

# Honeywell Genetron® Refrigerants



**Refrigerants with the future in mind**

**Honeywell**

# Genetron Refrigerants Products Guide

## HCFC

**Dichlorotrifluoroethane (CHCl<sub>2</sub>CF<sub>3</sub>)**  
A very low ozone depleting compound that serves as a replacement for CFC-11 in centrifugal chillers.

## HFC

**Pentafluoropropane (CF<sub>3</sub>CH<sub>2</sub>CHF<sub>2</sub>)**  
A non-ozone depleting candidate replacement for CFC-11 in centrifugal chillers.

## HCFC

**Chlorotetrafluoroethane (CHClF<sub>2</sub>)**  
A medium pressure refrigerant for chiller applications.

## HFC

**Tetrafluoroethane (CF<sub>3</sub>CH<sub>2</sub>F)**  
Replaces CFC-12 in auto air conditioning and in residential, commercial and industrial refrigeration systems.

## Selected Physical Data

### 123

### 245fa

### 124

### 134a

Substitutes (See Legend Below)	■	■	□	
ASHRAE Number	R-123	R-245fa	R-124	R-134a
Molecular Weight	152.9	134.0	136.5	102.0
Boiling Point @ 1 Atm,* (°F)	82.1	59.3	10.5	-14.9
Freezing Point @ 1 Atm, (°F) [Pure Fluids*]	-160.9	-151.8	-326.5	-153.9
Critical Temperature* (°F)	362.6	309.2	252.1	213.9
Critical Pressure* (psia)	531.1	529.5	525.7	588.8
Saturated Liquid Density @ 86°F,* (lb/ft <sup>3</sup> )	90.6	82.7	83.5	74.1
Specific Heat of Liquid @ 86°F,* (Btu/lb •°F)	0.25	0.32	0.27	0.35
Specific Heat of Vapor @ Constant Pressure* (Cp), @ 86°F and 1 Atm, (Btu/lb •°F)	0.17	0.22	0.18	0.21
Flammable range, (Based on ASHRAE Standard 34 with Match Ignition)††	None	None	None	None
ANSI/ASHRAE Standard 34-1992 Safety Group Classification	B1	A1	N.C.†††	A1

### Legend:

- CFC 11 Substitutes
- CFC 12 Substitutes
- R-502 Substitutes
- CFC 13/R-503 Substitutes
- HCFC 22 Substitutes

Refrigerants are listed in highest-to-lowest order according to their boiling point at 1 atmosphere pressure.

## Blend

**Pentafluoroethane Tetrafluoroethane Isobutane (CF<sub>3</sub>CHF<sub>2</sub>/CF<sub>3</sub>CH<sub>2</sub>F/(CH<sub>3</sub>)<sub>2</sub>CH)**  
A non-ozone-depleting replacement for HCFC-22 in low- and medium-temperature commercial refrigeration systems.

## Blend

**Difluoromethane Pentafluoroethane Tetrafluoroethane (CH<sub>2</sub>F<sub>2</sub>/CF<sub>3</sub>CHF<sub>2</sub>/CF<sub>3</sub>CH<sub>2</sub>F)**  
A non-ozone-depleting replacement for HCFC-22 in various air-conditioning applications, as well as in positive displacement refrigeration systems.

## Blend

**Pentafluoroethane Trifluoroethane Chlorodifluoromethane (CF<sub>3</sub>CHF<sub>2</sub>/CF<sub>3</sub>CH<sub>2</sub>F/CHClF<sub>2</sub>)**  
An interim replacement for retrofitting low- and medium-temperature commercial refrigeration systems.

## Blend

**Difluoromethane Pentafluoroethane Tetrafluoroethane (CH<sub>2</sub>F<sub>2</sub>/CF<sub>3</sub>CHF<sub>2</sub>/CF<sub>3</sub>CH<sub>2</sub>F)**  
Well-matched performer as a non-ozone depleting replacement for R-22 in low- and medium-temperature commercial refrigeration systems.

