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BSI Standards Publication

Fire extinguishing systems in commercial kitchens — System design, documentation, and test requirements

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National foreword

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The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to CEN text carry the number of the CEN amendment. For example, text altered by CEN amendment A1 is indicated by ▌A1⟩ ⟨A1▌.

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

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Fire extinguishing systems in commercial kitchens - System design, documentation, and test requirements

Systèmes d'extinction d'incendie dans les cuisines professionnelles - Conception du système, documentation et exigences d'essai

Brandbekämpfungsanlagen in Großküchen - Planung, Dokumentation und Prüfanforderungen

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European foreword

This document (EN 17446:2021+A1:2024) has been prepared by Technical Committee CEN/TC 191 “Fixed firefighting systems”, the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by April 2025, and conflicting national standards shall be withdrawn at the latest by April 2025.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

[A1⟩ This document supersedes EN 17446:2021 ⟨A1].

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Introduction

This document has been developed with the purpose of establishing a common base for fire protection of commercial kitchens (for example, the ones used in restaurants, hotels and hospitals), attending to the appliances usually found in them and independently from the typology of the fire extinguishing system used. This approach focused in hazard protection rather than in the definition of the system, allows achieving a same fire hazard protection level independently from the type of system used.

This document does not consider the requirements for the components that constitute the different types of fire extinguishing systems to which it applies. This circumstance does not reduce the importance to the need that components are designed to ensure functionality and reliability of the system, both for those having existing standards and for those that at this moment do not count with them.

Summarizing, this document offers a full set of requirements to carry out the design, installation and maintenance of fire protection systems for kitchens, together with test protocols applicable to any system, which shall be completed when required, with specific requirements in relationship with the components constituting a system for each typology.

It is important to understand that the protection of the cooking areas only without including the hood, plenum or the air extract ducts may become incomplete because of the possibility of fire causing the ignition of the grease present in them, and to which an extinguishing agent discharge not including these points, will not be capable to extinguish it. The existence of fire in the air extract ducts can cause its propagation to other parts of the building.

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1 Scope

This document establishes the minimum requirements applicable to the design, installation, functioning, test and maintenance of fixed automatic fire extinguishing systems for kitchen protection that covers the cooking appliances, the hood, the plenum and the air extract ducts. This document also provides requirements for the construction and components performance as applicable to specific types, designs, sizes and arrangements of pre-engineered kitchen fire-extinguishing systems.

This document does not cover household kitchens or industrial food production equipment.

The detailed test procedures for the plenum and air extract ducts are contained in CEN/TS 17749.

Closed plenum type ventilated ceilings designed similar to standard hoods are included in this document. Open plenum type ventilated ceilings are excluded and require an engineered solution for the plenum protection. Protection for appliances below open or closed plenum ventilated ceilings are included.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 3-7:2004+A1:2007, *Portable fire extinguishers — Part 7: Characteristics, performance requirements and test methods*

EN 3-8, *Portable fire extinguishers — Part 8: Requirements for the construction, pressure resistance and mechanical tests for extinguishers with a maximum allowable pressure equal to or lower than 30 bar, which comply with the requirements of EN 3-7*

EN 1860-2, *Appliances, solid fuels and firelighters for barbecuing — Part 2: Barbecue charcoal and barbecue charcoal briquettes — Requirements and test methods*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— IEC Electropedia: available at https://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1
extinguishing agent
substance whose action causes the extinguishment of a fire

3.2
cooking appliance
cooking device that has, or is capable of having, a surface of liquid grease or one in which cooking with grease is involved

EXAMPLE Deep fat fryer, griddle, range, chain-broiler, electric char-broiler, charcoal broiler, mesquite broiler, gas radiant char broiler, wok, tilt skillet/braising pan and similar appliances.

Note 1 to entry: The protected area is limited to the cooking area of the appliance only.

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3.3
hood
device part of an exhaust system that directs and captures grease and oil vapours and also the combustion gases from a cooking appliance

3.4
deep fat fryer
cooking appliance where the food is fried submerged in a fixed vat filled with oil exposed to an intense radiant or convective heat source

3.4.1
multiple vat fryer
fryer that incorporates vats that are mechanically joined together, where each vat incorporates a separately controlled heating source

3.4.2
split-vat deep fat fryer
fryer that incorporates a divided partition which splits the fryer in sections, where each split-vat fryer incorporates a separately controlled heating source

Note 1 to entry: It may have one or several vats arranged adjoining each other.

