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Food processing machinery — Smokehouses — Safety and hygiene requirements

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee MCE/3/5, Food industry machines.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Foreword

This document (EN 15861:2012) has been prepared by Technical Committee CEN/TC 153 “Machinery intended for use with foodstuffs and feed”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2012, and conflicting national standards shall be withdrawn at the latest by December 2012.

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For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This document is a type C standard as stated in EN ISO 12100:2010.

This European Standard is concerned with types of machinery referred to as “smokehouses”. The extent to which hazards, hazardous situations and events are covered is indicated in the scope of this document.

When provisions of this type C standard differ from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards.

1 Scope

1.1 Requirements

This European Standard specifies safety and hygiene requirements for the design and manufacture of smokehouses for commercial use.

The machines covered by this standard are used for the smoking of foodstuffs, especially meat, fish or similar products, as well as the connected heating and cooling processes.

Smokehouses consist of the following elements:

— Smoke chamber with equipment;

— Air handling system;

— Smoke generator;

— Pipes and ducts;

— Cleaning systems.

This European Standard deals with all significant hazards, hazardous situations and events and hygiene requirements relevant to smokehouses when they are used as intended and under reasonably foreseeable conditions of misuse.

This European Standard deals with the hazards which can arise during the whole life of smokehouses.

This document is not applicable to smokehouses which are manufactured before the date of publication of this document by CEN.

1.2 Types

This European Standard covers the following types of smokehouses and installations:

— Smokehouses with friction smoke generator;

— Smokehouses with steam smoke generator;

— Smokehouses with liquid smoke generator;

— Smokehouses with saw dust and wood chip smoke generators;

— Smokehouses with one or several smoke chambers for batch production;

— Smokehouses for continous production.

This European Standard does not cover automatic production.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 349:1993+A1:2008, *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body*

EN 614-1:2006+A1:2009, *Safety of machinery — Ergonomic design principles — Part 1: Terminology and general principles*

EN 953:1997+A1:2009*, Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*

EN 1005-1:2001+A1:2008, *Safety of machinery — Human physical performance — Part 1: Terms and definitions*

EN 1005-3:2002+A1:2008, *Safety of machinery — Human physical performance — Part 3: Recommended force limits for machinery operation*

EN 1088:1995+A2:2008, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection*

EN 1672-2:2005+A1:2009, *Food processing machinery — Basic concepts — Part 2: Hygiene requirements*

EN 1839:2003, *Determination of explosion limits of gases and vapours*

EN 60204-1:2006, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:2005, modified)*

EN 60529:1991, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989)*

EN ISO 3744:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane (ISO 3744:2010)*

EN ISO 4413:2010, *Hydraulic fluid power — General rules and safety requirements for systems and their components (ISO 4413:2010)*

EN ISO 4414:2010, *Pneumatic fluid power — General rules and safety requirements for systems and their components (ISO 4414:2010)*

EN ISO 4871:2009, *Acoustics — Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996)*

EN ISO 11201:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections (ISO 11201:2010)*

EN ISO 11688-1:2009, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part 1: Planning (ISO/TR 11688-1:1995)*

EN ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction (ISO 12100:2010)*

EN ISO 13732-1:2008, *Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 1: Hot surfaces (ISO 13732-1:2006)*

EN ISO 13849-1:2008, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-1:2006)*

EN ISO 13850:2008, *Safety of machinery — Emergency stop — Principles for design (ISO 13850:2006)*

EN ISO 13857:2008, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2008)*

3 Terms and Definitions

For the purpose of this document the terms and definitions given in EN ISO 12100:2010 and the following apply.

3.1
smoke generator
machinery part of a smokehouse, for generating the smoke

3.2
smouldering air
amount of air which will be fed to the smouldering place

3.3
smouldering place
place of smouldering in the smoke generator

3.4
smoke generation
production of fresh smoke from smoke materials

3.5
smoke chamber/processing room
part of the smokehouse, in which the product to be smoked is placed, and smoke will be applied

3.6
smoke
mixture from air and gaseous, vaporous, liquid and solid products of decomposition, developing from the pyrolysis of smoke materials

3.7
cycled smoke generation
smoke generation that, during an unchanged smoke program (smoke processing time), is switched on and off in intervals

3.8
smokehouse with open system
smokehouse without recirculation of the smoke to and from the smoke generator

3.9
smokehouse with re-circulated system
smokehouses with re-circulated smoke that travels from the smoke generator to the smoke chamber and is then re-circulated via the smoke generator

Note 1 to entry: The re-circulated smoke will then be used either
- exclusively as a smouldering volume for generating fresh smoke; or
- only for transportation of the high concentrated smoke from the smouldering place, which means that the re-circulated smoke is not involved in the smoke generating process; or
- as partial volume (part of the smouldering volume) for the generation of smoke.