## Selected Physical Data

### 422D

### 407C

### 408A

### Performax™ LT

Substitutes (See Legend Above)	■	■	■	
ASHRAE Number	R-422D	R-407C	R-408A	Pending
Molecular Weight	109.9	86.2	87.7	82.1
Boiling Point @ 1 Atm, (°F)	-45.8 <sup>Ω</sup>	-46.5 <sup>Ω</sup>	-48.3 <sup>Ω</sup>	-50.9
Freezing Point @ 1Atm, (°F)	—	-256.0	—	—
Critical Temperature* (°F)	175.2	186.9	181.7	180.8
Critical Pressure* (psia)	566.4	671.4	622.9	689.6
Saturated Liquid Density @ 86°F, (lb/ft <sup>3</sup> )	69.9	69.6	64.8	68.3
Specific Heat of Liquid @ 86°F (Btu/lb •°F)	0.35	0.38	0.35	0.39
Specific Heat of Vapor @ Constant Pressure* (Cp), @ 86°F and 1 Atm, (Btu/lb •°F)	0.20	0.20	0.19	0.2
Flammable range, (Based on ASHRAE Standard 34 with Match Ignition)††	None	None	None	None
ANSI/ASHRAE Standard 34-1992 Safety Group Classification	A1	A1	A1	Pending

\* NIST REFPROP 8, unless noted otherwise

<sup>Ω</sup> Bubble point temperature.

† Upper and lower vapor flammability (Vol.%).

†† ASTM E681-85 match ignition ambient conditions.

††† N.C. Not Classified.

Ω @ -30°F.

Contains HFC-125/  
HFC-134a/HC-600a

Contains HFC-32/  
HFC-125/HFC-134a

Contains HFC-125/  
HFC-143a/HCFC-22

Contains HFC-32/  
HFC-125/HFC-134a



## Blend

**Chlorodifluoromethane**  
**Difluoroethane**  
**Chlorotetrafluoroethane**  
**(CHClF<sub>2</sub>/CHF<sub>2</sub>CH<sub>2</sub>/CHClFCF<sub>3</sub>)**  
 An interim replacement for CFC-12 in medium-temperature commercial refrigeration systems.

# MP39

<input type="checkbox"/>
R-401A
94.4
-27.3 <sup>κ</sup>
—
225.2
668.3
73.1
0.31
0.18
None
A1

Contains HCFC-22/  
 HFC-152a/HCFC-124.



## Blend

**Chlorodifluoromethane**  
**Difluoroethane**  
**Chlorotetrafluoroethane**  
**(CHClF<sub>2</sub>/CHF<sub>2</sub>CH<sub>2</sub>/CHClFCF<sub>3</sub>)**  
 An interim replacement for CFC-12 in low-temperature commercial refrigeration systems.

# MP66

<input type="checkbox"/>
R-401B
92.9
-30.2 <sup>κ</sup>
—
222.0
679.6
76.7
0.30
0.17
None
A1

Contains HCFC-22/  
 HFC-152a/HCFC-124.



## Blend

**Chlorodifluoromethane**  
**Chlorotetrafluoroethane**  
**Chlorodifluoroethane**  
**(CHClF<sub>2</sub>/CHClFCF<sub>3</sub>/CClF<sub>2</sub>CH<sub>3</sub>)**  
 An interim replacement for CFC-12 in refrigeration systems.

# 409A

<input type="checkbox"/>
R-409A
97.4
-30.0 <sup>κ</sup>
—
228.7
681.5
74.6
0.30
0.17
None
A1

Contains HCFC-22/  
 HCFC-124/ HCFC-142b.



## HCFC

**Chlorodifluoromethane**  
**(CHClF<sub>2</sub>)**  
 As a refrigerant, operates with higher system pressures but low compressor displacement. Popular in residential, commercial and industrial applications.

# 22

<input type="checkbox"/>
R-22
86.5
-41.5
-251.4
205.1
723.7
73.1
0.31
0.16
None
A1



## Blend

**Pentafluoroethane**  
**Trifluoroethane**  
**Tetrafluoroethane**  
**(CF<sub>3</sub>CHF<sub>2</sub>/CF<sub>3</sub>CH<sub>2</sub>/CF<sub>3</sub>CH<sub>2</sub>F)**  
 A long-term, non-ozone-depleting replacement for R-502 in low- and medium-temperature commercial refrigeration systems.

