REFRIGERANT SOLUTIONS LIMITED

8 Murieston Road, Hale, Altrincham, Cheshire WA15 9ST
Tel: (+44)(0)161 926 9876 Fax: (+44)(0)161 926 9875
E-mail: rs@refsols.com Web: www.refsols.com

R22 RETROFIT REPLACEMENTS APPLICATIONS SUMMARY

RS-44 (R424A)	MEDIUM & HIGH TEMPERATURE
RS-45 (R434A)	MEDIUM, HIGH & LOW TEMPERATURE
RS-52 (R428A)	LOW TEMPERATURE

AIR CONDITIONING FIXED ORIFICE SYSTEMS	RS-44
AIR CONDITIONING FIXED TXV SYSTEMS	RS-44/RS-45
CHILLERS WITH FIXED ORIFICES	RS-44
CHILLERS WITH TXVS	RS-45
SHELL & TUBE EVAPORATORS	RS-44/RS-45
REFRIGERATION EVAPORATING DOWN TO -10^{0}C	RS-44
REFRIGERATION EVAPORATING DOWN TO -35^{0}C	RS-45
REFRIGERATION EVAPORATING DOWN TO -40^{0}C	RS-52

RS REFRIGERANTS BY APPLICATION

INDUSTRIAL PROCESS REFRIGERATION	RS-44 RS-45 RS-52
INDUSTRIAL PROCESS AIR CONDITIONING	RS-44
ICE SKATING RINKS	RS-52 RS-45
COLD STORAGE WAREHOUSES	RS-52 RS-45
REFRIGERATED TRANSPORT	RS-44 RS-45 RS-52
RETAIL FOOD REFRIGERATION	RS-44 RS-45 RS-52
COMMERCIAL ICE MACHINES	RS-52 RS-45
WATER COOLERS	RS-44 RS-45
RESIDENTIAL DEHUMIDIFIERS	RS-44
RECIPROCATING CHILLERS	RS-44 RS-45
SHELL& TUBE EVAPORATORS	RS-44/RS-45
CO-AXIAL CHILLERS	RS/44RS-45
FLAT PLATE CHILLERS	RS-44/ RS-45
BEER CELLARS	RS-44
WINDOW A/C	RS-44
SPLIT A/C	RS-44
FLOODED SYSTEMS	RS-45 RS-52

(1) RS-44 (R424A)

RS-44 is a Drop-in replacement for R22 in air conditioning applications and suitable for use in systems with either a capillary tube or expansion device. RS-44 is the only replacement for R22 recommended for use in a fixed orifice system without the need for any changes.

RS-44 has been formulated to match the properties of R22 at medium to higher temperatures when used for air conditioning applications, namely evaporating at 2-12^{0}C and condensing at 35-45^{0}C, to cold stores operating at -10^{0}C. For lower temperature applications, it is recommended to use either RS-45 (R434A) or RS-52 (R428A) see below.

(2) RS-45 (R434A)

RS-45 can replace R22 in both high & low temperature applications so that it can be used for air conditioning & refrigeration as the following figures demonstrate:

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(1) Air conditioning:

Evaporating +7^{0}C Condensing +45^{0}C	**R22**	**RS-45 (R434A)**
Discharge Pressure bar	17.91	19.81
Discharge Temp ^{0}C	111	81
Capacity kJ/m^3	3062	3115
% of R22		102
Coefficient of Performance	3.20	3.12
Compression ratio	3.02	3.02
Glide ^{0}C	0	1.5

(2) Refrigeration

Evaporating -35^{0}C
Condensing +35^{0}C

	R22	RS-45 (R434A)
Discharge Pressure bar	14.07	15.55
Discharge Temp ^{0}C	197	120
Capacity kJ/m^3	619	632
% of R22		102
Coefficient of Performance	1.27	1.28
Compression ratio	11.4	11.4
Glide ^{0}C	0	1.5

The low glide of RS-45 enables it to be used in flooded systems, shell & tube evaporators etc. But, the flow rate of RS-45 is higher than R22 so that it is not suitable for use with in situ capillary tube systems, and should be used to replace R22 in systems which contain a thermal expansion valve which can accommodate R404A.

Therefore, as a rule of thumb, RS-44 should be used in systems with a fixed orifice, and RS-45 in systems with an adjustable TXV where its high flow rate can be accommodated.

LOW TEMPERATURE REPLACEMENTS

RS-52 is an ideal replacement for R22 & the interim ozone depleting blends (including R402A, R402B, R403B, R408A, R411b) at low temperature (down to -45^{0}C evaporating temperature) where the system can accommodate the higher pressures and the higher capacity of RS-52 compared to R22 (similar to R502). The use of RS-52, with higher capacity than R22, may necessitate the replacement of the condenser.

RS-52 with its low glide (less than 0.5^{0}C) is particularly suited to replacing R22 in flooded systems & has a capacity which is about 15% greater than R22, as the following table shows:

Evaporating -35^{0}C
Condensing +35^{0}C

	R22	**R502**	**RS-52 (R428A)**
Discharge Pressure bar	14.07	15.46	17.38
Discharge Temp ^{0}C	197	136	115
Capacity			
System kJ/m3	619	686	719
% of R22		111	116
% of R502			105
Coefficient of Performance	1.27	1.29	1.26
Compression ratio	11.4	10.4	10.6
Glide ^{0}C	0	0	0.25