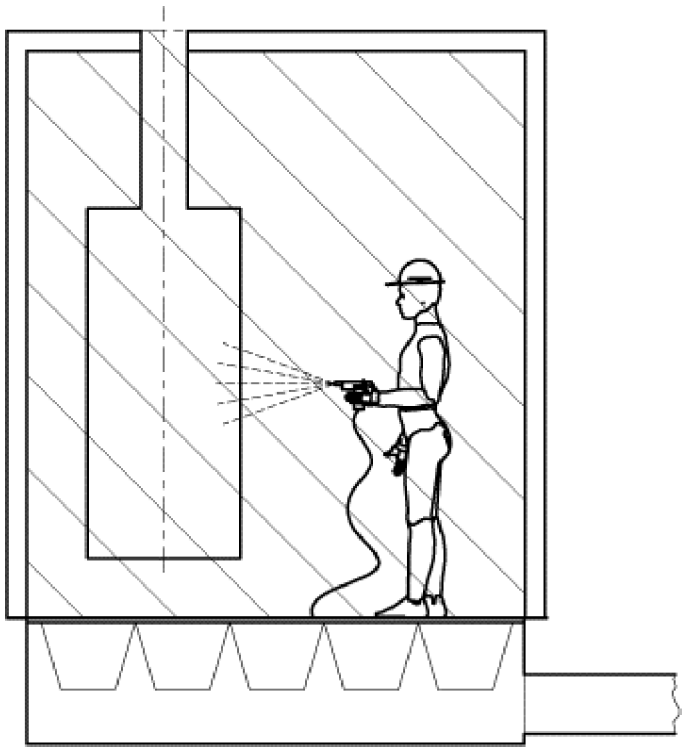
- $C_{LEL\ Liquid}$ < 25 % in the internal volume of spray booth;
- $C_{LEL\ Liquid}$ < 10 % in the internal volume of exhaust air cleaning system.



Key

zone 2

Figure B.1 — Manual spray booth for liquid coating material (top view)



Key

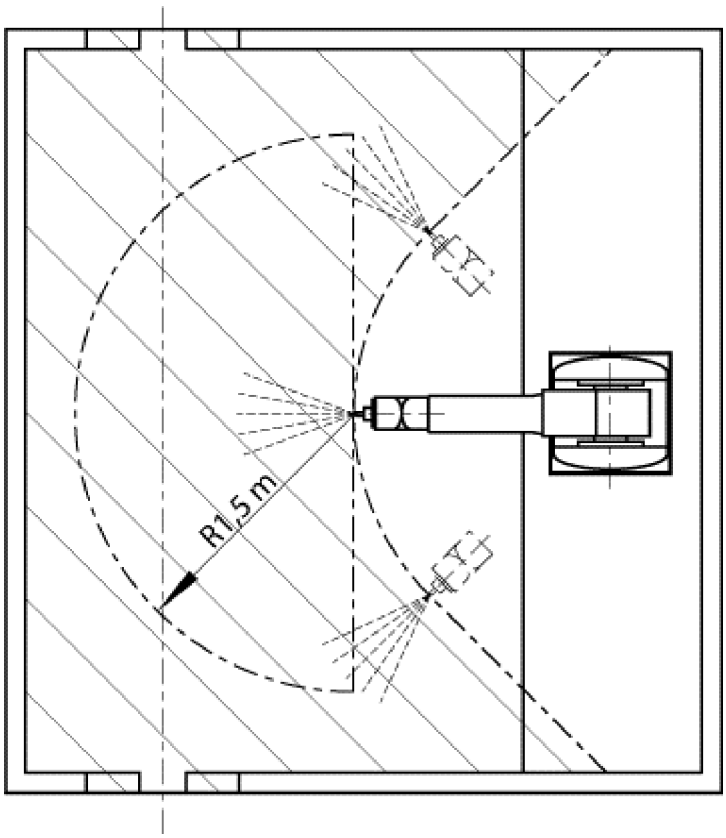
zone 2

Figure B.2 — Manual spray booth for liquid coating material (side view)

B.2 Example 2

Figures B.3 and B.4 show the hazardous zones for an automatic spray booth for liquid coating material with

