



R-470A (RS-53)

Characteristics and applications of R-470A (RS-53)

RS-53 is a blend of HFC+HFO refrigerant gases. It is non-azeotropic, **non-flammable** with a **zero ODP** and a **low global warming potential (GWP)** and was developed to comply with the requirements of the European F-Gas Regulation for reducing CO₂ emissions.

Some of its main properties are:

- It is a good alternative to R-410A for new medium and low temperature systems.
- It is a **direct drop-in** replacement for R-410A in existing systems.
- Its global warming potential (GWP) is **approximately 53% less** than that of R-410A.
- It has a refrigeration capacity and energy efficiency (COP) similar to that of R-410A.
- It is a blend that is compatible with POE synthetic oils.
- Since RS-53 is a blend, it should always be transferred in liquid phase or, if transferred in gas phase, in full loads.

Applications

RS-53 is the only direct drop-in replacement for R-410A with a GWP less than half that of R-410A. RS-52 can also be used with new equipment designed for R-410A and one of its major advantages is that it's **non-flammable**.

Working and service conditions

Since RS-53 is a blend, it should always be transferred in liquid phase or, if transferred in gas phase, in full loads.

There is no need to make any changes to an R-410A system to convert it to RS-53, whether it be a fixed expansion system (capillary) or a thermostatic expansion valve (TXV).

Lubricants

RS-53 is compatible with the same polyolester oils that are used with R-410A, so there is no need to change the oil type when converting systems from R-410A to RS-53.

Environmental data

None of the components of RS-53 contain chlorine, so the product has an ODP of zero (ozone depletion potential).

RS-53 has a **low** global warming potential (GWP), less than half that of R-410A, thus reducing CO₂ emissions if there is a direct leak.



Safety

RS-53 is not flammable under any blend fractionation situation, in accordance with the ASHRAE Standard 34.

The safety classification of RS-53 is **A1/group L1**.

Compatibility with materials

RS-53 is compatible with all materials commonly used in systems that have previously worked with R-401A. The materials used with R-410A are generally compatible with RS-53. It is recommended that you contact the equipment manufacturer to obtain precise information regarding the adaptation of said equipment in relation to the compatibility of the materials.

Pressure / temperature tables

The pressure / temperature tables and graphs for the refrigerant indicate both the bubble point of the liquid and the dew point of the vapour.

Bubble point temperature: this is the temperature at which the liquid refrigerant begins to vaporise at the given pressure. When below this temperature, the liquid refrigerant will be subcooled.

Dew point of vapour: this is the temperature at which the refrigerant vapour begins to condense at the given pressure. When above this temperature, the refrigerant vapour is considered to be in a superheated state.

Superheated vapour: to determine the evaporator superheat, measure the temperature and pressure from the suction line in the evaporator outlet pipe. Use the P/T tables to determine the vapour dew point, with the pressure measured in the suction line. Subtract the current temperature from the dew point and the difference will be the evaporator superheat.

Subcooling in refrigeration liquid: to determine subcooling, measure the temperature and pressure from the suction line in the condenser outlet pipe. Use the P/T tables to determine the bubble point, with the pressure measured in the condenser. Subtract the current temperature from the bubble point and the difference will be the condenser subcooling.

Note: with the RS range of refrigerants, the average evaporation and condensation temperatures will be the midpoint between the bubble point temperature and the dew point temperature.

Components

| Chemical Name | % By weight | N° CAS | N° CE |
|---|-------------|------------|-----------|
| Trans-1,3,3,3- Tetrafluoroprop-1-ene (R-1234ze) | 44 | 29118-24-9 | 471-480-0 |
| 1,1,1,2,2- Pentafluoroethane (R-125) | 19 | 354-33-6 | 206-557-8 |
| Difluoromethane (R-32) | 17 | 75-10-5 | 200-839-4 |
| Carbon Dioxide (R-744) | 10 | 124-38-9 | 204-696-9 |
| 1,1,1,2- Tetrafluoroethane (R-134a) | 7 | 811-97-2 | 212-377-0 |
| 1,1,1,2,3,3,3-Heptafluoropropane (R-227ea) | 3 | 431-89-0 | 207-079-2 |



