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English Version

Guidance on design, selection and installation of vents to safeguard the structural integrity of enclosures protected by gaseous fire-extinguishing systems (ISO/TS 21805:2018)

Lignes directrices pour la conception, la sélection et l'installation d'évents pour préserver l'intégrité structurelle des enceintes protégées par des systèmes fixes de lutte contre l'incendie à gaz (ISO/TS 21805:2018)

Anleitung für die Konstruktion, Auswahl und Installation von Entlüftungen zur Gewährleistung der strukturellen Integrität von Gehäusen, die durch ortsfeste Gaslöschanlagen geschützt sind (ISO/TS 21805:2018)

This Technical Specification (CEN/TS) was approved by CEN on 30 November 2018 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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European foreword

This document (CEN ISO/TS 21805:2019) has been prepared by Technical Committee ISO/TC 21 "Equipment for fire protection and fire fighting" in collaboration with Technical Committee CEN/TC 191 “Fixed firefighting systems” the secretariat of which is held by BSI.

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Endorsement notice

The text of ISO/TS 21805:2018 has been approved by CEN as CEN ISO/TS 21805:2019 without any modification.

TECHNICAL SPECIFICATION

ISO/TS 21805

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Guidance on design, selection and installation of vents to safeguard the structural integrity of enclosures protected by gaseous fire-extinguishing systems

Lignes directrices pour la conception, la sélection et l'installation d'évents pour préserver l'intégrité structurelle des enceintes protégées par des systèmes fixes de lutte contre l'incendie à gaz

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 21, *Equipment for fire protection and fire fighting*, Subcommittee SC 8, *Gaseous media and firefighting systems using gas*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The guidance presented here is based on the results of a joint research program conducted in 2006 and 2007 by several fire protection system manufacturers and interested parties. The program of work consisted of several series of tests to evaluate the peak pressure response and pressure-relief vent area effects for each agent addressed in this document. The key data used in the development of this document were the values of peak enclosure pressure response (PMAX) at each value of the volume-normalized pressure-relief vent area of the test enclosure, hereinafter referred to as the “leakage-to-volume ratio” or LVR. Other test parameters (enclosure temperature, agent quantity, discharge time, and humidity) were held constant or varied in a specified manner. For each test series employing a single agent, the several pairs of LVR and resultant PMAX values were graphically analysed and a best-fit correlation curve was determined.

The LVR vs. PMAX correlation curve for each agent or system forms the basis of the associated equations in cases where discharge of the agent results in cooling the air temperature below its dew point. (See Humidity effects and humidity correction factor below.) In most cases, only halocarbon agents cause sufficient cooling to cause humidity related effects on the peak enclosure pressure. Thus, a correction for humidity effects is included in the equations for estimating vent area and maximum pressure on the discharge of the following agents:

— FK-5-1-12

— HFC-23

— HFC-125

— HFC-227ea

The humidity corrections used in this document are based on the results of tests conducted with HFC-227ea at different conditions of humidity.

The resulting values for humidity correction will be assumed to be equally applicable to the agents FK-5-1-12, HFC-125 and HFC-23 until further data or analysis indicates otherwise.

The correlations of LVR to maximum negative pressure and maximum positive pressure were based on test work performed in a test chamber at a relative humidity (RH) of approximately 38 %. If the RH in a protected enclosure differs from 38 % then a correction to the estimated maximum negative and positive pressures may be required. See 7.8 and 7.9 for further information on the effect of humidity. The temperature of the test enclosure was 21°C (nominal) for all tests that form the basis of the estimating methods given in this document.

In conducting the research program, described above, a large number of different venting arrangements were created in the test enclosure. The equivalent leakage area (ELA) for each test was determined by a “door fan test” and data analysis. The average enclosure pressure in effect during the many door fan tests varied from test to test. All values of ELA were normalized to an equivalent enclosure differential pressure of 125 Pa. The resulting enclosure correlations of peak pressure vs. LVR, and any resulting estimate of enclosure pressure-relief vent area, reflect a pressure-relief vent area calculated at an effective enclosure pressure of 125 Pa for a vent with discharge coefficient of 0,61.

The effectiveness of a gaseous total flooding firefighting system depends, in part, on retention of the air-extinguishant mixture within the protected volume for a period of time. Retention of the extinguishant-air mixture requires that gas exchange (“leakage”) between the enclosure and the ambient environment be restricted. In order to limit the rate of gas exchange the enclosure boundary should have a high degree of integrity. To put it another way, the sum total of the areas of the various penetrations in an enclosure’s bounding surfaces should be low, at least during the gas-retention period (hold time) after the end of extinguishant discharge.

Addition of a gaseous firefighting extinguishant to an enclosure having limited pressure-relief vent area will naturally result in a change of pressure therein. If the enclosure is sealed too tightly during the extinguishant discharge, i.e., too little pressure-relief vent area, the pressure change could exceed the