3.10
explosive mixture
mixture of combustible gases, steam, fogs, vapours or dusts in which a burning process after ignition transmits to the total un-burnt mixture

3.11
explosive atmosphere
mixture of combustible gases, steam, fogs, vapours or dusts under atmosphere conditions, in which a burning process after ignition transmits to the total un-burnt mixture

Note 1 to entry: As atmospheric conditions apply total pressures from 0.8 bar to 1.1 bar and mixture temperatures from - 20 °C to + 60 °C.

Note 2 to entry: "Transmission to the total un-burnt mixture" has to be understood in the way of an independent propagation of the reaction.

3.12
dangerous explosive atmosphere
explosive atmosphere, which exists in such a quantity (hazardous quantity), that special measures are necessary for the maintenance of the protection of safety and health of the operators or third parties

3.13
explosion
sudden oxidation reaction with increase of the temperature, or the pressure or both of these at the same time

3.14
product carrier
device to accommodate or store the product

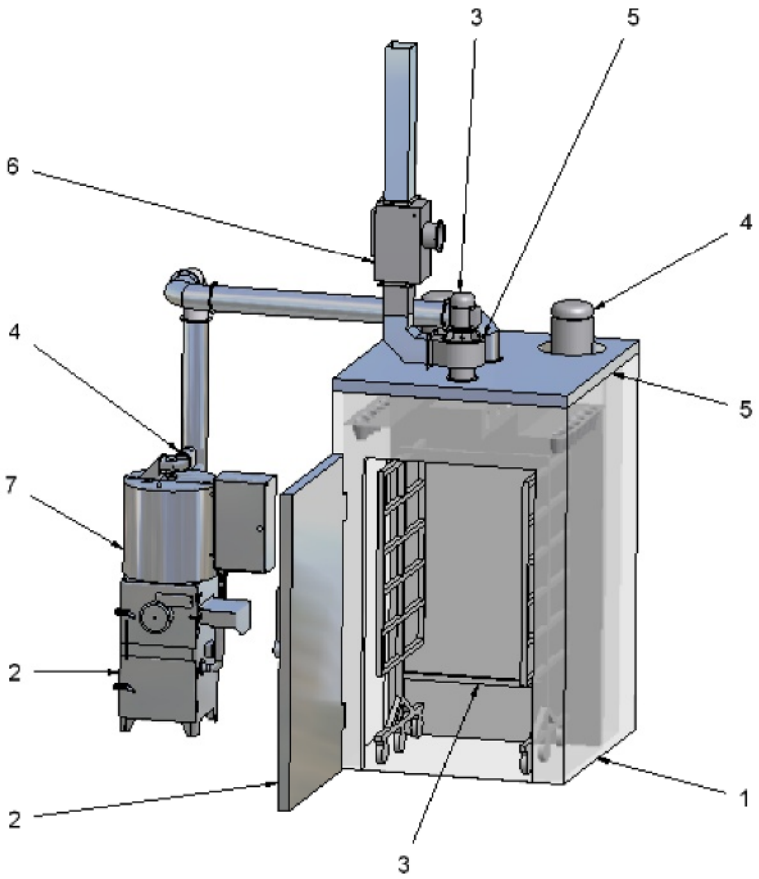
Note 1 to entry: Examples include rods, sticks, supports, clamps, tubs and dishes.

4 List of significant hazards

4.1 General

This clause contains all the hazards, hazardous situations and events identified by risk assessment, according to EN ISO 12100:2010, identified as significant for smokehouses, and which require action to eliminate or reduce the risk.

4.2 Mechanical hazards



Key

Zone 1	processing room and equipment (smoke chamber)
Zone 2	doors
Zone 3	trolleys and racks
Zone 4	drives (motors)
Zone 5	fans (ventilators)
Zone 6	dampers
Zone 7	smoke generator

Figure 1 — Danger zones of smokehouses

Zone 1: Processing room and equipment (smoke chamber)

Hazard of crushing and/or shearing of lower limbs between fixed and movable parts.

Zone 2: Doors

Hazard of crushing of limbs between doors and gates and the smoke chamber.

Zone 3: Trolleys and racks

Hazard of impact, crushing and/or shearing of upper limbs by pushing or pulling of trolleys or racks between the trolley or the rack and the smoke chamber.

Zone 4: Drives

Hazard of trapping and drawing in of limbs at places where chains run on gearwheels as well as at running in places from chains or rollers and the fixed frame of conveyers.

Zone 5: Fans (ventilators)
Hazard of crushing, trapping and/or drawing in of upper limbs by the rotating ventilator wheel.

Zone 6: Dampers-flaps
Hazard of crushing of limbs between movable dampers and flaps and fixed parts of the housing.

Zone 7: Smoke generator
Hazard of crushing, trapping and/or drawing in of upper limbs between rotating and fixed parts.

4.3 Electrical hazards

Electrical hazards include:

— hazard from electrical shock by direct or indirect contact with live components;

— hazard from external influences to the electrical equipment, e.g. cleaning with water.

