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Gasilni sistemi v profesionalnih kuhinjah - Načrtovanje in preskusne zahteve

Fire extinguishing systems in commercial kitchens - Design and test requirements

Brandbekämpfungsanlagen für Großküchen - Planung und Prüfanforderungen

Systèmes d'extinction d'incendie dans les cuisines professionnelles - Exigences de calcul et d'essai

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Fire extinguishing systems in commercial kitchens - Design and test requirements

Systèmes d'extinction d'incendie dans les cuisines professionnelles - Exigences de calcul et d'essai

Brandbekämpfungsanlagen für Großküchen - Planung und Prüfanforderungen

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European foreword

This document (prEN 17446:2019) has been prepared by Technical Committee CEN/TC 191 “Fixed firefighting systems”, the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

Introduction

This standard 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 free hazard protection level independently from the type of system used.

The standard 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, the standard 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 exhaust ducts may become incomplete because 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 exhaust ducts can cause its propagation to other parts of the building.

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 kitchen appliances, the hood, the plenum and the exhaust 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.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

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

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

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

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

3.2
kitchen 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.

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
kitchen appliance where the food is fried submerged in a fixed vat filled with oil exposed to an intense radiant or convective heat 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 to or as a result from the preparation of foods

3.7
range top
kitchen 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
kitchen 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
kitchen appliance where the food is on a grill, directly exposed to an intense heat source by radiation, and perhaps by convection, where nor the food, nor the radiation source have to be necessarily in the horizontal position

3.11
plenum
hood space behind the filters

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

3.13
tilt skillet
kitchen 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 area
surface enclosing all the kitchen appliances located under the projection of a hood, including the associated filters, plenum and ductwork

4 Design

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

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.

5 System requirements

5.1 General

The system is typically made up of:

— extinguishing agent storage unit plus triggering mechanism (mechanical or electrical); its location shall be close to the kitchen without direct exposure to heat exceeding the temperatures specified by the manufacturer;

— detection system associated to the triggering mechanism;

— manual triggering mechanism;

— pipe layout to feed the extinguishing agent discharge nozzles;

— fuel/power supply shut down.

The equipment shall be suitable for use within the minimum ambient temperature range of (+ 5, + 50) °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 and associated ductwork.

Hoods with an inner physical separation or attached to each other shall be dealt with as separate protected areas.

The protected length of duct from the cooking appliance ignition source shall not exceed 23 m. The coverage as determined by the duct test (see 8.4).

5.2 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 other.

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

Any systems using a combined detection and agent distribution network shall be capable of full agent discharge simultaneously from all nozzles upon activation.

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 in an alarm panel:

— to activate an audible and visual signal at the protected room that warns about the convenience of leaving the zone;

— to pick up the “extinction activated” signal that allows starting the necessary security protocols in the whole building;

— to actuate over the electric power and/or gas supply shutting off device for the kitchen appliances.

A readily accessible means for the manual activation of the system shall be located in the evacuation route.

5.3 Location of system components

5.3.1 Extinguishing agent storage

Extinguishing agent and expellant gas containers shall be located in places where the range of ambient temperature is within the specified values in the system manual, avoiding those locations where wide and continuous variations of temperature are foreseen that may result in a premature degradation of the extinguishing agent and therefore, in a considerable decrease of its extinguishing capacity.

In the event the extinguishing agent might freeze at low temperatures, it shall be conditioned so that the container temperature is always at least 5 °C over the extinguishing agent freezing temperature.

Systems in which the extinguishing agent partially or wholly may be located in zones susceptible to be exposed to high temperatures are not considered suitable (for example, inside the hood), provided this situation may cause the degradation and therefore, loss of the extinguishing agent effectiveness.

In case the ambient temperature is expected to be out of the range of temperatures specified by the manufacturer of the system, a protection system to keep the assembly temperature within that range shall be provided.

Extinguishing agent and expellant gas containers shall not be located where they can be exposed to mechanical and chemical damages, bad weather or sun direct action. In case this is not possible, protection systems such as enclosures or guards shall be provided. Likewise, the extinguishing agent and expellant gas containers sets shall be readily accessible for their inspection, maintenance and recharge and shall be located according to the instructions indicated by the manufacturer of the system, and in no case where they may be exposed to fire.

If the extinguishing agent or any of its components may be degraded by continuous exposure to the usual temperatures to which it may be subjected, closed type nozzles keeping the extinguishing agent pressurized inside the distribution network, shall not be installed, in any case.

5.3.2 Discharge nozzles

All discharge nozzles shall be located so that the possible damages are minimized, avoiding its wrongful alignment and having to be always within the limitations and restrictions indicated in the system manual.

5.3.3 Detection

The detection system shall be capable of detecting fires occurring on any of the cooking appliances and within the extract hood.

The detection systems shall be suitable for kitchen environments and have detection thresholds appropriate for areas of different temperature within kitchen ventilation hoods.

The detection system shall be tested with the kitchen fire extinguishing system it is installed and used with.

All detection elements shall be located and installed 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.

Glass bulbs are not applicable as detection elements in kitchen fire extinguishing systems.

Glass bulbs can be subject to micro cracks resulting from mechanical damage such as may arise from kitchen ventilation system cleaning.

5.3.4 Special requirements

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

Movable kitchen appliances shall have the appropriate means to ensure its correct positioning in relation to the discharge nozzles during the usual tasks in the kitchen.

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

6 Components

6.1 General

The system shall only use components as used in the testing and as specified in the manufacturer' 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.

6.2 Agent container assembly

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

— the agent in terms of corrosion;

— pressure resistance;

— chemical compatibility.

NOTE The Container material is typically stainless steel. The valve material is typically brass or stainless steel.

6.3 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 resistant to:

— corrosion;

— extinguishing agent;

— environmental conditions;

— stress corrosion in systems where the nozzles is under constant pressure;

— temperature conditions and fire resistance;