

TABLE A.3SI Thermodynamic Properties of Refrigerant-12 (Dichlorodifluoromethane)

TABLE A.3.1SI Saturated R-12 (SI Units)

Temp. °C	Abs. Press. MPa <i>P</i>	Specific Volume, m ³ /kg			Enthalpy, kJ/kg			Entropy, kJ/kg K		
		Sat. Liquid <i>v_f</i>	Evap. <i>v_{fg}</i>	Sat. Vapor <i>v_g</i>	Sat. Liquid <i>h_f</i>	Evap. <i>h_{fg}</i>	Sat. Vapor <i>h_g</i>	Sat. Liquid <i>s_f</i>	Evap. <i>s_{fg}</i>	Sat. Vapor <i>s_g</i>
-90	0.00284	0.000608	4.414937	4.415545	-43.284	189.748	146.464	-0.20863	1.03593	0.82730
-85	0.00424	0.000612	3.036704	3.037316	-39.005	187.737	148.731	-0.18558	0.99771	0.81213
-80	0.00617	0.000617	2.137728	2.138345	-34.721	185.740	151.018	-0.16312	0.96155	0.79843
-75	0.00879	0.000622	1.537030	1.537651	-30.430	183.751	153.321	-0.14119	0.92725	0.78606
-70	0.01227	0.000627	1.126654	1.127280	-26.128	181.764	155.636	-0.11977	0.89465	0.77489
-65	0.01680	0.000632	0.840534	0.841166	-21.814	179.774	157.960	-0.09880	0.86361	0.76480
-60	0.02262	0.000637	0.637274	0.637911	-17.485	177.775	160.289	-0.07827	0.83397	0.75570
-55	0.02998	0.000642	0.490358	0.491000	-13.141	175.762	162.621	-0.05815	0.80563	0.74748
-50	0.03915	0.000648	0.382457	0.383105	-8.779	173.730	164.951	-0.03841	0.77848	0.74007
-45	0.05044	0.000654	0.302029	0.302682	-4.400	171.676	167.276	-0.01903	0.75241	0.73338
-40	0.06417	0.000659	0.241251	0.241910	0	169.595	169.595	0	0.72735	0.72735
-35	0.08071	0.000666	0.194732	0.195398	4.420	167.482	171.903	0.01871	0.70322	0.72193
-30	0.10041	0.000672	0.158703	0.159375	8.862	165.335	174.197	0.03711	0.67993	0.71704
-25	0.12368	0.000679	0.130487	0.131166	13.327	163.149	176.476	0.05522	0.65742	0.71264
-20	0.15093	0.000685	0.108162	0.108847	17.816	160.920	178.736	0.07306	0.63563	0.70869
-15	0.18260	0.000693	0.090326	0.091018	22.331	158.643	180.974	0.09063	0.61450	0.70513
-10	0.21912	0.000700	0.075946	0.076646	26.874	156.314	183.188	0.10796	0.59397	0.70194
-5	0.26096	0.000708	0.064255	0.064963	31.446	153.928	185.375	0.12506	0.57400	0.69907
0	0.30861	0.000716	0.054673	0.055389	36.052	151.479	187.531	0.14196	0.55453	0.69649
5	0.36255	0.000724	0.046761	0.047485	40.694	148.961	189.654	0.15865	0.53551	0.69416
10	0.42330	0.000733	0.040180	0.040914	45.375	146.365	191.740	0.17517	0.51689	0.69206
15	0.49137	0.000743	0.034671	0.035413	50.100	143.684	193.784	0.19154	0.49862	0.69015
20	0.56729	0.000752	0.030028	0.030780	54.874	140.909	195.783	0.20777	0.48064	0.68841
25	0.65162	0.000763	0.026091	0.026854	59.702	138.028	197.730	0.22388	0.46292	0.68680
30	0.74490	0.000774	0.022734	0.023508	64.592	135.028	199.620	0.23991	0.44539	0.68530
35	0.84772	0.000786	0.019855	0.020641	69.551	131.896	201.446	0.25587	0.42800	0.68387
40	0.96065	0.000798	0.017373	0.018171	74.587	128.613	203.200	0.27179	0.41068	0.68248
45	1.08432	0.000811	0.015220	0.016032	79.712	125.160	204.872	0.28771	0.39338	0.68109
50	1.21932	0.000826	0.013344	0.014170	84.936	121.514	206.450	0.30366	0.37601	0.67967
55	1.36630	0.000841	0.011701	0.012542	90.274	117.645	207.920	0.31967	0.35849	0.67817
60	1.52592	0.000858	0.010253	0.011111	95.743	113.521	209.264	0.33580	0.34073	0.67653
65	1.69884	0.000877	0.008971	0.009847	101.362	109.099	210.460	0.35209	0.32262	0.67471

