

R-1234ze (Solstice® ze)

Trans-1,3,3,3-tetrafluoroprop-1-ene (CF₃-CH=CHF)

Molecular weight (g/mol)	114.04
Melting point (°C)	-104.53
Boiling point (at 1.013 bar)	-18.98
Temperature glide at 1.013 bar (K)	0
Critical temperature (°C)	109.4
Critical pressure (bar absolute)	36.35
Specific heat (liquid) at + 25°C (kJ/kg.K)	1.386
Specific heat (vapour) at 1.013 bar and + 25°C (kJ/kg.K)	0.889
Thermal capacity ratio (Cp/Cv) at + 25°C and 1.013 bar	1.101
Viscosity (liquid) at + 25°C in Centipoise (10 ⁻³ Pa.s)	0.199
Surface tension at + 25°C in dyne per centimetre (10 ⁻³ N/m)	8.85
Classification NF-EN 378	A2L
GWP (IPCC 4)	7

🔍 Main applications

Solstice® ze is a fluorinated gas from the HFO family. This product has a very low GWP figure and is suitable for air conditioning applications. It can be used for chillers and heat pumps.

🔍 Commercial specifications

Purity: ≥ 99.5 % weight.
 Water content: ≤ 10 ppm weight.
 Non-condensables (gas phase): ≤ 1.5 % volume.
 Chloride ion test: negative.
 Acidity (HCl): ≤ 1 ppm weight.

🔍 Oils

Use a polyol ester (POE) oil.
 Check with **Climalife** regarding the viscosity of the oil selected for your application, and the miscibility with the fluid under consideration.

🔍 Regulation

The use and implementation of R-1234ze are governed by EU Regulation n° 517/2014.
 The recovery of R-1234ze is mandatory under EU Regulation n° 517/2014.
 (Refer to regulations enforced in each country).

