

# EU F-Gas Regulation Guidance

## Information Sheet 25: Understanding CO<sub>2</sub> Size Thresholds

### Target audience for this Information Sheet

This information sheet is aimed at all organisations that need to use the “CO<sub>2</sub> size thresholds” that appear in several parts of the 2014 EU F-Gas Regulation. This includes end users, maintenance contractors and equipment manufacturers. It is also of relevance to F-Gas producers, importers and exporters.

### 1. Background

This guidance is for organisations affected by the 2014 EU F-Gas Regulation (517/2014). The F-Gas Regulation creates controls on the use and emissions of fluorinated greenhouse gases (F-Gases) including HFCs, PFCs and SF<sub>6</sub>. The 2014 EU F-Gas Regulation replaces the 2006 Regulation, strengthening all of the 2006 requirements and introducing a number of important new measures. The 2014 Regulation makes use of various thresholds, using “CO<sub>2</sub> equivalent”. This Information Sheet provides guidance on how these new thresholds are defined and how they should be used.

A wide range of further guidance is available for other aspects of the EU F-Gas Regulation – see Information Sheet 30 for a full list and a glossary of terms.

### 2. Use of Size Thresholds in the F-Gas Regulation

Various rules in the F-Gas Regulation use a size threshold. Small equipment below a threshold might not be affected, but above a certain size a relevant rule starts to apply. Thresholds are important as it is not always cost effective or practical to apply certain rules to small equipment. The requirements in both the 2006 and 2014 EU F-Gas Regulations that make use of a size threshold are:

- a) Mandatory leak checks
- b) Automatic leak detection systems
- c) Record keeping
- d) The refrigeration equipment Service Ban (2014 Regulation only)
- e) Reporting on production, import and export of bulk F-Gases

From 2017 product and equipment labels must show the amount of F-Gas in a system expressed in kg and in CO<sub>2</sub> equivalent. This information must also be in instruction manuals and advertising material.

### 3. CO<sub>2</sub> Equivalent (CO<sub>2</sub>e) Size Thresholds

In the 2006 Regulation, the thresholds were based on the quantity of F-Gas, measured in terms of the mass of fluid (in kilograms). For example, mandatory leak checks were required on all refrigeration and air-conditioning systems containing more than 3 kg of HFC refrigerant. The same kilogram threshold applied to all refrigerant types. Under the 2014 Regulation the thresholds have been changed to CO<sub>2</sub> equivalent (CO<sub>2</sub>e). For example, the 3 kg leak checking threshold has been replaced with a threshold of 5 tonnes CO<sub>2</sub>e.

**What is “tonnes CO<sub>2</sub> equivalent”?** Tonnes CO<sub>2</sub> equivalent is calculated by multiplying the mass of gas (in tonnes) by the GWP (global warming potential) of that gas. GWP compares the global warming impact of a gas compared to that of CO<sub>2</sub> (which has a GWP of 1). F-Gases have high GWPs.

For example, the tonnes CO<sub>2</sub> equivalent of 10 kg of HFC 404A is calculated as follows:

$$\begin{aligned}\text{CO}_2 \text{ equivalent} &= \text{mass (in tonnes)} * \text{GWP} \\ &= (10/1,000) * 3,922 \\ &= 39.2 \text{ tonnes CO}_2\text{e}\end{aligned}$$

For the purposes of the 2014 EU F-Gas Regulation, the GWPs to be used in these calculations are those from the UN IPCC 4<sup>th</sup> Assessment Report. For pure gases, these GWP values are listed in Annex I of the Regulation. Many refrigerant gases in common use are blends, and for these you can calculate the GWP from the proportions and GWPs of the component pure gases (see table 2).

**Why has the change to tonnes CO<sub>2</sub> equivalent been made?** The use of CO<sub>2</sub>e thresholds creates a lower kg threshold for F-Gases with a high GWP. This penalises those organisations that use high GWP gases and will encourage them to select equipment that uses F-Gases with the lowest practical GWP. This supports the objective of the F-Gas Regulation which is to minimise the global warming impact of F-Gas emissions.

