R-401A and R-401B

Technical Guidelines

Physical Properties of Refrigerants	R-401A	R-401B
Environmental Classification	HCFC	HCFC
Molecular Weight	94.4	92.8
Boiling Point (1 atm, ˚F)	-29.9	-32.3
Critical Pressure (psia)	669	679.1
Critical Temperature (˚F)	221	218.3
Critical Density, (lb./ft^ 3)	30.9	31.1
Liquid Density (70 ˚F, lb./ft ^ 3)	74.6	74.6
Vapor Density (bp, lb./ft ^ 3)	0.306	0.303
Heat of Vaporization (bp, BTU/lb.)	97.5	98.2
Specific Heat Liquid (70 ˚F, BTU/lb. ˚F)	0.3037	0.3027
Specific Heat Vapor (1 atm, 70 ˚F, BTU/lb. ˚F)	0.1755	0.1725
Ozone Depletion Potential (CFC 11 = 1.0)	0.037	0.039
Global Warming Potential (CO_2 = 1.0)	1182	1288
ASHRAE Standard 34 Safety Rating	A1	A1
Temperature Glide (˚F) (see section 2)	8	8

Available in the following sizes

R-401A
30 LB. CYLINDER
125 LB. CYLINDER

R-401B
30 LB. CYLINDER
125 LB. CYLINDER

R-401A

(R-22 /152a/124)
(53 / 13 / 34 wt%)

R-401B

(R-22 /152a/124)
(61 / 11 / 28 wt%)

Replaces: R-12 and R-500

Applications:

R-401A: Medium and low temperature commercial and industrial direct expansion refrigeration

R-401B: Low temperature commercial and industrial direct expansion refrigeration, R-12 air conditioning, R-500 systems

Performance:

- Very similar capacity, higher glide
- Similar evaporator pressure when average evaporator temperature is the same as R-12
- Head pressure runs higher

Lubricant Recommendation: Compatible with a combination of mineral oil and alkylbenzene or polyolester lubricants.

Retrofitting:

Replacement for R-12 page 90, 92
Replacement for R-500 page 97

Pressure-Temp Chart

R-401A Liquid (psig)	R-401A Vapor (psig)	Temp (˚F)	R-401B Liquid (psig)	R-401B Vapor (psig)
8.1″	*13.2″*	**-40**	*6.5″*	*11.8″*
5.1″	*10.7″*	**-35**	*3.3″*	*9.1″*
1.7″	*7.9″*	**-30**	0.2	*6.1″*
1.0	*4.8″*	**-25**	2.1	*2.8″*
3.0	*1.4″*	**-20**	4.3	0.5
5.2	1.2	**-15**	6.6	2.5
7.7	3.3	**-10**	9.2	4.7
10.3	5.5	**-5**	12.0	7.1
13.2	8.0	**0**	15.1	9.7
16.3	10.7	**5**	18.4	12.6
19.7	13.7	**10**	22.0	15.8
23.4	16.9	**15**	25.9	19.2
27.4	20.4	**20**	30.1	23.0
31.7	24.2	**25**	34.6	27.0
36.4	28.3	**30**	39.5	31.4
41.3	32.8	**35**	44.8	36.1
46.6	37.6	**40**	50.4	41.1
52.4	42.7	**45**	56.4	46.6
58.5	48.2	**50**	62.8	52.4
65.0	54.1	**55**	69.6	58.7
71.9	60.4	**60**	76.9	65.4
79.3	67.2	**65**	84.7	72.5
87.1	74.4	**70**	92.9	80.1
95.4	82.1	**75**	102	88.2
104	90.2	**80**	111	96.8
114	98.9	**85**	121	106
123	108	**90**	131	116
134	118	**95**	142	126
145	128	**100**	153	137
156	139	**105**	166	148
169	151	**110**	178	160
181	163	**115**	192	173
195	176	**120**	206	187
209	189	**125**	220	201
224	203	**130**	236	216
239	218	**135**	252	231
255	234	**140**	269	248
272	250	**145**	287	265
290	267	**150**	305	283

