



Refrigerants

- Reclaimed HCFCs
- HFCs
- HFOs
- Ammonia
- Hydrocarbons
- Thermodynamic tools
- Packaging characteristics
- Refrigerant recovery
- Refrigerant reclaiming
- Physico-chemical characteristics of fluids





Solutions for replacing R-22 T

Reminder: Use of R-22T will be forbidden as from 31/12/2014 in Europe.

For each application, replacement fluids are possible for direct expansion installations.

A preliminary comprehensive study of all parameters, checking the general condition of the installation, its economic viability and the oil to use, is essential before any fluid change over.

Replacement refrigerants for R-22:

- Refrigeration application:
Performax™ LT (R-407F), R-404A, R-427A, R-407A, R-422D.
- Air-conditioning application:
R-407C, R-422D, R-427A.



HFO: 4th generation fluids for future installations

HFO: molecules on the market (*)

| Current HFC | HFO Non flammable | HFO Low flammability (ASHRAE A2L) | Application examples |
|--------------------|----------------------|---|---|
| R-134a GWP=1430 | | Solstice™ yf GWP=4 | Automotive AC, Vending Machines, Refrigerators |
| | | R-1234ze GWP=6 | Chillers, CO ₂ Cascade, Refrigerators |
| R-123 GWP=77 | R-1233zd GWP=5 | | Centrifugal chillers |

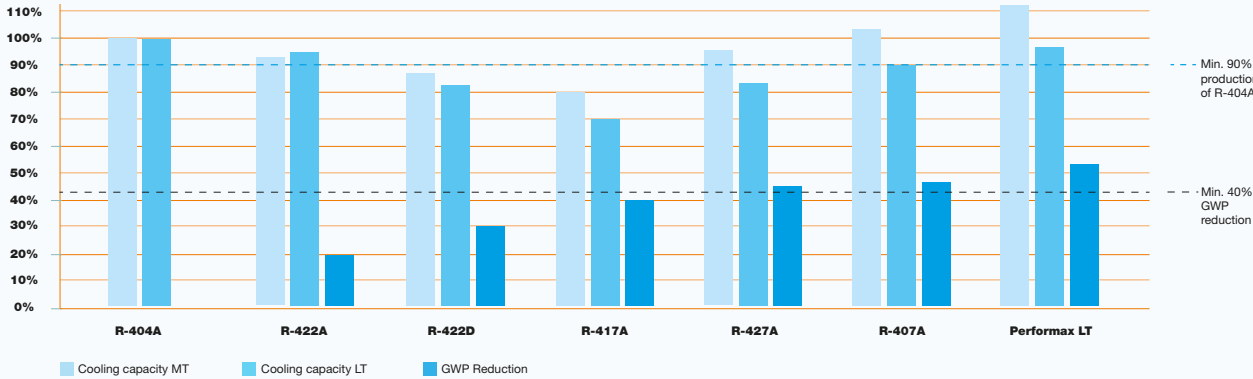
(*) Mixes are currently in development phase. Climalife will accompany you and present these new solutions to you.

Replacement solutions for R-404A

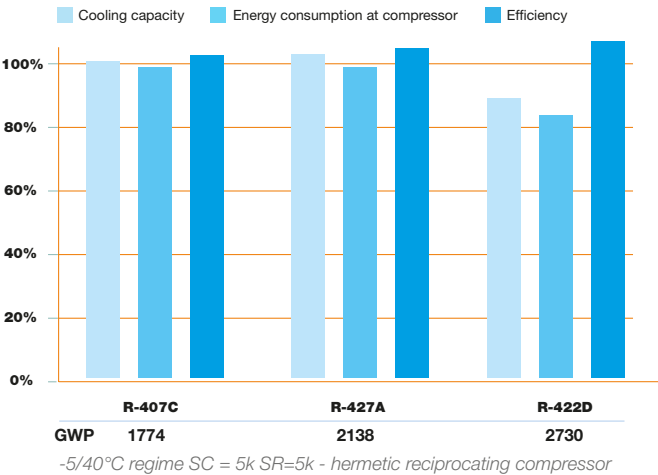
With F-Gas regulations in mind, be prepared and choose tomorrow's fluid now.

