




 9
[Engineering News](#)[PrinterFriendly](#)[ToolBox ShortList](#)• [Add this Page!](#)[Link to this Page!](#)

Sponsored Links



Refrigerants - Physical Properties

Physical properties of some common refrigerants - molecular weight, boiling, freezing and critical points

[Free Pipe Marking Book](#) 24 Pages of free expert advice on Pipe Marking best practices [DuraLabel.com](#)

[Dwyer® D.P. Switches](#) Huge range of stock for Industrial, HVAC, OEM, & BAS [www.dwyer-inst.com](#)

[Texas Flange](#) Steel Flanges ~ Import & Domestic in Carbon, Stainless, & Alloys [www.texasflange.com](#)

AdChoices ▶

Physical properties of some common refrigerants are indicated in the table below:

Refrigerant No.	Name	Molecular Mass	Boiling point at atmospheric pressure 14.7 psia, 1 bar abs (°F)	Freezing Point at atmospheric pressure 14.7 psia, 1 bar abs (°F)	Critical Point		
					Temperature (°F)	Pressure (psia)	Specific Volume (Cu.Ft./lb.)
R-10	Carbontetrachloride	153.8	170.2				
R-11	Trichlorofluoromethane ¹⁾	137.37	74.9	-168	388	640	0.0289
R-12	Dichlorodifluoromethane ²⁾	120.91	-21.8	-252	234	597	0.0287
R-13	Monochlorotrifluoromethane	104.46	-114.6	-294	84	561	0.0277
R-13B1	Bromotrifluoromethane	148.91	-72	-270	153	575	0.0215
R-14	Tetrafluoromethane (Carbon tetrafluoride)	88.00	-198.2	-299	-50	543	0.0256
R-14	Chloroform	119.4	142				
R-21	Dichloro-fluoromethane	102.92	48.1	-211			
R-22	Monochlorodifluoromethane ³⁾	86.468	-41.3	-256	205	722	0.0305
R-23	Trifluoromethane	70	-119.9				
R-30	Methylene Chloride	84.9	105.2				
R-31	Monochloromonofluoromethane	68.5	48.0				
R-32	Methylene Fluoride	52.0	-61.4				
R-40	Chloromethane (Methyl Chloride)	50.488	-10.7	-144	290	969	0.0454
R-41	Methyl Fluoride	34.0	-109				
R-50	Methane	16.044	-259	-296.6			
R-110	Hexachloroethane	236.8	365				
R-111	Pentachloromonofluoroethane	220.3	279				
R-112	Tetrachlorodifluoroethane	203.8	199.0				
R-113	Trichlorotrifluoroethane ⁴⁾	187.39	118	-31	417	499	0.0278
R-114	1,2-dichloro-1,1,2,2-tetrafluoroethane	170.92	38.4	-137	294	473	0.0275
R-115	Chloropentafluoroethane	154.47	-38.0	-149	176	458	0.0261
R-116	Hexafluoroethane	138.0	-108.8				
R-120	Pentachloroethane	202.3	324				
R-123	Dichlorotrifluoroethane ⁵⁾	152.93	82	-161	363	533	
R-124	Monochlorotetrafluoroethane	136.5	10.4				
R-125	Pentafluoroethane	120	-55				
R-133a	Monochlorotrifluoroethane	118.5	43.0				
R-134a	Tetrafluoroethane ⁶⁾	102.03	-15	-142	214	590	0.0290
R-140a	Trichloroethane	133.4	165				

[Free Industry Magazines](#)
[Laser Focus World](#)

[Power Transmission Engineering](#)

[Diesel & Gas Turbine Worldwide](#)

Home

- Acoustics
- Air Psychrometrics
- Basics
- Combustion
- Drawing Tools
- Dynamics
- Economics
- Electrical
- Environment
- Fluid Mechanics
- Gas and Compressed Air
- HVAC Systems
- Hydraulics and Pneumatics
- Insulation
- Material Properties
- Mathematics
- Mechanics
- Miscellaneous
- Physiology
- Piping Systems
- Process Control
- Pumps
- Standards Organizations
- Steam and Condensate
- Thermodynamics
- Water Systems

[ToolBox ShortList](#)
• [Add this Page!](#)

[Search the ToolBox!](#)
[Translate this Page!!](#)
[About Us!](#)
[Temperature](#)
 °C
 °F

[Length](#)
 m
 km
 in
 ft
 yards
 miles
 nautical miles

Convert !

[Volume](#)

- 1
- m³
 - liters
 - in³
 - ft³
 - us gal

Convert !

[Velocity](#)

- 1
- m/s
 - km/h
 - ft/min
 - ft/s
 - mph
 - knots

Convert !

[Pressure](#)

- 1
- Pa (N/m²)
 - bar
 - mm H₂O
 - kg/cm²
 - psi
 - inches H₂O

Convert !

[Flow](#)

- 1
- m³/s
 - m³/h
 - US gpm
 - cfm

Convert !

