RS-24 (R426A): Q & A

1 Q: What is RS-24?

A: RS-24 is a non ozone depleting Drop-in replacement for R12 in all applications including mobile air conditioning.

2 Q: Yes, but what does RS-24 contain?

A: RS-24 is a blend of HFC134a, HFC125, butane and isopentane.

3 Q: Does RS-24 have an ASHRAE number & what is its classification?

A: Yes. RS-24 has been designated an ASHRAE number of R426A with a classification of A1, which is low toxicity & non flammable under all conditions of fractionation.

4. Q: Is RS-24 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-24 is subject to a phase out schedule under the Montreal protocol or any regulations.

5 Q: Why is RS-24 different to Isceon 49 (MO49)?

A: RS-24 does not contain perfluorocarbon 218, which has an atmospheric lifetime of over 2,500 years and is a significant constituent of Isceon 49. RS-24's lifetime in the atmosphere is less than 20 years compared to approximately 250 years in the case of 49 on a weight average basis. RS-24 is non flammable with an ASHRAE classification of A1 while Isceon 49 (MO49) is classified A2. RS-24 also has a lower head pressure than Isceon 49.

6 Q: How does RS-24 compare to other Drop-in refrigerants such as R409A (FX56), R401A (MP39) and others?

A: RS-24 in the first place has no ability to deplete ozone which R409A and R401A have and as such RS-24 is a long term replacement for R12. In addition, RS-24 is suitable for automobile air conditioning applications which is not the case with R409A and R401A, or any other mixtures containing R22.

7 Q: Is RS-24 suitable for mobile air conditioning?

A: Yes. RS-24 can be used in this application without the need to change the oil thereby enabling the continued use of traditional mineral oils.

8 Q: Can RS-24 be used with mineral and alkylbenzene lubricants?

A: Yes. There is no need to change to synthetic POE or PAG oils with RS-24 which operates satisfactorily with traditional lubricants.

9 Q: Is RS-24 non flammable and non toxic?

A; RS-24 is both non flammable and non toxic. RS-24 is non flammable as defined by the ASHRAE EN 681-98 test.

10 Q: Is RS-24 approved by compressor manufacturers?

A: The individual components which comprise RS-24 are widely used in compressors produced by major manufacturers.

11 Q: Can RS-24 be used to top up a system containing R134a and POE or PAG oil?

A: Yes. The components of RS-24 are compatible with R134a and synthetic lubricants.

12 Q: When RS-24 has been used to top up a system originally charged with R134a and a synthetic lubricant, which type of lubricant should be added?

A: The original synthetic lubricant should be added to the system.

13 Q: Can RS-24 be used to top up a system originally charged with R12?

A: No. Such a mixture can produce extremely high pressures due to the formation of a R12/R134a azeotrope.

14 Q: Can RS-24 be added to Isceon 49?

A: There is not sufficient experience in the field to be able to comment. It is recommended that Isceon 49 is recovered from the system and replaced with RS-24.

15 Q: Can RS-24 be added to R409A (FX56) or any other drop-in R12 replacement?

A: No. RS-24 is a very different refrigerant and should not be mixed with R409A or other drop-in replacements.

16 Q: Is RS-24 as efficient as R12 or R134a?

A: RS-24’s efficiency is comparable to both R12 and R134a.

17 Q: What tests have been carried out on RS-24 and what are the results?

A: Tests on RS-24 have been carried out in commercial refrigeration, domestic appliances and mobile air conditioning. The results show good oil return to the compressor in all cases and a level of efficiency similar to both R12 and R134a.

18 Q: Does RS-24 need to be charged in the liquid or gaseous form?

A: Because RS-24 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.

19 Q: Does the RS-24 disposable cylinder have a dip tube?

A: No. The disposable should be inverted to discharge RS-24 in the liquid form.

20 Q: Is RS-24 on the SNAP (Significant New Alternatives Policy programme) list in the USA?

A: Yes. RS-24 is on the SNAP list and approved by EPA for all uses where R12 finds an application..

21 Q: How does RS-24's pressure rating compare with R12 and R134a?

A: RS-24's discharge pressure is very similar to R134a.

22 Q: How does RS-24's capacity compare to R12?

A: RS-24's capacity is very similar to R12.

23 Q: How does RS-24's capacity compare to R134a?

A: RS-24's capacity is slightly higher than to R134a.

24 Q: How does RS-24's temperature rating compare to R12?

A: RS-24's discharge temperatures are lower than R12.

25 Q: How does RS-24's temperature rating compare to R134a?

A: RS-24's discharge temperatures are similar to R134a.

26 Q: What are the flammability characteristics of RS-24?

A: RS-24 is non flammable at room temperature and atmospheric pressure, and has the same classification as R12, R134a, R404A, R409A (FX56), R507 (AZ-50) etc

27 Q: What are the decomposition products resulting from the combustion of RS-24?

A: The decomposition products resulting from subjecting RS-24 to a high temperature source are similar to those when R12 and R134a are 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

28 Q: Are there any special precautions with RS-24?

A: There are no specific precautions which must be taken with RS-24. As with all refrigerants, common sense and good housekeeping is always recommended. Because the use of hygroscopic synthetic POE lubricants are avoided with RS-24, scrupulous attention to preventing moisture contamination is not necessary, although the ingress of moisture should be avoided at all times.

