

R513B



REFRIGERANTS

R513B

Product information

Product description

R513B has been developed for chiller applications typically covered by R134a. It has a significantly lower GWP and outstanding performance characteristics.

Applications

- Centrifugal- and other chiller applications typically designed for R134a
- Condensing units for medium temperature applications
- Typical R134a applications where low GWP and non-flammability is requested

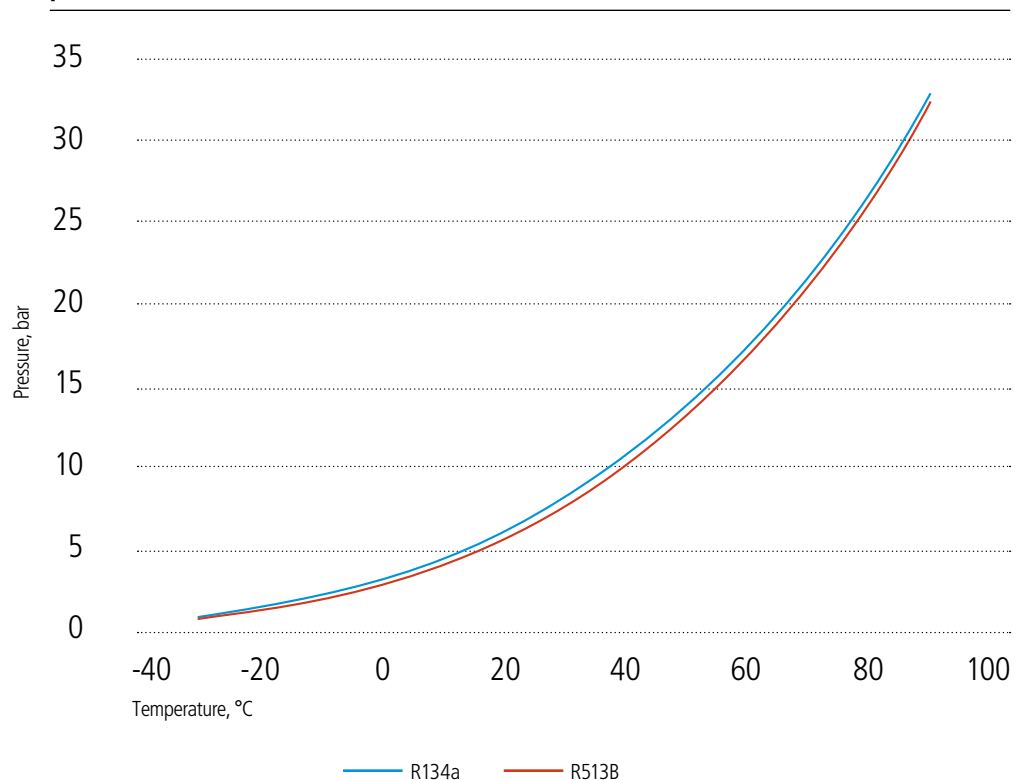
Environmental aspects

R513B is a refrigerant that addresses a range of environmental and safety considerations:

- Zero Ozone Depletion Potential (ODP)
- Lower Global Warming Potential (GWP) – less than 50% compared to R134a
- R513B has comparable performance characteristics to R134a with slight advantages at medium condensing temperatures
- Compatible to all standard materials used in R404A systems
- Safe to use in all applications because it's A1 classification (low toxicity and lower flammability)

