D2.2 Properties of Dry Air

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1 Composition of Dry Air

Substance	Mole fraction	Molecular mass g/mol	Mass fraction
N_2	0.7812	28.013	0.75570
Ar	0.0092	39.948	0.01269
O_2	0.2096	31.999	0.23161

Molecular mass of the mixture: $\widetilde{M}$ = 28.9583 g/mol
Specific gas constant of the mixture: R = 0.28712 kJ/(kg K)

Deviations caused by neglecting the CO_2 fraction in air always remain smaller than the uncertainty of the equations used to calculate the tabulated properties. The impact of all other trace components is smaller than the impact of CO_2. Humidity has to be considered separately.

To calculate the properties tabulated in the following pages, the "pseudo pure-component" equations from the cited references were used. According to the authors, these equations are slightly more accurate than the mixture models published in the same articles.

Z	Compression factor $Z = p/(\rho RT)$	β	Isobaric expansion coefficient in 10^{-3}/K $\beta = v^{-1}\,(\partial_v/\partial T)_p$
Pr	Prandtl number Pr = $\eta\, c_p/\lambda$	c_p	Specific isobaric heat capacity in kJ/(kg K)
		w_s	Isentropic speed of sound in m/s

p	Pressure in bar	v	Specific volume in m^3/kg
ρ	Density in kg/m^3	λ	Thermal conductivity in mW/(m K)
ϑ	Temperature in °C	ν	Kinematic viscosity ν in 10^{-7} m^2/s
h	Specific enthalpy in kJ/kg	η	Dynamic viscosity in 10^{-6} Pa·s
s	Specific entropy in kJ/(kg K)	a	Thermal diffusivity in 10^{-7} m^2/s

2 Critical Parameters of Dry Air

	Temperatures	Pressures	Densities
Critical	132.531 K	3.7860 MPa	11.8308 mol/dm^3
	−140.619 °C	37.860 bar	342.599 kg/m^3
Maxcondentherm	132.631 K	3.7850 MPa	10.4477 mol/dm^3
	−140.519 °C	37.850 bar	302.547 kg/m^3
Maxcondenbar	132.604 K	3.7891 MPa	11.0948 mol/dm^3
	−140.547 °C	37.891 bar	321.286 kg/m^3

2.1 Reference States of Enthalpy and Entropy

h = 0 kJ/kg, s = 0 kJ/(kg K) at T = 298.15 K (ϑ) = 25°C), p = 1.01325 bar for the pure components

