CEN standardization work on refrigerating systems, especially standard EN 378

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Context of legal requirements and “harmonized” standards

- European Directives are Rules for the European Single Market.

- Applicable for refrigerating systems:
  Machinery Directive 2006/42/EC
  Pressure Equipment Directive 2014/68/EU
  Low voltage directive 2014/35/EU (only for domestic use)

- Manufacturers are obliged to place only “safe products” on the market.

- Manufacturers are obliged to perform conformity assessment procedure(s)
  – this includes a risk assessment which considers
    “reasonably foreseeable conditions” for the use of the product
  – this may include participation of a notified body
Context of legal requirements and “harmonized” standards

- “Harmonized” standards – their application is NOT mandatory.
- “Harmonized” standards are used in order to benefit from the “Presumption of Conformity”.
- “Harmonized” standards are published in the “Official Journal” of the EU.
- “Harmonized” standard for refrigerating systems: **EN 378-2**.
- **EN 378 series of standards** is prepared by CEN, Technical Committee TC 182, major work by TC 182 WG 6
Standard EN 378: Refrigerating systems and heat pumps – Safety and environmental requirements

- is a “generic” standard covering all kinds of refrigerating systems and heat pump with only few exception (e.g. vehicle air-conditioners acc. ISO 13043)

- The standard series EN 378 includes 4 parts:
  - EN 378-1: Basic requirements, definitions, classification and selection criteria
  - EN 378-2: Design, construction, testing, marking and documentation – “Harmonized”
  - EN 378-3: Installation site and personal protection
  - EN 378-4: Operation, maintenance, repair and recovery

- Please consider: Parts 1, 3 & 4 are not recognized as “harmonized” standards, but can be considered as “state of the art” in Europe.

- is the “origin” of the ISO standard on refrigerating systems ISO 5149
Harmonized standard EN 378-2
Design, construction, testing, marking and documentation

Considering all applicable conditions/factors, the **maximum allowable pressures (PS)** shall be determined for the refrigerating system or its parts, respectively (e.g. HP side and LP side). The aim is the consideration of all expected operational loads during design of the refrigerating system.

The determination of maximum allowable pressures (PS) is a new approach. It is differing from the approaches used in former national standards in Europe and also different to existing valid standards of IEC 60335 series or from other parts in the world.

This means: “Freedom” for the designer which PS value to choose - but also **responsibility**!
Harmonized standard EN 378-2

Design, construction, testing, marking and documentation

The manufacturer has to choose suitable components for the refrigerating system → Requirements are listed in Table 1, mainly normative references to component standards. Examples:

EN 14276-1: Vessels
EN 14276-2: Piping
EN 12263: Safety switching devices limiting the pressure
EN 12693: Positive displacement refrigeration compressors
EN 12284: Valves for refrigerating systems.

The manufacturer has to choose the necessary protection devices / measures as given in clause 6.2.6.2 → Flow Chart (new version in EN 378:2016).
Installation site requirements according to EN 378-1:2016 (general) and EN 378-3:2016 (detailed)

- based on general definitions in Part 1
  - type of refrigerant and its safety classification (taken over from ISO 817)
  - access category (a - general, b - supervised, c - authorized)
  - location classification (I - occupied space, II - compressor in machinery room or open air, III - machinery room or open air, IV – ventilated enclosure)

- Charge limitation requirements are given in Part 1, Annex C.
  This includes a set of requirements comprising
  - 2 tables and several additional conditions,
  - in case of flammable refrigerants different approaches for “human comfort” and “other applications”,
  - alternative measures in sub-clauses C.2 and C.3.

- In case of “machinery room” (authorized): no charge restriction.
Installation site requirements according to EN 378:2016

- Assessment of charge limitation requirements is quite complicated, if only the standard is followed,
- and gets even more complicated: each EU member state can set out differing requirements, which will **prevail** - in case of legal requirements - over the requirements given in standard EN 378-1.
- Such legal requirement will arise from, e.g.
  - workplace safety regulations,
  - building regulations,
  - environmental regulations.
Installation site requirements according to EN 378:2016

Summary

The current situation is not yet providing sufficient support for the application of alternative refrigerants with lower GWP.

Needed in the future: is a simplified and commonly accepted approach on installation site requirements for all kinds of refrigerating systems.

This future approach shall include
- risk assessment, based on the design of the individual design of a refrigerating system
- and all types of refrigerants.
Thank you for Attention

→ Questions?