3.5
expellant gas
means used to discharge the extinguishing agent from its container

3.6
grease
melted animal fat, vegetable shortening, or other type of oily substance used in, or as a result from, the preparation of foods

3.7
range top
cooking appliance where the food is cooked and is directly exposed to a heat source

3.8
system manual
manufacturer's documentation where the design, installation, functioning and maintenance of the system are defined

3.9
griddle
cooking appliance where the food is not directly exposed to the fire but on a flat surface intensely heated by radiation or convection

3.10
broiler
cooking appliance where the food is on a grill, directly exposed to an intense heat source by radiation, and perhaps by convection, where neither the food nor the radiation source have to be necessarily in the horizontal position

3.11
plenum
hood space behind the filters

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3.12
tested hazard
kitchen appliance, hood or plenum where the fire is generated, and the air extract duct during the tests described in this document and that will determine the scope of the obtained results

3.13
tilt skillet
cooking appliance consisting in a large dimension vessel exposed to an intense heat source, which can move from one side to the other tilting on an axis, where the food is cooked, boiled, sautéed or fried

3.14
extinguishing system
components fitted to each other forming a fixed system that discharges an extinguishing agent for the purpose of extinguishing fires in kitchens

3.15
discharge time
time during which the discharge of the extinguishing agent occurs without interruptions in it, without including the residual expellant gas discharge, if applicable

3.16
wok
bottom domed round frying pan

3.17
protected kitchen area
surface enclosing all the cooking appliances located under the projection of a hood, including the associated filters, plenum and air extract ducts

3.18
pre-engineered kitchen fire-extinguishing system
performance tested system in accordance with the limitations prescribed by the manufacturer and included in the system manual

4 Design and system requirements

4.1 General

The system shall be designed according to the fire extinguishing system manual. The system manual shall be based on the parameters determined from the requirements of this document.

A full system review shall be conducted to the fire extinguishing system prior to any change which could affect the operation and/or efficacy of the kitchen equipment.

Each system shall consist of at least the following elements:

— extinguishing agent storage unit plus actuation mechanism (mechanical or electrical);

— nozzles;

— detection system associated to the actuation mechanism;

— manual actuation mechanism;

— pipe layout to feed the extinguishing agent discharge nozzles;

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— fuel/power supply shut down.

The system shall be dedicated to the protected equipment.

Where power supplies are essential to maintain the operation of the system, a secondary power supply should be provided independent of the primary supply.

The secondary power supply should be of sufficient capacity and resilience to maintain the system for at least the operation time identified in the manufacturer's manual and be capable of operating safely in fire conditions for the appropriate period of time.

Extinguishing media supply shall be permanently available to the kitchen fire protection system. Where the agent supply is external to the equipment, e.g. mains water supply, it shall not be possible to reduce the supply when the system is in operation. During installation it has to be established that sufficient water flow and water pressure (with all possible demand on the same source in use) is available. The extinguishing system needs to be connected directly into the water main or sprinkler system supply and a test connection included to allow routine testing to confirm adequate flow and pressure.

The equipment shall be suitable for use within the minimum ambient temperature range of (+5, +60) °C. The equipment operating temperature range shall be specified in the manufacturer's design manual.

The system shall be designed to provide simultaneous discharge to the protected appliances, the hood and air extract duct entrances.

For hoods with an inner physical separation, both sides of the separation shall be protected.

Hoods that are connected without an inner physical separation, as they are vulnerable to fire spread, shall be protected with a simultaneous system activation and discharge to all hazard areas.

The protected length of duct from the cooking appliance ignition source shall be specified in the manufacturer's design manual.

4.2 Components

4.2.1 General

The system shall only use components as used in the testing and as specified in the manufacturer's manual. There shall be no substitution of components.

All system components shall be designed to function under the intended conditions and within their range of temperatures of utilization.

4.2.2 Agent container assembly

Where containers are used in these systems they shall be designed to meet the requirements of relevant national standards.

Agent container, valve and seals shall be made of material suitable for use with:

— the agent in terms of corrosion and chemical compatibility.