#### 4. Comparison of old and new thresholds

Table 1 shows the 2006 kg thresholds, the new 2014 CO<sub>2</sub> thresholds and kg equivalents for a high GWP and moderate GWP refrigerant (HFC 404A, GWP = 3,922; HFC 134a, GWP = 1,430).

**Table 1: Size Threshold Used in the Regulations**

Requirement	2006 Regulation	2014 Regulation		
	kg threshold	tonnes CO <sub>2</sub> threshold	kg equivalent for HFC 404A	kg equivalent for HFC 134a
Thresholds for equipment size: mandatory leak tests, record keeping and service ban				
Annual leak test*	3 kg	5 tonnes CO <sub>2</sub>	1.3 kg	3.5 kg
6 monthly leak test	30 kg	50 tonnes CO <sub>2</sub>	12.7 kg	35 kg
Automatic leak detection	300 kg	500 tonnes CO <sub>2</sub>	127 kg	350 kg
Record keeping*	3 kg	5 tonnes CO <sub>2</sub>	1.3 kg	3.5 kg
Service ban	n/a	40 tonnes CO <sub>2</sub>	10.2 kg	28 kg
Thresholds for reporting of bulk product				
Production, import, export	1,000 kg	100 tonnes CO <sub>2</sub>	25 kg	70 kg
Destruction, feedstock	n/a	1,000 tonnes CO <sub>2</sub>	250 kg	700 kg
Products	n/a	500 tonnes CO <sub>2</sub>	125 kg	350 kg
Independent audit	n/a	10,000 tonnes CO <sub>2</sub>	2 500 kg	7,000 kg

\* The lowest thresholds for mandatory leak testing and record keeping are doubled for hermetically sealed equipment, from 5 tonnes CO<sub>2</sub> to 10 tonnes CO<sub>2</sub>

n/a Not applicable: these requirements were not in the 2006 Regulation

The size thresholds for the high GWP HFC 404A are considerably smaller under the 2014 Regulation than previously. The reporting thresholds for production, import and export of bulk product are more than 10 times lower than in the 2006 Regulation.

## 5. CO<sub>2</sub> to kg Conversion Table

**Table 2: Equipment Size Thresholds for Various F-Gases and Refrigerant Blends**

F-Gas	GWP	Mass in kg for the respective thresholds in CO <sub>2</sub> equivalents			
		5 tonnes CO <sub>2</sub>	40 tonnes CO <sub>2</sub>	50 tonnes CO <sub>2</sub>	500 tonnes CO <sub>2</sub>
SF <sub>6</sub>	22,800	0.2	1.8	2.2	22
HFC 23	14,800	0.3	2.7	3.4	34
HFC 508B	13,396	0.4	3.0	3.7	37
HFC 143a	4,470	1.1	8.9	11.2	112
HFC 507A	3,985	1.3	10.0	12.5	125
HFC 404A	3,922	1.3	10.2	12.7	127
HFC 428A	3,607	1.4	11.1	13.8	139
HFC 125	3,500	1.4	11.4	14.3	143
HFC 434A	3,245	1.5	12.3	15.4	154
HFC 227ea	3,220	1.6	12.4	15.5	155
HFC 422A	3,143	1.6	12.7	15.9	159
HFC 422D	2,729	1.8	14.7	18.3	183
HFC 417A	2,346	2.1	17.1	21.3	213
HFC 423A	2,280	2.2	17.5	21.9	219
HFC 438A	2,264	2.2	17.7	22.1	221
HFC 427A	2,138	2.3	18.7	23.4	234
HFC 407A	2,107	2.4	19.0	23.7	237
HFC 410A	2,088	2.4	19.2	23.9	239
HFC 442A	1,888	2.6	21.2	26.5	265
HFC 407F	1,825	2.7	21.9	27.4	274
HFC 437A	1,805	2.8	22.2	27.7	277
HFC 407C	1,774	2.8	22.5	28.2	282
HFC 426A	1,508	3.3	26.5	33.2	332
HFC 134a	1,430	3.5	28.0	35.0	350
HFC 245fa	1,030	4.9	38.8	48.5	485
HFC 365mfc	794	6.3	50.4	63.0	630
HFC 32	675	7.4	74.1	74.1	741
HFC 152a	124	40.3	322.6	403.2	4,032

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