D2.2. Table 1. Properties of dry air at $p = 1$ bar

ϑ °C	ρ kg/m³	h kJ/kg	s kJ/(kg K)	c_p kJ/(kg K)	β 10^{-3}/K	λ mW/(m K)	η μ Pa*s	ν 10^{-7} m²/s	a 10^{-7} m²/s	Pr –	w_s m/s
−200	900.81	−435.60	−4.0270	1.9145	4.8833	149.590	206.790	2.296	0.867	2.6466	917.9
−194.36	875.52	−424.76	−3.8842	1.9329	5.2331	140.180	167.360	1.912	0.828	2.3076	866.7
−191.54	4.4419	−219.76	−1.3183	1.0891	13.8730	7.673	5.811	13.08	15.86	0.8248	177.1
−190	4.3492	−218.09	−1.2980	1.0818	13.5040	7.824	5.921	13.62	16.63	0.8187	179.0
−180	3.8383	−207.44	−1.1770	1.0517	11.6120	8.803	6.630	17.28	21.81	0.7921	190.8
−170	3.4418	−197.01	−1.0707	1.0359	10.2600	9.774	7.323	21.28	27.41	0.7762	201.6
−160	3.1230	−186.70	−0.9753	1.0266	9.2236	10.733	8.001	25.62	33.48	0.7653	211.7
−150	2.8600	−176.47	−0.8886	1.0206	8.3947	11.679	8.664	30.29	40.01	0.7571	221.3
−140	2.6390	−166.28	−0.8091	1.0165	7.7122	12.611	9.313	35.29	47.01	0.7507	230.4
−130	2.4503	−156.13	−0.7356	1.0137	7.1381	13.529	9.948	40.60	54.47	0.7454	239.2
−120	2.2873	−146.01	−0.6672	1.0116	6.6471	14.434	10.571	46.22	62.38	0.7409	247.6
−110	2.1448	−135.90	−0.6033	1.0101	6.2217	15.326	11.182	52.13	70.74	0.7370	255.7
−100	2.0193	−125.80	−0.5432	1.0090	5.8490	16.205	11.780	58.34	79.54	0.7335	263.5
−90	1.9078	−115.72	−0.4866	1.0081	5.5196	17.071	12.368	64.83	88.76	0.7304	271.1
−80	1.8080	−105.64	−0.4330	1.0074	5.2260	17.924	12.944	71.59	98.41	0.7275	278.5
−70	1.7183	−95.57	−0.3822	1.0068	4.9627	18.766	13.511	78.63	108.5	0.7249	285.7
−60	1.6371	−85.51	−0.3338	1.0064	4.7250	19.596	14.067	85.93	118.9	0.7224	292.7
−50	1.5632	−75.44	−0.2877	1.0061	4.5094	20.416	14.614	93.49	129.8	0.7202	299.5
−40	1.4958	−65.38	−0.2436	1.0059	4.3128	21.224	15.152	101.3	141.1	0.7181	306.2
−30	1.4340	−55.33	−0.2013	1.0058	4.1329	22.023	15.680	109.4	152.7	0.7161	312.7
−20	1.3771	−45.27	−0.1608	1.0057	3.9675	22.811	16.201	117.7	164.7	0.7143	319.1
−10	1.3245	−35.21	−0.1218	1.0058	3.8149	23.590	16.714	126.2	177.1	0.7126	325.4
0	1.2758	−25.15	−0.0843	1.0059	3.6738	24.360	17.218	135.0	189.8	0.7110	331.5
10	1.2306	−15.09	−0.0481	1.0061	3.5428	25.121	17.715	144.0	202.9	0.7095	337.5
20	1.1885	−5.03	−0.0132	1.0064	3.4209	25.873	18.205	153.2	216.3	0.7081	343.4
30	1.1492	5.04	0.0205	1.0067	3.3071	26.618	18.689	162.6	230.1	0.7068	349.2
40	1.1124	15.11	0.0532	1.0071	3.2007	27.354	19.165	172.3	244.2	0.7056	354.9
50	1.0779	25.18	0.0849	1.0077	3.1010	28.082	19.635	182.2	258.5	0.7045	360.5
60	1.0455	35.26	0.1156	1.0082	3.0073	28.804	20.099	192.2	273.2	0.7035	365.9
70	1.0150	45.34	0.1454	1.0089	2.9192	29.518	20.557	202.5	288.2	0.7026	371.3
80	0.9862	55.44	0.1744	1.0097	2.8361	30.225	21.009	213.0	303.5	0.7018	376.7
90	0.9590	65.54	0.2026	1.0105	2.7576	30.925	21.455	223.7	319.1	0.7011	381.9
100	0.9333	75.65	0.2301	1.0115	2.6833	31.620	21.896	234.6	335.0	0.7004	387.0
120	0.8858	95.90	0.2830	1.0136	2.5463	32.989	22.763	257.0	367.5	0.6994	397.1
140	0.8428	116.19	0.3333	1.0160	2.4225	34.336	23.610	280.1	401.0	0.6986	406.9
160	0.8039	136.54	0.3814	1.0188	2.3103	35.660	24.439	304.0	435.4	0.6982	416.4
180	0.7684	156.95	0.4275	1.0218	2.2081	36.964	25.251	328.6	470.8	0.6980	425.7
200	0.7359	177.42	0.4717	1.0252	2.1145	38.248	26.046	353.9	507.0	0.6981	434.7
250	0.6655	228.91	0.5751	1.0347	1.9120	41.382	27.970	420.3	601.0	0.6993	456.2
300	0.6075	280.90	0.6700	1.0454	1.7450	44.417	29.811	490.7	699.5	0.7016	476.6
350	0.5587	333.46	0.7579	1.0568	1.6048	47.367	31.579	565.2	802.2	0.7046	495.9
400	0.5172	386.60	0.8399	1.0688	1.4855	50.240	33.284	643.5	908.9	0.7081	514.3
450	0.4815	440.33	0.9170	1.0808	1.3827	53.047	34.932	725.6	1019.5	0.7117	532.0
500	0.4503	494.67	0.9896	1.0927	1.2932	55.795	36.530	811.2	1133.9	0.7154	549.0
550	0.4230	549.60	1.0584	1.1043	1.2147	58.490	38.084	900.4	1252.3	0.7190	565.4
600	0.3988	605.09	1.1239	1.1154	1.1451	61.139	39.597	993.0	1374.6	0.7224	581.3
650	0.3772	661.13	1.1863	1.1260	1.0830	63.745	41.073	1089.0	1501.0	0.7255	596.7

