Tecumseh

CHILLVENTA eSPECIAL

Refrigeration | AC & Ventilation | Heat Pumps

13.–15.10.2020

CONNECTING EXPERTS.

ACTING for an EFFECTIVE ENVIRONMENTAL TRANSITION IN EU

NÜRNBERG MESSE

The F-Gas Regulation, a driving force

Fluorinated gases (F-Gases), which include hydrofluorocarbons (HFCs), are powerful greenhouse gases, with a global warming potential (GWP), involved in destruction of ozone layer and climate change.

The objective of the F-Gas Regulation is to **protect the environment by reducing emissions of fluorinated greenhouse gases.**

As EU Regulation the F-Gas is directly applicable and enforceable in all Member States (contrary to a Directive, which must be transposed into national law).

The F-Gas Regulation applies from 1 January 2015.

Climate change

The F-Gas Regulation (EC) 842/2006 was adopted on 17th May 2006 and later revised and replaced by (EU) 517/2014 in April 2014

F-Gas Regulation mechanism

The Regulation:

(a) lays down rules on the containment, use, recovery and destruction of fluorinated greenhouse gases and on accompanying measures relating thereto

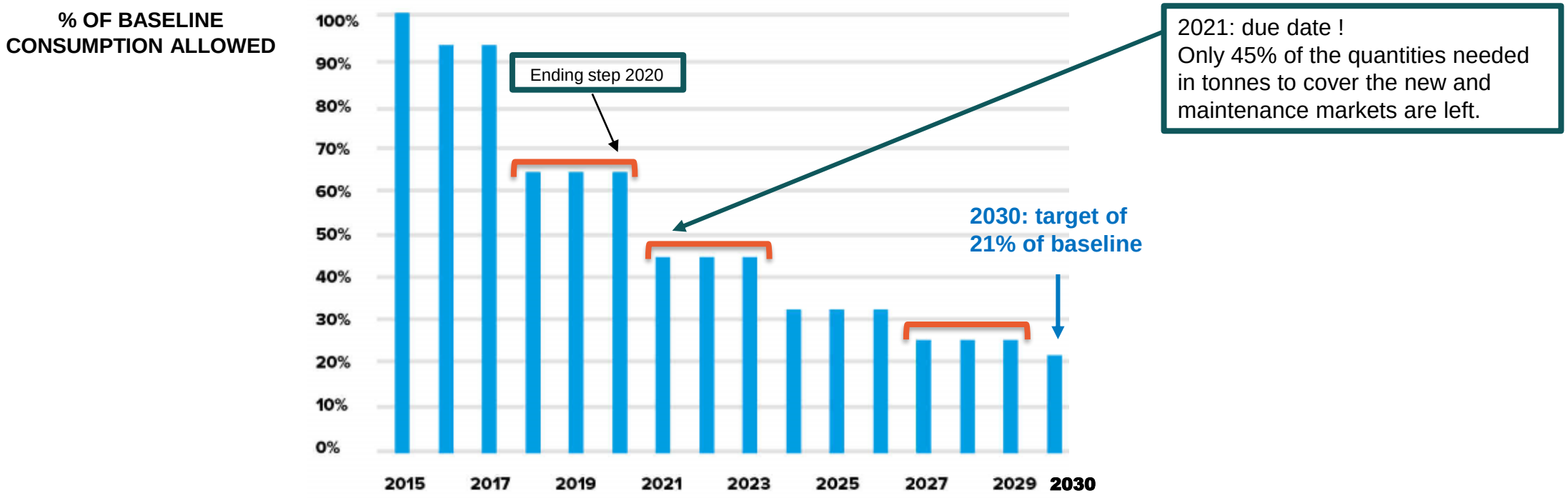
(b) imposes **conditions on the placing on the market of certain products and equipment** containing or relying on fluorinated greenhouse gases

(c) imposes conditions on certain specific uses of fluorinated greenhouse gases

(d) **sets quantitative limits for the placing on the market of hydrofluorocarbons.**

Timeline of The F-Gas Regulation

HFC phase-down – a main measure of the regulation which runs from 2015 to 2030



To keep necessary quantities for new equipment and maintenance, the F-Gas Regulation forces us to move to <150 GWP refrigerants in commercial refrigeration.