4.4 Hydraulic and pneumatic hazards

Hydraulic and pneumatic hazards include:

— hazard from crushing and/or shearing;

— hazard from high pressure injection;

— hazard from unexpected movements caused by stored energy (pressure);

— hazard from impact, caused by uncontrolled moving components;

— contamination of product by hydraulic fluid.

4.5 Hazards from loss of stability

Hazards due to loss of stability include:

— hazard from impact or crushing of the body, if the smokehouse is unstable;

— hazard from impact or crushing of the body, if the smoke trolley/rack falls over.

4.6 Noise hazard

Smokehouses can generate noise which might result in hearing damage and accidents caused by lack of speech communication and acoustic signals.

4.7 Hazards from non-compliance with ergonomic principles during construction

Physiological hazards can result from:

— excessive lifting, pushing and pulling;

— an unhealthy posture of body due loading and unloading as well as maintaining and cleaning of the smokehouses.

4.8 Hazards from non-compliance with hygiene principles

Significant health hazards can arise from:

— biological issues such as pathogens and micro-organisms which can cause spoilage, poisons or pests;

— chemical issues such as cleaning and disinfecting agents as well as lubricants;

— foreign bodies from raw materials within the smokehouse and from other sources.

From each of these hazards, risks of contamination of the foodstuff and/or injuries to the health of the consumer are possible.

Microbiological hazards can lead to the spoilage of food-stuffs, food poisoning or to other sicknesses of the consumer.

Chemical hazards may contaminate the food-stuff or leave residues behind in the food-stuff, which may be detrimental to health (e.g. acid burns or dangerous fumes).

Foreign bodies can contaminate the foodstuff and cause physical damage (e.g. suffocation, cutting injuries).

4.9 Thermal hazards

4.9.1 Hazards from hot surfaces

Hazards from hot surfaces include hazards from burns in the zones 1, 2, 3 and 7.

4.9.2 Hazards from hot steam

Hazards from hot steam can result from escaping steam from the smokehouse when the door is opened and from scalding.

4.10 Being enclosed

Hazards from being enclosed include hazards due to heat and suffocation.

4.11 Explosion hazards

Explosive hazards can arise if smoke-gas-air-mixtures occur in an explosive concentration.

4.12 Hazards from chemical materials and agents

Hazards from chemical materials and agents include risks of damage to health, especially irritation and/or chemical burn from contact with and/or inhaling of cleaning agents, liquid smoke, saw dust or smoke.

4.13 Hazards from slipping, tripping and falling

Hazards from slipping, tripping and falling are due to the omission of non-slip floor surfaces and accesses.

5 Safety and hygiene requirements and/or protective measures

5.1 General

Smokehouses shall comply with the safety requirements and/or protective measures of this Clause. In addition, they shall be designed according to the principles of EN ISO 12100:2010 in relation to relevant but not significant hazards which are not dealt with by this European Standard (e.g. sharp edges).

5.2 Mechanical installation

5.2.1 General

Smokehouses shall be designed and constructed in accordance with the conditions mentioned below. Guards shall comply with EN 953:1997+A1:2009.

Interlocking guards shall be at least interlocking without guard locking as defined in EN 1088:1995+A2:2008, 4.2.1.

The safety-related parts of the control systems shall have at least performance level "b" in accordance with EN ISO 13849-1:2008, unless stated otherwise.

5.2.2 Measures for particular danger zones

Safety distances in zones of danger points shall comply with EN ISO 13857:2008 and EN 349:1993+A1:2008.

Zone 1: Processing room with installations

Conveyer systems shall work with a maximum speed of 0,1 m/s. Automatic operation shall only work if the doors of the smokehouse are closed. Operation with open doors shall only be possible by pushing a start button that is located so that the operator has a good sight into the smokehouse. Next to the start button shall be an emergency stop button. At every emergency stop, the conveyer shall stop in less than 1 s.

Zone 2: Doors, gates

Mechanically driven doors shall not be operated automatically or with a jog switch; or they shall have a locking edge control that stops the drive of the door. The door shall be visible from the switch position.

Zone 3: Trolleys and racks

Handles of trolleys shall be located within the external perimeter of the trolley.

Zone 4: Drives

Drives shall be directly connected to the driven parts without access to moving parts; or accessible moving parts shall be covered with fixed guards.

Zone 5: Fans/ventilators

Access to fans shall be prohibited by fixed guards, even if inspection doors are opened.

Zone 6: Flaps/dampers

Access to movable parts of flaps/dampers shall be prohibited by fixed guards.

Zone 7: Smoke generator

Mechanical components which rotate slowly (1 m/min cycled, 0,5 m/min not cycled) shall be designed to have no trap points. The access to faster moving parts or parts with trap points shall be prohibited by fixed guards or interlocking guards without guard locking, according to EN 1088:1995+A2:2008, 4.2.1. The movement shall stop within 1 s after opening the interlocking guard.

