

Ozone Depleting Substances ODS

| Name/Group | Chemical name | Formula | ASHRAE # for refrigerants only | 2002 HS code (first 6 digits) | 2007 HS code (first 6 digits) |
|-----------------------------------------------|-----------------------------|-------------------------------------------------|-----------------------------------|-------------------------------------|-------------------------------------|
| Annex A, Group I (CFCs) | | | | --2903.40 | --2903.40 |
| CFC-11 | Trichlorofluoromethane | CFCI ₃ | R-11 | --2903.41.00 | --2903.41 |
| CFC-12 | Dichlorodifluoromethane | CF ₂ CI ₂ | R-12 | --2903.42.00 | --2903.42 |
| CFC-113 | Trichlorotrifluoroethanes | C ₂ F ₃ CI ₃ | R-113 | --2903.43.00 | --2903.43 |
| CFC-114 | Dichlorotetrafluoroethanes | C ₂ F ₄ CI ₂ | R-114 | --2903.44.10 | --2903.44 |
| CFC-115 | Chloropentafluoroethane | CCIF ₂ CF ₃ | R-115 | --2903.44.90 | --2903.44 |
| Annex A, Group II (Halons) | | | | --2903.40 | --2903.40 |
| Halon-1211 | Bromochlorodifluoromethane | CF ₂ BrCl | R-12B1 | --2903.46.10 | --2903.46 |
| Halon-1301 | Bromotrifluoromethane | CF ₃ Br | R-13B1 | --2903.46.20 | --2903.46 |
| Halon-2402 | Dibromotetrafluoroethanes | C ₂ F ₄ Br ₂ | R-114B2 | --2903.46.90 | --2903.46 |
| Annex B, Group I (Other CFCs) | | | | --2903.45 | --2903.45 |
| CFC-13 | Chlorotrifluoromethane | CF ₃ CI | R-13 | --2903.45.10 | --2903.45 |
| CFC-111 | Pentachlorofluoroethane | C ₂ FCI ₅ | R-111 | --2903.45.15 | --2903.45 |
| CFC-112 | Tetrachlorodifluoroethane | C ₂ F ₂ CI ₄ | R-112 | --2903.45.20 | --2903.45 |
| Annex B, Group II | | | | --2903.10 | --2903.10 |
| Tetrachloromethane or carbon | | CCI ₄ | | --2903.14.00 | --2903.14 |
| Annex B, Group III | | | | --2903.19 | --2903.19 |
| 1,1,1-trichloroethane or methyl | | C ₂ H ₃ CI ₃ | R-140a | --2903.19.10 | --2903.19 |
| Annex C, Group I (HCFCs) | | | | --2903.49 | --2903.49 |
| HCFC-22 | Chlorodifluoromethane | CHF ₂ CI | R-22 | --2903.49.10 | --2903.49 |
| HCFC-123 | Dichlorotrifluoroethanes | C ₂ HF ₃ CI ₂ | R-123 | --2903.49.10 | --2903.49 |
| HCFC-124 | Chlorotetrafluoroethanes | C ₂ HF ₄ CI | R-124 | --2903.49.10 | --2903.49 |
| HCFC-141 | Dichlorofluoroethanes | C ₂ H ₃ FCI ₂ | | --2903.49.10 | --2903.49 |
| HCFC-141b | 1,1-dichloro-1-fluoroethane | CH ₃ CFCI ₂ | R-141b | --2903.49.10 | --2903.49 |
| HCFC-142 | Chlorodifluoroethanes | C ₂ H ₃ F ₂ CI | | --2903.49.10 | --2903.49 |
| HCFC-142b | 1-chloro-1,1-difluoroethane | CH ₃ CF ₂ CI | R-142b | --2903.49.10 | --2903.49 |
| Annex C, Group II (HBFCs) | | | | --2903.49 | --2903.49 |
| HBFC-22B1 | Bromodifluoromethane | CHF ₂ Br | | --2903.49.30 | --2903.49 |
| Annex C, Group III | | | | --2903.49 | --2903.49 |
| Bromochloromethane | | CH ₂ BrCl | | --2903.49.80 | --2903.49 |
| Annex E, Group I | | | | --2903.30 | --2903.30 |
| Methyl bromide (or Bromomethane) | | CH ₃ Br | | --2903.30.33 | --2903.30 |
| The most popular ODS containing blends | | | | | |

| | | | | |
|----------------|------------------------------|--------|--------------|-----------|
| R-500 | CFC-12 / HFC-152a | R-500 | --3824.71.00 | --3824.71 |
| R-502 | HCFC-22 / CFC-115 | R-502 | --3824.71.00 | --3824.71 |
| R-401A (MP-39) | HCFC-22/HFC-152a/HCFC-124 | R-401A | --3824.90.99 | --3824.74 |
| R-408A (FX 10) | HCFC-22/HFC-143a/HFC-125 | R-408A | --3824.90.99 | --3824.74 |
| R-409A (FX 56) | HCFC-22 / HCFC-124/HCFC-142b | R-409A | --3824.90.99 | --3824.74 |