Identification of key points / Transition to A2L

	Topic
Standards & Regulations drivers	F-gas regulation
	Charge Limit
	Risk assessment
	ATEX
	PED
Economical & business factors	HFOs price perception
	Refrigerant availability & sustainability
	Other component ready for A2Ls
	TCO
Policy & Market Forces	F-gas why it's mandatory by when (fact)
	Natural vs Chemicals
Technical & Product Impact	Temperature Glide
	Flammability (A2Ls)
	People safety

Risk Assessment - Commercial Refrigeration 1 to 20 kW

Risk = the probability of the presence of refrigerant * probability of ignition by a component

Search for leak risk points → Estimation of the extent of the leak area and its presence over time → Identification of ignition sources in risk areas

- A risk analysis is to be carried out according to:
  * the **refrigerant charge** necessary for the proper functioning of the installation
  * the **sources of potential ignition** installed in the volume considered

- Study the **potential spreading area** of the refrigerant and place components outside this area

Main focus from Refrigerant Systems Contractors on Risk Assessment

Risk Assessment – In practice

- Respect for existing **refrigeration good practices**

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- **Choice of the location** of the condensing units (ie protection from impact)

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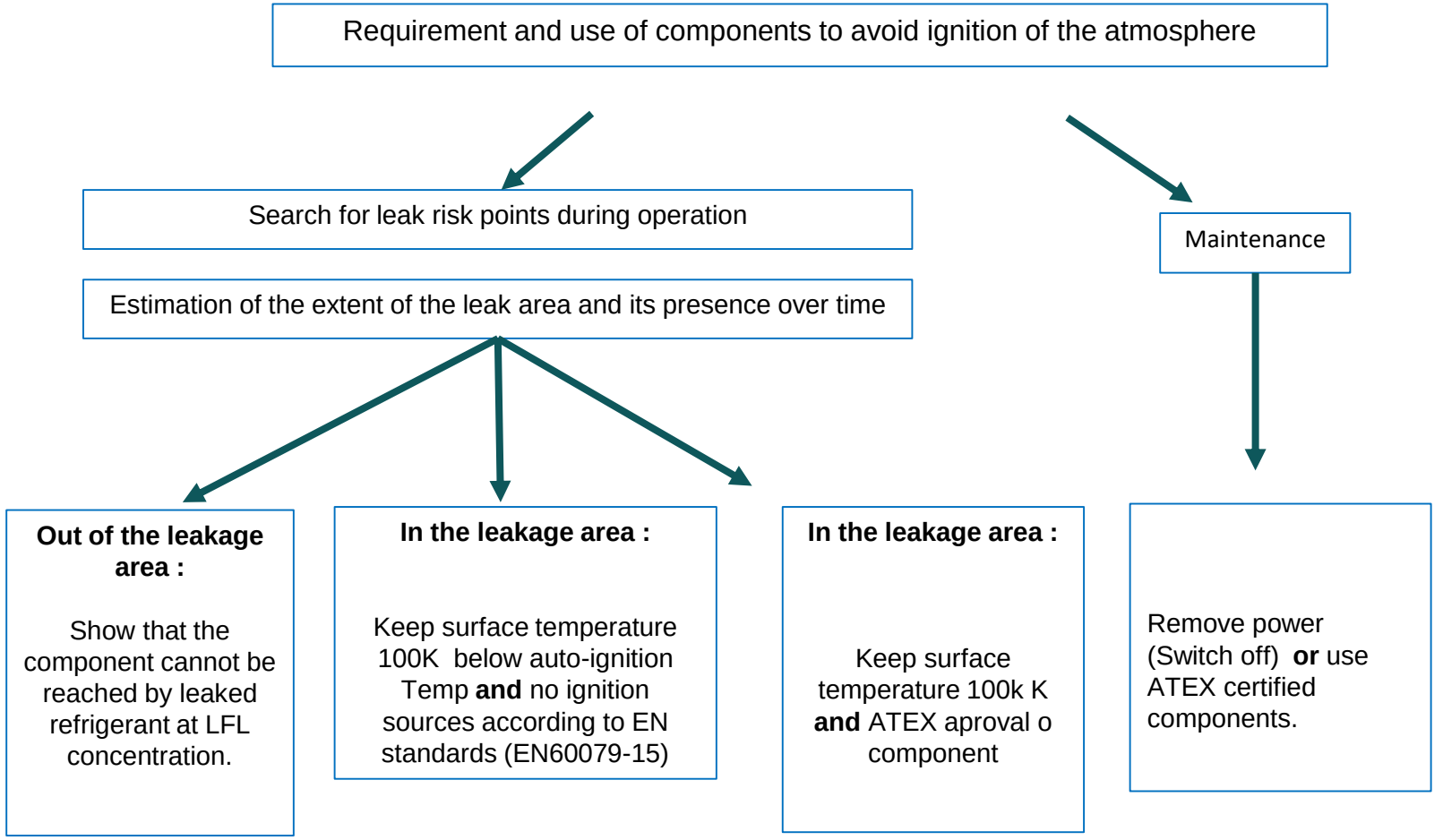
- Guarantee **control of the risks of leaks** from the refrigeration system (sealing)