[Unit Converter](#)

[Scientific](#)



[Calculator](#)

[Free Industry Magazines](#)

[Plant Engineering](#)



[Pipeline & Gas Journal](#)



R-142b	1-chloro-1,1-difluoroethane	100.50	14	-204	279	598	0.0368
R-143a	Trifluoroethane	84	-53.5				
R-150a	Dichloroethane	98.9	140				
R-152a	Difluoroethane	66.05	-13				
R-160	Ethyl Chloride	64.515	12.2	-218			
R-170	Ethane	30.070	-127	-278	90	710	0.0830
R-218	Octafluoropropane	188	-36.4				
R-290	Propane	44.097	-44	-309.8	206	617	0.0728
RC-318	Octafluorocyclobutane	200.04	22	-43	240	404	0.0258
R-410A	R-32 Difluoromethane (50% weight), R-125 Pentafluoroethane (50% weight)	72.6	-55.4		162	690	
R-500	Dichlorodifluoromethane/ Difluoroethane ⁷⁾	99.31	-28	-254	222	642	0.0323
R-502	Chlorodifluoromethane/ Chloropentafluoroethane	111.63	-50		180	591	0.0286
R-503	Chlorotrifluoromethane/ Trifluoromethane	87.50	-128		67	607	0.0326
R-600	n-Butane	58.12	31.2	-217	306	551	0.0702
R-600a	Isobutane (2-Methyl propane)	58.12	10.8	-229	275	529	0.0725
R-611	Methyl formate	60.05	89	-146	417	870	0.0459
R-702	Hydrogen	2.016	-423	-434.6			
R-704	Helium	4.0026	-452				
R-717	Ammonia	17.02	-28	-107.9	271	1657	0.0680
R-720	Neon	20.179	-410.9	-415.6			
R-728	Nitrogen	28.0134	-320.4	-346			
R-729	Air	28.966	-320	-357.2			
R-732	Oxygen	31.9988	-297.3	-361.3			
R-740	Argon	39.948	-303	-308.5			
R-744	Carbon Dioxide	44.01	-109.4	-70	88	1070	0.0342
R-744A	Nitrous Oxide	44.012	-127.3	-131.5			
R-764	Sulfur Dioxide	64.06	14.0	-104	316	1143	0.0306
R-1150	Ethylene	28.05	-155	-272	49	742	0.0700
R-1270	Propylene	42.08	-54	-301	197	670	0.0720

- ¹⁾ Production of R11 or CFC-11 was halted by the clean air act on January 1, 1996
- ²⁾ Production of R12 or CFC-12 (Freon) was halted by the clean air act on January 1, 1996
- ³⁾ R22 or HCFC-22 is a single component HCFC refrigerant with low ozone depletion potential. It has long been used in a variety of air-conditioning and refrigeration applications in a variety of markets, including appliance, construction, food processing, and supermarkets
- ⁴⁾ Production of R113 or CFC-113 was halted by the clean air act on January 1, 1996
- ⁵⁾ R123 or HCFC-123 is a replacement for R11 in chillers and is providing this new refrigerant to chiller manufacturers for use in new and existing chillers
- ⁶⁾ Refrigerant R134a or HFC-134a is a commercially available hydrofluorocarbon (HFC) refrigerant for use as a long-term replacement for R-12 in new equipment and for retrofitting medium temperature CFC-12 systems
- ⁷⁾ Production of R-500 was halted by the clean air act on January 1, 1996.

Low Pressure, Medium Pressure and High Pressure Refrigerants

Typical low, medium and high pressure refrigerants are listed in the table below:

Refrigerants		
Low Pressure	R11	Trichlorofluoromethane
	R13	Chlorotrifluoromethane
	R113	Trichlorotrifluoroethane
	R123	Dichlorotrifluoroethane
Medium Pressure	R114	1,2-dichloro-1,1,2,2-tetrafluoroethane
High Pressure	R12	Dichlorodifluoromethane
	R22	Chlorodifluoromethane
	R134a	Tetrafluoroethane



Industry standards online:
 ASM, ASME, IEEE, ISO, API

[Consulting-
Specifying
Engineer](#)



	R410A	Difluoromethane/Pentafluoroethane
	R500	Dichlorodifluoromethane/ Difluoroethane
	R502	Chlorodifluoromethane/ Chloropentafluoroethane

CFS, HCFC, HFC and HC Refrigerants

Refrigerants can be classified as CFS's - ChloroFluoroCarbons refrigerants, HCFC's - HydroChloroFluorCarbons refrigerants, HFC's - HydroFluorCarbons refrigerants and HC - HydroCarbon refrigerants.