Selection criteria:

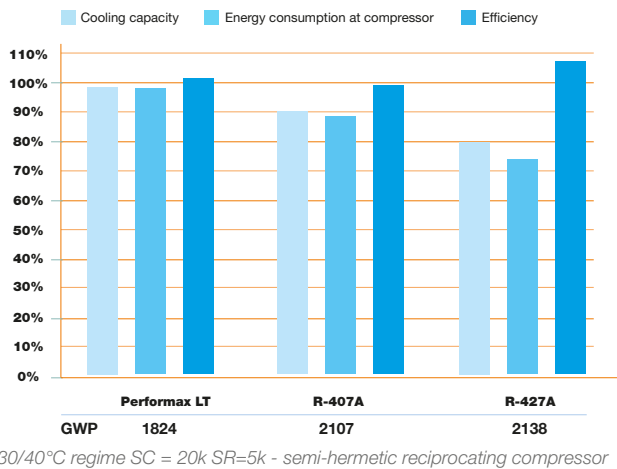
- Cooling capacity at medium or low temperatures : 90% minimum compared to R-404A
- GWP reduced by at least 40% compared to R-404A



Air-conditioning – compared to R-22



Refrigeration – compared to R-22



Refrigerants

Refrigerant gases intended for refrigeration and air conditioning



R

HydroChloroFluoroCarbons:

Refrigerant fluids whose sale and use are regulated by European regulation 1005/2009 of 16 September 2009, because they deplete the ozone layer (Montreal Protocol). From 1 January 2010 to 31 December 2014, only the use of non-virgin HCFCs (recycled or reclaimed) is authorised.

Definition of recycled product from CE regulation N° 1005/2009:

The reuse of a recovered controlled substance following a basic cleaning process.
The placing on the market of recycled HCFCs for free or against payment is prohibited.



Friostar®

Definition of reclaimed product from CE regulation N° 1005/2009:

The reprocessing of a recovered controlled substance in order to meet the equivalent performance of a virgin substance, taking into account its intended use. The placing on the market of reclaimed HCFCs for free or against payment is allowed until 31 December 2014.



| Reclaimed HCFCs | | | | |
|-----------------|----------|---------------|--------|--|
| Ref. | Products | Packaging | Charge | Comments |
| 3962 | R-22 T | Friopack® | 10 kg | Ask us for other package sizes or reclaimed HCFCs. |
| 7714 | R-22 T | Friostar® | 15 kg | |
| 127 | R-22 T | Cylinder 52 L | 50 kg | |
| 7458 | R-22 T | Drum 448 L | 450 kg | |
| 138 | R-22 T | Drum 930 L | 950 kg | |

Stock of these products is limited, and only available until 31.12.2014 on the European market.

Quality Label: Our quality label guarantees you a reclaimed product with the same performance levels as those of a new product. Analysis is always carried out by our laboratories during and after the reclamation cycle, so as to guarantee the fluid composition.

| HFCs | | | | |
|-------------|----------|-----------------|--------|---------------------|
| Ref. | Products | Packaging | Charge | Comments |
| 7718 | R-134a | Cubikool™ | 13 kg | Vertical container. |
| 7704 | R-134a | Friostar® | 20 kg | |
| 251 | R-134a | Cylinder 52 L | 53 kg | |
| 3247 | R-134a | Drum 448 L | 460 kg | |
| 3249 | R-134a | Drum 930 L | 950 kg | |
| 7722 | R-227ea | Cubikool™ | 14 kg | |
| 6731 | R-227ea | Cylinder 27 L | 31 kg | |
| 4925 | R-227ea | Cylinder 52 L | 62 kg | |
| 6618 | R-236fa | Cylinder 12,5 L | 10 kg | |
| 7259 | R-236fa | Cylinder 52 L | 50 kg | |
| 7246 | R-404A | Cubikool™ | 10 kg | Vertical container. |
| 7708 | R-404A | Friostar® | 15 kg | |
| 7205 | R-404A | Frioplus® | 18 kg | |
| 383 | R-404A | Cylinder 52 L | 40 kg | |
| 3781 | R-404A | Drum 448 L | 350 kg | |
| 3274 | R-404A | Drum 930 L | 740 kg | |
| 7842 | R-407A | Cubikool™ | 11 kg | Vertical container. |
| 7843 | R-407A | Friostar® | 18 kg | |
| 7836 | R-407A | Cylinder 52 L | 48 kg | |
| 7844 | R-407A | Drum 448 L | 421 kg | |
| 7845 | R-407A | Drum 930 L | 874 kg | |