Physical properties

| PHYSICAL PROPERTIES | UNITS | R-470A (RS-53) ⁽²⁾ | R-410A ⁽²⁾ |
|--|----------------------|-------------------------------|-----------------------|
| Molecular weight | (kg/kmol) | 84,43 | 72,60 |
| Boiling point (at 1,013 bar) ⁽¹⁾ | (°C) | -62,50 | -51,40 |
| Critical temperature | (°C) | 88,70 | 71,30 |
| Critical pressure | (bara) | 55,91 | 49,00 |
| Liquid density at 25°C ⁽¹⁾ | (kg/m ³) | 1088 | 1059 |
| Saturated vapour density at 25°C ⁽¹⁾ | (kg/m ³) | 61,99 | 64,87 |
| Cv (25°C y 1 bara) Specific heat at V const. | (kJ/kg.K) | 0,749 | 0,700 |
| Cp (25°C y 1 bara) Specific heat at P const. | (kJ/kg.K) | 0,854 | 0,823 |
| Cp/Cv (25°C y 1 bara) | | 1,141 | 1,1755 |
| Vapour pressure 25°C ⁽¹⁾ | (bara) | 18,40 | 16,57 |
| Latent heat of vaporization at the boiling point. ⁽³⁾ | (kJ/kg) | 267,30 | 273,00 |
| Vapour viscosity (25°C y 1 bara) | cP | 0,013 | 0,0133 |
| Liquid viscosity (25°C) ⁽¹⁾ | cP | 0,135 | 0,118 |
| Thermal conductivity of liquid (25°C) | W/m.K | 0,0828 | 0,0892 |
| Surface tension (25°C) ⁽¹⁾ | N/m | 0,00592 | 0,00521 |
| Specific heat of liquid (25°C) ⁽¹⁾ | kJ/kg.K | 1,59 | 1,71 |
| Flammability in air at 1 atm | %vol. | No | No |
| ODP | | 0 | 0 |
| GWP* | | 979* | 2088* |
| Inhalation exposure (8h/day and 40h/week) | (ppm) | 1000 | 1000 |

(1) Bubble point.

(2) Properties of the RS-53 refrigerant obtained from the REFPROP v10 program from NIST.

(3) Difference between the enthalpy of the liquid bubble point and the enthalpy of the vapour dew point at 1 atm.

* According to IPPCC-AR4/CIE (Fourth Assessment Report of the Intergovernmental Panel of Experts on Climate Change)-2007.

Remember to consult the guidelines for conversion from RS-53.