Refrigerants		
CFS ChloroFluoroCarbons	R11	Trichlorofluoromethane
	R12	Dichlorodifluoromethane
	R13	Chlorotrifluoromethane
	R113	Trichlorotrifluoroethane
	R114	1,2-dichloro-1,1,2,2-tetrafluoroethane
	R500	Dichlorodifluoromethane/ Difluoroethane
	R502	Chlorodifluoromethane/ Chloropentafluoroethane
	R503	Chlorotrifluoromethane/ Trifluoromethane
HCFC HydroChloroFluorCarbons	R22	Chlorodifluoromethane
	R123	Dichlorotrifluoroethane
	R124	Chlorotetrafluoroethane
	R401a	R22(53%)/R152a(13%) /R124(34%)
	R401b	R22(61%)/R152a(11%) /R124(28%)
	R402a	R22(38%)/R125(60%)/R290(2%)
	R403b	R22(56%)/R218(39%)/R290(5%)
	R406a	R22(55%)/R600a(4%) /R142b(41%)
	R408a	R125(7%)/R143a(46%)/R22(47%)
	R409a	R22(60%)/R124(25%) /R142b(15%)
HFC HydroFluorCarbons	R23	Trifluoromethane
	R134a	Tetrafluoroethane
	R404a	R125(44%)/R143a(52%) /R134a(4%)
	R407a	R32(20%)/R125(40%) /R134a(40%)
	R410a	R32(50%)/R125(50%)
	R416a	R134a(59%)/R124(39.5%) /R600(1.5%)
	R507	R125(50%)/R143a(50%)
	R508a	R23(39%)/R116(61%)
HC HydroCarbons	R600	butane
	R600a	iso-butane

Sponsored Links

[Mission Energy by STULZ](#) Temperature and humidity solutions for new and existing data centers. info.stulz-ats.com

[Roof Exhaust Fans](#) Check Our Huge Selection of Fans & Industrial-Strength Blowers Online www.StandardEquipmentCo.com

[Load Cells, Force Gage](#) Force and Pressure Measurement Compression and Tension Systems www.CooperInstruments.com

AdChoices ▶

Related Topics

- [Material Properties](#) - Material properties - density, heat capacity, viscosity and more - for gases, fluids and solids

Sponsored Links

Related Documents

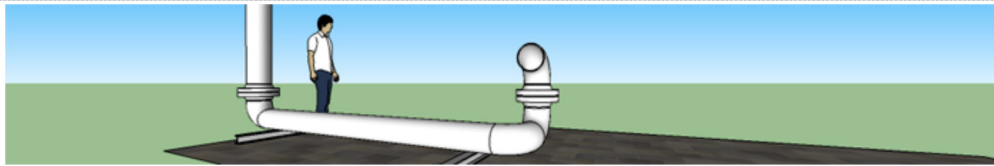
- [Evaporation Temperature and Compressor Capacities](#) - Evaporation temperature, condensing temperature and compressor capacities
- [Freon Properties](#) - Properties of saturated liquid Freon - CCl_2F_2 - density, specific heat capacity, kinematic viscosity, thermal conductivity and Prandtl number
- [Refrigerant Color Codes](#) - Color codes refrigerants
- [Refrigerant R134a Properties](#) - Thermodynamic properties refrigerant R-134a
- [Refrigerant R22 - Properties](#) - Properties of Refrigerant R22 - saturated liquid and saturated vapor - both imperial and metric units
- [Refrigerant Temperature-Pressure Chart](#) - Temperature and pressure chart of refrigerants R22, R410A, R12, R134A, R401A, R409A, R502, R404A, R507A, R408A and R402A
- [Refrigerants - Environment Properties](#) - Refrigerants - Ozone Depletion (ODP) and Global Warming Potential (GWP)
- [Temperature-Pressure Diagram for Constant Boiling Refrigerants](#) - Temperature-pressure in imperial and SI units

ToolBox Short List

Difficult to find your favorite ToolBox page? **Add links** to your favorite pages in your own **personal Short List!**

• [Add this Page!](#) • [Delete the ShortList!](#)

Engineering ToolBox - SketchUp Edition - Online 3D modeling!



[Engineering ToolBox - SketchUp Edition](#) - enabled for use with the amazing, fun and free [Google SketchUp](#).

Search the ToolBox

Translate the ToolBox

[Arabic](#) - [Chinese \(Simplified\)](#) - [Chinese \(Traditional\)](#) - [Dutch](#) - [French](#) - [German](#) - [Italian](#) - [Japanese](#) - [Korean](#) - [Portuguese](#) - [Russian](#) - [Spanish](#)

About the ToolBox

We appreciate any comments and tips on how to make The Engineering ToolBox a better information source. Please contact us by email

- editor.engineeringtoolbox@gmail.com

if You find any faults, inaccuracies, or otherwise unacceptable information.

The content in The Engineering ToolBox is [copyrighted](#) but can be used with [NO WARRANTY or LIABILITY](#). Important information should always be double checked with alternative sources. All applicable national and local regulations and practices concerning this aspects must be strictly followed and adhered to.

Advertise in the ToolBox

If you want to promote your products or services in this site - please follow [this link](#).