| HFCs (continued) | | | | |
|------------------|------------------------|-----------------|---------|---------------------|
| Ref. | Products | Packaging | Charge | Comments |
| 7244 | R-407C | Cubikool™ | 11 kg | Vertical container. |
| 7706 | R-407C | Friostar® | 18 kg | |
| 348 | R-407C | Cylinder 52 L | 48 kg | |
| 3647 | R-407C | Drum 448 L | 400 kg | |
| 3645 | R-407C | Drum 930 L | 840 kg | |
| 7602 | R-407F (Performax™ LT) | Cubikool™ | 11 kg | Vertical container. |
| 7715 | R-407F (Performax™ LT) | Friostar® | 18 kg | |
| 7604 | R-407F (Performax™ LT) | Cylinder 52 L | 47 kg | |
| 7605 | R-407F (Performax™ LT) | Container 448 L | 410 kg | |
| 7606 | R-407F (Performax™ LT) | Container 930 L | 850 kg | |
| 7242 | R-410A | Cubikool™ | 10 kg | Vertical container. |
| 7712 | R-410A | Friostar® | 16 kg | |
| 4011 | R-410A | Cylinder 52 L | 40 kg | |
| 6617 | R-410A | Drum 448 L | 360 kg | |
| 7719 | R-417A (ISCEON® MO59) | Cubikool™ | 12 kg | |
| 5157 | R-417A (ISCEON® MO59) | Cylinder 52 L | 50 kg | |
| 7721 | R-422A (ISCEON® MO79) | Cubikool™ | 10 kg | Vertical container. |
| 6839 | R-422A (ISCEON® MO79) | Cylinder 52 L | 45 kg | |
| 7093 | R-422A (ISCEON® MO79) | Container 448 L | 380 kg | |
| 6841 | R-422A (ISCEON® MO79) | Container 930 L | 818 kg | |
| 7720 | R-422D (ISCEON® MO29) | Cubikool™ | 11 kg | Vertical container. |
| 6832 | R-422D (ISCEON® MO29) | Cylinder 52 L | 47 kg | |
| 7091 | R-422D (ISCEON® MO29) | Container 448 L | 380 kg | |
| 6834 | R-422D (ISCEON® MO29) | Container 930 L | 840 kg | |
| 7402 | R-423A (ISCEON® 39TC) | Cylinder 52 L | 58 kg | Vertical container. |
| 7403 | R-423A (ISCEON® 39TC) | Drum 448 L | 500 kg | |
| 7723 | R-427A | Cubikool™ | 11 kg | Vertical container. |
| 7596 | R-427A | Cylinder 52 L | 48 kg | |
| 7201 | R-427A | Container 448 L | 430 kg | |
| 7202 | R-427A | Container 930 L | 850 kg | |
| 7726 | R-437A (ISCEON® MO49) | Cubikool™ | 12 kg | |
| 7319 | R-438A (ISCEON® MO99) | Cylinder | 11.5 kg | |
| 7320 | R-438A (ISCEON® MO99) | Frioplus® | 20 kg | |
| 7321 | R-438A (ISCEON® MO99) | Cylinder | 57 kg | |
| 7710 | R-507 | Friostar® | 15 kg | |
| 468 | R-507 | Cylinder 52 L | 40 kg | |
| 3664 | R-507 | Drum 930 L | 740 kg | |

HFCs (HydroFluoroCarbons):

Non-flammable and non-toxic fluids whose placing on the market, use, recovery and destruction are restricted by EU regulation 842/2006 (F-Gas). These products do not affect the ozone layer and are recommended to replace CFCs and HCFCs.

Performax™ LT, the best combination for the environment:

- GWP = 1824,
- reduced energy consumption costs,
- improved energy efficiency,
- the solution for R-404A replacement,
- with no change of components required.



Cubikool™



Frioplus®

Refrigerants

Refrigerant gases intended for refrigeration and air conditioning



HFOs, (HydroFluoro-Olefins)

are 4th generation refrigerants. They are an alternative with low GWP values that reduce environmental impact while offering energy efficiency.



7788

Ammonia

NH₃ is an L2 (toxic and flammable) secondary refrigerant fluid. Its transport and use in installations are governed by regulations and security standards.