TABLE A.3.1SI (Continued) *Thermodynamic Properties of Refrigerant-12 (Dichlorodifluoromethane)*TABLE A.3.1SI *Saturated R-12 (SI Units)*

Temp. °C	Abs. Press. MPa <i>P</i>	Specific Volume, m ³ /kg			Enthalpy, kJ/kg			Entropy, kJ/kg K		
		Sat. Liquid	Evap.	Sat. Vapor	Sat. Liquid	Evap.	Sat. Vapor	Sat. Liquid	Evap.	Sat. Vapor
		v_f	v_{fg}	v_g	h_f	h_{fg}	h_g	s_f	s_{fg}	s_g
70	1.88578	0.000897	0.007828	0.008725	107.155	104.326	211.481	0.36861	0.30401	0.67262
75	2.08745	0.000920	0.006802	0.007723	113.153	99.136	212.288	0.38543	0.28474	0.67017
80	2.30460	0.000946	0.005875	0.006821	119.394	93.437	212.832	0.40265	0.26457	0.66722
85	2.53802	0.000976	0.005029	0.006005	125.932	87.107	213.039	0.42040	0.24320	0.66361
90	2.78850	0.001012	0.004246	0.005258	132.841	79.961	212.802	0.43887	0.22018	0.65905
95	3.05689	0.001056	0.003508	0.004563	140.235	71.707	211.942	0.45833	0.19477	0.65310
100	3.34406	0.001113	0.002790	0.003903	148.314	61.810	210.124	0.47928	0.16564	0.64492
105	3.65093	0.001197	0.002045	0.003242	157.521	49.047	206.568	0.50285	0.12970	0.63254
110	3.97846	0.001364	0.001098	0.002462	169.550	28.444	197.995	0.53334	0.07423	0.60758
112	4.11548	0.001792	0	0.001792	183.418	0	183.418	0.56888	0	0.56888

TABLE A.3.2SI *Superheated Refrigerant-12 (SI Units)*

Temp. °C	v m ³ /kg	h kJ/kg	s kJ/kg K	v m ³ /kg	h kJ/kg	s kJ/kg K	v m ³ /kg	h kJ/kg	s kJ/kg K
	0.05 MPa			0.10 MPa			0.15 MPa		
-20	0.341859	181.170	0.79172	0.167702	179.987	0.74064	—	—	—
-10	0.356228	186.889	0.81388	0.175223	185.839	0.76331	0.114826	184.753	0.73240
0	0.370509	192.705	0.83557	0.182648	191.765	0.78541	0.119980	190.800	0.75495
10	0.384717	198.614	0.85681	0.189995	197.770	0.80700	0.125051	196.906	0.77690
20	0.398864	204.617	0.87764	0.197277	203.855	0.82812	0.130053	203.077	0.79832
30	0.412960	210.710	0.89808	0.204507	210.018	0.84879	0.135000	209.314	0.81924
40	0.427014	216.891	0.91814	0.211692	216.262	0.86905	0.139900	215.621	0.83971
50	0.441031	223.160	0.93784	0.218839	222.583	0.88892	0.144761	221.998	0.85975
60	0.455018	229.512	0.95720	0.225956	228.982	0.90842	0.149589	228.446	0.87940
70	0.468980	235.946	0.97623	0.233045	235.457	0.92757	0.154391	234.963	0.89867
80	0.482919	242.460	0.99494	0.240112	242.007	0.94638	0.159168	241.549	0.91759
90	0.496839	249.050	1.01334	0.247160	248.629	0.96487	0.163926	248.204	0.93617