R-470A (RS-53) Absolute Saturation Properties

| T [°C] | Pressure Liquid [bar] | Pressure Vapour [bar] | Density Liquid [kg/m ³] | Density Vapour [kg/m ³] | Enthalpy Liquid [kJ/kg] | Enthalpy Vapour [kJ/kg] | Entropy Liquid [kJ/K·kg] | Entropy Vapour [kJ/K·kg] |
|-----------|-----------------------------|-----------------------------|---|---|-------------------------------|-------------------------------|--------------------------------|--------------------------------|
| -60 | 1.1515 | 0.25481 | 1397.7 | 1.229 | 117.24 | 366.36 | 0.66131 | 1.8959 |
| -59 | 1.207 | 0.27168 | 1394.7 | 1.305 | 118.57 | 367.02 | 0.66749 | 1.8928 |
| -58 | 1.2645 | 0.28945 | 1391.7 | 1.3848 | 119.89 | 367.67 | 0.67365 | 1.8897 |
| -57 | 1.3241 | 0.30816 | 1388.7 | 1.4684 | 121.22 | 368.33 | 0.67979 | 1.8866 |
| -56 | 1.3859 | 0.32785 | 1385.8 | 1.556 | 122.55 | 368.98 | 0.6859 | 1.8836 |
| -55 | 1.4498 | 0.34855 | 1382.8 | 1.6478 | 123.88 | 369.64 | 0.69199 | 1.8807 |
| -54 | 1.516 | 0.37031 | 1379.7 | 1.7439 | 125.21 | 370.29 | 0.69806 | 1.8778 |
| -53 | 1.5845 | 0.39317 | 1376.7 | 1.8444 | 126.55 | 370.95 | 0.7041 | 1.875 |
| -52 | 1.6553 | 0.41715 | 1373.7 | 1.9495 | 127.88 | 371.6 | 0.71013 | 1.8722 |
| -51 | 1.7285 | 0.44231 | 1370.7 | 2.0594 | 129.21 | 372.25 | 0.71613 | 1.8695 |
| -50 | 1.8042 | 0.46869 | 1367.6 | 2.1741 | 130.55 | 372.91 | 0.72211 | 1.8669 |
| -49 | 1.8824 | 0.49634 | 1364.6 | 2.2939 | 131.89 | 373.56 | 0.72807 | 1.8642 |
| -48 | 1.9631 | 0.52528 | 1361.5 | 2.4189 | 133.23 | 374.21 | 0.734 | 1.8617 |
| -47 | 2.0464 | 0.55557 | 1358.5 | 2.5493 | 134.57 | 374.86 | 0.73992 | 1.8591 |
| -46 | 2.1324 | 0.58726 | 1355.4 | 2.6852 | 135.91 | 375.51 | 0.74582 | 1.8567 |
| -45 | 2.2211 | 0.62039 | 1352.3 | 2.8268 | 137.26 | 376.16 | 0.7517 | 1.8542 |
| -44 | 2.3125 | 0.65501 | 1349.3 | 2.9743 | 138.6 | 376.81 | 0.75756 | 1.8519 |
| -43 | 2.4068 | 0.69117 | 1346.2 | 3.1278 | 139.95 | 377.46 | 0.76339 | 1.8495 |
| -42 | 2.5039 | 0.72891 | 1343.1 | 3.2875 | 141.3 | 378.1 | 0.76921 | 1.8472 |
| -41 | 2.604 | 0.76829 | 1339.9 | 3.4537 | 142.65 | 378.75 | 0.77501 | 1.845 |
| -40 | 2.707 | 0.80935 | 1336.8 | 3.6264 | 144.01 | 379.4 | 0.7808 | 1.8427 |
| -39 | 2.8131 | 0.85216 | 1333.7 | 3.8059 | 145.36 | 380.04 | 0.78656 | 1.8406 |
| -38 | 2.9222 | 0.89675 | 1330.6 | 3.9924 | 146.72 | 380.68 | 0.79231 | 1.8384 |
| -37 | 3.0345 | 0.94319 | 1327.4 | 4.186 | 148.08 | 381.32 | 0.79804 | 1.8363 |
| -36 | 3.15 | 0.99152 | 1324.2 | 4.387 | 149.44 | 381.96 | 0.80375 | 1.8343 |
| -35 | 3.2688 | 1.0418 | 1321.1 | 4.5955 | 150.8 | 382.6 | 0.80944 | 1.8323 |
| -34 | 3.3908 | 1.0941 | 1317.9 | 4.8118 | 152.16 | 383.24 | 0.81512 | 1.8303 |