When tested in accordance with EN 3-7:2004+A1:2007, Clause 14:

— external corrosion.

When tested in accordance with EN 3-7:2004+A1:2007, Clause 14:

— pressure resistance.

When tested in accordance with EN 3-8.

Where applicable, means shall be provided to indicate that each container is correctly charged.

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Each container shall have a permanent nameplate or other permanent marking specifying the extinguishant, tare and gross mass, and the super pressurization level (where applicable) of the container.

The containers used in these systems shall be designed to meet the requirements of relevant national standards.

4.2.3 Discharge nozzles

Nozzles shall be manufactured from non-combustible materials and they shall withstand the intended fire exposure without observed deformation or without its extinguishing performances being reduced. Nozzles shall be designed to prevent clogging, or other means within the system shall be employed.

Nozzles shall be resistant to:

— corrosion;

— extinguishing agent;

— environmental conditions;

— temperature conditions and fire.

When tested in accordance with design manual.

Open nozzles shall be provided with a protective cover protecting the nozzle opening against grease migration.

The protective cover shall not interfere in the agent discharge in a way that affects the performance of the system and shall be included in the fire testing. Additionally, it shall not create an increased danger of fire spread or to the people, due to splashing.

The protective cover shall be made of material suitable for use with:

— agent in terms of corrosion;

— temperature conditions and fire resistance;

— blow-off pressure;

— vibration;

— stress corrosion.

4.2.4 Pipe and fittings

Pipe and fittings shall be of non-combustible material and with physical and chemical characteristics compatible with the extinguishing agent. They shall withstand the maximum operating pressures (at maximum storage temperature) occurring during the discharge.

Pipework and fittings shall comply with the appropriate national standards.

4.2.5 Hose and hose fittings

Hoses and hose fittings, shall not be used where they are exposed to the fire and be of materials having physical and chemical characteristics compatible with the extinguishing agent. They shall withstand the maximum operating pressures (at maximum storage temperature) occurring during the discharge. Hoses and hose fittings used in the system shall be installed as described in the system manual.

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4.2.6 Extinguishing agent

The extinguishing agent used shall be defined in the fire test report. Extinguishing agents with different formulations or provided by different manufacturers shall not be used or mixed. The instructions provided in the system manual shall be followed.

4.2.7 Manual activation device(s)

4.2.7.1 General

Each system shall be equipped with at least one manual activation device (see 4.4.4). Operation of the manual activation device shall lead to immediate activation and complete discharge (in accordance with the system design manual) of the system.

The construction and materials used for the manual activation device (including the marking - see 4.4.5) shall be suitable for the typical commercial kitchen environment including frequent cleaning.

4.2.7.2 Mechanical activation devices

The operating mechanism of the manual activation device (pull ring, handle, lever, push button or strike knob) shall be suitable for manual operation.

The operating mechanism shall be provided with a safety device to prevent inadvertent operation. The release of the safety device shall involve an operation distinct from that of the operating mechanism.

The manual activation device shall be fitted with an indicating element which clearly shows whether the manual activation device may have been operated. It shall not be possible to restore, re-insert or re-install the indicating element. Wire seals and frangible elements are examples of acceptable indicating elements.

4.2.7.3 Electrical activation devices

For systems with an electrical manual push button actuation system, it shall be fitted with a protective cover to prevent inadvertent operation. The protective cover shall have a wire seal or equivalent indicating element. The manual activation device shall have an Ingress Protection (IP) rating of 54 or higher.

4.2.8 Special requirements

For all penetrations through a protected air extract duct or hood an appropriate oil tight fitting shall be used.

Simultaneously to the system activation, all fuel or electrical power sources generating heat at the protected equipment shall be disconnected.

4.3 Detection and system activation

All systems shall have both automatic and manual activation methods. These activation methods shall be independent from each other in order to avoid the failure of one of them preventing the functioning of the system.

The automatic detection and manual activation system shall be in accordance with the system manual.

All activation devices shall be designed, located, installed or protected in such a way that they are not subjected to adverse mechanical or environmental conditions that may render the system inoperative or that may cause an unwanted activation of the system. The system shall have the necessary electrical switches to be able to integrate the following signals and actions:

— output to audible and visual fire alarm;

— output to control and indicating equipment;

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