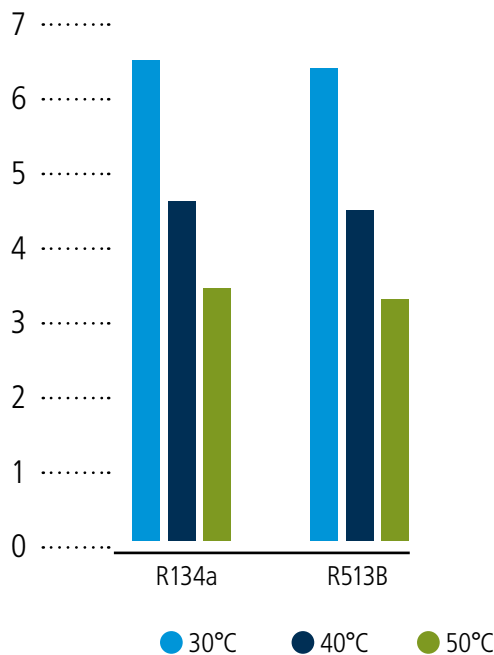
Range of Applications

p/t Curve

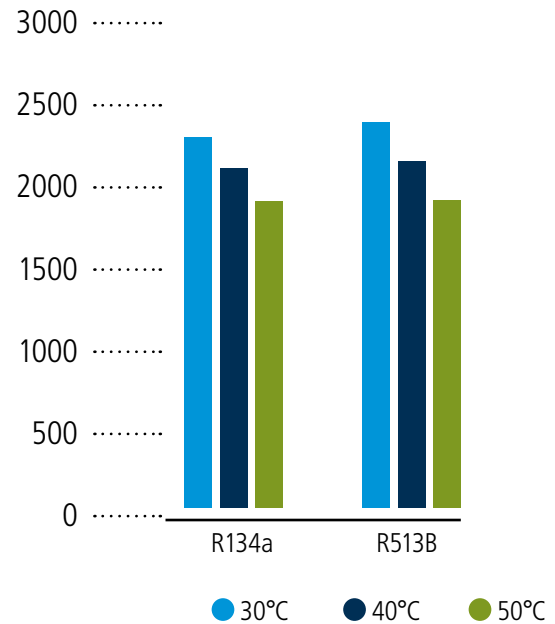


Theoretical Performance¹

COP



Capacity, kJ/m³



¹Conditions Cycle Simulation:
 $t_o = -30^\circ\text{C}$, $t_c = \text{variable}$, $T_{\text{superheat}} = 10\text{K}$, $T_{\text{subc}} = 2\text{K}$, $\text{isent. eff.} = f(p_o/p_c)$

Physical Properties²

Chemical Name		2,3,3,3-Tetrafluoropropene / 1,1,1,2-Tetrafluoroethane
Chemical Formula		$\text{CH}_2 = \text{CFCF}_3 / \text{CF}_3\text{CH}_2\text{F}$
Molecular Weight	kg/kmol	108.7
GWP ₁₀₀	IPCC 4 th AR / 5 th AR	596 / 540
Boiling Point @ 1.013 bar	°C	-29.2
Critical Temperature	°C	95.5
Critical Pressure	bar	36.6
Critical Density	kg/m ³	490
Critical Volume	dm ³ /kg	2.04
Liquid Density ³	kg/m ³	1131
Sat. Vapour Density ³	kg/m ³	3732
Heat of Vaporization ³	kJ/kg	156.3
$c_{p, \text{liq.}}$ ³	kJ/(kg K)	1.417
$c_{p, \text{vap.}}$ ³	kJ/(kg K)	1.059
Temp. Glide @ NBP	K	-/-
ASHRAE 34 safety class		A1

Packaging

Type	Loan Steel Container	Iso Tank Containers
Size	859 x 2230 (D x L)	6096 x 2438 x 2591 (L x W x H)
Volume	900 l	18000 l
Tara	~ 500 kg	7300 – 9000 kg
Net Content	880 kg	17600 kg
Connections	Valve DIN4676, W 1-1/4	Flange DIN2635, DN40 / PN40 (liq.), DN40 / PN40 (gas)
Other packaging on request		

²Data calculated with Refprop 9.0 using own mixing parameter. Data might differ from other R513B calculations done by Refprop 9.0