The product supplied is a high quality one: qualifying HP 100. Purity: ≥ 99,99% weight, water content: ≤ 100 ppm weight.



867



155

| HFCs (continued) | | | | |
|---------------------------------|-------------------------------|-----------------|--------|---|
| Ref. | Products | Packaging | Charge | Comments |
| • Low temperature application | | | | |
| 7725 | ISCEON® MO89 | Cubikool™ | 8 kg | |
| 5673 | ISCEON® MO89 | Cylinder 52 L | 37 kg | |
| 4058 | R-508B | Cylinder 1,34 L | 1 kg | Ask us. |
| 4060 | R-508B | Cylinder 6,7 L | 6 kg | |
| 4061 | R-508B | Cylinder 13,4 L | 12 kg | |
| 155 | R-23 | Cylinder 6,7 L | 5 kg | |
| 157 | R-23 | Cylinder 13,4 L | 12 kg | |
| 160 | R-23 | Cylinder 50 L | 47 kg | |
| 7724 | FX 80 | Cubikool™ | 10 kg | |
| • Standard refrigerant cylinder | | | | |
| 4122 | Standard refrigerant cylinder | | | Combination of calibrated refrigerants. Compliance certificate. |

| HFO | | | | |
|-----------|-------------------------|-----------------|--------|---------------------|
| Ref. | Products | Packaging | Charge | Comments |
| 7787 | R-1234ze (Solstice™ ze) | Cubikool™ | 12 kg | Vertical container. |
| 7788 | R-1234ze (Solstice™ ze) | Friostar® | 19 kg | |
| 7789 | R-1234ze (Solstice™ ze) | Cylinder 52 L | 52 kg | |
| 7790 | R-1234ze (Solstice™ ze) | Container 448 L | 450 kg | |
| 7791 | R-1234ze (Solstice™ ze) | Container 930 L | 940 kg | |
| 8.007.624 | Solstice™ yf | Cylinder 6 L | 5 kg | |
| 8.007.959 | Solstice™ yf | Cylinder 12,3 L | 10 kg | |

| Ammonia | | | | |
|---------|----------|---------------|--------|-------------------|
| Ref. | Products | Packaging | Charge | Comments |
| 867 | Ammonia | Cylinder 88 L | 45 kg | Without dip tube. |
| 868 | Ammonia | Cylinder 88 L | 45 kg | With dip tube. |
| 869 | Ammonia | Drum 930 L | 480 kg | |

| Hydrocarbons | | | | |
|--------------|------------------|---------------|--------|------------------------------|
| Ref. | Products | Packaging | Charge | Comments |
| 6732 | Propane R-290 | Cylinder 1 L | 390 g | 1/4" SAE. |
| 6741 | Propane R-290 | Cylinder 27 L | 10 kg | |
| 3602 | Isobutane R-600a | Aerosol* | 420 g | To be used with prestovalve. |
| 6755 | Isobutane R-600a | Cylinder 27 L | 12 kg | |

**Limited stock available. Similar packaging will become available. Please consult us for bulk quantities of various refrigerants.*

Cleaning refrigerant circuits

For internal cleaning, see → p. 58 : Facilisolv, GC1.

Analysis in Climalife laboratory

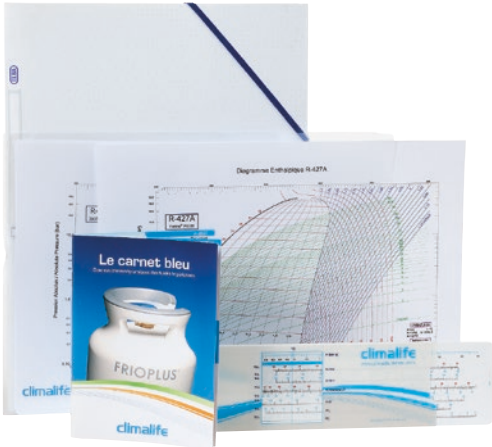
Climalife offers a specific analysis range in order to help you with the maintenance of your installations See → p. 74.