# 404A

<input type="checkbox"/>
R-404A
97.6
-51.2 <sup>κ</sup>
—
161.7
540.8
63.6
0.38
0.21
None
A1

Contains HFC-125/  
 HFC-143a/HFC-134a.



## Azeotrope

**Pentafluoroethane**  
**Trifluoroethane**  
**(CF<sub>3</sub>CHF<sub>2</sub>/CF<sub>3</sub>CH<sub>2</sub>)**  
 A non-ozone depleting azeotropic mixture of HFC-125 and HFC-143a. It has been primarily designed to replace R-502 in low- and medium-temperature commercial refrigeration applications such as supermarket display cases and ice machines.

# AZ-50<sup>®</sup> 507

<input type="checkbox"/>
R-507, R-507A
98.9
-52.2 <sup>κ</sup>
-178.0
159.1
537.4
63.8
0.38
0.21
None
A1

Contains HCFC-22/  
 HFC-125/HC-290



## Blend

**Chlorodifluoromethane**  
**Pentafluoroethane**  
**Propane**  
**(CHClF<sub>2</sub>/CF<sub>3</sub>CHF<sub>2</sub>/C<sub>3</sub>H<sub>8</sub>)**  
 An interim replacement for R-502 used mainly for ice machines and soft ice cream machines.

# HP81

<input type="checkbox"/>
R-402B
94.7
-52.7
—
181.2
654.9
70.4
0.33
0.18
None
A1

Contains HFC-125/  
 HFC-143a.



## Blend

**Chlorodifluoromethane**  
**Pentafluoroethane**  
**Propane**  
**(CHClF<sub>2</sub>/CF<sub>3</sub>CHF<sub>2</sub>/C<sub>3</sub>H<sub>8</sub>)**  
 An interim replacement for retrofitting low- and medium-temperature commercial refrigeration systems.

# HP80

<input type="checkbox"/>
R-402A
101.6
-56.1 <sup>κ</sup>
-153.0
168.5
612.0
70.0
0.34
0.18
None
A1

Contains HCFC-22/  
 HFC-125/HC-290.



## Azeotropic Mixture

**Difluoroethane**  
**Pentafluoroethane**  
**(CH<sub>2</sub>F<sub>2</sub>/CF<sub>3</sub>CHF<sub>2</sub>)**  
 Widely accepted to replace HCFC-22 in air conditioning and refrigeration applications.

# AZ-20<sup>®</sup> 410A

<input type="checkbox"/>
R-410A
72.6
-60.6
-247.0
160.4
711.0
64.5
0.42
0.20
None
A1

Contains HFC-32/HFC-125.



## HFC

**Trifluoromethane**  
**(CHF<sub>3</sub>)**  
 A specialty low temperature refrigerant that may be used to replace CFC-13 and R-503 in the low stage of cascade systems.

# 23

<input type="checkbox"/>
R-23
70.0
-115.6
-247.2
79.1
700.8
77.6 Ω
0.34 Ω
0.16 Ω
None
N.C.†††

None



## Azeotrope

**Trifluoromethane**  
**Hexafluoroethane**  
**(CHF<sub>3</sub>/C<sub>2</sub>F<sub>6</sub>)**  
 A non-ozone depleting azeotrope of HFC-23 and FC-116 used to replace CFC-13 and R-503 in the low stage of cascade systems.

# 508B

<input type="checkbox"/>
R-508B
95.4
-125.7
—
52.2
547.0
78.8 Ω
0.31 Ω
0.16 Ω
None
A1

Contains HFC-23/FC-116.



## Genetron Refrigerants

### A world leader in the invention, manufacture and supply of environmentally safer refrigerants

#### Honeywell's Genetron Refrigerants

In these changing times, it's important to have a knowledgeable refrigerant partner that can help your business make the transition to environmentally safer hydrofluorocarbon products. Honeywell strives to be that full-service supplier by providing products and support programs that meet the changing needs of air conditioning and refrigeration professionals. The broad product line we offer features Genetron brand solutions for virtually every application in air conditioning and refrigeration.