Characterization of the zone - Location of the component

- The design and installation of a condensing unit in accordance with Product Standards implies that it does not generate an ATEX zone.

- Compliance with product standards means minimising the risk of leaks by confining the fluid in an airtight system.



Characterization of the zone - Location of the component

- The product standards EN60335 and the generic standard EN378 define the use of flammable fluids without imposing compliance with the ATEX directive in the case of installation outside the ATEX zone.
- The vapor compression system is not the cause of ATEX zones (compressor).

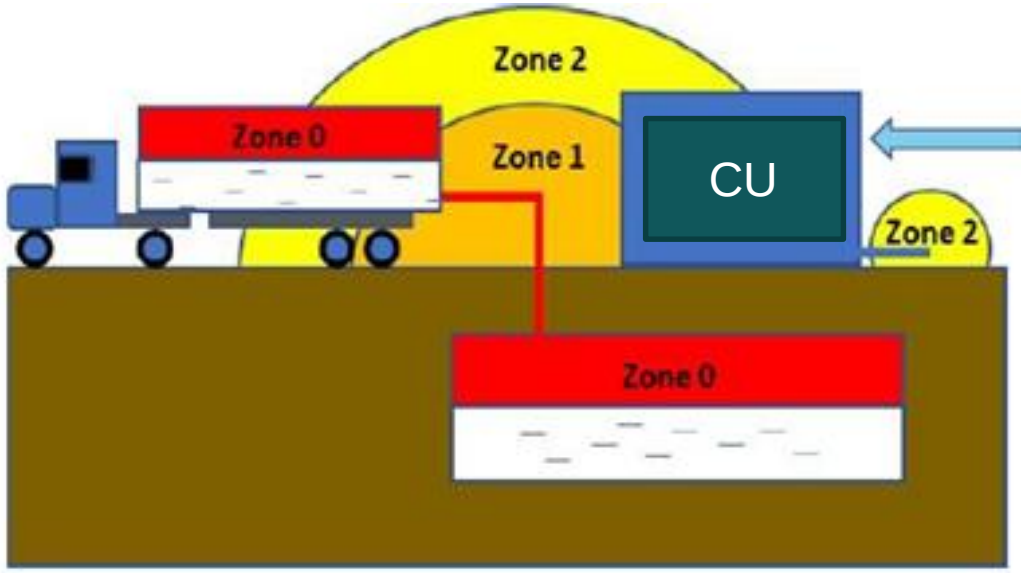


Illustration – source *ASERCOM*

TECUMSEH products are designed in accordance with EN60335. The risk of leakage is minimized by design and layout.

Example of load limit calculation

Chilling Walk 'In Cold Room / EN378: 2016

Application		Chilling Room	
Refrigerant / reference		R 134a equivalent R 404A equivalent	
Chilled Volume (Walk 'In Cold Room)	170 m³	Category of Access	Controlled Access (b)
Cooling Capacity calculation	8,5kW	Location Category	Outdoor Condensing Unit (II)
Refrigerant Charge in the system R 134a equivalent R 404A equivalent	6,2kg 5,5kg		
Evaluation of the Refrigerant Charge Limit with A2L	**R 1234yf**	**9,83 kg**	✓
	R 454C	**9,25 kg**	✓
	R 455A	**14,4 kg**	✓

SILAG4573Z

There are no load constraints to the use of A2L in concrete cases of application

Maximum load EN378 - Paragraph C3 - Practical aspects

For cold stores operating with a remote condensing unit, the refrigerant charge may be increased above the limits of the graphs corresponding to Annex C2.

