

RS-44 (R424A) : Q & A



1 Q: What is RS-44?

A: RS-44 is a non ozone depleting Drop-in replacement for R22 in most applications.

2 Q: Yes, but what does RS-44 contain?

A: RS-44 is a blend of HFC134a, HFC125, iso-pentane, n-butane & isobutane.

3 Q: Does RS-44 have an ASHRAE number & what is its classification?

A: Yes. RS-44 has been designated an ASHRAE number of R424A with a classification of A1, which is low toxicity & non flammable under all conditions of fractionation.

4.Q: Is RS-44 subject to a phase out programme under any regulations as is the case with CFCs and HCFCs?

A: No. None of the components of RS-44 is subject to a phase out schedule under the Montreal protocol or any regulations.

5 Q: Why is RS-44 different to Isceon 59 /MO59 (R417A)?

A: RS-44 is a different blend to R417A with a higher capacity and additionally contains a combination of iso-pentane, butane & isobutane which provides optimum oil return to the compressor while remaining non flammable as formulated.

6 Q: Can RS-44 be used with mineral and alkylbenzene lubricants?

A: Yes. There is no need to change to a synthetic polyol ester (POE) oil with RS-44 which operates satisfactorily with traditional lubricants.

7 Q: Is RS-44 approved by compressor manufacturers?

A: The individual components which comprise RS-44 are widely used in compressors produced by major manufacturers.

8 Q: Can RS-44 be used to top up a system containing R22?

A: The standard recommendation is not to mix refrigerants. RS-44 does not form an azeotropic mixture with R22 so that adding RS-44 to R22 in a system will not generate any higher pressures. In strictly technical terms, work has shown that RS-44 may be added to R22 without any adverse effects.

9 Q: Can RS-44 be added to Isceon 59/MO59 (R417A)?

A: There is not sufficient experience in the field to be able to comment. It is recommended that Isceon 59 is recovered from the system and replaced with RS-44.

10 Can RS-44 be used in refrigeration as well as air conditioning?

A: RS-44 was designed as a Drop-in replacement for R22 in existing air conditioning equipment without replacing the mineral oil lubricant. At lower temperatures, RS-45 (R434A) is the preferred alternative to R22.

11 Q: Is RS-44 as efficient as R22?

A: Tests show that RS-44 has a higher Coefficient of Performance than R22 and hence is considered to be more energy efficient than R22.

12 Q: What trials have been carried out on RS-44 and what are the results?

A: Case studies on RS-44 have been carried out in a range of applications commonly occupied by R22 including window air conditioning, chilled food and commercial heat pumps in both heating and cooling modes. The results show good oil return to the compressor in all cases and a higher COP.

13 Q: What is the glide of RS-44?

A: A calculation based on a typical air conditioning cycle gives evaporator and condenser glides of approximately 3°C. RSL has demonstrated, in its own tests, that RS-44 is an excellent replacement for R22 in a variety of air conditioning equipment & that the refrigerant glide does not adversely affect its performance. RSL considers that glide values, calculated from the properties of a zeotropic refrigerant, do not necessarily reflect the glides observed in a real unit. For example, for R22 a pressure drop of 0.5 bar in a DX evaporator will induce a glide of 2.8°C. In contrast a similar pressure will induce a glide of only 0.8°C with RS-44. This apparently paradoxical result occurs because the glide resulting from the composition change of RS-44 works opposite to the glide due to the pressure drop tending to cancel it out.

14 Q: Does RS-44 need to be charged in the liquid or gaseous form?

A: Because RS-44 is a blend, the recommendation is to charge it into the system in the liquid form. However, if the entire contents of the cylinder are being charged, then vapour charging is acceptable.

15 Q: Does the RS-44 disposable cylinder have a dip tube?

A: No. The disposable should be inverted to discharge RS-44 in the liquid form.

16 Q: Is RS-44 on the SNAP (Significant New Alternative Policy programme) list in the USA?

A: Yes. RS-44 is approved by the US Environmental Protection Agency as a replacement for R22 & is on the SNAP list.

17 Q: How does the pressure rating of RS-44 compare with R22?

A: The discharge pressure of RS-44 is lower than R22.

18 Q: How does the capacity of RS-44 compare to R22?

A: RSL has tested RS-44 in a variety of air conditioning units under realistic operating conditions. In all cases the cooling performance of RS-44 was indistinguishable from that of R22 working in the same equipment under comparable conditions. Preliminary calculations based on a simplified cycle suggested that the refrigeration capacity of RS-44 might be lower than that of R22 under similar conditions. In practice this is not supported by the results from real equipment confirming that cooling capacity is determined by a number of factors which cannot be readily included in simple calculations.

19 Q: How does the temperature rating of RS-44 compare to R22?

A: The discharge temperatures of RS-44 are considerably lower than R22.