Thermodynamic properties of R-1234ze - Saturated state

Absolute pressure P (bar)	LIQUID					VAPOUR					Latent heat Lv (kJ/kg)
	Bubble point t' (°C)	Volume v' (dm ³ /kg)	Density ρ' (kg/dm ³)	Enthalpy h' (kJ/kg)	Entropy s' (kJ/kg.K)	Dew point t" (°C)	Volume v" (m ³ /kg)	Density ρ" (kg/m ³)	Enthalpy h" (kJ/kg)	Entropy s" (kJ/kg.K)	
0.010	-90	0.678	1.476	87.169	0.501	-90.0	13.092	0.076	321.201	1.779	234.032
0.016	-85	0.683	1.463	93.255	0.534	-85.0	8.454	0.118	324.516	1.763	231.261
0.025	-80	0.689	1.451	99.348	0.566	-80.0	5.614	0.178	327.879	1.749	228.531
0.038	-75	0.695	1.438	105.450	0.597	-75.0	3.825	0.261	331.287	1.737	225.836
0.055	-70	0.701	1.426	111.564	0.627	-70.0	2.668	0.375	334.733	1.726	223.169
0.079	-65	0.708	1.413	117.694	0.657	-65.0	1.900	0.526	338.213	1.717	220.519
0.112	-60	0.714	1.401	123.841	0.686	-60.0	1.381	0.724	341.722	1.708	217.881
0.154	-55	0.720	1.388	130.009	0.715	-55.0	1.021	0.979	345.254	1.702	215.246
0.209	-50	0.727	1.375	136.200	0.743	-50.0	0.768	1.303	348.805	1.696	212.605
0.279	-45	0.734	1.362	142.418	0.770	-45.0	0.586	1.707	352.369	1.691	209.951
0.367	-40	0.741	1.350	148.664	0.797	-40.0	0.453	2.206	355.941	1.687	207.277
0.477	-35	0.748	1.336	154.942	0.824	-35.0	0.355	2.814	359.515	1.683	204.573
0.611	-30	0.756	1.323	161.253	0.850	-30.0	0.282	3.549	363.086	1.680	201.833
0.774	-25	0.763	1.310	167.602	0.876	-25.0	0.226	4.428	366.651	1.678	199.048
0.969	-20	0.771	1.296	173.991	0.901	-20.0	0.183	5.470	370.202	1.677	196.211
1.013	-18.98	0.773	1.294	175.301	0.907	-18.98	0.175	5.705	370.926	1.676	195.624
1.201	-15	0.780	1.283	180.422	0.927	-15.0	0.149	6.696	373.736	1.675	193.314
1.474	-10	0.788	1.269	186.898	0.951	-10.0	0.123	8.129	377.247	1.675	190.349
1.794	-5	0.797	1.255	193.423	0.976	-5.0	0.102	9.793	380.730	1.674	187.307
2.166	0	0.806	1.240	200.000	1.000	0	0.085	11.714	384.180	1.674	184.180
2.593	5	0.816	1.225	206.632	1.024	5.0	0.072	13.923	387.591	1.675	180.959
3.084	10	0.826	1.210	213.323	1.048	10.0	0.061	16.450	390.957	1.675	177.634
3.642	15	0.837	1.195	220.078	1.071	15.0	0.052	19.332	394.271	1.676	174.193
4.273	20	0.848	1.179	226.902	1.094	20.0	0.044	22.607	397.528	1.676	170.626
4.985	25	0.860	1.163	233.799	1.118	25.0	0.038	26.321	400.719	1.677	166.919
5.783	30	0.872	1.146	240.778	1.141	30.0	0.033	30.523	403.835	1.678	163.057
6.674	35	0.886	1.129	247.843	1.163	35.0	0.028	35.272	406.867	1.679	159.024
7.665	40	0.900	1.112	255.003	1.186	40.0	0.025	40.636	409.803	1.680	154.800
8.761	45	0.915	1.093	262.266	1.209	45.0	0.021	46.693	412.629	1.681	150.363
9.972	50	0.931	1.074	269.642	1.231	50.0	0.019	53.538	415.328	1.682	145.686
11.304	55	0.949	1.054	277.143	1.254	55.0	0.016	61.286	417.881	1.683	140.739
12.766	60	0.969	1.033	284.783	1.277	60.0	0.014	70.078	420.265	1.683	135.482
14.365	65	0.990	1.010	292.579	1.300	65.0	0.012	80.093	422.449	1.684	129.870
16.110	70	1.014	0.986	300.556	1.322	70.0	0.011	91.563	424.399	1.683	123.843
18.011	75	1.041	0.961	308.744	1.346	75.0	0.010	104.797	426.065	1.683	117.321
20.077	80	1.072	0.933	317.186	1.369	80.0	0.008	120.226	427.382	1.681	110.196
22.321	85	1.109	0.902	325.946	1.393	85.0	0.007	138.484	428.252	1.679	102.307
24.755	90	1.153	0.867	335.123	1.418	90.0	0.006	160.570	428.523	1.675	93.401
27.395	95	1.209	0.827	344.889	1.444	95.0	0.005	188.222	427.933	1.669	83.045
30.260	100	1.287	0.777	355.594	1.471	100.0	0.004	225.006	425.953	1.660	70.358
33.378	105	1.412	0.708	368.232	1.504	105.0	0.004	281.016	421.116	1.644	52.884

Thermodynamic properties of R-1234ze - (superheated vapour) - Entropy (kJ/kg.K)

