

# Refrigeration & Air-Conditioning Technology

## General instructions for the use of Refrigerants

### Refrigerant data from CFC-alternative refrigerants

Refrigerant	Composition	ODP	GWP	Temperature glide
R22 (HFC-CFC refrigerant)	CHCLF2	0.05	1,700	–
R134a (HFC chlorine-free refrigerant)	CF3CH2F	0	1,300	–
R32 (HFC chlorine-free refrigerant)	CH2F2	0	580	–
R404A (HFC chlorine-free blends)	52% R143a, 44% R125, 4% R134a	0	3,750	–
R507 (HFC chlorine-free blends)	50% R143a, 50% R125	0	3,800	–
R407C (HFC chlorine-free blends)	23% R32, 25% R125, 52% R134a	0	1,610	7.5K
R410A (HFC chlorine-free blends)	50% R32, 50% R125	0	1,890	0.2K

ODP = Ozone Depletion Potential (degree in which the ozone layer is destroyed)

GWP = Global Warming Potential (degree in which it contributes to the greenhouse effect)

### Instructions for safe and proper use of the refrigerants:

#### Refrigerant:

- Wear protective gloves and safety goggles
- Do not let refrigerant come in contact with skin
- Do not inhale high concentrations of vapours  
(Lack of oxygen causes a narcotic effect and is a danger to life)
- Do not smoke around refrigerant
- Working place / room must be thoroughly aired, if necessary extracted

#### Refrigerant bottles:

- Secure against accidents, do not throw
- Do not expose to direct sunlight and do not place near radiators or other heat sources
- Do not use open flame
- Do not disassemble or remove valves
- Damaged bottles need to be properly returned
- Close empty containers

#### Air-conditioners:

- Air-conditioner leaks need to be repaired immediately
- Do not allow refrigerant to leak while filling or doing maintenance work
- In high concentrations (for example pipe burst), leave the room and do not enter again until it has been properly ventilated
- Only do brazing work together with protective nitrogen gas and only in well ventilated areas

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### Flare connections

Normal flare size in accordance with JIS B8607:2008

Flare outer diameter in relationship to the pipe diameter

Pipe outer diameter mm / inch	Metric	Wall thickness mm / inch	Flare outer diameter with R22-, R134a-, R404-, R407C air-conditioners	Flare outer diameter with R410A air-conditioners
6 mm	–	1 mm	8.5 mm	9.1 mm
8 mm	–	1 mm	11.1 mm	11.1 mm
10 mm	–	1 mm	13.6 mm	13.2 mm
12 mm	–	1 mm	15.3 mm	16.5 mm
16 mm	–	1 mm	19.5 mm	19.2 mm
18 mm	–	1 mm	22.0 mm	22.7 mm
1/4"	6.35 mm	0.35"	9.0 mm	9.1 mm
5/16"	7.94 mm	0.35"	11.0 mm	11.1 mm
3/8"	9.52 mm	0.35"	13.0 mm	13.2 mm
1/2"	12.70 mm	0.35"	16.2 mm	16.6 mm
5/8"	15.88 mm	0.35"	19.4 mm	19.7 mm
3/4"	19.05 mm	0.35"	23.3 mm	24.0 mm