Products, packaging and fill weights may vary by country. Contact your subsidiary for more detailed information.

| Thermodynamic tools | | | |
|---------------------|----------------------------------|-------------|--|
| Ref. | Products | Packaging | Comments |
| 4068 | Climalife refrigerant comparator | Piece | |
| 6446 | Training Kit | Piece | Includes 1 blue handbook, 1 comparator and thermodynamic diagrams. |
| 7041 | Blue Handbook | Piece | Thermodynamic data. |
| 7351 | Installation labels | Batch of 25 | Labelling required on new equipment by EU regulation 842-2006. |
| 6128 | Cooltool | Piece | Complete software. Only available in Belgium, Holland and Germany. |



6732



6446



4068



7351

Refrigerants

Refrigerant gases intended for refrigeration and air conditioning



6566



6246



7237

Packaging characteristics

| Packaging | Packaging material | Test pressure (Bar) | Capacity (L) | Tare (kg) | Diameter (mm) | Height (mm) | Exit valves | Valve material | Number per pallet |
|--------------------------------|---------------------------------|---------------------|--------------|-----------|---------------|-------------|----------------------------|----------------|-------------------|
| Cubikool™ | Lightened steel + Polypropylene | 42 | 12,5 | 6 | 310 x 310 | 400 | Male 21,8 x 1,814 on right | Brass | 24 |
| Frioplus® | Lightened steel + Polypropylene | 42 | 22 | 8,5 | 305 | 543 | Male 21,8 x 1,814 on right | Brass | 16 |
| Friostar® | Aluminium | 31 | 20 | 7 | 300 | 530 | Male 21,8 x 1,814 on right | Brass | 11, 16 or 24 |
| Friostar® | Aluminium | 36 | 20 | 7 | 300 | 530 | Male 21,8 x 1,814 on right | Brass | |
| Friostar® | Aluminium | 48 | 20 | 7,3 | 300 | 530 | Male 21,8 x 1,814 on right | Brass | |
| Cylinder 12 L | Steel | 47 | 12,3 | 7,6 | 229 | 505 | Male 1/4 SAE on right | Brass | 15, 25 or 40 |
| Friopack® | Steel | 29,5 | 12,5 | 7 | 300 | 310 | Male 1/4 SAE on right | Brass | 30 or 45 |
| Xlite 26 L | Steel | 42 | 26,2 | 9,3 | 303 | 600 | Male 21,8 x 1,814 on right | Brass | 11, 12 or 16 |
| Cylinder 27 L | Steel | 33 | 27 | 14,5 | 300 | 625 | Male 21,8 x 1,814 on right | Brass | 11, 12 or 16 |
| Cylinder 27 L | Steel | 45 | 27 | 16 | 300 | 631 | Male 21,8 x 1,814 on right | Brass | |
| Cylinder 27 L | Steel | 46,5 | 27 | 16 | 300 | 606 | Male 21,8 x 1,814 on right | Brass | |
| Cylinder 52 L | Steel | 45 | 52 | 29,5 | 267 | 1195 | Male 21,8 x 1,814 on right | Brass | 16 |
| Cylinder 88 L | Steel | 33 | 88 | 38 | 300 | 1525 | Male 21,8 x 1,814 on right | Brass | 12 |
| Cylinder 88 L | Steel | 46,5 | 88 | 40 | 300 | 1525 | Male 21,8 x 1,814 on right | Brass | |
| Cylinder NH₃ | Steel | 46,5 | 88 | 40 | 300 | 1525 | Male 21,7 x 1,814 on right | Steel | 12 |
| Drum 448 L | Steel | 42 | 448 | 450 | 800 | 1565 | Male 26,1 x 1,814 on right | Brass | |
| Drum 930 L | Steel | 33 | 930 | 440 | 800 | 2330 | Male 26,1 x 1,814 on right | Brass | |
| Drum 930 L | Steel | 42 | 930 | 470 | 800 | 2330 | Male 26,1 x 1,814 on right | Brass | |
| Drum 930 L | Steel | 48 | 930 | 590 | 800 | 2330 | Male 26,1 x 1,814 on right | Brass | |

Non-contractual information.

Products, packaging and fill weights may vary by country. Contact your subsidiary for more detailed information.

Recovery and transfer equipment

Climalife provides the necessary equipment to work with refrigerants, recovery machines, hoses, etc.
See equipment range → [p. 43](#).