| -33 | 3.5162 | 1.1485 | 1314.7 | 5.0361 | 153.53 | 383.87 | 0.82078 | 1.8283 |
| -32 | 3.6451 | 1.205 | 1311.5 | 5.2685 | 154.9 | 384.51 | 0.82643 | 1.8264 |
| -31 | 3.7774 | 1.2636 | 1308.3 | 5.5093 | 156.27 | 385.14 | 0.83206 | 1.8245 |
| -30 | 3.9132 | 1.3245 | 1305.1 | 5.7588 | 157.64 | 385.77 | 0.83767 | 1.8227 |
| -29 | 4.0526 | 1.3878 | 1301.8 | 6.017 | 159.02 | 386.4 | 0.84327 | 1.8208 |
| -28 | 4.1957 | 1.4533 | 1298.6 | 6.2843 | 160.39 | 387.03 | 0.84885 | 1.819 |
| -27 | 4.3424 | 1.5213 | 1295.3 | 6.5609 | 161.77 | 387.66 | 0.85442 | 1.8173 |
| -26 | 4.4929 | 1.5918 | 1292 | 6.847 | 163.15 | 388.28 | 0.85997 | 1.8156 |
| -25 | 4.6472 | 1.6648 | 1288.8 | 7.1428 | 164.54 | 388.91 | 0.86551 | 1.8139 |
| -24 | 4.8054 | 1.7405 | 1285.5 | 7.4487 | 165.92 | 389.53 | 0.87103 | 1.8122 |
| -23 | 4.9675 | 1.8188 | 1282.1 | 7.7647 | 167.31 | 390.15 | 0.87655 | 1.8105 |
| -22 | 5.1336 | 1.8999 | 1278.8 | 8.0913 | 168.7 | 390.77 | 0.88204 | 1.8089 |
| -21 | 5.3037 | 1.9837 | 1275.5 | 8.4286 | 170.09 | 391.38 | 0.88753 | 1.8073 |
| -20 | 5.4778 | 2.0705 | 1272.1 | 8.7769 | 171.49 | 391.99 | 0.893 | 1.8058 |
| -19 | 5.6562 | 2.1602 | 1268.8 | 9.1365 | 172.89 | 392.61 | 0.89845 | 1.8042 |
| -18 | 5.8387 | 2.2529 | 1265.4 | 9.5077 | 174.29 | 393.22 | 0.9039 | 1.8027 |
| -17 | 6.0255 | 2.3487 | 1262 | 9.8906 | 175.69 | 393.82 | 0.90933 | 1.8012 |
| -16 | 6.2166 | 2.4477 | 1258.6 | 10.286 | 177.1 | 394.43 | 0.91475 | 1.7998 |
| -15 | 6.412 | 2.5499 | 1255.2 | 10.693 | 178.51 | 395.03 | 0.92015 | 1.7983 |
| -14 | 6.6119 | 2.6554 | 1251.7 | 11.113 | 179.92 | 395.63 | 0.92555 | 1.7969 |
| -13 | 6.8162 | 2.7642 | 1248.3 | 11.546 | 181.33 | 396.23 | 0.93094 | 1.7955 |
| -12 | 7.0251 | 2.8765 | 1244.8 | 11.993 | 182.75 | 396.82 | 0.93631 | 1.7941 |
| -11 | 7.2386 | 2.9923 | 1241.3 | 12.453 | 184.17 | 397.41 | 0.94167 | 1.7928 |
| -10 | 7.4567 | 3.1118 | 1237.8 | 12.927 | 185.59 | 398 | 0.94702 | 1.7914 |
| -9 | 7.6795 | 3.2349 | 1234.3 | 13.415 | 187.02 | 398.59 | 0.95236 | 1.7901 |
| -8 | 7.9071 | 3.3617 | 1230.7 | 13.917 | 188.45 | 399.17 | 0.95769 | 1.7888 |
| -7 | 8.1395 | 3.4924 | 1227.2 | 14.435 | 189.88 | 399.76 | 0.96301 | 1.7875 |
| -6 | 8.3767 | 3.627 | 1223.6 | 14.968 | 191.32 | 400.33 | 0.96832 | 1.7862 |
| -5 | 8.6189 | 3.7656 | 1220 | 15.516 | 192.76 | 400.91 | 0.97363 | 1.785 |
| -4 | 8.866 | 3.9082 | 1216.4 | 16.081 | 194.2 | 401.48 | 0.97892 | 1.7838 |
| -3 | 9.1182 | 4.055 | 1212.8 | 16.661 | 195.64 | 402.05 | 0.9842 | 1.7826 |
| -2 | 9.3754 | 4.2061 | 1209.1 | 17.259 | 197.09 | 402.62 | 0.98948 | 1.7814 |
| -1 | 9.6378 | 4.3614 | 1205.4 | 17.873 | 198.54 | 403.18 | 0.99474 | 1.7802 |