Non-Ozone Depleting Substances

| Name/Group | Chemical name | Formula | ASHRAE # for refrigerants only | 2002 HS code (first 6 digits) | 2007 HS code (first 6 digits) |
|-----------------------------------------|---------------------------|-----------------------------------|-----------------------------------|-------------------------------------|-------------------------------------|
| Hydrofluorocarbons (HFCs) | | | | --2903.30 | --2903.30 |
| HFC-134a | 1,1,1,2-Tetrafluoroethane | CF ₃ CH ₂ F | R-134a | --2903.30.80 | --2903.30 |
| HFC-152a | 1,1-Difluoroethane | CHF ₂ CH ₃ | R-152a | --2903.30.80 | --2903.30 |
| HFC-125 | Pentafluoroethane | CF ₃ CHF ₂ | R-125 | --2903.30.80 | --2903.30 |
| HFC-143a | 1.1.1-trifluoroethane | CF ₃ CH ₃ | R-143a | --2903.30.80 | --2903.30 |
| HFC-32 | Difluoromethane | CH ₂ F ₂ | R-32 | --2903.30.80 | --2903.30 |
| HFC-23 | Trifluoromethane | CHF ₃ | R-23 | --2903.30.80 | --2903.30 |
| Hydrofluorocarbons blends (HFCs) | | | | | |
| R-404A | R143a/125/134a | | R-404A | --3824.90.99 | --3824.90 |
| R-507A | R143a/125 | | R-507A | --3824.90.99 | --3824.90 |
| R-407A | R32/125/134a | | R-407A | --3824.90.99 | --3824.90 |
| R-407B | R32/125/134a | | R-407B | --3824.90.99 | --3824.90 |
| R-407C | R32/125/134a | | R-407C | --3824.90.99 | --3824.90 |
| R-410A | R32/125 | | R-410A | --3824.90.99 | --3824.90 |
| R-508A | R23/116 | | R-508A | --3824.90.99 | --3824.90 |
| R-508B | R23/116 | | R-508B | --3824.90.99 | --3824.90 |
| Halogen-free Refrigerants | | | | | |
| R-717 | Ammonia | NH ₃ | R-717 | --2814.10.00 | --2814.10 |
| R-600a | Iso-Butane | C ₄ H ₁₀ | R-600a | --2901.10.90 | --2901.10 |
| R-290 | Propane | C ₃ H ₈ | R-290 | --2901.10.90 | --2901.10 |

1- ASHRAE Safety Groups (ASHRAE: American Society for Heating Refrigeration & Air-conditioning Engineers):

- A1** Lower Toxicity & No Flammability
- A2** Lower Toxicity & Lower Flammability
- A3** Lower Toxicity & Higher Flammability
- B1** Higher Toxicity & No Flammability
- B2** Higher Toxicity & Lower Flammability
- B3** Higher Toxicity & Higher Flammability

2- CAS #: Chemical Abstract Service Number

3- UN #: United Nations Number for some Chemicals

** CAS # for blend is combined of the CAS # of its components

(Example: R-500 CAS # is: 75-71-8 / 75-37-6 which CAS # for both CFC-12 & HFC-152a)

Most popular refrigerants trade names

ARCTON - ASAHIFRON - ASAHIKLIN - FORANE - FREON - GENETRON - ISCEON - SOLKANE - SUVA -

DANGER SYMBOLS

List of main producing countries for ODS



Toxic substances



Flammable substances

| Group | Producing Countries |
|----------------------------|----------------------------------------------------------|
| Chlorofluorocarbons (CFCs) | CHINA, INDIA, NETHERLANDS, BRAZIL, REP. OF KOREA, ITALY, |
| Halons | CHINA, & REP. OF KOREA |



Explosive substances



Oxidizing substances



Corrosive substances



Irritating substances



Environmentally dangerous substances

| | |
|------------------------------------------------------|--------------------------------------------------------------------|
| Carbon tetrachloride (CCl ₄) | INDIA, BRAZIL, UKRAINE & ROMANIA |
| Methylchloroform (CH ₃ CCl ₃) | JAPAN, USA, FRANCE & CHINA |
| Hydrochlorofluorocarbon (HCFCs) | USA, FRANCE, JAPAN, CHINA, NETHERLANDS, UK, SPAIN, INDIA & RUSSIAN |
| Methyl Bromide | USA, ISRAEL, JAPAN, FRANCE, CHINA |

| Classification of ODS containing products with accordance to HS | |
|-----------------------------------------------------------------|--|
| Product | |
| A/C Systems | |
| AC components | |
| Refrigerators & Freezers | |
| Compressors | |
| Vehicles | |
| Fire Extinguishers | |
| Ins. boards & pipe covers | |
| PRE-POLYMERS | |



United Nations Environment Programme

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