

## Names of Refrigerants

The name **chlorofluorocarbon (CFC)** is applied to a substance formed by replacing all of the hydrogen atoms in a hydrocarbon molecule with chlorine and fluorine (or sometimes bromine).

**Hydrochlorofluorocarbons (HCFC's)** are similar to CFC's, but they are only partially halogenated and therefore retain some hydrogen.

**Hydrofluorocarbons (HFC's)** are formed by partially fluorinating hydrocarbons. They retain some hydrogen and are totally chlorine free.

**Perfluorocarbons (PFC's)** are fully fluorinated hydrocarbons. They are very stable, have excellent fire suppressing properties, but have very long atmospheric lifetimes.

**Hydrocarbons (HC's)** are naturally occurring organic substances, generally they are stable and unreactive, the exceptions being their flammability and their ability to react with halogens.

In order to provide a similar three lettered acronym, the other natural refrigerants are sometimes referred to as '**Not In Kind**' (**NIK**) refrigerants.

The chemical names for the halogenated refrigerants are long and cumbersome, and therefore a numbering system was developed to identify the different products. The number was originally part of the registered trade name, but was later donated to the industry by Du Pont in order to avoid confusion and proliferation of different numbers for the same product.

The number assigned to each refrigerant is related to its chemical composition, and the system has been formalised by the American Society of Heating Refrigeration & Air Conditioning Engineers (ASHRAE) under standard 34. This internationally recognised system of numbering refrigerants is somewhat obscure, but straightforward in application. The rules are as follows:

The number consists of four digits (leading zero's are dropped) with each digit describing a characteristic of the molecule.

The first digit is the number of carbon to carbon double bonds (in most cases zero).

The second digit is one less than the number of carbon (C) atoms.

The third digit is one more than the number of hydrogen (H) atoms.

The fourth digit is the number of fluorine (F) atoms.

Any spare atoms are assumed to be chlorine unless otherwise noted, for example when chlorine atoms are replaced with bromine the letter (B) is used in the number, as in the case of R13B1.

Ordinary (non-azeotropic) mixtures are assigned numbers in the 400 series.

Azeotropic mixtures are assigned numbers in the 500 series in order of their commercial introduction.

Miscellaneous organic refrigerants are assigned arbitrary numbers in the 600 series. This includes hydrocarbon refrigerants that cannot be identified by the regular numbering system because they contain nine or more hydrogen atoms (as  $9 + 1$  cannot be represented by a single digit number).

Inorganic refrigerants are allocated to the 700 series, using the molecular weight prefixed by the number 7.

Lower case suffices are added to denote decreasing symmetry in isomers, or to denote inorganic gases with the same molecular weight.

## Refrigerant Nomenclature

REFRIGERANT TYPE	REFRIGERANT NUMBER	DESCRIPTION	FORMULA
CFC	11	Trichlorofluoromethane	CCl <sub>3</sub> F
CFC	12	Dichlorodifluoromethane	CCl <sub>2</sub> F <sub>2</sub>
CFC	115	2-Chloro-1,1,2,2,	CF <sub>3</sub> CClF <sub>2</sub>
CFC	502	pentafluoroethane	
HCFC	22	Blend of 48.8% 22 + 51.2% 115	CHClF <sub>2</sub>
HCFC	402A	Chlorodifluoromethane	
HCFC	403A	Blend of 60% 125, 2% 290, 38% 22	
HCFC	408A	Blend of 75% 22, 200% 218, 5%290	
HCFC	411B	Blend of 7% 125, 46% 143, 47% 22	
HFC	134A	Blend of 94% 22, 3% 152A,3%1270	CF <sub>3</sub> CH <sub>2</sub> F
HFC	125	1,1,1,2-Tetrafluoroethane	CF <sub>3</sub> CHF <sub>2</sub>
HFC	23	Pentafluoroethane	CHF <sub>3</sub>
HFC	32	Trifluoromethane	CH <sub>2</sub> F <sub>2</sub>
HFC	143A	Difluoromethane	CF <sub>3</sub> CH <sub>3</sub>
HFC	152A	1,1,1-Trifluoroethane	CHF <sub>2</sub> CH <sub>3</sub>
HFC	507	1,1-Difluoroethane	
HFC	407A	Blend of 50% 125, 50% 143A	
HFC	404A	Blend of 20% 32,40%125,40%134A	
HFC	407C	Blend 44%125, 52%143A,4%134A	
HFC	410A	Blend 23% 32,25% 125, 52% 134A	
HFC	410B	Blend of 50% 32, 50% 125	
HFC	13A	Blend of 45% 32, 55% 125	
PFC	14	Blend of 9%218,88%134A,3%600A	CF <sub>4</sub>
PFC	116	Tetrafluoromethane	C <sub>2</sub> F <sub>6</sub>
PFC	218	Hexafluoromethane	C <sub>3</sub> F <sub>8</sub>
PFC	C318	Octafluoropropane	C <sub>4</sub> F <sub>8</sub>
HC	50	Octafluorocyclobutane	CH <sub>4</sub>
HC	170	Methane	C <sub>2</sub> H <sub>6</sub>
HC	1270	Ethane	C <sub>3</sub> H <sub>6</sub>
HC	290	Propene	C <sub>3</sub> H <sub>8</sub>
HC	C270	Propane	C <sub>3</sub> H <sub>6</sub>
HC	600A	Cyclopropane	C <sub>4</sub> H <sub>10</sub>
NIK	717	Isobutane	NH <sub>3</sub>
NIK	718	Ammonia	H <sub>2</sub> O
NIK	729	Water	Mixture
NIK	744	Air	CO <sub>2</sub>
		Carbon Dioxide	