

R22 REPLACEMENTS IN WATER CHILLERS

Conversion of water chillers operating on R22 to a suitable replacement will depend very much upon the type of chiller barrel or evaporator.

This summary note tries to provide a general guide to the replacement refrigerant that should be used for R22, but the final decision may depend upon an inspection of each chiller to determine its suitability.

Suggested R22 alternatives in the common types of water chillers:

- (1) Single pass refrigerant, single pass water, counter current flow, DX, tube in tube, tube in shell or plate type.
RS-44 (R424A)
- (2) Multi pass refrigerant or water, DX , tube in shell.
RS-45 (R434A)
- (3) Flooded chillers.
RS-45 (R434A)

Note: RS-44 is not recommended for use when evaporator temperatures are below -50C

The main differences between RS-44 and RS-45 are that RS-45 has a higher capacity and lower temperature glide (near azeotropic). The mass flow rate of RS-45 is higher so that the expansion device on the chiller will need to accommodate a higher liquid flow rate similar to the liquid flow rate of R404A.

RS-45 is the only replacement for R22, as far as we are aware, which can match the performance in flooded systems satisfactorily. RS-45 can be used in any type of chiller if these chillers can accommodate the higher flow rate.

Both RS-44 and RS-45 have considerably lower discharge temperatures than R22, have a safety classification from ASHRAE of A1, namely low toxicity and non flammable under all conditions of flammability, and are compatible with mineral oil, alkylbenzene and POE lubricants.

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PRESSURE/TEMPERATURE TABLES OF R22 REPLACEMENTS

RS-44 (R424A)

RS-45 (R434A)

TEMPERATURE
Deg C
-60
-58
-56
-54
-52
-50
-48
-46
-44
-42
-40
-38
-36
-34
-32
-30
-28
-26
-24
-22
-20
-18
-16
-14
-12
-10
-8
-6
-4
-2
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
44
46
48
50
52
54
56
58
60
62
64
66
68
70
72
74
76
78
80
Temperature Glide

BUBBLE PRESSURE (LIQUID)	DEW PRESSURE (VAPOUR)
(barg)	(barg)
-0.66	-0.80
-0.62	-0.77
-0.58	-0.74
-0.53	-0.70
-0.48	-0.66
-0.42	-0.62
-0.36	-0.58
-0.29	-0.53
-0.21	-0.47
-0.13	-0.41
-0.05	-0.34
0.05	-0.27
0.15	-0.19
0.25	-0.11
0.37	-0.02
0.49	0.08
0.62	0.18
0.76	0.30
0.91	0.42
1.07	0.55
1.24	0.69
1.42	0.84
1.61	1.00
1.81	1.17
2.03	1.35
2.25	1.54
2.49	1.74
2.74	1.96
3.01	2.19
3.29	2.43
3.58	2.69
3.89	2.96
4.21	3.24
4.55	3.55
4.91	3.86
5.28	4.20
5.67	4.55
6.08	4.91
6.51	5.30
6.95	5.71
7.42	6.13
7.90	6.58
8.41	7.04
8.93	7.53
9.48	8.04
10.05	8.57
10.64	9.12
11.26	9.70
11.90	10.30
12.56	10.93
13.25	11.58
13.96	12.26
14.71	12.97
15.47	13.71
16.27	14.48
17.09	15.27
17.94	16.10
18.83	16.96
19.74	17.85
20.68	18.78
21.66	19.74
22.66	20.74
23.70	21.78
24.78	22.86
25.89	23.98
27.03	25.14
28.22	26.35
29.44	27.61
30.69	28.91
31.99	30.28
33.32	31.71
Approximately 3 Deg C	

BUBBLE PRESSURE (LIQUID)	DEW PRESSURE (VAPOUR)
(barg)	(barg)
-0.55	-0.61
-0.49	-0.57
-0.44	-0.51
-0.37	-0.46
-0.30	-0.40
-0.23	-0.33
-0.15	-0.25
-0.06	-0.17
0.04	-0.09
0.14	0.01
0.25	0.11
0.37	0.22
0.50	0.33
0.63	0.46
0.78	0.59
0.93	0.74
1.10	0.89
1.27	1.05
1.46	1.23
1.66	1.41
1.87	1.61
2.09	1.82
2.33	2.04
2.57	2.28
2.84	2.53
3.11	2.79
3.40	3.07
3.71	3.36
4.03	3.67
4.33	3.99
4.73	4.33
5.10	4.69
5.49	5.06
5.90	5.46
6.33	5.87
6.77	6.30
7.24	6.76
7.73	7.23
8.24	7.72
8.77	8.24
9.33	8.78
9.90	9.34
10.50	9.93
11.13	10.54
11.78	11.17
12.45	11.83
13.15	12.52
13.88	13.24
14.64	13.98
15.42	14.75
16.23	15.56
17.08	16.39
17.95	17.25
18.86	18.15
19.79	19.08
20.76	20.05
21.77	21.05
22.81	22.09
23.88	23.17
25.00	24.29
26.15	25.45
27.34	26.65
28.57	27.90
29.85	29.20
31.17	30.55
32.53	31.97
33.94	33.45
35.67	35.02
Approximately 1.5 Deg C	