| T [°C] | Pressure Liquid [bar] | Pressure Vapour [bar] | Density Liquid [kg/m ³] | Density Vapour [kg/m ³] | Enthalpy Liquid [kJ/kg] | Enthalpy Vapour [kJ/kg] | Entropy Liquid [kJ/K·kg] | Entropy Vapour [kJ/K·kg] |
|-----------|-----------------------------|-----------------------------|---|---|-------------------------------|-------------------------------|--------------------------------|--------------------------------|
| 0 | 9.9053 | 4.5212 | 1201.8 | 18.505 | 200 | 403.74 | 1 | 1.779 |
| 1 | 10.178 | 4.6854 | 1198 | 19.155 | 201.46 | 404.3 | 1.0053 | 1.7778 |
| 2 | 10.456 | 4.8542 | 1194.3 | 19.823 | 202.92 | 404.85 | 1.0105 | 1.7767 |
| 3 | 10.74 | 5.0277 | 1190.5 | 20.51 | 204.39 | 405.4 | 1.0157 | 1.7756 |
| 4 | 11.029 | 5.206 | 1186.8 | 21.217 | 205.86 | 405.94 | 1.021 | 1.7745 |
| 5 | 11.323 | 5.389 | 1183 | 21.942 | 207.33 | 406.48 | 1.0262 | 1.7733 |
| 6 | 11.623 | 5.577 | 1179.1 | 22.688 | 208.81 | 407.02 | 1.0314 | 1.7723 |
| 7 | 11.928 | 5.7701 | 1175.3 | 23.455 | 210.3 | 407.55 | 1.0366 | 1.7712 |
| 8 | 12.239 | 5.9682 | 1171.4 | 24.242 | 211.78 | 408.08 | 1.0418 | 1.7701 |
| 9 | 12.556 | 6.1716 | 1167.5 | 25.052 | 213.27 | 408.61 | 1.047 | 1.769 |
| 10 | 12.878 | 6.3802 | 1163.6 | 25.883 | 214.77 | 409.13 | 1.0522 | 1.768 |
| 11 | 13.206 | 6.5943 | 1159.6 | 26.737 | 216.27 | 409.65 | 1.0574 | 1.7669 |
| 12 | 13.54 | 6.8138 | 1155.6 | 27.614 | 217.77 | 410.16 | 1.0626 | 1.7659 |
| 13 | 13.88 | 7.039 | 1151.6 | 28.515 | 219.28 | 410.67 | 1.0677 | 1.7649 |
| 14 | 14.226 | 7.2698 | 1147.6 | 29.44 | 220.79 | 411.17 | 1.0729 | 1.7638 |
| 15 | 14.577 | 7.5064 | 1143.5 | 30.39 | 222.31 | 411.67 | 1.0781 | 1.7628 |
| 16 | 14.935 | 7.7489 | 1139.4 | 31.366 | 223.83 | 412.16 | 1.0832 | 1.7618 |
| 17 | 15.299 | 7.9975 | 1135.3 | 32.368 | 225.36 | 412.65 | 1.0884 | 1.7608 |
| 18 | 15.668 | 8.2521 | 1131.1 | 33.396 | 226.89 | 413.13 | 1.0936 | 1.7598 |
| 19 | 16.044 | 8.513 | 1126.9 | 34.453 | 228.43 | 413.61 | 1.0987 | 1.7588 |
| 20 | 16.427 | 8.7801 | 1122.7 | 35.537 | 229.97 | 414.08 | 1.1039 | 1.7578 |
| 21 | 16.815 | 9.0537 | 1118.5 | 36.651 | 231.52 | 414.55 | 1.109 | 1.7568 |
| 22 | 17.21 | 9.3338 | 1114.2 | 37.794 | 233.07 | 415.01 | 1.1142 | 1.7558 |
| 23 | 17.611 | 9.6206 | 1109.8 | 38.968 | 234.63 | 415.47 | 1.1193 | 1.7548 |
| 24 | 18.018 | 9.9142 | 1105.5 | 40.173 | 236.19 | 415.91 | 1.1245 | 1.7538 |
| 25 | 18.432 | 10.215 | 1101 | 41.41 | 237.76 | 416.36 | 1.1296 | 1.7529 |
| 26 | 18.852 | 10.522 | 1096.6 | 42.681 | 239.34 | 416.79 | 1.1348 | 1.7519 |
| 27 | 19.279 | 10.837 | 1092.1 | 43.985 | 240.92 | 417.22 | 1.1399 | 1.7509 |