20 Q: What are the flammability characteristics of RS-44?

A: RS-44 is non flammable at room temperature and atmospheric pressure, and has the same classification as R12, R134a, R404A, R409A (FX56), R507 (AZ-50) etc.

21 Q: What are the decomposition products resulting from the combustion of RS-44?

A: The decomposition products resulting from subjecting RS-44 to a high temperature source are similar to those when R22 is exposed to fire conditions. The decomposition products in each case are irritating and toxic, and breathing apparatus should be worn where a possibility to exposure exists.

22 Q: Are there any special precautions with RS-44?

A: There are no specific precautions which must be taken with RS-44. As with all refrigerants, common sense and good housekeeping is always recommended. Because the use of hygroscopic synthetic POE lubricants are avoided with RS-44, scrupulous attention to preventing moisture contamination is not necessary, although the ingress of moisture should be avoided at all times.

23 Q: Is RS-44 compatible with refrigeration and air conditioning systems designed for R22?

A: Yes. RS-44 is compatible with all materials commonly used in systems that were designed and charged with R22. As in the case of R22, magnesium and zinc alloys should be avoided.

24 Q: Can RS-44 be recovered and recycled?

A: Yes. RS-44 can be recovered and re-used after a cleaning process such as reclamation.

25 Q: What technical guidance do you advise when changing from R22 to RS-44?

A: The procedure for converting from R22 to RS-44 is straightforward. Use the same type of lubricant, replace the filter/drier and charge approximately the same amount of RS-44 as the original R22 charge after fully evacuating.

26 Q: How does RS-44 compare in price with R407C and other alternatives?

A: RS-44 is competitive in price with other R22 alternatives.

27 Q: What is the main advantage of RS-44?

A: RS-44 is a long term alternative for R22, and its main advantage is that it can be used to replace R22 without the need to change the original mineral oil in the system. There is, therefore, no necessity to retrofit to a synthetic lubricant such as POE.

28 Q: Is RS-44 compatible with hoses, seals, gaskets and O-rings commonly used with R22?

A: Yes. Because the original mineral oil is being used and not a synthetic lubricant, elastomers and plastics used with R22 are compatible with RS-44.

29 Q: How does the Coefficient of Performance (COP) of RS-44 compare with R22?

A: Tests show that RS-44 provides a higher COP than R22 depending upon the application and equipment.

30 Q: What is the specification for RS-44?

A: RS-44 complies with the refrigerant specification ARI 700 – 04 for fluorocarbon refrigerants.

31 Q: What is the effect of high exposure by inhalation of RS-44?

A: As is the case with all CFC, HCFC and HFC based refrigerants, high exposure to RS-44 may produce anaesthetic effects. Very high exposures may cause an abnormal heart rhythm and prove suddenly fatal as is the case with all CFC, HCFC and HFC based refrigerants.

32 Q: What is the flash point, flammability explosion limits and auto-ignition temperature for RS-44?

A: RS-44 is non flammable as defined in the ASHRAE EN 681-98 test, and hence does not have a flash point or explosion limits. The auto-ignition temperature of RS-44 has not been determined but is expected to be greater than 750°C.

33 Q: How does RS-44 compare with Isceon/MO59 (417A) in terms of efficiency?

A: RS-44 has a higher capacity than Isceon/MO59 (417A) and a similar Coefficient of Performance.

34: Can RS-44 be used in flooded evaporators, in systems with liquid receivers and in centrifugal compressors?

A: RS-52 is suitable for use in flooded evaporators & should be used in this application.

35: What types of leak detectors should be used with RS-44?

A: Leak detectors used with HFCs are suitable for use with RS-44.

36: What would be the effect of a large release of RS-44?

A: In common with other refrigerants of this type, the area should be immediately evacuated. The vapour may concentrate at floor level and in poorly ventilated areas may be slow to disperse. Forced ventilation should be provided before entering such areas.

37: How does RS-44 compare to Isceon/MO59 (R417a) in terms of GWP?

A: RS-44 has a similar GWP to Isceon 59/MO59 (R417A).

38: Is RS-44 available in both returnable and disposable cylinders:

A: Yes.

39: Can RS-44 be used in systems designed to replace R22 and initially charged with a hydrocarbon?

A: Although no development work has been carried out on hydrocarbon systems designed to replace R22, we believe that RS-44 would be suitable but an increased refrigerant charge would be required.

40: Is RS-44 suitable for use with new equipment?

A: RS-44 has a zero ODP, a relatively low GWP, a higher Coefficient of Performance, significantly lower discharge temperatures and pressures than R22, and a lower temperature glide and pressure than R407C. RS-44 is a candidate for use by Original equipment Manufacturers but consideration should also be given to the use of RS-45 and/or RS-52 in new equipment.

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