#### Technical Support

Honeywell's Genetron refrigerants are brought to you by some of the most knowledgeable people in the industry. These engineers and specialists work with the leading equipment and compressor manufacturers to guarantee that Genetron refrigerants will meet your needs today and in the future. Honeywell also serves as a valuable information resource to the industry by offering a full complement of informational materials, ranging from technical bulletins and retrofit guidelines to in-field presentations made by our sales and technical professionals.

#### Air Conditioning

A variety of environmentally safer alternatives are available from Honeywell for the air conditioning industry. For the unitary-air-conditioning market, we offer non-ozone-depleting replacements for R-22, including Genetron 407C and Genetron AZ-20® (R-410A). R-410A is an azeotrope-like mixture of HFC-32 and HFC-125 that was invented and patented by Honeywell. Our AZ-20 brand of R-410A has been selected by equipment manufacturers as the refrigerant of choice for providing non-ozone-depleting air conditioning and heat pump options to homeowners.

Our alternative refrigerants for centrifugal chillers include Genetron 123, 245fa, and 134a. Genetron 245fa is a non-ozone depleting fluid developed by Honeywell for use in centrifugal chillers. Genetron AZ-50® (R-507) and AZ-20 are available for positive displacement chiller applications.

As a major supplier to the world's leading automobile and truck manufacturers, we offer a non-ozone-depleting refrigerant, Genetron 134a, for mobile air conditioning systems. As an aid to automotive mechanics worldwide, we offer Genetron 134aUV — a mixture of Genetron 134a and a refrigerant-soluble dye that fluoresces when viewed under ultraviolet light. This novel solution now makes it easier, cleaner, and less expensive to pinpoint leaks in automotive air conditioning systems.

#### Refrigeration

The flagship of Honeywell's R-22 replacements is Genetron® Performax™ LT. Genetron Performax LT is a low toxicity, non-flammable replacement for R-22 suitable for both refrigeration system retrofits and new installations. Genetron Performax LT is a close capacity match to R-22 in both medium- and low- temperature applications. The efficiency of Genetron Performax LT is highest among currently available replacements hence it contributes to low operating costs. Because no TXV changes or adjustments are needed, retrofit costs are low. The global warming potential of Performax LT is lower than comparable products.

Honeywell offers a broad line of R-502 and R-22 replacements for low- and medium-temperature refrigeration systems. A popular alternative is Genetron AZ-50® (R-507), an azeotropic HFC mixture

of R-125 and R-143a invented and patented by Honeywell. R-507 can be used in both low- and medium-temperature refrigeration systems, and in both new equipment and retrofit applications. Sold under our brand name AZ-50, R-507 has been approved by the world's leading refrigeration manufacturers. It is used worldwide in supermarkets and in industrial, food-service, and other applications.

Another alternative to R-502 and R-22 is Genetron 404A, which is used in both low- and medium-temperature systems. Genetron HP80 and Genetron 408A are also excellent interim products for low- and medium-temperature applications.

For medium-temperature systems, we manufacture interim products such as Genetron MP39, Genetron MP66 and Genetron 409A for retrofitting applications. We also offer Genetron 134a as a long-term non-ozone-depleting solution for new and retrofit medium-temperature refrigeration systems.

#### Retrofitting

Retrofitting existing refrigeration systems to environmentally safer refrigerants plays a major role in the industry's move away from ozone depleting substances. Honeywell encourages its customers to retrofit systems now to help guarantee their smooth and economical operation over the long term.

Comprehensive information is available to help retrofit refrigeration systems to all of our alternative refrigerants.

#### Reclamation

As a responsible chemical producer, Honeywell discourages any unnecessary release of refrigerants to the atmosphere and encourages contractors and end-users to return used refrigerant for reclamation and eventual re-use. Honeywell offers an economical refrigerant reclamation program through our network of wholesalers and distributors.

#### Technical Expertise

An integral part of Honeywell's investment in non-ozone-depleting fluorocarbon products is the company's Fluorine Products Technology Center in Buffalo, N.Y. This world-class research facility plays a leading role in our application support programs for customers. Some of the work performed at the center includes materials compatibility, lubricant miscibility and system performance testing.



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