Non-flammable refrigerant fluid recovery CFC/ HCFC / HFC / HFO

| Ref. | Products | Packaging | Pressure | Comments |
|---|----------------------------|-----------|----------|--|
| • Implementation and use | | | | |
| 793 | Recovery barrel | 217 L | | |
| Packaging designed for halogenated refrigerants to be regenerated or destroyed. | | | | |
| 6566 | Recovery cylinder | 12 L | 42 bars | For all low or middle pressure halogenated refrigerants. For R-22. For all low or middle pressure halogenated refrigerants. For R-22. |
| 796 | Recovery cylinder | 27 L | 33 bars | |
| 6246 | Recovery cylinder | 27 L | 45 bars | |
| 799 | Recovery cylinder | 88 L | 33 bars | |
| 795 | Recovery cylinder | 13,4 L | 200 bars | For high pressure refrigerants: R-13, R-23, R-503. |
| 801 | Recovery drum | 930 L | | |
| Our temporary storage (Receiver) cylinders are cleaned and vacuumed to avoid refrigerant contamination. Thus, the refrigerant will be recharged into the installation without any contamination problems. | | | | |
| 6565 | Temporary storage cylinder | 12 L | 42 bars | For temporarily evacuating a system before reintroducing fluids. |
| 7834 | Temporary storage cylinder | 26 L | 42 bars | |
| 6247 | Temporary storage cylinder | 88 L | 42 bars | |
| 754 | Temporary storage drum | 930 L | | |

Ammonia recovery

| Ref. | Products | Packaging |
|---------------------------------|---------------------------------------|-----------|
| • Implementation and use | | |
| 757 | Ammonia recovery / transfer cylinder | 88 L |
| 758 | Ammonia recovery / transfer container | 930 L |

Flammable refrigerant fluid recovery Hydrocarbons / HFC / HFO

| Ref. | Products | Packaging |
|---------------------------------|-------------------|-----------|
| • Implementation and use | | |
| 7755 | Recovery cylinder | 12 L |
| 7858 | Recovery cylinder | 27 L |
| 7756 | Recovery cylinder | 88 L |

Contact us for containers.
See our services range.

Regeneration HCFCs / HFCs

Reclamation of recovered refrigerants: We deal with recovered fluids on request (for quantities over 300 kg) so as to offer performance rates equivalent to those of a pure substance. After recovery, the fluid is reconditioned and made available for the customer or stored on our industrial sites (storage contract). Offer subject to conditions. Reclaiming recovered HCFCs and HFCs is possible based on the results of the composition analysis carried out when the client's sample is received. ([Sampling cylinders see → p. 74](#)).

To find out more about reclaiming fluids [please see → p. 83](#).



In Europe, it is compulsory to recover CFCs, HCFCs, HFCs and HFOs from installations of any weight under European regulation 842-2006 or 1005-2009. These must be returned with appropriate waste documentation as required in each country.