5.3 Electrical installation

5.3.1 General

The electrical installations shall comply with EN 60204-1:2006.

5.3.2 Emergency stop

Each machine shall be fitted with one or more Emergency Stop devices to avoid an immediate or re-occurring hazard, according to EN ISO 13850:2008.

For facilities where a hazard exists and a measure according to 5.10 is not sufficient, or else when drives or driven parts exist in the processing room, an Emergency Stop device shall also exist in the processing room.

The Emergency Stop function shall be independent from the operating control and be constantly available to stop the machine.

An Emergency Stop device is not required, if the risk is not lessened.

5.3.3 Protection against water ingress

Electrical operating components shall comply with the following IP degrees of protection, in accordance with EN 60529:1991:

a) IPX5 External electrical operating components:

   1) on the smokehouse;

   2) on the control box enclosure close to the machine;

   3) on the control box enclosure located in the process area.

b) IPX2 Internal electrical operating components:

   1) in a machine with completely enclosed housing with the degree of protection of IPX5;

   2) protection against condensate water shall be provided;

   3) in the control box enclosure.

c) IPX0 Internal electrical operating components:

   1) in a machine with completely enclosed housing with the degree of protection of IPX5;

   2) protection against water condensation shall be provided, and the safety fingers and the back of hand be assured.

5.4 Hydraulic and pneumatic installations

The hydraulic and pneumatic equipment shall comply with the following European Standards:

— EN ISO 12100:2010, 6.2.10

— EN ISO 4413:2010

— EN ISO 4414:2010

The instruction manual shall give details of the maximum operating pressure.

5.5 Hazards from loss of stability

Smokehouses shall be of a robust construction and designed to be stable on the floor under all operating conditions. The Instruction Manual shall give details of the foundation load and the type of floor preparation required or, for smokehouses that are not fixed to the floor, the type for base and the required space underneath.

During the test in accordance with Table 1, smokehouses shall not start to tilt or fall at the set location.

The ascent and decent of the in/out loading/unloading ramp shall not exceed the ratio of 1:8.

Trolleys/racks shall not be unstable when being loaded and unloaded in or out of the smokehouse.

5.6 Noise reduction

Noise reduction shall be an integral part of the design process thus specifically taking into account measures at source as given in EN ISO 11688-1:2009. The success of the applied noise reduction measures is assessed on the basis of the actual noise emission values (see Clause 6 and Annex A) in relation to other machines of the same family.

5.7 Ergonomic requirements

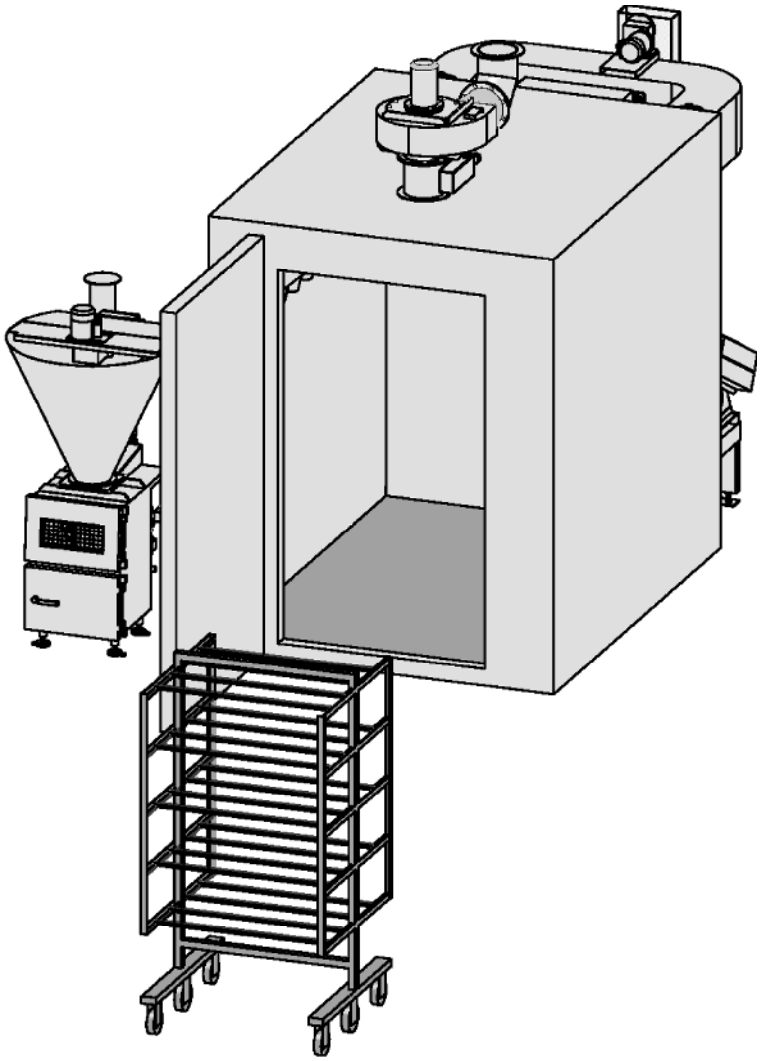
Attention shall be paid to the ergonomic principles and requirements described in EN ISO 12100:2010, 6.2.6, as well as in EN 614-1:2006+A1:2009, EN 1005-1:2001+A1:2008 and EN 1005-3:2002+A1:2008.