The C3 initials apply because :

- The refrigerant is an A2L
- SILENSYS ADVANCED is not a pre-charged monobloc system.
- The cold room is not considered as an occupied volume because the occupancy time is not significant.
- The words "the door is not airtight" are not relevant.

The designers of the whole refrigeration system shall consider all the "dashes" of EN378 - Part 1, paragraph C3.

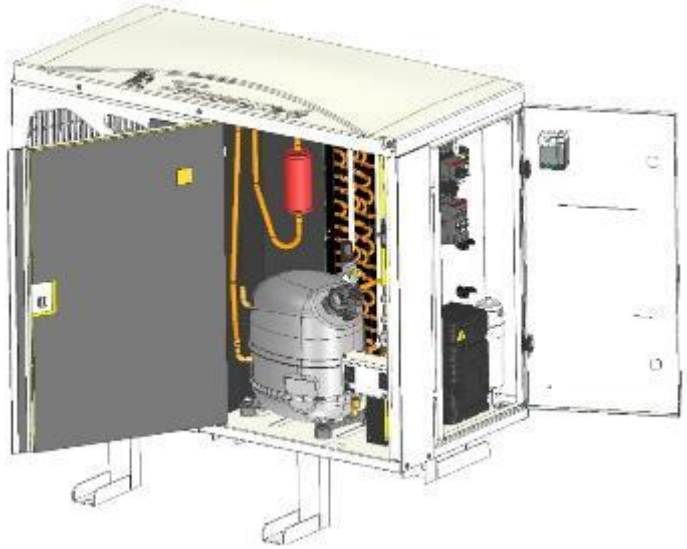
The necessary reconfiguration of the SILENSYS A2L - "Safe by Design

- **Prevention of the formation of flammable zones**
  Reduction of the refrigerant concentration thanks to a dedicated fan.

- **Strict application by Tecumseh of safety standards:**

  (a) Separation of electrical and refrigeration components
  Standard components housed in a protected case.
  Specific cable glands.

  (b) Certification of control and safety components
  Pressure switches, condenser variator, crankcase heater: components certified for A2L and located in the refrigeration compartment.



The SILENSYS ADVANCED Condensing Unit is designed for the safety of property and people.

SILENSYS complies with regulatory requirements Eco design

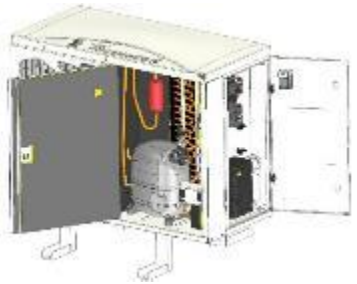
The SILENSYS condensing units are :

SILENSYS condensing units are qualified for low GWP refrigerants since 2017:

- Chilling T°: R-134a, R-513A, R-452A, (R-404A)
- Freezing T°- R-452A, (R-404A)

Condensing units SILENSYS ADVANCED For A2L refrigeration systems

- R-455A, R-454C, R-1234yf



How to Select the Condensing Unit?