Temp. °C	v m ³ /kg	h kJ/kg	s kJ/kg K	v m ³ /kg	h kJ/kg	s kJ/kg K	v m ³ /kg	h kJ/kg	s kJ/kg K
	0.20 MPa			0.25 MPa			0.30 MPa		
0	0.088609	189.805	0.73249	0.069752	188.779	0.71437	0.057150	187.718	0.69894
10	0.092550	196.020	0.75484	0.073024	195.109	0.73713	0.059984	194.173	0.72215
20	0.096419	202.281	0.77657	0.076219	201.468	0.75920	0.062735	200.636	0.74458
30	0.100229	208.597	0.79775	0.079351	207.866	0.78066	0.065419	207.119	0.76633
40	0.103990	214.971	0.81843	0.082432	214.309	0.80157	0.068049	213.635	0.78747
50	0.107710	221.405	0.83866	0.085470	220.803	0.82198	0.070636	220.191	0.80808
60	0.111397	227.902	0.85846	0.088474	227.351	0.84193	0.073186	226.793	0.82820
70	0.115056	234.462	0.87786	0.091449	233.956	0.86147	0.075706	233.444	0.84787
80	0.118691	241.087	0.89689	0.094399	240.620	0.88061	0.078200	240.147	0.86712
90	0.122305	247.775	0.91556	0.097328	247.341	0.89937	0.080673	246.904	0.88599
100	0.125902	254.525	0.93390	0.100239	254.122	0.91779	0.083127	253.716	0.90449
110	0.129484	261.338	0.95191	0.103135	260.962	0.93588	0.085566	260.582	0.92265
	0.40 MPa			0.50 MPa			0.60 MPa		
20	0.045837	198.906	0.72043	0.035646	197.077	0.70043	—	—	—
30	0.047971	205.577	0.74281	0.037464	203.963	0.72352	0.030422	202.263	0.70679
40	0.050046	212.250	0.76447	0.039215	210.810	0.74574	0.031966	209.307	0.72965
50	0.052072	218.939	0.78549	0.040912	217.643	0.76722	0.033450	216.300	0.75163
60	0.054059	225.653	0.80595	0.042566	224.479	0.78806	0.034887	223.268	0.77287
70	0.056014	232.401	0.82591	0.044185	231.330	0.80832	0.036286	230.231	0.79346
80	0.057941	239.188	0.84540	0.045775	238.206	0.82807	0.037653	237.201	0.81348
90	0.059846	246.017	0.86447	0.047341	245.112	0.84735	0.038996	244.188	0.83299
100	0.061731	252.892	0.88315	0.048886	252.054	0.86621	0.040316	251.200	0.85204
110	0.063601	259.815	0.90145	0.050415	259.035	0.88467	0.041619	258.242	0.87066
120	0.065456	266.786	0.91941	0.051929	266.057	0.90276	0.042907	265.318	0.88889
130	0.067299	273.806	0.93704	0.053430	273.123	0.92050	0.044181	272.431	0.90675
	0.70 MPa			0.80 MPa			0.90 MPa		
40	0.026761	207.732	0.71529	0.022830	206.074	0.70210	0.019744	204.320	0.68972
50	0.028100	214.903	0.73783	0.024068	213.446	0.72527	0.020912	211.921	0.71361
60	0.029387	222.017	0.75951	0.025247	220.720	0.74744	0.022012	219.373	0.73633
70	0.030632	229.099	0.78045	0.026380	227.934	0.76878	0.023062	226.730	0.75808
80	0.031843	236.171	0.80076	0.027477	235.114	0.78940	0.024073	234.028	0.77905
90	0.033028	243.244	0.82051	0.028545	242.279	0.80941	0.025051	241.290	0.79932