5.8 Hygiene and cleaning

5.8.1 Design

The design of smokehouses shall be in accordance with EN 1672-2:2005+A1:2009 and with the requirements specified below.

For hygiene areas, see Figure 2.



Key

food area

splash area

non-food area

Figure 2 — Hygiene areas on smokehouses

5.8.2 Food area

The inner side of smoke trolleys/racks (see Figure 2), inclusive of the product carrier. (i.e. sticks, rods, trays), are defined according to EN 1672-2:2005+A1:2009 and regarded as the food area.

5.8.3 Splash area

The splash area is comprised of the floor zone 1, the smoke chamber and the rest of smoke trolley/rack (outer side and area of wheels and supports).

5.8.4 Non-food area

The components not mentioned in the categories above relate to the non-food area.

5.8.5 Surface condition

The surface design shall be in accordance with EN 1672-2:2005+A1:2009. The maximum roughness shall be Rz ≤ 16 µm for the food area and Rz ≤ 25 µm for the splash area.

5.8.6 Cleaning and disinfecting

All surfaces in the food area shall be easy to clean, disinfect and rinse. They shall be designed according to EN 1672-2:2005+A1:2009, 5.3.1.4.

Information shall be included in the Instruction Manual for use on recommended and unsuitable methods and agents for cleaning and disinfecting.

The smokehouses and connected equipment shall be designed and constructed so that the inner sides of components, in contact with any remaining product of zones 1, 2, 5, 6 and 7, can be cleaned and disinfected by the recommended cleaning methods and cleaning agents, and can be rinsed with water. Other stains shall be easy to remove. The draining off from liquids shall comply with EN 1672-2:2005+A1:2009, 5.3.1.4. For zones which are not easy to clean, special information on the cleaning and the sufficient removal of cleaning and disinfection agents shall be given in the instruction handbook.

5.9 Measures against high temperatures and hot steam

Smokehouse design shall prevent, during intended use, burns and scalding.

On control equipment (grips, surfaces), burn thresholds according to EN ISO 13732-1:2008 shall be enforced.

The requirements above are not applicable to the inside area of the smoke chamber nor to surfaces, liquids and flames which provide the processing heat, nor to smoke generators. They are also not applicable for smoke trolleys/racks and product carriers, which will be heated by processing heat.

5.10 Measures against being enclosed

It shall be possible to open doors easily from the inside of smoke chambers where the operators or other persons can walk inside. The unlocking shall always be a simple action. The device for opening the door from the inside shall be easily accessible.

5.11 Explosion prevention measures

5.11.1 General

The development of an explosive atmosphere to a dangerous extent shall be prevented in smokehouses during use and also reasonably foreseeable misuse.

NOTE 1 This requirement for use includes that the development of potentially explosive mixtures in a dangerous amount is also prevented during breakdowns which can be typically expected.

This can be achieved for example by dilution of the smoke close to the smouldering place or the volumes flowing from the smouldering place so that the explosion hazard is excluded. The smoke generators shall be built to produce smoke in potentially explosive mixtures only in the smouldering place and there only in such small amounts that an ignition of the smoke cannot cause a hazard.

The smoke transporting parts (ducts and pipes) between the smoke generator and the smoke chamber shall be cleaned to prevent the generation of potentially explosive smouldering gases when burning.

NOTE 2 The use of an extinguishing installation is not sufficient.

5.11.2 Smokehouses with open system and saw dust/wood chip smoke generator or friction smoke generator

The hazard of explosion shall be prevented by dilution of the smoke by one of the following measures.

1) The smoke shall be diluted to a ratio of at least 20:1 of fresh air to smouldering air at the latest when leaving the smoke generator.

2) The volume proportion of carbon monoxide (CO) shall be in each case less than 0,9 % at the latest when leaving the smoke generator.

3) The volume proportion of oxygen (O_2) shall be in each case more than 19,5 % at the latest when leaving the smoke generator.

4) The dilution ratio shall always be higher than the ratio determined by one of the following test procedures, i) or ii), at the latest when the smoke leaves the smoke generator:

   i) The fresh air flow rate is determined by explosion tests according to EN 1839:2003 on a continued smoke cycle of at least 3 h so that the diluted smoke gas mixture is at no time explosive. The required dilution ratio is twice the value of the measured fresh air flow rate relating to the smouldering air flow rate. If the smoke generator is operated in cycled smoke generation, the continuous smoking process will be replaced by a continued succession of the longest possible smoke generation time and the shortest possible break time.

   ii) The mass concentration of a non-explosive smoke is determined by explosion tests according to EN 1839:2003 and simultaneous continuous measurement of the mass concentration of the combustible parts of the dispersed phase of the fresh smoke when leaving the smoke generator on a continued smoke cycle. The mass concentration of the highest admissible smoke generation shall not be able to exceed 50 % of the measured mass concentration. If the smoke generator is operated in cycled smoke generation, the continuous smoking process will be replaced by a continued succession of the longest possible smoke generation time and the shortest possible break time.