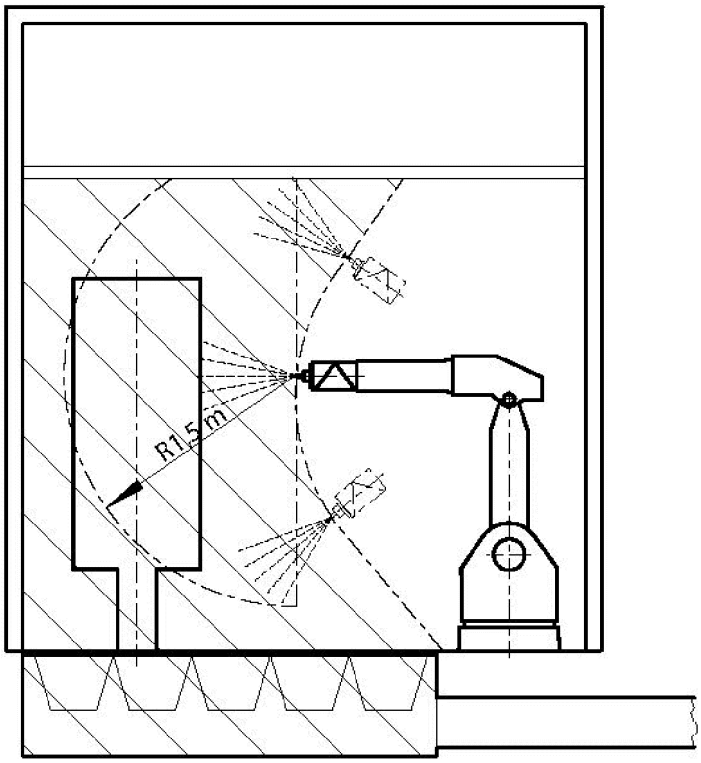
- $C_{LEL\ Liquid}$ < 25 % in the internal volume of spray booth;
- sections of the internal volume which cannot be reached by the robot;
- $C_{LEL\ Liquid}$ > 10 % and < 25 % in the internal volume of exhaust air cleaning system.



Key

zone 2

Figure B.3 — Automatic spray booth for liquid coating material operated at $C_{LEL\ Liquid}$ < 25 % (top view)



Key

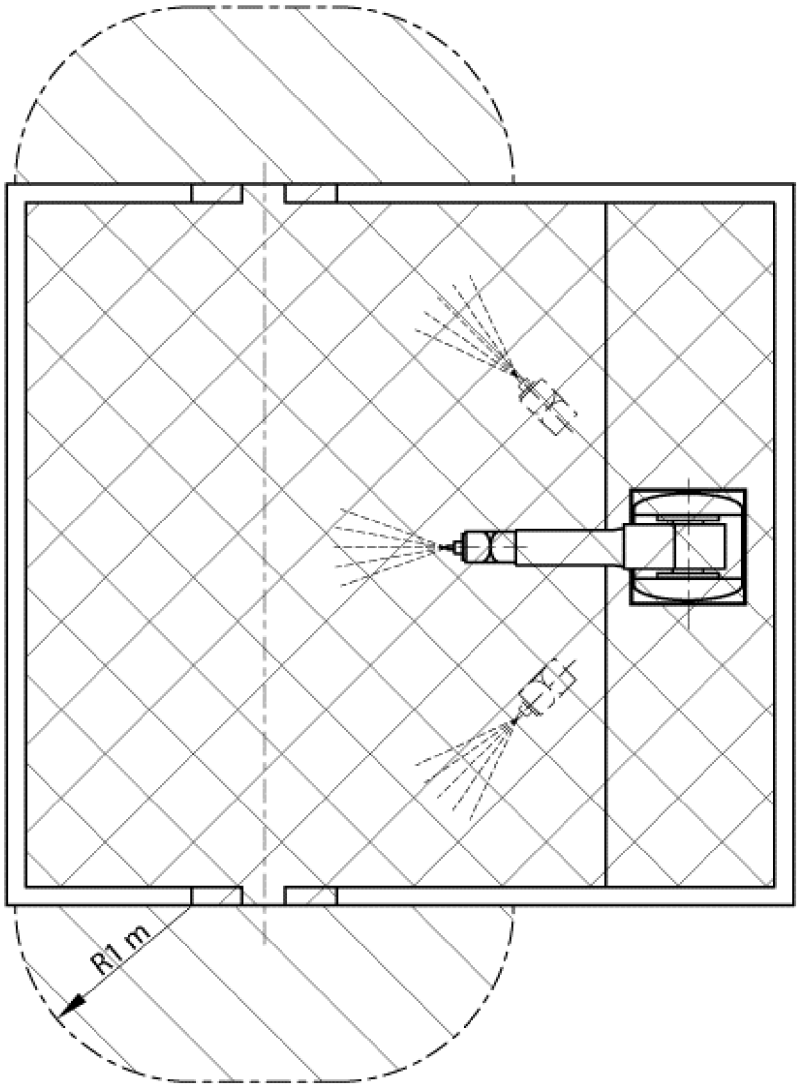
zone 2

Figure B.4 — Automatic spray booth for liquid coating material operated at $C_{LEL\ Liquid}$ < 25 % (side view)

B.3 Example 3

Figures B.5 and B.6 show the hazardous zones for an automatic spray booth for liquid coating material with

- 25 % < $C_{LEL\ Liquid}$ < 50 % in the internal volume of spray booth;
- 25 % < $C_{LEL\ Liquid}$ < 50 % in the internal volume of the exhaust air cleaning system;
- 25 % < $C_{LEL\ Liquid}$ < 50 % in the internal volume of the exhaust air ducting and recirculation air ducting.



Key

zone 1

zone 2

Figure B.5 — Automatic spray booth for liquid coating material operated at 25 % < $C_{LEL\ Liquid}$ < 50 % (top view)