Sat. Temp. °C	Sat. Pressure bar	Superheat (°C)																				
		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
-90	0.010	1.779	1.797	1.815	1.832	1.850	1.867	1.884	1.901	1.918	1.935	1.951	1.968	1.984	2.000	2.016	2.032	2.047	2.063	2.078	2.093	2.108
-85	0.016	1.763	1.781	1.798	1.816	1.833	1.850	1.867	1.884	1.901	1.917	1.934	1.950	1.966	1.982	1.998	2.013	2.029	2.044	2.059	2.074	2.089
-80	0.025	1.749	1.767	1.784	1.801	1.819	1.836	1.852	1.869	1.886	1.902	1.918	1.934	1.950	1.966	1.982	1.997	2.012	2.028	2.043	2.058	2.072
-75	0.038	1.737	1.754	1.771	1.789	1.806	1.823	1.839	1.856	1.872	1.888	1.904	1.920	1.936	1.952	1.967	1.983	1.998	2.013	2.028	2.043	2.057
-70	0.055	1.726	1.743	1.760	1.777	1.794	1.811	1.828	1.844	1.860	1.876	1.892	1.908	1.924	1.939	1.954	1.970	1.985	2.000	2.015	2.029	2.044
-65	0.079	1.717	1.734	1.751	1.768	1.784	1.801	1.817	1.834	1.850	1.866	1.881	1.897	1.913	1.928	1.943	1.958	1.973	1.988	2.003	2.017	2.032
-60	0.112	1.708	1.726	1.742	1.759	1.776	1.792	1.808	1.825	1.841	1.856	1.872	1.887	1.903	1.918	1.933	1.948	1.963	1.978	1.992	2.007	2.021
-55	0.154	1.702	1.718	1.735	1.752	1.768	1.785	1.801	1.817	1.833	1.848	1.864	1.879	1.894	1.909	1.924	1.939	1.954	1.969	1.983	1.998	2.012
-50	0.209	1.696	1.712	1.729	1.746	1.762	1.778	1.794	1.810	1.826	1.841	1.857	1.872	1.887	1.902	1.917	1.932	1.946	1.961	1.975	1.990	2.004
-45	0.279	1.691	1.707	1.724	1.740	1.756	1.772	1.788	1.804	1.820	1.835	1.850	1.866	1.881	1.895	1.910	1.925	1.939	1.954	1.968	1.982	1.997
-40	0.367	1.687	1.703	1.719	1.736	1.752	1.768	1.784	1.799	1.815	1.830	1.845	1.860	1.875	1.890	1.905	1.919	1.934	1.948	1.962	1.976	1.990
-35	0.477	1.683	1.700	1.716	1.732	1.748	1.764	1.779	1.795	1.810	1.826	1.841	1.856	1.870	1.885	1.900	1.914	1.929	1.943	1.957	1.971	1.985
-30	0.611	1.680	1.697	1.713	1.729	1.745	1.761	1.776	1.792	1.807	1.822	1.837	1.852	1.867	1.881	1.896	1.910	1.924	1.939	1.953	1.967	1.980
-25	0.774	1.678	1.694	1.711	1.727	1.742	1.758	1.773	1.789	1.804	1.819	1.834	1.849	1.863	1.878	1.892	1.907	1.921	1.935	1.949	1.963	1.977
-20	0.969	1.677	1.693	1.709	1.725	1.740	1.756	1.771	1.787	1.802	1.817	1.832	1.846	1.861	1.875	1.890	1.904	1.918	1.932	1.946	1.960	1.973
-18.98	1.013	1.676	1.693	1.709	1.724	1.740	1.756	1.771	1.786	1.801	1.816	1.831	1.846	1.860	1.875	1.889	1.903	1.917	1.931	1.945	1.959	1.973
-15	1.201	1.675	1.692	1.708	1.723	1.739	1.755	1.770	1.785	1.800	1.815	1.830	1.844	1.859	1.873	1.887	1.902	1.916	1.930	1.943	1.957	1.971
-10	1.474	1.675	1.691	1.707	1.723	1.738	1.754	1.769	1.784	1.799	1.814	1.828	1.843	1.857	1.872	1.886	1.900	1.914	1.928	1.942	1.955	1.969
-5	1.794	1.674	1.690	1.706	1.722	1.738	1.753	1.768	1.783	1.798	1.813	1.827	1.842	1.856	1.871	1.885	1.899	1.913	1.927	1.940	1.954	1.967
0	2.166	1.674	1.690	1.706	1.722	1.737	1.753	1.768	1.783	1.798	1.812	1.827	1.841	1.856	1.870	1.884	1.898	1.912	1.926	1.939	1.953	1.966