NOTE Special knowledge for test procedures is available from notified bodies for EU-Directive 94/9/EC.

5.11.3 Smokehouses with open system and saw dust/wood chip smoke generation and only thermic buoyancy

The hazard of explosion shall be prevented by the following measures.

1) The smoke generation shall be in direct connection with the processing room.

2) Additional energy shall not be used for the transport of smouldering air, smoke, circulating air or exhaust air.

3) The sum of all openings shall be at least 1/10 of the area of the sawdust/woodchip fill.

5.11.4 Smokehouses with open system and steam smoke generator

The hazard of explosion shall be prevented by one of the following measures.

1) Test procedures have proven that the generation of potentially explosive mixtures in dangerous amounts is preventable.

2) The proportion of steam relating to the smouldering air shall not go below the level necessary for the inertisation of the smoke. The proportion is determined by explosion tests according to EN 1839:2003.

NOTE Special knowledge for test procedures is available from notified bodies for EU Directive 94/9/EC.

5.11.5 Smokehouses with re-circulated system

The hazard of explosion shall be prevented by one of the following measures.

1) The smoke shall be diluted to a ratio of at least 20:1 of fresh air to smouldering air at the latest when leaving the smoke generator.

2) The smoke generation time shall be restricted to guarantee the volume proportion of carbon monoxide (CO) cannot exceed 0,9 % at the latest when leaving the smoke generator.

3) The smoke generation time shall be restricted to guarantee the volume proportion of oxygen (O_2) cannot go below 19,5 % at the latest when leaving the smoke generator.

4) The smoke generation time shall never exceed the time determined by one of the following test procedures, i) or iii), at the latest when leaving the smoke generator:

   i) The volume share of carbon monoxide (CO) of non-explosive smoke is determined by explosion tests according to EN 1839:2003 and simultaneous continuous measurement of the volume proportion of carbon monoxide of the smoke when leaving the smoke generator on a continued smoke cycle. The longest admissible smoke generation time shall guarantee that the volume proportion of carbon monoxide is not able to exceed 50 % of the measured volume proportion. If the smoke generator is operated in cycled smoke generation, the continuous smoking process will be replaced by a continued succession of the longest possible smoke generation time and the shortest possible break time.

   ii) The volume proportion of oxygen (O_2) of non-explosive smoke is determined by explosion tests according to EN 1839:2003 and simultaneous continuous measurement of the volume proportion of oxygen of the smoke when leaving the smoke generator on a continued smoke cycle. The longest admissible smoke generation time shall guarantee that the average of the volume proportion of oxygen of air (20,9 %) and the measured volume proportion of oxygen of non-explosive smoke cannot be exceeded. If the smoke generator is operated in cycled smoke generation, the continuous smoking process will be replaced by a continued succession of the longest possible smoke generation time and the shortest possible break time.

   iii) The mass concentration of non-explosive smoke is determined by explosion tests according to EN 1839:2003 and simultaneous continuous measurement of the mass concentration of the combustible parts of the dispersed phase of the fresh smoke when leaving the smoke generator on a continued smoke cycle. The longest admissible smoke generation time shall guarantee that the mass concentration is not able to exceed 50 % of the measured mass concentration. If the smoke generator is operated in cycled smoke generation, the continuous smoking process will be replaced by a continued succession of the longest possible smoke generation time and the shortest possible break time.

NOTE Special knowledge for test procedures is available from notified bodies for EU directive 94/9/EC.

5.12 Measures against chemical materials and agents

The smokehouse shall be designed so that in a closed state no steam/aerosols from cleaning agents can escape.

6 Verification of safety and hygiene requirements and/or protective measures

This Clause contains the methods of testing for the presence and adequacy of the safety requirements stated in Clause 5. All safety measures of Clause 5 contain self-evident criteria of acceptance.

Verification of the requirements can be made by means of inspection, calculation, or testing. These means shall be applied to a machine in a fully commissioned condition. Partial dismantling might be necessary

however for the purpose of some checks. Such partial dismantling shall not invalidate the result of the verification.

Smokehouses shall be inspected according to the stipulation of the manufacturer by a competent person at periodical intervals. The inspection shall include a visual and functional inspection of the existing safety equipment.