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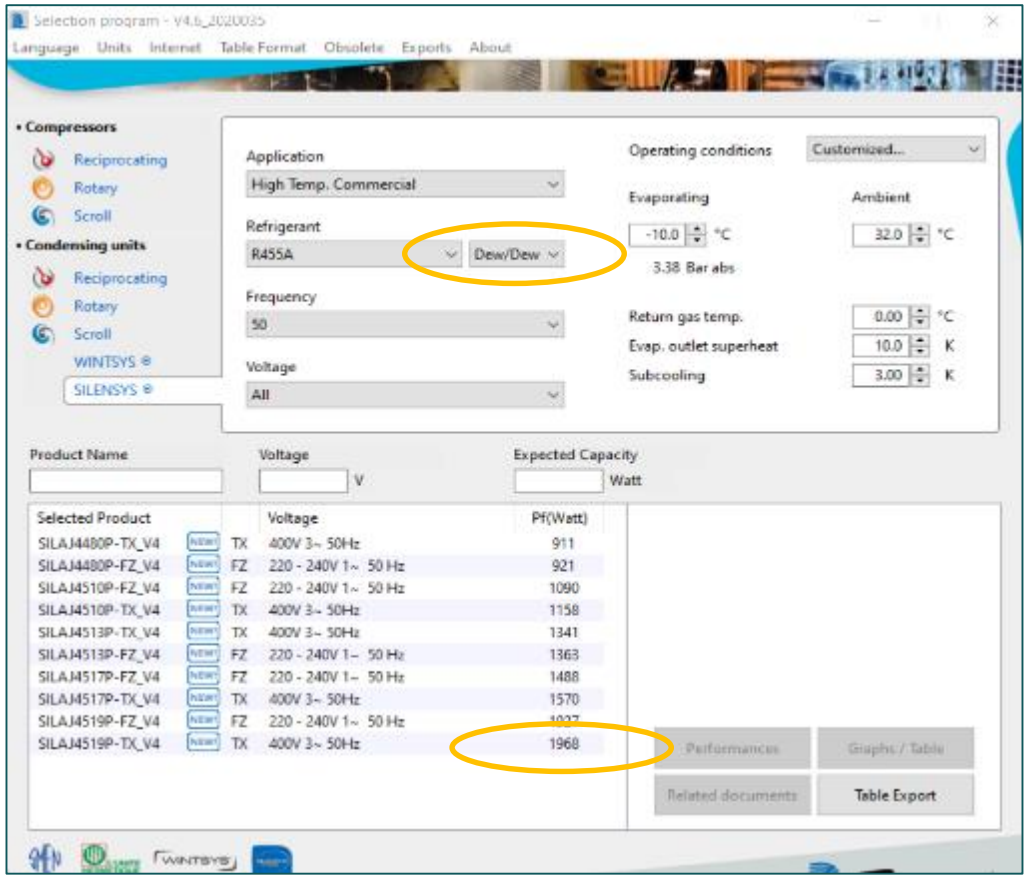
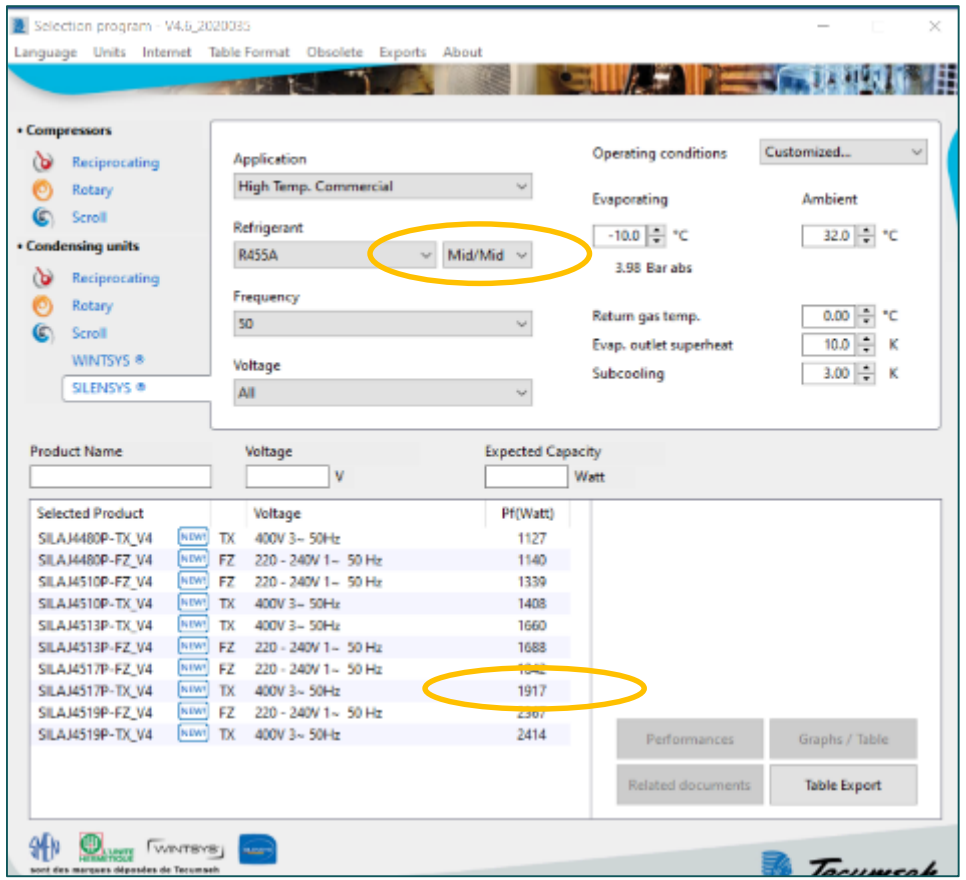




The EN13215 Standard allows the selection of products in a comparable way.
The average temperature selection closely reflects the behaviour of the application.