| 28 | 19.713 | 11.158 | 1087.6 | 45.324 | 242.51 | 417.65 | 1.1451 | 1.7499 |
| 29 | 20.153 | 11.487 | 1083 | 46.7 | 244.1 | 418.06 | 1.1502 | 1.7489 |
| 30 | 20.599 | 11.824 | 1078.4 | 48.112 | 245.7 | 418.47 | 1.1554 | 1.7479 |
| 31 | 21.053 | 12.168 | 1073.7 | 49.562 | 247.31 | 418.88 | 1.1605 | 1.7469 |
| 32 | 21.513 | 12.52 | 1069 | 51.051 | 248.92 | 419.27 | 1.1657 | 1.7459 |
| 33 | 21.979 | 12.88 | 1064.3 | 52.581 | 250.54 | 419.66 | 1.1708 | 1.7449 |
| 34 | 22.453 | 13.248 | 1059.5 | 54.152 | 252.17 | 420.04 | 1.176 | 1.7439 |
| 35 | 22.933 | 13.624 | 1054.6 | 55.765 | 253.81 | 420.41 | 1.1812 | 1.7429 |
| 36 | 23.421 | 14.008 | 1049.7 | 57.423 | 255.45 | 420.77 | 1.1863 | 1.7419 |
| 37 | 23.915 | 14.401 | 1044.7 | 59.127 | 257.1 | 421.12 | 1.1915 | 1.7408 |
| 38 | 24.416 | 14.802 | 1039.7 | 60.877 | 258.76 | 421.47 | 1.1967 | 1.7398 |
| 39 | 24.924 | 15.212 | 1034.6 | 62.676 | 260.42 | 421.81 | 1.2019 | 1.7387 |
| 40 | 25.438 | 15.631 | 1029.5 | 64.524 | 262.1 | 422.13 | 1.2071 | 1.7377 |
| 41 | 25.96 | 16.059 | 1024.3 | 66.425 | 263.78 | 422.45 | 1.2123 | 1.7366 |
| 42 | 26.489 | 16.496 | 1019 | 68.379 | 265.47 | 422.76 | 1.2175 | 1.7355 |
| 43 | 27.025 | 16.942 | 1013.7 | 70.388 | 267.18 | 423.05 | 1.2227 | 1.7344 |
| 44 | 27.568 | 17.398 | 1008.2 | 72.455 | 268.89 | 423.34 | 1.228 | 1.7333 |
| 45 | 28.118 | 17.864 | 1002.8 | 74.582 | 270.61 | 423.62 | 1.2332 | 1.7322 |
| 46 | 28.676 | 18.34 | 997.21 | 76.77 | 272.34 | 423.88 | 1.2385 | 1.731 |
| 47 | 29.24 | 18.825 | 991.58 | 79.022 | 274.08 | 424.13 | 1.2437 | 1.7299 |
| 48 | 29.811 | 19.321 | 985.86 | 81.34 | 275.83 | 424.37 | 1.249 | 1.7287 |
| 49 | 30.39 | 19.827 | 980.06 | 83.728 | 277.59 | 424.6 | 1.2543 | 1.7275 |
| 50 | 30.975 | 20.344 | 974.17 | 86.187 | 279.37 | 424.81 | 1.2596 | 1.7262 |
| 51 | 31.568 | 20.872 | 968.19 | 88.722 | 281.15 | 425.01 | 1.265 | 1.725 |
| 52 | 32.168 | 21.411 | 962.11 | 91.335 | 282.95 | 425.19 | 1.2703 | 1.7237 |
| 53 | 32.775 | 21.961 | 955.93 | 94.029 | 284.77 | 425.36 | 1.2757 | 1.7224 |
| 54 | 33.389 | 22.523 | 949.64 | 96.808 | 286.59 | 425.52 | 1.2811 | 1.7211 |
| 55 | 34.01 | 23.096 | 943.24 | 99.677 | 288.43 | 425.66 | 1.2865 | 1.7197 |
| 56 | 34.638 | 23.681 | 936.72 | 102.64 | 290.29 | 425.78 | 1.2919 | 1.7183 |
| 57 | 35.272 | 24.279 | 930.08 | 105.7 | 292.16 | 425.88 | 1.2974 | 1.7169 |
| 58 | 35.914 | 24.889 | 923.3 | 108.86 | 294.05 | 425.97 | 1.3029 | 1.7155 |
| 59 | 36.563 | 25.512 | 916.39 | 112.13 | 295.96 | 426.03 | 1.3084 | 1.7139 |
| 60 | 37.218 | 26.149 | 909.33 | 115.52 | 297.88 | 426.07 | 1.314 | 1.7124 |