29 Q: Is RS-24 compatible with refrigeration and air conditioning systems designed for R12?

A: Yes. RS-24 is compatible with all materials commonly used in systems that were designed and charged with R12. As in the case of R12, magnesium and zinc alloys should be avoided.

30 Q: Can RS-24 be recovered and recycled like other R12 alternatives?

A: Yes. RS-24 can be recovered and re-used like other R12 alternatives after a cleaning process such as reclamation.

31 Q: What technical guidance do you advise when changing from R12 to RS-24?

A: The procedure for converting from R12 to RS-24 is very similar to any other conversion to a Drop-in replacement. Use the same type of lubricant, replace the filter/drier and charge approximately 10% less RS-24 than the original R12 charge after fully evacuating.

32 Q: How does RS-24 compare in price with R134a and other alternatives?

A: RS-24 is competitive in price with other R12 alternatives.

33 Q: What is the main advantage of RS-24?

A: RS-24 is a long term alternative for R12, and its main advantage is that it can be used to replace R12 without the need to change the original mineral oil in the system. There is, therefore, no necessity to retrofit to a synthetic lubricant (polyolester or polyalkylene glycol).

34 Q: Why should RS-24 be used in mobile air conditioning when the addition of R134a and synthetic lubricants to the system without draining the mineral oil appears to work satisfactorily?

A: It is widely accepted that R134a alone is not miscible in mineral oil which should be reduced to a maximum 5% content before adding a synthetic lubricant. RS-24 can be used with both mineral and synthetic lubricants which removes the risk of not achieving oil return to the compressor.

35 Q: Can RS-24 be used in flooded evaporators?

A: Because RS-24 has a very low glide of less than 1^0C, RS-24 is suitable for use in flooded evaporators.

36 Q: Can RS-24 be used satisfactorily at evaporator temperatures below -20^oC ?

A: Under certain circumstances, at low evaporator temperatures, poor oil miscibility can result in problems with compressor lubrication. At evaporator temperatures below -20^{o}C, migration of oil to the evaporator can result in a lack of lubrication in the compressor. If such conditions apply, then the recommendation is to change to a polyol ester lubricant to facilitate oil return to the compressor. There is no need to drain all the existing oil from the system. Simply remove as much of the mineral oil charge as is practicable and recharge to the appropriate level using POE lubricant.

37 Q: Are there any problems of oil migration using RS-24 if a flooded start-up occurs?

A: Under some circumstances “flooded start-ups” can occur when the non-operating compressor of a refrigerated vehicle is exposed to a lower temperature than that of the evaporator, and this temperature differential can result in refrigerant condensing in the compressor sump. In the case of R12, the refrigerant will dissolve in the mineral oil. RS-24, being less miscible with mineral oil, can collect as a pool in the bottom of the sump where the outlet to the oil pump is typically sited. When the compressor is next started, oil flow to the bearings could be impeded.

It has long been recognised that flooded start-ups are detrimental to compressor operation. Even in R12 systems, designers sometimes anticipate excessive wear by fitting heaters which prevents the problem. In many cases, a pressure controlled check valve is installed between the evaporator and compressor to prevent the return of the condensed liquid refrigerant to the sump. Where sump heaters are fitted, they will prevent the accumulation of liquid of RS-24. Indeed, they might be even more effective in this case since less heat is required to evaporate a liquid refrigerant than to distil a refrigerant from a solution.

If the possibility of a flooded start-up exists, then the recommendation is to change to a polyol ester lubricant, which will increase the miscibility of the refrigerant with the lubricant thereby facilitating oil return to the compressor and also avoid accumulation of lubricant in the evaporator.

38 Q: Is RS-24 compatible with hoses, seals, gaskets and O-rings commonly used with R12?

A: RS-24 is compatible with all materials commonly used in refrigeration systems previously charged with R12.In general, materials which are compatible with R12 can be used with RS-24. It is recommended to check equipment manufacturer's retrofit literature and obtain recommendations from equipment manufacturers with regard to materials' compatibility. In older systems which have been operating on R12 for many years, replacement of some seals may be required due to the different composition of RS-24 which contains HFCs.Yes. Because the original mineral oil is being used and not a synthetic lubricant, elastomers and plastics used with R12 are compatible with RS-24.

39 Q: How does the Coefficient of Performance (COP) of RS-24 compare with R12 and R134a?

A: The COP of RS-24 is slightly lower than R12 and R134a and slightly higher than R409A (FX56).

40 Q: What is the specification for RS-24?

A: RS-24 complies with the refrigerant specification ARI 700 – 04 for fluorocarbon refrigerants.

41 Q: What is the effect of high exposures by inhalation of RS-24?

A: As is the case with all CFC, HCFC and HFC based refrigerants, high exposure to RS-24 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.

42 Q: What is the flash point, flammability explosion limits and auto-ignition temperature for RS-24?

A: RS-24 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-24 has not been determined but is expected to be greater than 750^{o}C.

43 Q: What type of leak detectors should be used with RS-24?

A: Leak detectors designed for HFCs, eg R134a, R404A, R507, R407C etc, are suitable for use with RS-24.

44 Q: Can RS-24 be used in a system designed and initially charged with a hydrocarbon, ie R600a iso-butane?

A: Yes.

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