Table 1

Clause	Test method
5.2	Measurement of dimensions (type) Verification of electrical circuit diagram (type) Visual inspection especially of the interlocking device r (individual)
5.3.	Functional test of emergency stop (if provided) (individual) Functional test in the event of a power failure (individual) Functional test of guard (individual)
5.4	Verification of hydraulic/pneumatic circuit diagram (type) Looking in instruction handbook (type) Visual inspection (individual)
5.5	Calculation or standing test on a plane with an inclination of 10° and an unfavourable wheel position. The wheels shall be locked. (type) Functional test (individual) Visual inspection (individual)
5.6	Noise emission measurement according to Annex A (type)
5.7	Measurement of forces (type) Functional test (individual) Visual inspection (type)
5.8	Measurement of surface roughness, radii and grooves (type) Visual inspection especially of welds, edges and screws (type)
5.9	Measurement of temperature (type)
5.10	Visual inspection (individual)
5.11	Measurement of ratio (individual/type) or Measurement of CO-volume share (individual/type) or Measurement of O_2-volume share (individual/type) or Verification of documentation of test procedures for explosion tests (individual/type) Measurement of dimensions (individual/type)
5.12	Visual inspection (type)
7.1	Examination of documentation to verify that the required information is provided (type)

7 Information for use

7.1 General

The information for use shall meet the requirements laid down in EN ISO 12100:2010, 6.4, and shall provide the information as listed under 7.2.

Where the means of reducing the risk during the installation of a smokehouse is available, the manufacturer shall indicate this in the 'Information for use' (i.e. Installation and Operation Manual) and prescribe that the supervision of the work shall be carried out by a qualified person, (if required, indicating the necessary qualifications). The qualified person shall be sufficiently experienced in the physical requirements of positioning and attaching parts to the smokehouse, and also have a good knowledge of the risks related to this type of work.

7.2 Manual

The manual shall provide the following information:

a) Information relating to the use of the smokehouse:

   1) Detailed description of the machine and its components;

   2) Information on the range of applications for which the smokehouse is intended;

   3) Documents attesting that the smokehouse complies with the essential requirements;

   4) information on airborne noise emissions, determined and declared in accordance with Annex A of this European Standard, by declaring the A-weighted emission sound pressure level at workstations where this exceeds 70 dB(A). Where this level does not exceed 70 dB(A), this fact shall be indicated by e.g. stating that $L_{pA} \leq 70$ dB.

b) Information relating to the installation of the machine:

   1) Information on the space required for the operation of the machine;

   2) Information on permissible environmental influences;

   3) Information on how to connect the smokehouse to the electric, hydraulic, pneumatic ,steam or gas supply, including necessary safety devices;

   4) Information on foundation loads.

c) Information relating to transportation and storage of the smokehouse:

   1) Information on dimensions, weight, position of centre of gravity.

d) Information relating to the intended use of the smokehouse:

   1) Instructions for commissioning;

   2) Instructions for settings and adjustment;

   3) Information on items which require setting;

   4) Information on residual risks, and recommended personal protective equipment;

   5) Information on relevant safety devices and their supervision;

   6) Information on particular risks which may arise in certain applications;

   7) Information on prohibited use.

e) Information relating to maintenance:

   1) Information on the nature and frequency of inspections and maintenance activities (at least half a year for smokehouses);

   2) Information on the risks of breakdowns and their repair;

   3) Information on the types of oils and/or greases to be used for lubrication;

   4) Information on safety related spare parts.

f) Information relating to the cleaning of the machine:

1) advice on the cleaning of tools and the need for the user to determine the frequency of inspections necessary to prevent the accumulation of residues or product in the smokehouse;

2) method of cleaning;

3) type of cleaning agents;

4) method of disinfecting;

5) type of disinfecting agents;

6) type of rinsing agents.

g) Information relating to training:

1) Information on the standard of the training;

2) Information on the frequency of operator training.

7.3 Marking

Smokehouses shall be marked permanently and legibly with the following information on a rating plate:

— The business name and full address of the manufacturer and, where applicable, his authorised representative;

— Designation of the machine;

— Model of series or type;

— Serial number;

— Mandatory marking[1)];

— The year of construction (the year in which the manufacturing process was completed);

— Rating information, including supply voltage and frequency and power rating.

[1)] For machines and their related products intended to be put on the market in the EEA: CE marking, as defined in the applicable European directive(s), e.g. Machinery.

Annex A
(normative)

Noise test code for smokehouses (grade 2)

A.1 Determination of the emission sound pressure level

EN ISO 11201:2010, grade 2 shall be applied in order to determine the emission sound pressure level.

For smokehouses with one charging door, the measurements shall be taken at a height of (1,55 ± 0,075) m centrally of the charging door and at a distance of 1 m.

For smokehouses with several charging doors on one side, the microphone shall be positioned centrally on the side with the charging doors at a height of (1,55 ± 0,075) m and at a distance of 1 m.

For other large smokehouses, measurements shall be made on each side at a height of (1,55 ± 0,075) m and at a distance of 1 m. In these cases, the highest emission sound pressure level shall be used for declaration.