³sat. @ 25°C

Wet-Vapor Table of R513B*

Temp.	p	p''	v'	v''	rho'	rho''	h'	h''	r	s'	s''
°C	bar	bar	dm ³ /kg	dm ³ /kg	kg/m ³	kg/m ³	kJ/kg	kJ/kg	kJ/kg	kJ/kg K	kJ/kg K
-30	0.976	0.972	0.763	182.870	1.311	5.47	161.103	356.722	195.62	0.850	1.655
-29	1.021	1.017	0.765	175.225	1.308	5.71	162.369	357.379	195.01	0.855	1.654
-28	1.068	1.064	0.766	167.964	1.305	5.95	163.637	358.036	194.40	0.860	1.653
-27	1.116	1.112	0.768	161.066	1.302	6.21	164.907	358.692	193.79	0.865	1.653
-26	1.166	1.162	0.770	154.509	1.299	6.47	166.179	359.348	193.17	0.871	1.652
-25	1.218	1.214	0.772	148.274	1.296	6.74	167.452	360.002	192.55	0.876	1.652
-24	1.271	1.268	0.773	142.342	1.293	7.03	168.728	360.656	191.93	0.881	1.651
-23	1.327	1.323	0.775	136.696	1.290	7.32	170.006	361.309	191.30	0.886	1.651
-22	1.384	1.380	0.777	131.319	1.287	7.62	171.285	361.960	190.68	0.891	1.650
-21	1.443	1.440	0.779	126.198	1.284	7.92	172.567	362.611	190.04	0.896	1.650
-20	1.504	1.501	0.781	121.316	1.281	8.24	173.851	363.261	189.41	0.901	1.649
-19	1.568	1.564	0.783	116.663	1.278	8.57	175.136	363.910	188.77	0.906	1.649
-18	1.633	1.629	0.784	112.224	1.275	8.91	176.424	364.558	188.13	0.911	1.649
-17	1.700	1.697	0.786	107.989	1.272	9.26	177.714	365.204	187.49	0.916	1.648
-16	1.769	1.766	0.788	103.946	1.269	9.62	179.006	365.849	186.84	0.921	1.648
-15	1.841	1.838	0.790	100.086	1.266	9.99	180.301	366.493	186.19	0.926	1.648
-14	1.915	1.912	0.792	96.397	1.262	10.37	181.597	367.136	185.54	0.931	1.647
-13	1.991	1.988	0.794	92.873	1.259	10.77	182.896	367.777	184.88	0.936	1.647
-12	2.069	2.066	0.796	89.503	1.256	11.17	184.197	368.417	184.22	0.941	1.647
-11	2.150	2.147	0.798	86.280	1.253	11.59	185.500	369.055	183.55	0.946	1.646
-10	2.233	2.230	0.800	83.197	1.250	12.02	186.806	369.692	182.89	0.951	1.646
-9	2.319	2.316	0.802	80.246	1.247	12.46	188.114	370.327	182.21	0.956	1.646
-8	2.407	2.404	0.804	77.421	1.244	12.92	189.425	370.960	181.54	0.961	1.646
-7	2.497	2.495	0.806	74.715	1.241	13.38	190.738	371.592	180.85	0.966	1.645
-6	2.591	2.588	0.808	72.122	1.237	13.87	192.053	372.222	180.17	0.971	1.645
-5	2.687	2.684	0.810	69.637	1.234	14.36	193.371	372.851	179.48	0.976	1.645
-4	2.785	2.783	0.812	67.255	1.231	14.87	194.692	373.477	178.79	0.981	1.645
-3	2.887	2.884	0.815	64.970	1.228	15.39	196.015	374.102	178.09	0.985	1.645
-2	2.991	2.989	0.817	62.778	1.224	15.93	197.340	374.724	177.38	0.990	1.645
-1	3.098	3.096	0.819	60.674	1.221	16.48	198.669	375.345	176.68	0.995	1.644