Questions and answers regarding R-470A (RS-53)

1 Q: What is RS-53?

A: RS-53 is an HFC+HFO blend for the direct replacement of R-410A. It is non-flammable, has a low global warming potential (GWP) and a zero ozone depletion potential (ODP).

2 Q: OK, but what does RS-53 contain?

A: RS-53 is a blend of R-1234ze, R-125, R-32, R-744, R-134a and R-227ea.

3 Q: Is RS-53 in the process of being phased out, in accordance with regulations, as is the case with CFCs and HCFCs?

A: No, none of the components of RS-53 are subject to a phase-out calendar within the framework of the Montreal Protocol or other European regulations.

4 Q: Can RS-53 be used with the same oil when used as a replacement for R-410A?

A: Yes. RS-53 is fully compatible with synthetic polyolester oils (POE), which are commonly used with R-410A.

5 Q: Is RS-53 non-flammable and non-toxic?

A: RS-53 is non-flammable and has a low toxicity. It is non-flammable under all fractionation conditions. It is classified as group L1.

6 Q: Is RS-53 approved by compressor manufacturers?

A: The components that make up RS-53 are widely used for compressors produced by the main manufacturers.

7 Q: Should RS-53 be charged in liquid or gas phase?

A: Since RS-53 is a blend, it is recommended that it be charged in liquid phase. However, if the entire content of the cylinder is being charged into a system, it can be done in gas phase.

8 Q: Is RS-53 included in SNAP (US programme for new alternatives)?

A: An application will be made to the Environmental Protection Agency (EPA) in the USA for RS-53 to be included in SNAP.

9 Q: Does RS-53 have an ASHRAE number, and what is its classification?

A: Yes, the ASHRAE number for RS-53 is R-470A, and the safety classification is A1, meaning that it has a low toxicity and it is non-flammable under all fractionation conditions.

10 Q: What are the pressures of RS-53 compared with R-410A?

A: The discharge pressure of RS-53 is similar to that of R-410A.

11 Q: What is the capacity of RS-53 compared with R-410A?

A: The capacity of RS-53 is similar to that of R-410A.

12 Q: Is RS-53 as efficient as R410A?

A: The tests demonstrate that RS-53 has a similar COP to that of R-410A.

13 Q: What is the working temperature of RS-53 compared with R-410A?

A: The discharge temperature of RS-53 is similar to that of R-410A.