7834



7756



7858

7755

Refrigerants

Refrigerant gases intended for refrigeration and air conditioning



HFC physico-chemical properties*

| | Units | R-23 | R-125 | R-134a | R-152a | R-227ea | R-236fa | R-404A | R-407A |
|--|-----------------------|------------------|-----------------------------------|-----------------------------------|-----------------------------------|--------------------------------------|---|---|---------------------------------------|
| Composition | | CHF ₃ | CHF ₂ -CF ₃ | CH ₂ F-CF ₃ | CH ₃ -CHF ₂ | CF ₃ -CHF-CF ₃ | CF ₃ CH ₂ CF ₃ | 44% R-125, 52 % R-143a, 4% R-134a | 20% R-32, 40% R-125, 40% R-134a |
| Boiling point (under 1,013 bar) | °C | -82 | -48,09 | -26,08 | -24,03 | -16,35 | -1,44 | -46,57 | -45,01 |
| Temperature glide under 1,013 bar | K | 0 | 0 | 0 | 0 | 0 | 0 | 0,75 | 6,41 |
| Density of liquid at 25°C | kg/m³ | 680,09 | 1189,35 | 1206,71 | 899,5 | 1387,67 | 1359,8 | 1044 | 1145 |
| Density of saturating vapour at normal boiling point | kg/m³ | 4,662 | 6,788 | 5,257 | 3,375 | 8,484 | 7,14 | 5,48 | 4,881 |
| Saturation pressure (Liquid sat.) 25°C | bar | 49,986 | 13,78 | 6,654 | 5,964 | 4,55 | 2,72 | 12,55 | 12,53 |
| 50°C | | | 25,37 | 13,18 | 11,77 | 9,16 | 5,84 | 23,11 | 23,24 |
| Critical temperature | °C | 26,14 | 66,02 | 101,06 | 113,26 | 101,75 | 124,92 | 72,05 | 82,26 |
| Critical pressure | bar absolute | 48,32 | 36,18 | 40,59 | 45,17 | 29,25 | 32 | 37,29 | 45,15 |
| Critical density | kg/m³ | 526,5 | 573,58 | 511,9 | 368 | 594,25 | 551,29 | 486,54 | 499 |
| Latent vapourisation heat at normal boiling point | kJ/kg | 239,4 | 164,11 | 216,97 | 329,9 | 131,77 | 160,32 | 200,94 | 235,57 |
| Specific heat at 25°C Liquid | kJ/(kg.K) | 18,87 | 1,407 | 1,425 | 1,8 | 1,182 | 1,26 | 1,542 | 1,52 |
| Vapor under 1,013 bar | | 0,737 | 0,797 | 0,8512 | 1,051 | 0,813 | 0,839 | 0,877 | 0,829 |
| Cp/Cv ratio at 25°C under 1,013 bar | | 1,201 | 1,104 | 1,119 | 1,155 | 1,075 | 1,083 | 1,118 | 1,138 |
| NF-EN 378 classification | | L1 | L1 | L1 | L2 | L1 | L1 | L1 | L1 |
| ODP | (R11 = 1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| GWP | (CO ₂ = 1) | 14800 | 3500 | 1430 | 124 | 3220 | 9810 | 3922 | 2107 |

HFC physico-chemical properties*

| | Units | R-407C | R-407F | R-410A | R-417A | R-422A | R-422D |
|--|-----------------------|---------------------------------------|---------------------------------------|------------------------|---|--|--|
| Composition | | 23% R-32, 25% R-125, 52% R-134a | 30% R-32, 30% R-125, 40% R-134a | 50% R-32, 50% R-125 | 46,6% R-125, 50% R-134a, 3,4% R-600 | 85,1% R-125, 11,5% R-134a, 3,4% R-600a | 65,1% R-125, 31,5% R-134a, 3,4% R-600a |
| Boiling point (under 1,013 bar) | °C | -43,81 | -46,06 | -51,6 | -39,07 | -46,5 | -43,2 |
| Temperature glide under 1,013 bar | K | 7 | 6,4 | 0,08 | 4,99 | 2,46 | 4,86 |
| Density of liquid at 25°C | kg/m³ | 1137,5 | 1116,9 | 1058,6 | 1151,3 | 1135,6 | 1143,44 |
| Density of saturating vapour at normal boiling point | kg/m³ | 4,63 | 4,46 | 4,173 | 5,685 | 6,317 | 5,954 |
| Saturation pressure (Liquid sat.) 25°C | bar | 11,9 | 13,11 | 16,57 | 9,83 | 12,75 | 11,28 |
| 50°C | | 22,16 | 24,31 | 30,71 | 18,44 | 23,42 | 20,89 |
| Critical temperature | °C | 86,03 | 82,66 | 71,35 | 87,13 | 71,72 | 79,6 |
| Critical pressure | bar absolu | 46,29 | 47,55 | 49 | 40,35 | 37,46 | 39,05 |
| Critical density | kg/m³ | 484,2 | 477,34 | 459,53 | 520,6 | 538,71 | 529,14 |
| Latent vapourisation heat at normal boiling point | kJ/kg | 249,8 | 257,21 | 272,97 | 200,75 | 177,04 | 190,05 |
| Specific heat at 25°C Liquid | kJ/(kg.K) | 1,535 | 1,575 | 7,708 | 1,444 | 1,446 | 1,443 |
| Vapor under 1,013 bar | | 0,837 | 0,834 | 0,823 | 0,855 | 0,833 | 0,844 |
| Cp/Cv ratio at 25°C under 1,013 bar | | 1,144 | 1,152 | 1,176 | 1,111 | 1,105 | 1,108 |
| NF-EN 378 classification | | L1 | L1 | L1 | L1 | L1 | L1 |
| ODP | (R11 = 1) | 0 | 0 | 0 | 0 | 0 | 0 |
| GWP | (CO ₂ = 1) | 1774 | 1824 | 2088 | 2347 | 3144 | 2730 |

