KNOW-HOW

April 2017

Focus on: F-Gas Regulation

Three years ago, Regulation (EU) No. 517/2014 of the European Parliament and of the Council of 16 April 2014 on fluorinated greenhouse gases and repealing regulation (EC) No 842/2006 – the F-gas regulation – was adopted in Brussels. It was published in the Official Journal on 20 May 2014, entering into force and application on 1 January 2015.

What has happened since then?

In the meantime, the Kigali agreement can be viewed as an important milestone in climate protection. The community of nations agreed on a gradual but drastic reduction in hydrofluorocarbons (HFCs), which are especially harmful to the climate. HFCs up to now have been replacing the chlorofluorocarbons (CFCs), which damage the ozone layer and which the international community agreed to ban in 1987 under the Montreal Protocol. The new rules adopted by the treaty states in Kigali, Rwanda, now substantially expand the Montreal Protocol, and a treaty to protect the ozone layer makes them an effective instrument of climate protection. That's the conclusion in the press release from Germany's Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety dated 15 October 2016.

The Kigali agreement covers 17 HFCs and R23 (as Group II substances with separate treatment). HFOs are not considered.

This agreement established clarity for all involved about how the reductions of HFCs will evolve, not just in Europe but all over the world.

What's the current situation?

At Chillventa 2016 we saw sold-out specialist forums for presentations and discussions of new refrigerants, solutions for individual industries, low GWP refrigerants and the risks of flammable refrigerants. The need to stay informed about consequences and opportunities has continued uninterrupted down to today.

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From 2017, the following specific effects of the F-gas regulation must be taken into account:

- Leak checks pursuant to article 4 – here the transitional period for leak checks on equipment containing quantities of less than 3 kg and hermetic equipment with less than 6 kg ends effective 1 January 2017. Now the limit of less than 10 tonnes of CO_2 equivalent applies.

- Labelling requirement under article 12 – here, from 1 January 2017, the quantity of fluorinated greenhouse gases, expressed in weight and CO_2 equivalent, and the greenhouse potential of these gases must appear on the label.

- Under articles 15 and 16 and Annex V, the reduction of partially fluorinated hydrocarbons placed on the market will be set by level 2 of the quota system, at 93% of the total quantity of hydrofluorocarbons, as defined in article 2(1) and Annex 1, placed on the market in the union during the period from 2009 to 2012.

In backup I, you'll find a list of the current regulations and other helpful sources, with the associated links.

Uncertainty?

Presentations and publications reported on topics concerning the regulation, with its 40 pages, that have aroused uncertainty among operators, planners, potential operators and employees at companies. When reading the individual articles, it's important also to bear the definitions of terms from article 2 in mind. That article establishes 39 definitions for the purposes of the regulation, many of which are substantially different from how the same terms are understood in the industry.

Two examples of topics that have contributed to the uncertainty:

- **“Are split devices affected by the HFC ban?”**

Regulation: From 1 January 2025, mono- split air-conditioning systems containing less than 3 kg of fluorinated greenhouse gases, that contain, or whose functioning relies upon, fluorinated greenhouse gases with a **GWP of 750** or more, can no longer be placed on the market.
What does that mean? Mono- split air-conditioning systems with, for example, less than 3 kg of R32 already meet the requirements today that will apply as from 2025. Single split air-conditioning systems containing 3 kg of F gases or more **are not banned!** Multi-split air-conditioning systems, no matter how much F gases they contain, **are not banned!**

- **“The future of VRF/VRV?“**

Regulation: From 1 January 2022, there will be a ban on marketing **multipack centralised refrigeration systems** for commercial use with a rated capacity of 40 kW or more that contain, or whose functioning relies upon, fluorinated greenhouse gases with a GWP of 150 or more, except in the primary refrigerant circuit of cascade systems where fluorinated greenhouse gases with a GWP of less than 1,500 may be used.
What does that mean? A look at the definitions of terms clarifies what’s intended here:
Regulation: In article 2, definitions, under section (37) you find: For the purposes of this regulation the following definition applies: (37) **“Multipack centralised refrigeration systems”** means systems with two or more compressors operated in parallel, which are connected to one or more common one or more common condensers **and** to a number of cooling devices such as **display cases, cabinets, freezers or to chilled store rooms.**

Then the regulation also contains additional prohibitions that are connected with VRF/VRV:

Regulation: From 1 January 2022, refrigerators and freezers for **commercial use** (hermetically sealed equipment) that contain HFCs with a GWP of 150 or more can no longer be placed on the market.
Here again, a look at the definitions of terms clarifies what's intended:
Article 2, **definitions:** For the purposes of this regulation the following definition applies: (32) **"commercial use"** means used for the storage, display or dispensing of products, for sale to end users, in retail and food service.
And another:
Regulation: From 1 January 2020, stationary refrigeration equipment that contains, or whose functioning relies upon, HFCs with a GWP of 2,500 or more can no longer be put on the market. Exception: equipment intended for application designed to cool products to temperatures below –50°C.
Here you find the answer in the refrigerants currently being used: the current common refrigerant for VRF/VRV: R410A, with a GWP of 2087.5.
So VRF/VRV systems are not affected by the bans.

What solutions are already apparent today?
Home appliances (refrigeration and freezing) with the refrigerant R600a generally do not fall under the F-gas Regulation.
Transport refrigeration has chosen a pragmatic solution. They've converted from R404A to the refrigerant R452A. It can be used immediately, but because it has a GWP of 2140, it's not a long-term solution. Here non-flammability is of major importance.
In commercial refrigeration there is an apparent trend toward R290 in series-produced hermetically sealed equipment containing low charges.
In automotive air-conditioning systems, though, R1234yf has now become established.
In industrial refrigeration, R717 remains dominant. For large liquid coolers, R134a will presumably be replaced in the midterm by HFOs or HFO blends.

The ASERCOM association reports on replacements for:

- R404A

Among the non-flammables, one finds a GWP value of about 2000 → R452A and R452C
Among materials in safety group A2L one finds a GWP value below 1400 → R449A and R448A or R32.

- R134a

Among the non-flammables, one finds a GWP value of about 600 → R450A and R513A
Among materials in safety group A2L, one finds a GWP value less than 4 → R1234yf and ze(E).

In backup I you can find a collection of the current regulations and other helpful sources, with the associated links.

In backup II you can find current statistics on the use of F-gases in Germany and Europe, with the associated links.

In backup III you can find information about literature sources.

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