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BSI Standards Publication

State of the art on the use of flammable refrigerant alternatives, in particular from class A3, in refrigeration, air conditioning and heat pump equipment

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National foreword

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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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English Version

State of the art on the use of flammable refrigerant alternatives, in particular from class A3, in refrigeration, air conditioning and heat pump equipment

État de l'art sur l'utilisation de fluides frigorigènes inflammables de substitution, en particulier de la classe A3, dans les équipements de réfrigération, de climatisation et de pompes à chaleur

Stand der Technik über die Verwendung von brennbaren Kältemitteln, insbesondere der Klasse A3, als Alternativen in Kälte-, Klima- und Wärmepumpenanlagen

This Technical Report was approved by CEN on 20 March 2022. It has been drawn up by the Technical Committee CEN/TC 182.

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European foreword

This document (CEN/TR 17608:2022) has been prepared by Technical Committee CEN/TC 182 "Refrigerating systems, safety and environmental requirements", the secretariat of which is held by DIN.

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Introduction

CEN and CENELEC implemented standardisation request M/555 - IMPLEMENTING DECISION of 14 November 2017 on a standardisation request to the European Committee for Standardisation and to the European Committee for Electrotechnical Standardisation as regards use of flammable refrigerants in refrigeration, air conditioning and heat pump equipment. CEN/TC 182 took the lead and established a liaison with CENELEC/TC 61.

The two European Standardization Organizations CEN and CENELEC have responded positively to standardisation request M/555 regarding use of flammable refrigerants in refrigeration, air conditioning and heat pump equipment.

CEN/TC 182 and CENELEC/TC 61 were tasked to address the standardisation request. A new working group (WG12) was set up under CEN/TC 182 with active participation of experts nominated by CENELEC/TC 61.

The technical information was gathered by six ad hoc groups two of which were led by CENELEC/TC 61 experts. The ad hoc groups analysed the current status of risk assessment in general, commercial refrigeration, transport refrigeration, industrial refrigeration, air conditioning and heat pumps, and chillers. Each of the groups finalized their summary with conclusions about existing barriers and recommendations for additional options.

The Technical Committee reviewed guidance for the risk assessment in general and for refrigeration appliances in particular. This includes reviews of guidance and standards that apply for flammable gases in general. Also, the risk assessment was reviewed of global organisations like the risk approach of the Organisation for Economic Co-operation, Development and United Nations Development Programme and United Nations Environment Programme.

The requirements of the Standardisation Request M/555 were reviewed carefully. Having reviewed the documentation, the working group agree that, responding to the standardisation request, the following deliverables were to be prepared:

1) A Technical Specification for the installation of refrigeration, air conditioning and heat pump equipment containing flammable refrigerants, complementing existing standards.
2) A Technical Specification for the operation, servicing, maintenance, repair and decommissioning of refrigeration, air conditioning and heat pump equipment containing flammable refrigerants complementing existing standards.

The recommendations about transport refrigeration are beyond the standardisation request M/555. CEN/TC 413 will develop a specific EN standard dedicated to transport refrigeration risk assessment.

1 Scope

This document provides the results of a comprehensive assessment of the state of the art on the use of flammable refrigerants, in particular from class A3.

Refrigerants from class B (toxic) are excluded from this scope.

This document includes the following elements:

- A segmentation of the refrigeration, air conditioning and heat pump market, making use of existing studies and research, including an assessment of safety-related barriers to the uptake of flammable refrigerants in particular from class A3 across all relevant applications;

- An assessment of the way risk assessments is used in existing standards for refrigeration, air conditioning and heat pump equipment and in other standards and a review of available risk assessment research to be taken into account including identification of potential needs for additional research;

- Analysis of:

  - the relationship between risk and increased charge;
  - the acceptability of increased risk compared to the risk presented by other technologies;
  - the options for additional mitigation methods if the risk increase is unacceptable;

- Review of existing standards and work programmes and identification of standards that should be further updated under existing or future standardisation requests based on relevant product safety legislation, in particular with regard to allowable charge sizes of flammable refrigerants, taking into account available technology as well as emerging research and development;
- Identification of options for performance based requirements that result from risk assessments to enable the use of all flammable substances;
- Identification of options for risk minimisation and for offering flexibility in application of mitigation measures.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

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