Temp.	p	p''	v'	v''	rho'	rho''	h'	h''	r	s'	s''
°C	bar	bar	dm ³ /kg	dm ³ /kg	kg/m ³	kg/m ³	kJ/kg	kJ/kg	kJ/kg	kJ/kg K	kJ/kg K
0	3.208	3.206	0.821	58.654	1.218	17.05	200.000	375.963	175.96	1.000	1.644
1	3.321	3.319	0.823	56.715	1.215	17.63	201.334	376.579	175.25	1.005	1.644
2	3.436	3.435	0.825	54.852	1.211	18.23	202.670	377.193	174.52	1.010	1.644
3	3.555	3.554	0.828	53.062	1.208	18.85	204.010	377.805	173.80	1.014	1.644
4	3.677	3.676	0.830	51.341	1.205	19.48	205.352	378.415	173.06	1.019	1.644
5	3.803	3.801	0.832	49.686	1.201	20.13	206.697	379.022	172.32	1.024	1.644
6	3.931	3.930	0.835	48.095	1.198	20.79	208.046	379.626	171.58	1.029	1.644
7	4.063	4.061	0.837	46.564	1.195	21.48	209.397	380.229	170.83	1.034	1.644
8	4.198	4.197	0.839	45.090	1.191	22.18	210.751	380.828	170.08	1.038	1.643
9	4.336	4.335	0.842	43.672	1.188	22.90	212.108	381.425	169.32	1.043	1.643
10	4.478	4.477	0.844	42.306	1.184	23.64	213.469	382.019	168.55	1.048	1.643
11	4.623	4.622	0.847	40.991	1.181	24.40	214.832	382.610	167.78	1.053	1.643
12	4.772	4.771	0.849	39.723	1.178	25.17	216.199	383.199	167.00	1.058	1.643
13	4.924	4.924	0.852	38.502	1.174	25.97	217.569	383.784	166.22	1.062	1.643
14	5.081	5.080	0.854	37.325	1.171	26.79	218.943	384.367	165.42	1.067	1.643
15	5.240	5.240	0.857	36.189	1.167	27.63	220.319	384.946	164.63	1.072	1.643
16	5.404	5.403	0.859	35.094	1.164	28.49	221.700	385.522	163.82	1.077	1.643
17	5.571	5.571	0.862	34.038	1.160	29.38	223.084	386.095	163.01	1.081	1.643
18	5.743	5.742	0.865	33.018	1.156	30.29	224.471	386.665	162.19	1.086	1.643
19	5.918	5.918	0.867	32.034	1.153	31.22	225.862	387.231	161.37	1.091	1.643
20	6.097	6.097	0.870	31.084	1.149	32.17	227.257	387.793	160.54	1.095	1.643
21	6.280	6.280	0.873	30.166	1.145	33.15	228.655	388.352	159.70	1.100	1.643
22	6.468	6.468	0.876	29.280	1.142	34.15	230.057	388.907	158.85	1.105	1.643
23	6.659	6.659	0.879	28.424	1.138	35.18	231.463	389.459	158.00	1.110	1.643
24	6.855	6.855	0.882	27.596	1.134	36.24	232.873	390.006	157.13	1.114	1.643
25	7.055	7.055	0.885	26.796	1.131	37.32	234.288	390.549	156.26	1.119	1.643
26	7.260	7.260	0.887	26.022	1.127	38.43	235.706	391.089	155.38	1.124	1.643
27	7.468	7.468	0.891	25.273	1.123	39.57	237.128	391.624	154.50	1.128	1.643
28	7.682	7.682	0.894	24.549	1.119	40.73	238.555	392.154	153.60	1.133	1.643
29	7.900	7.900	0.897	23.849	1.115	41.93	239.986	392.680	152.69	1.138	1.643

*based on Refprop 9.0 using own mixing parameter. Data might differ from other calculations done by Refprop 9.0. Mixing parameters available on request.