NOTE If it is required to determine the A-weighted sound power level, this should be carried out according to EN ISO 3744 and using the parallelepiped measurement surface.

A.2 Installation and mounting conditions

The test field shall be in accordance with Clause 6 of EN ISO 11201:2010, grade 2. It shall be laid out according to EN ISO 3744:2010, Annex A.

The smokehouse to be tested shall be installed on a reflecting acoustically, hard floor.

A flexible joining material shall be provided between the smokehouse and the attached surface so that the transmission of vibrations onto the support as well as the reaction to the noise source is minimized. The smokehouse should stand on this horizontal surface and shall be sufficiently removed from any reflective walls or ceilings or any other objects as required by EN ISO 3744:2010.

A.3 Operating conditions

The test shall be carried out when the smokehouse is operating under full load with the loudest possible cycle.

A.4 Measurement

The A-weighted time-averaged emission sound pressure level shall be measured under full load with the loudest possible cycle.

The measuring instruments shall be in accordance with EN ISO 11201:2010, 4.1 and 4.2.

The measurement shall be carried out over a complete working cycle of more than 15 s whereby stopping shall be excluded.

A.5 Measurement uncertainty

The total measurement uncertainty of the noise emission values determined according to this European Standard depends on the standard deviation σ_{R0} given by the applied noise emission measurement method and the uncertainty associated with the instability of the operating and mounting conditions σ_{omc}. The resulting total uncertainty is then calculated from:

$$\sigma_{tot} = \sqrt{\sigma_{R0}^2 + \sigma_{omc}^2} \quad \text{(A.1)}$$

The upper bound value of σ_{R0} is about 1,5 dB for the grade 2 measurement methods dealing with the determination of the emission sound pressure level.

NOTE 1 For machines with a rather constant noise emission, a value of 0,5 dB for σ_{omc} can apply. In other cases, e.g. a large influence of the material flow into and out of the machine or a material flow that varies in an unpredictable manner, it is possible that a value of 2 dB is more appropriate. Methods to determine σ_{omc} are described in the basic measurement standards.

The expanded measurement uncertainty *U*, in decibels, shall be calculated from

$U = k \cdot \sigma_{tot}$,

where

k is the coverage factor.

NOTE 2 The expanded measurement uncertainty depends on the degree of confidence that is desired. For the purpose of comparing the result with a limit value, it is appropriate to apply the coverage factor for a one-sided normal distribution. In that case, the coverage factor $k = 1,6$ corresponds to a 95 % confidence level. Further information is given in EN ISO 4871. Please note that the expanded measurement uncertainty *U* is denoted as *K* in EN ISO 4871:2009.

NOTE 3 The expanded measurement uncertainty as described in this European Standard does not include the standard deviation of production which is used in EN ISO 4871:2009 for the purpose of making a noise declaration for batches of machines.

A.6 Information to be recorded

The information shall be in accordance with Clause 12 of EN ISO 11201:2010, grade 2.

All deviations from this noise test code and from EN ISO 11201:2010, grade 2 shall be documented together with the technical justification for these deviations.

A.7 Information to be reported

The information to be included in the report is at least that which the manufacturer requires to prepare a noise declaration or the user requires it to verify the declared values.

As a minimum, the following information shall be included:

— reference to the basic noise emission standard EN ISO 11201:2010 grade 2;

— description of the mounting and operating conditions used;

— location for the determination of the emission sound pressure level at the workstation;

— the noise emission value obtained.

It shall be confirmed that all requirements of this noise test code have been fulfilled, or, if this is not the case, that any unfulfilled requirements shall be identified. Deviations from the requirements shall be stated and technical justification for the deviations shall be given.

A.8 Declaration and verification of the noise emission values

The declaration of the emission sound pressure level shall be made as a dual value declaration according to EN ISO 4871:2009, thus declaring the emission sound pressure level L_{pA} at the workstation and the uncertainty K_{pA}.

NOTE 1 K_{pA} is expected to have a value of about 2,5 dB, according to EN ISO 4871:2009, A.2.2.

The noise emission declaration shall explicitly state that the emission sound pressure level has been measured according to the specification of this noise test code as well as the basic standard EN ISO 11201:2010 grade 2.

If this is not the case, any deviations shall be explicitly mentioned.

If undertaken, verification shall be done according to EN ISO 4871:2009 using the same mounting, installation and operating conditions as those used for the initial determination of the emission sound pressure level.

NOTE 2 Additional noise emission values can be indicated in the declaration.

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide one means of conforming to Essential Requirements of the New Approach Directive 2006/42/EC on machinery.

Once this standard is cited in the Official Journal of the European Union under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative Clauses of this standard confers, within the limits of the scope of this standard, a presumption of conformity with the relevant Essential Requirements of that Directive and associated EFTA regulations.

WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

Bibliography

[1] EN 1005-2:2003+A1:2008, *Safety of machinery — Human physical performance — Part 2: Manual handling of machinery and component parts of machinery*

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