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Thermal road vehicles - Temperature-controlled systems using flammable refrigerants for transport of goods - Requirements and risk analysis process

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

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English Version

Thermal road vehicles - Temperature-controlled systems using flammable refrigerants for transport of goods - Requirements and risk analysis process

Véhicules routiers réfrigérés - Systèmes sous contrôle
de température utilisant des fluides frigorigènes
inflammables pour le transport de marchandises -
Exigences et processus d'analyse des risques

Anforderungen und Risikoanalyseverfahren für
Kühlanlagen für den Straßentransport von
temperaturempfindlichen Gütern, die mit brennbaren
Kältemitteln betrieben werden

This European Standard was approved by CEN on 8 April 2024.

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European foreword

This document (EN 17893:2024) has been prepared by Technical Committee CEN/TC 413 “Insulated means of transport for temperature sensitive goods with or without cooling and/or heating device”, 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of an identical text or by endorsement, at the latest by December 2024, and conflicting national standards shall be withdrawn at the latest by December 2024.

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.

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations 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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

EN 17893:2024 (E)**Introduction**

For many years, hydrofluorocarbons (HFCs) have been the preferred refrigerants used in refrigerating systems of truck and trailer road vehicles and vans (TRV). However, the use of these refrigerants is being now considered as unacceptable due to their contribution to global warming. Regulation (EU) No 517/2014 of the European Parliament and of the Council imposes provisions for the reduction of the use of HFCs, in order to reduce the emissions of these fluorinated gases and lower the impact of their use on climate change. The use of HFCs is regulated in all EU Member States, the United Kingdom and EFTA countries and these fluorinated gases are to be phased down.

The continuous improvement of refrigerating systems in terms of reduction of greenhouse gas (GHG) emissions and energy efficiency results in the deployment of technologies which has entailed the use of flammable refrigerants. The use of these flammable refrigerants in transport refrigeration units (TRU's) may raise specific safety concerns or pose additional hazards which should be considered in the design phase and during operation, correspondingly in all phases of the product life cycle. Leakage of flammable refrigerants may lead to fire, explosion, or toxicity when decomposed.

This document has been developed to enable the safe use of flammable refrigerants in TRU's. This document enables system manufacturers, owners, and operators to understand and validate the risks associated with operation, especially for maintenance and repair. This document provides requirements and methodology to an acceptable level of safety.

For TRV's this document supplements EN 378 (all parts) with specific additional requirements. It provides minimum requirements for a risk-based approach to reduce the threat to persons, assets, and the environment.

The working group which developed this document consisted of representatives from refrigerating system manufacturers, refrigerated vehicle body builder, notified body, equipment owners and other interested industry experts.

1 Scope

This document specifies requirements for the use of flammable refrigerants class A2L, A2 and A3 as defined in ISO 817 with regard to:

- design and construction of the refrigerating system (as far as not specified in EN 378-2);
- operation;
 - in all anticipated operational modes and locations;
 - including continuous idling during standstill;
- service, maintenance and decommissioning;
- for the investigation and mitigation of risk for thermally insulated means of transport, including: trucks, trailers, tanks, vans (light commercial vehicles), wagons, containers for land transport, small containers, packaging.

This document describes an Operational Mode Risk Assessment (OMRA), which uses methods such as Hazard and Operability Analysis (HAZOP), Failure Mode and Effects and Criticality Analysis (FMECA), or Fault Tree Analysis (FTA) or a combination of these methods.

The document specifies requirements:

- for the validation of possible safety concepts and protective devices within the OMRA process, including charge release tests, simulation, and function tests of the associated protective equipment;
- for tests related to the application;
- using methodologies to achieve tolerable risk values.

Mobile air conditioning systems in cars are covered in ISO 13043 and refrigerated containers conforming to ISO 20854 are excluded.

This document could be used for class “B” refrigerants providing the OMRA is adjusted to account for their specific properties.

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 378-1:2016+A1:2020, *Refrigerating systems and heat pumps — Safety and environmental requirements — Part 1: Basic requirements, definitions, classification and selection criteria*

EN 378-2:2016, *Refrigerating systems and heat pumps — Safety and environmental requirements — Part 2: Design, construction, testing, marking and documentation*

EN 378-4:2016+A1:2019, *Refrigerating systems and heat pumps — Safety and environmental requirements — Part 4: Operation, maintenance, repair and recovery*

EN 1127-1:2019, *Explosive atmospheres — Explosion prevention and protection — Part 1: Basic concepts and methodology*

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EN 1736:2008, *Refrigeration systems and heat pumps — Flexible pipe elements, vibration isolators, expansion joints and non-metallic tubes — Requirements, design and installation*

EN 14624, *Performance of portable locating leak detectors and of fixed gas detectors for all refrigerants*

EN ISO 7010:2020, *Graphical symbols — Safety colours and safety signs — Registered safety signs (ISO 7010:2019, Corrected version 2020-06)*

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

EN 60068-2-6, *Environmental testing — Part 2-6: Tests — Test Fc: Vibration (sinusoidal) (IEC60068-2-6)*

EN 60068-2-75, *Environmental testing — Part 2-75: Tests — Test Eh: Hammer tests (IEC 60068-2-75)*

IEC 60079-10-1:2020, *Explosive atmospheres — Part 10-1: Classification of areas — Explosive gas atmospheres*

EN 60079-14, *Explosive atmospheres — Part 14: Electrical installations, design, selection and erection (IEC 60079-14)*

IEC 60079-15:2020, *Explosive atmospheres — Part 15: Equipment protection by type of equipment “n”*

IEC 60079-29-1, *Explosive atmospheres — Part 29-1: Gas detectors — Performance requirements of detectors for flammable gases*

IEC 60335-2-40:2018, *Household and similar electrical appliances — Safety — Part 2-40: Particular requirements for electrical heat pump, air-conditioners and dehumidifiers*

ISO 817:2014, *Refrigerants — Designation and safety classification*

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