Temp.	p	p''	v'	v''	rho'	rho''	h'	h''	r	s'	s''
°C	bar	bar	dm³/kg	dm³/kg	kg/m³	kg/m³	kJ/kg	kJ/kg	kJ/kg	kJ/kg K	kJ/kg K
30	8.122	8.122	0.900	23.171	1.111	43.16	241.421	393.202	151.78	1.142	1.643
31	8.349	8.349	0.903	22.514	1.107	44.42	242.861	393.718	150.86	1.147	1.643
32	8.581	8.581	0.906	21.878	1.103	45.71	244.306	394.230	149.92	1.152	1.643
33	8.818	8.818	0.910	21.263	1.099	47.03	245.755	394.737	148.98	1.156	1.643
34	9.059	9.059	0.913	20.666	1.095	48.39	247.210	395.239	148.03	1.161	1.643
35	9.306	9.306	0.916	20.088	1.091	49.78	248.669	395.735	147.07	1.166	1.643
36	9.557	9.557	0.920	19.528	1.087	51.21	250.133	396.226	146.09	1.170	1.643
37	9.814	9.814	0.923	18.984	1.083	52.67	251.602	396.711	145.11	1.175	1.643
38	10.076	10.075	0.927	18.458	1.079	54.18	253.076	397.190	144.11	1.180	1.643
39	10.343	10.342	0.931	17.947	1.075	55.72	254.556	397.664	143.11	1.184	1.643
40	10.615	10.614	0.934	17.451	1.070	57.30	256.042	398.131	142.09	1.189	1.643
41	10.892	10.891	0.938	16.970	1.066	58.93	257.533	398.592	141.06	1.194	1.643
42	11.175	11.174	0.942	16.504	1.062	60.59	259.029	399.046	140.02	1.198	1.643
43	11.463	11.462	0.946	16.050	1.057	62.30	260.532	399.494	138.96	1.203	1.643
44	11.757	11.756	0.950	15.610	1.053	64.06	262.041	399.934	137.89	1.208	1.643
45	12.057	12.055	0.954	15.183	1.048	65.86	263.556	400.367	136.81	1.212	1.642
46	12.362	12.360	0.958	14.768	1.044	67.71	265.077	400.793	135.72	1.217	1.642
47	12.673	12.671	0.962	14.365	1.039	69.62	266.605	401.211	134.61	1.222	1.642
48	12.990	12.988	0.966	13.972	1.035	71.57	268.140	401.621	133.48	1.226	1.642
49	13.312	13.310	0.971	13.591	1.030	73.58	269.681	402.023	132.34	1.231	1.642
50	13.641	13.638	0.975	13.221	1.025	75.64	271.230	402.416	131.19	1.236	1.642
51	13.976	13.973	0.980	12.860	1.020	77.76	272.786	402.800	130.01	1.241	1.642
52	14.316	14.314	0.985	12.510	1.016	79.94	274.350	403.175	128.83	1.245	1.641
53	14.663	14.660	0.989	12.168	1.011	82.18	275.921	403.541	127.62	1.250	1.641
54	15.017	15.014	0.994	11.836	1.006	84.49	277.501	403.896	126.40	1.255	1.641
55	15.377	15.373	0.999	11.513	1.001	86.86	279.089	404.241	125.15	1.259	1.641
56	15.743	15.739	1.005	11.198	0.995	89.30	280.685	404.576	123.89	1.264	1.641
57	16.116	16.111	1.010	10.891	0.990	91.82	282.291	404.899	122.61	1.269	1.640
58	16.495	16.490	1.015	10.592	0.985	94.41	283.905	405.210	121.31	1.274	1.640
59	16.881	16.876	1.021	10.301	0.980	97.08	285.529	405.510	119.98	1.279	1.640