Points of vigilance on site / Installation of a condensing unit

Sources of ignition are far enough away from the unit or placed in an enclosure preventing the penetration of the fluid: Observe installation instructions

Sufficient distance has been provided to prevent the possible ingress of fluid-laden air through a suction opening or other opening in the building.

Natural air renewal is available around the group. It prevents any accumulation of fluid in case of leakage.

Both units are positioned to ensure a minimum level of risk. Without additional risk analysis, the groups shall be placed on the same horizontal plane.

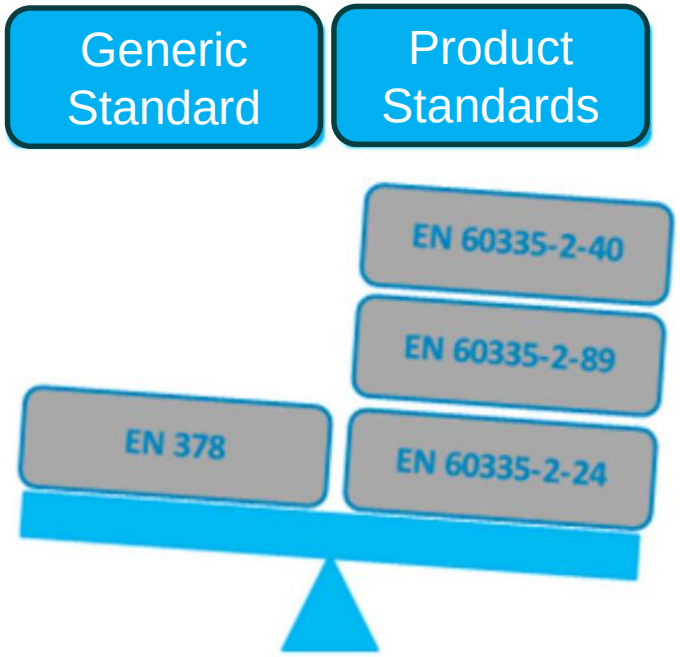
The use of A2L refrigerants simply requires the use of good practice.

An efficient and sustainable transition to Commercial Refrigeration from 1 to 20 kW

– From an "Implementation" point of view:

- **F-Gas is the issue that impacts our sector of activity for both new installation and maintenance**
  - The HFCs Phase Down mechanism is the main driving measure to keep the CO_2 emissions reduction target
  - By lowering the GWP by 2023-2024 latest we'll keep the necessary quantity of refrigerants required for the proper functioning of the installed base in the field.
  - According to Various application segments, some bans on commercial refrigeration (2020 to 2022) will drive our industry to choose the lowest GWPs as soon as possible.
  - The non-proliferation of refrigerants must guide the choice towards long-term solutions in limited numbers.
- **The A2L solution in direct expansion is the sustainable choice technically and economically speaking regarding Total cost of Ownership**
- **The simplest solution through the respect of good practices:**
  - Thermodynamic characteristics are very similar to that of HFCs.
  - The assessment of the main risks (flammability, load limit, temperature glide, ATEX, etc.) is managed by the design.
  - The remaining portion of the operator risk analysis is approximately 20% (see manufacturers' installation guides).
  - The components are qualified and declared in accordance with the harmonized standards and are suitable for the use of flammable fluids.
  - No over-equipment required
  - Tecumseh condensing units comply with eco-design (MEPS), and are designed for high ambient temperatures.
  - Product selection, installation and commissioning are as simple as they are today with HFCs.
  - Some specific precautions remains in terms of safety, throughout the life time of an installation while commissioning or maintenance operation
  - The potential learning curve is fast because A2L are ultimately very close to HFCs.

When is EN 378 applied and when is IEC applied?



- Product safety standards (EN 60335-… series) must be studied as a priority.
- EN 378 covers cases where a product does not meet the field of application of one of the product safety standards (excess load, ...)

Thank you for your attention

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