THERMODYNAMIC PROPERTIES OF R-401B

Temp [˚F]	Pressure Liquid [psia]	Pressure Vapor [psia]	Density Liquid [lb/ft^3]	Density Vapor [lb/ft^3]	Enthalpy Liquid [Btu/lb]	Enthalpy Vapor [Btu/lb]	Entropy Liquid [Btu/R-lb]	Entropy Vapor [Btu/R-lb]
-60	6.9	5.2	88.34	0.1145	-5.346	95.56	-0.01302	0.2430
-55	8.0	6.1	87.87	0.1324	-4.016	96.21	-0.00972	0.2414
-50	9.2	7.1	87.40	0.1524	-2.681	96.86	-0.00645	0.2398
-45	10.6	8.2	86.92	0.1748	-1.343	97.51	-0.00321	0.2383
-40	12.1	9.4	86.44	0.1997	0.000	98.16	0.00000	0.2369
-35	13.7	10.8	85.96	0.2273	1.348	98.80	0.00318	0.2355
-30	15.6	12.4	85.47	0.2577	2.701	99.44	0.00634	0.2343
-25	17.6	14.1	84.98	0.2914	4.059	100.1	0.00947	0.2330
-20	19.8	16.0	84.48	0.3283	5.422	100.7	0.01258	0.2318
-15	22.3	18.1	83.99	0.3688	6.791	101.3	0.01567	0.2307
-10	25.0	20.5	83.48	0.4131	8.166	102.0	0.01873	0.2296
-5	27.9	23.0	82.97	0.4614	9.548	102.6	0.02177	0.2286
0	31.1	25.8	82.46	0.514	10.94	103.2	0.02479	0.2276
5	34.5	28.9	81.94	0.5713	12.33	103.8	0.02779	0.2267
10	38.3	32.2	81.42	0.6333	13.73	104.4	0.03077	0.2258
15	42.3	35.8	80.89	0.7005	15.14	105.0	0.03374	0.2249
20	46.7	39.7	80.35	0.7732	16.56	105.6	0.03669	0.2241
25	51.4	43.9	79.81	0.8516	17.98	106.2	0.03962	0.2233
30	56.4	48.5	79.26	0.9362	19.42	106.7	0.04253	0.2225
35	61.8	53.4	78.71	1.027	20.86	107.3	0.04544	0.2218
40	67.6	58.7	78.15	1.125	22.31	107.8	0.04832	0.2211
45	73.8	64.4	77.58	1.23	23.76	108.4	0.05120	0.2204
50	80.4	70.5	77.00	1.343	25.23	108.9	0.05406	0.2197
55	87.5	77.0	76.42	1.464	26.71	109.5	0.05692	0.2190
60	95.0	84.0	75.82	1.594	28.20	110.0	0.05976	0.2184
65	102.9	91.4	75.22	1.732	29.70	110.5	0.06259	0.2178
70	111	99.3	74.61	1.881	31.21	111.0	0.06542	0.2172
75	120	108	73.99	2.039	32.73	111.4	0.06824	0.2166
80	130	117	73.36	2.209	34.26	111.9	0.07105	0.2160
85	140	126	72.71	2.39	35.81	112.4	0.07385	0.2154
90	150	136	72.06	2.584	37.37	112.8	0.07665	0.2149
95	162	147	71.39	2.791	38.94	113.2	0.07945	0.2143
100	173	158	70.70	3.012	40.53	113.6	0.08224	0.2137
105	186	170	70.01	3.248	42.13	114.0	0.08504	0.2131
110	199	182	69.29	3.501	43.75	114.3	0.08783	0.2126
115	212	195	68.56	3.771	45.39	114.7	0.09063	0.2120
120	227	209	67.81	4.06	47.05	115.0	0.09343	0.2114
125	242	224	67.04	4.369	48.72	115.3	0.09624	0.2108
130	258	239	66.25	4.701	50.42	115.5	0.09905	0.2102
135	274	255	65.44	5.058	52.14	115.8	0.1019	0.2095
140	291	272	64.59	5.441	53.88	116.0	0.1047	0.2089
145	309	290	63.72	5.854	55.66	116.1	0.1076	0.2082
150	328	309	62.81	6.3	57.46	116.3	0.1105	0.2074
155	348	328	61.87	6.783	59.30	116.3	0.1134	0.2067