14 Q: What are the flammability properties of RS-53?

A: RS-53 is non-flammable, as established in the ASHRAE EN 681-09 test, and therefore has neither a flash point nor explosion limits. The autoignition temperature of RS-53 has not been determined but is expected to be higher than 750 °C. RS-53 is non-flammable at room temperature and atmospheric pressure, and has the same classification as R-410A, R-134a, R-404A, R-507, etc.



15 Q: What are the decomposition products resulting from the combustion of RS-53?

A: The decomposition products resulting from the exposure of RS-53 to a high temperature source are similar to those produced by R-410A when it is exposed to fire. The decomposition products in any case are irritants and toxic, and in the case of exposure, a self-contained breathing apparatus should be used.

16 Q: Should any special precautions be taken into account with RS-53?

A: There are no particular precautions that need to be taken with RS-53. Common sense and good practices are always recommended, as with all refrigerants.

17 Q: Is RS-53 compatible with systems designed for R-410A?

A: Yes, RS-53 is compatible with all the materials commonly used in systems that were designed for and loaded with R-410A. Magnesium and zinc alloys should be avoided.

18 Q: Can R-470A (RS-53) be recovered and regenerated?

A: Yes, RS-53 can be recovered and reused after a cleaning process, as with regeneration, which is carried out by an authorised waste management service provider.

19 Q: What technical advice would you give when changing from R-410A to RS-53?

A: Use the same kind of oil that is already in use, which should be POE. After recovering the R-410A and emptying the system, change the filter dehydrator and charge 10% less than the original charge of R-410A. The flow rate of the liquid is similar to that of R-410, meaning it is compatible with equipment that has either a fixed expansion system (capillary) or a thermostatic expansion valve (TXV). Finish charging the equipment with small charges of RS-53 while keeping an eye on the superheating.

20 Q: How does the price of RS-53 compare to other alternatives?

A: RS-53 is the only alternative for existing R-410A equipment, the price is competitive and the tax is approximately 53% lower than that of R-410A.

21 Q: What is the main benefit of RS-53?

A: The global warming potential (GWP) of RS-53 is 53% lower than that of R-410A.

22 Q: Is RS-53 compatible with the joints, seals, hoses and toric joints that are used with R-410A?

A: Yes, there is no need to change any seal, hose, etc. when replacing R-410A with RS-53.

23 Q: What is the specification of R-470A (RS-53)?

A: RS-53 complies with the AHRI-700 specification for fluorocarbon refrigerants.

24 Q: What are the effects of prolonged exposure to RS-53 by inhalation?

A: As is the case with all CFC, HCFC, HFC and HFC+HFO refrigerants, prolonged exposure to RS-53 can cause anaesthetic effects. Very prolonged exposure may lead to heart arrhythmia and could be fatal, as is the case with all CFC, HCFC, HFC and HFC+HFO refrigerants.

25 Q: What kinds of leak detectors should be used with RS-53?

A: The same leak detectors used for other HFC and HFC+HFO refrigerants can also be used with RS-53.

26 Q: What is the correct way to respond to a major leak of RS-53?

A: As is the case with all other refrigerants of this type, the area should be immediately evacuated. The vapours may concentrate at ground level and in poorly ventilated areas they may disperse slowly. The area should be properly ventilated before entering.

27 Q: Can RS-53 be used in new systems?

A: RS-53 has also been developed as an alternative to R-410A in new systems due to its low global warming potential (GWP) and one of its major advantages is that it's non-flammable.



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28 Q: What tests have been carried out on RS-53, and what were the results?

A: A change of refrigerant from R-410A to RS-53 was carried out on a split air conditioning system and the resulting performance and operating parameters were both satisfactory.

29 Q: Do RS-53 cylinders have probe tubes?

A: It depends on the type of cylinder. All the blue cylinders from Gas Servei have them. If there isn't one, it is recommended that you turn the cylinder upside down.

30 Q: Is RS-53 available in rechargeable and disposable cylinders?

A: Yes, although disposable cylinders may only be used outside of the European Union.