TABLE A.3.2SI (Continued) *Superheated Refrigerant-12 (SI Units)*

Temp. °C	v m ³ /kg	h kJ/kg	s kJ/kg K	v m ³ /kg	h kJ/kg	s kJ/kg K	v m ³ /kg	h kJ/kg	s kJ/kg K
0.70 MPa			0.80 MPa			0.90 MPa			
100	0.034189	250.330	0.83976	0.029588	249.443	0.82887	0.026005	248.537	0.81901
110	0.035332	257.436	0.85855	0.030612	256.616	0.84784	0.026937	255.781	0.83817
120	0.036459	264.568	0.87693	0.031619	263.806	0.86636	0.027852	263.032	0.85685
130	0.037572	271.730	0.89492	0.032612	271.019	0.88448	0.028751	270.298	0.87510
140	0.038673	278.925	0.91254	0.033592	278.259	0.90221	0.029639	277.585	0.89295
150	0.039765	286.155	0.92984	0.034563	285.529	0.91960	0.030515	284.896	0.91043
1.00 MPa			1.20 MPa			1.40 MPa			
50	0.018366	210.317	0.70259	0.014483	206.813	0.68165	—	—	—
60	0.019410	217.970	0.72591	0.015463	214.964	0.70649	0.012579	211.613	0.68806
70	0.020397	225.485	0.74814	0.016368	222.851	0.72982	0.013448	219.984	0.71281
80	0.021341	232.910	0.76946	0.017221	230.568	0.75198	0.014247	228.059	0.73601
90	0.022251	240.278	0.79004	0.018032	238.171	0.77321	0.014997	235.940	0.75802
100	0.023133	247.612	0.80996	0.018812	245.699	0.79366	0.015710	243.692	0.77907
110	0.023993	254.931	0.82931	0.019567	253.180	0.81344	0.016393	251.355	0.79934
120	0.024835	262.246	0.84816	0.020301	260.632	0.83265	0.017053	258.961	0.81893
130	0.025661	269.567	0.86655	0.021018	268.072	0.85133	0.017695	266.530	0.83795
140	0.026474	276.902	0.88452	0.021721	275.509	0.86955	0.018321	274.078	0.85644
150	0.027275	284.255	0.90211	0.022412	282.952	0.88735	0.018934	281.618	0.87447
160	0.028068	291.632	0.91933	0.023093	290.408	0.90477	0.019535	289.158	0.89208
1.60 MPa			1.80 MPa			2.00 MPa			
70	0.011208	216.810	0.69641	0.009406	213.208	0.67992	—	—	—
80	0.011984	225.344	0.72092	0.010187	222.363	0.70622	0.008704	219.024	0.69143
90	0.012698	233.563	0.74387	0.010884	231.007	0.73036	0.009406	228.226	0.71713
100	0.013366	241.575	0.76564	0.011525	239.332	0.75297	0.010035	236.936	0.74079
110	0.014000	249.448	0.78646	0.012126	247.446	0.77443	0.010615	245.336	0.76300
120	0.014608	257.225	0.80649	0.012697	255.417	0.79497	0.011159	253.528	0.78411
130	0.015195	264.937	0.82586	0.013244	263.288	0.81474	0.011676	261.577	0.80433
140	0.015765	272.606	0.84465	0.013772	271.090	0.83385	0.012172	269.526	0.82380
150	0.016320	280.250	0.86293	0.014284	278.847	0.85240	0.012651	277.405	0.84265

Temp. °C	v m ³ /kg	h kJ/kg	s kJ/kg K	v m ³ /kg	h kJ/kg	s kJ/kg K	v m ³ /kg	h kJ/kg	s kJ/kg K
	1.60 MPa			1.80 MPa			2.00 MPa		
160	0.016864	287.880	0.88076	0.014784	286.574	0.87045	0.013116	285.237	0.86094
170	0.017398	295.506	0.89816	0.015272	294.284	0.88805	0.013570	293.037	0.87874
180	0.017923	303.136	0.91519	0.015752	301.988	0.90524	0.014013	300.819	0.89611
	2.50 MPa			3.00 MPa			3.50 MPa		
90	0.006595	219.736	0.68284	—	—	—	—	—	—
100	0.007264	230.029	0.71081	0.005231	220.723	0.67755	—	—	—
110	0.007837	239.453	0.73573	0.005886	232.256	0.70806	0.004324	222.360	0.67559
120	0.008351	248.379	0.75873	0.006419	242.398	0.73420	0.004959	235.086	0.70840
130	0.008827	256.986	0.78035	0.006887	251.825	0.75788	0.005456	245.865	0.73548
140	0.009273	265.377	0.80091	0.007313	260.818	0.77991	0.005884	255.728	0.75965
150	0.009697	273.616	0.82062	0.007709	269.521	0.80072	0.006270	265.053	0.78195
160	0.010104	281.748	0.83961	0.008083	278.024	0.82059	0.006626	274.027	0.80291
170	0.010497	289.802	0.85799	0.008439	286.384	0.83967	0.006961	282.759	0.82284
180	0.010879	297.802	0.87584	0.008782	294.640	0.85809	0.007279	291.319	0.84194
190	0.011250	305.764	0.89322	0.009114	302.820	0.87594	0.007584	299.752	0.86035
200	0.011614	313.701	0.91018	0.009436	310.946	0.89330	0.007878	308.092	0.87816
	4.00 MPa			5.00 MPa					
120	0.003736	225.180	0.67769	0.001369	176.303	0.54710			
130	0.004325	238.691	0.71164	0.002501	216.458	0.64811			
140	0.004781	249.930	0.73918	0.003139	235.004	0.69359			
150	0.005172	260.124	0.76357	0.003585	248.416	0.72568			
160	0.005522	269.710	0.78596	0.003950	259.910	0.75253			
170	0.005845	278.903	0.80694	0.004268	270.400	0.77648			
180	0.006147	287.825	0.82685	0.004555	280.276	0.79851			
190	0.006434	296.552	0.84590	0.004821	289.740	0.81917			
200	0.006708	305.136	0.86424	0.005071	298.916	0.83877			
210	0.006972	313.614	0.88197	0.005308	307.882	0.85753			
220	0.007228	322.013	0.89917	0.005535	316.690	0.87557			
230	0.007477	330.352	0.91592	0.005753	325.380	0.89301			