5	2.593	1.675	1.691	1.706	1.722	1.738	1.753	1.768	1.783	1.798	1.812	1.827	1.841	1.856	1.870	1.884	1.898	1.912	1.925	1.939	1.952	1.966
10	3.084	1.675	1.691	1.707	1.723	1.738	1.753	1.768	1.783	1.798	1.813	1.827	1.842	1.856	1.870	1.884	1.898	1.912	1.925	1.939	1.952	1.966
15	3.642	1.676	1.692	1.708	1.723	1.739	1.754	1.769	1.784	1.799	1.813	1.828	1.842	1.856	1.870	1.884	1.898	1.912	1.925	1.939	1.952	1.966
20	4.273	1.676	1.693	1.709	1.724	1.740	1.755	1.770	1.785	1.800	1.814	1.829	1.843	1.857	1.871	1.885	1.899	1.913	1.926	1.940	1.953	1.966
25	4.985	1.677	1.694	1.710	1.725	1.741	1.756	1.771	1.786	1.801	1.815	1.830	1.844	1.858	1.872	1.886	1.900	1.913	1.927	1.940	1.954	1.967
30	5.783	1.678	1.695	1.711	1.726	1.742	1.757	1.772	1.787	1.802	1.817	1.831	1.845	1.859	1.873	1.887	1.901	1.915	1.928	1.942	1.955	1.968
35	6.674	1.679	1.696	1.712	1.728	1.743	1.759	1.774	1.789	1.804	1.818	1.833	1.847	1.861	1.875	1.889	1.902	1.916	1.930	1.943	1.956	1.969
40	7.665	1.680	1.697	1.713	1.729	1.745	1.760	1.775	1.790	1.805	1.820	1.834	1.848	1.863	1.876	1.890	1.904	1.918	1.931	1.944	1.958	1.971
45	8.761	1.681	1.698	1.715	1.731	1.746	1.762	1.777	1.792	1.807	1.822	1.836	1.850	1.864	1.878	1.892	1.906	1.919	1.933	1.946	1.959	1.973
50	9.972	1.682	1.699	1.716	1.732	1.748	1.764	1.779	1.794	1.809	1.823	1.838	1.852	1.866	1.880	1.894	1.908	1.921	1.935	1.948	1.961	1.974
55	11.304	1.683	1.700	1.717	1.734	1.750	1.765	1.781	1.796	1.811	1.825	1.840	1.854	1.868	1.882	1.896	1.910	1.923	1.937	1.950	1.963	1.976
60	12.766	1.683	1.701	1.718	1.735	1.751	1.767	1.782	1.798	1.813	1.827	1.842	1.856	1.870	1.884	1.898	1.912	1.926	1.939	1.952	1.965	1.979
65	14.365	1.684	1.702	1.719	1.736	1.753	1.769	1.784	1.800	1.815	1.829	1.844	1.858	1.873	1.887	1.901	1.914	1.928	1.941	1.955	1.968	1.981
70	16.110	1.683	1.702	1.720	1.737	1.754	1.770	1.786	1.802	1.817	1.832	1.846	1.861	1.875	1.889	1.903	1.917	1.930	1.944	1.957	1.970	1.983
75	18.011	1.683	1.702	1.721	1.738	1.755	1.772	1.788	1.803	1.819	1.834	1.848	1.863	1.877	1.891	1.905	1.919	1.933	1.946	1.959	1.973	1.986
80	20.077	1.681	1.702	1.721	1.739	1.757	1.773	1.789	1.805	1.821	1.836	1.851	1.865	1.880	1.894	1.908	1.921	1.935	1.948	1.962	1.975	1.988
85	22.321	1.679	1.701	1.721	1.740	1.757	1.774	1.791	1.807	1.823	1.838	1.853	1.867	1.882	1.896	1.910	1.924	1.938	1.951	1.964	1.978	1.991
90	24.755	1.675	1.699	1.720	1.740	1.758	1.776	1.792	1.809	1.824	1.840	1.855	1.870	1.884	1.898	1.912	1.926	1.940	1.954	1.967	1.980	1.993
95	27.395	1.669	1.697	1.719	1.740	1.759	1.777	1.794	1.810	1.826	1.842	1.857	1.872	1.886	1.901	1.915	1.929	1.943	1.956	1.970	1.983	1.996
100	30.260	1.660	1.693	1.718	1.739	1.759	1.777	1.795	1.811	1.828	1.843	1.859	1.874	1.889	1.903	1.917	1.931	1.945	1.959	1.972	1.985	1.998
105	33.378	1.644	1.688	1.715	1.738	1.758	1.777	1.795	1.813	1.829	1.845	1.861	1.876	1.891	1.905	1.919	1.933	1.947	1.961	1.974	1.988	2.001