HFC physico-chemical properties*

| | Units | R-427A | R-437A | R-507 | R-508B | Forane® FX80 | Isceon® MO89 |
|--|-----------------------|--|--|--------------------------|------------------------|------------------------|-------------------------------------|
| Composition | | 50% R-134a, 25% R-125, 15% R-32, 10% R-143a | 78,5% R-134a 19,5% R-125 1,4% R-600 0,06% R-601 | 50% R-125, 50% R-143a | 46% R-23, 54% R-116 | 32% R-32, 68% R-125 | 86% R-125, 9% R-218, 5% R-290 |
| Boiling point (under 1,013 bar) | °C | -46,55 | -32,33 | -46,75 | -87,6 | -50,9 | -53,41 |
| Temperature glide under 1,013 bar | K | 6,75 | 4,27 | 0 | 0,44 | 0,21 | 3,06 |
| Density of liquid at 25°C | kg/m³ | 1124,98 | 1177,74 | 1047,9 | à -30°C 1234,4 | 1101,8 | 1082,5 |
| Density of saturating vapour at normal boiling point | kg/m³ | 4,78 | 5,382 | 5,585 | 6,548 | 4,85 | 6,507 |
| Saturation pressure (Liquid sat.) 25°C | bar | 11,43 | 7,94 | 12,83 | – | 16,09 | 15,28 |
| 50°C | | 21,25 | 15,26 | 23,61 | – | 29,74 | 27,52 |
| Critical temperature | °C | 85,32 | 96,26 | 70,62 | 11,21 | 69,46 | 64,18 |
| Critical pressure | bar absolute | 43,91 | 40,86 | 37,05 | 37,72 | 45,55 | 37,35 |
| Critical density | kg/m³ | 689,97 | 512,43 | 490,77 | 568,45 | 496,92 | 535,33 |
| Latent vapourisation heat at normal boiling point | kJ/kg | 236,52 | 213,13 | 196,94 | 165,36 | 234,38 | 170,42 |
| Specific heat at 25°C Liquid | kJ/(kg.K) | 1,517 | 1,436 | 1,539 | – | 1,613 | 1,501 |
| Vapor under 1,013 bar | | 0,847 | 0,858 | 0,87 | 0,7567 | 0,814 | 0,84 |
| Cp/Cv ratio at 25°C under 1,013 bar | | 1,131 | 1,116 | 1,117 | 1,136 | 1,149 | 1,103 |
| NF-EN 378 classification | | L1 | L1 | L1 | L1 | L1 | L1 |
| ODP | (R11 = 1) | 0 | 0 | 0 | 0 | 0 | 0 |
| GWP | (CO ₂ = 1) | 2138 | 1805 | 3985 | 13996 | 3168 | 3806 |

*All elements are simulated using Refprop 8 and 9 and given purely as an indication.

HFO physico-chemical properties*

| | Units | R-1234ze | Solstice™ yf |
|--|-----------------------|-------------------------|------------------------------------|
| Composition | | CF ₃ -CH=CHF | CH ₂ =CFCF ₃ |
| Boiling point (under 1,013 bar) | °C | -18,96 | -29,49 |
| Temperature glide under 1,013 bar | K | 0 | 0 |
| Density of liquid at 25°C | kg/m³ | 1163 | 1092 |
| Density of saturating vapour at normal boiling point | kg/m³ | 5,71 | 5,98 |
| Saturation pressure (Liquid sat.) 25°C | bar | 4,99 | 6,83 |
| 50°C | | 9,97 | 13,02 |
| Critical temperature | °C | 109,37 | 94,7 |
| Critical pressure | bar absolute | 36,36 | 33,82 |
| Critical density | kg/m³ | 489,24 | 475,55 |
| Latent vapourisation heat at normal boiling point | kJ/kg | 195,43 | 180,25 |
| Specific heat at 25°C Liquid | kJ/(kg.K) | 1,383 | 1,392 |
| Vapor under 1,013 bar | | 0,887 | 0,905 |
| Cp/Cv ratio at 25°C under 1,013 bar | | 1,102 | 1,099 |
| NF-EN 378 classification | | L2L | L2L |
| ODP | (R11 = 1) | 0 | 0 |
| GWP | (CO ₂ = 1) | 6 | 4 |