Temp.	p	p''	v'	v''	rho'	rho''	h'	h''	r	s'	s''
°C	bar	bar	dm³/kg	dm³/kg	kg/m³	kg/m³	kJ/kg	kJ/kg	kJ/kg	kJ/kg K	kJ/kg K
60	17.274	17.269	1.027	10.017	0.974	99.83	287.164	405.796	118.63	1.283	1.639
61	17.674	17.668	1.032	9.740	0.969	102.67	288.808	406.069	117.26	1.288	1.639
62	18.080	18.075	1.039	9.470	0.963	105.60	290.463	406.328	115.87	1.293	1.639
63	18.494	18.488	1.045	9.206	0.957	108.62	292.129	406.573	114.44	1.298	1.638
64	18.915	18.909	1.051	8.949	0.951	111.74	293.807	406.802	112.99	1.303	1.638
65	19.344	19.337	1.058	8.698	0.945	114.97	295.497	407.015	111.52	1.307	1.637
66	19.779	19.772	1.065	8.452	0.939	118.31	297.200	407.211	110.01	1.312	1.637
67	20.222	20.215	1.072	8.213	0.933	121.77	298.916	407.389	108.47	1.317	1.636
68	20.673	20.665	1.079	7.978	0.927	125.34	300.646	407.548	106.90	1.322	1.636
69	21.131	21.123	1.086	7.749	0.920	129.05	302.391	407.687	105.30	1.327	1.635
70	21.597	21.589	1.094	7.525	0.914	132.90	304.152	407.804	103.65	1.332	1.634
71	22.072	22.063	1.102	7.305	0.907	136.89	305.929	407.899	101.97	1.337	1.634
72	22.554	22.545	1.111	7.090	0.900	141.05	307.723	407.970	100.25	1.342	1.633
73	23.044	23.034	1.120	6.879	0.893	145.37	309.536	408.015	98.48	1.347	1.632
74	23.542	23.533	1.129	6.673	0.886	149.87	311.369	408.032	96.66	1.352	1.631
75	24.049	24.039	1.138	6.470	0.878	154.57	313.222	408.019	94.80	1.358	1.630
76	24.564	24.554	1.148	6.271	0.871	159.47	315.099	407.975	92.88	1.363	1.629
77	25.088	25.078	1.159	6.075	0.863	164.61	316.999	407.895	90.90	1.368	1.628
78	25.621	25.611	1.170	5.883	0.855	169.99	318.926	407.778	88.85	1.373	1.626
79	26.163	26.152	1.182	5.693	0.846	175.65	320.882	407.619	86.74	1.379	1.625
80	26.714	26.703	1.194	5.506	0.838	181.61	322.869	407.415	84.55	1.384	1.624
81	27.274	27.263	1.207	5.322	0.828	187.91	324.891	407.160	82.27	1.390	1.622
82	27.844	27.832	1.221	5.139	0.819	194.58	326.951	406.850	79.90	1.395	1.620
83	28.423	28.412	1.236	4.959	0.809	201.66	329.054	406.476	77.42	1.401	1.619
84	29.013	29.001	1.252	4.779	0.799	209.23	331.205	406.031	74.83	1.407	1.616
85	29.612	29.600	1.269	4.601	0.788	217.35	333.412	405.503	72.09	1.413	1.614
86	30.222	30.210	1.288	4.423	0.776	226.11	335.684	404.881	69.20	1.419	1.612
87	30.842	30.830	1.309	4.244	0.764	235.64	338.031	404.145	66.11	1.425	1.609
88	31.474	31.462	1.332	4.063	0.751	246.10	340.471	403.273	62.80	1.432	1.606
89	32.116	32.105	1.359	3.880	0.736	257.72	343.024	402.232	59.21	1.439	1.602
90	32.771	32.760	1.389	3.692	0.720	270.85	345.725	400.973	55.25	1.446	1.598

The information contained herein is subject to change without notice, due to the refrigerants being under development. The information contained herein represents examples of actual measurement data, and examples of use herein do not guarantee that the products can be practically applicable for the example of use.

R513B

Product information

Daikin Chemical Europe GmbH

Am Wehrhahn 50

40211 Düsseldorf, Germany

Phone: +49 211-179225-0

Fax: +49 211-179225-39

daikinchem.de