D2.2. Table 1. (continued)

ϑ °C	ρ kg/m³	h kJ/kg	s kJ/(kg K)	c_p kJ/(kg K)	β 10^{-3}/K	λ mW/(m K)	η μ Pa*s	ν 10^{-7} m²/s	a 10^{-7} m²/s	Pr –	w_s m/s
700	0.3578	717.68	1.2459	1.1361	1.0274	66.312	42.517	1188.3	1631.4	0.7284	611.7
750	0.3403	774.72	1.3031	1.1455	0.9772	68.846	43.931	1290.9	1766.0	0.7310	626.3
800	0.3245	832.22	1.3580	1.1544	0.9317	71.348	45.317	1396.7	1904.9	0.7333	640.6
850	0.3100	890.16	1.4107	1.1628	0.8902	73.822	46.679	1505.7	2047.9	0.7352	654.6
900	0.2968	948.49	1.4615	1.1706	0.8522	76.271	48.018	1617.8	2195.3	0.7370	668.3
950	0.2847	1007.20	1.5106	1.1778	0.8174	78.695	49.336	1733.1	2347.0	0.7384	681.7
1000	0.2735	1066.30	1.5579	1.1846	0.7853	81.099	50.635	1851.4	2503.1	0.7396	694.8

D2.2. Table 2. Properties of the saturated liquid

ϑ °C	p' bar	ρ' kg/m³	h' kJ/kg	s' kJ/(kg K)	c_p' kJ/(kg K)	β' 10^{-3}/K	λ' mW/(m K)	η' μ Pa*s	ν' 10^{-7} m²/s	a' 10^{-7} m²/s	Pr′	Z'	w' m/s	σ' N/m
−212	0.070027	951.78	−458.54	−4.3679	1.9013	4.3568	169.16	351.22	3.6902	0.93477	3.9477	0.000419	1019.0	13.81
−210	0.10276	943.46	−454.73	−4.3067	1.9017	4.4305	165.92	318.80	3.3791	0.92475	3.6541	0.000601	1002.8	13.32
−208	0.14697	935.07	−450.92	−4.2474	1.9027	4.5093	162.66	290.38	3.1055	0.91425	3.3968	0.000840	986.2	12.83
−206	0.20536	926.60	−447.11	−4.1899	1.9045	4.5936	159.40	265.40	2.8642	0.90325	3.1710	0.001150	969.5	12.34
−204	0.28095	918.06	−443.30	−4.1340	1.9071	4.6842	156.13	243.38	2.6510	0.89174	2.9728	0.001541	952.4	11.86
−202	0.37705	909.43	−439.47	−4.0797	1.9105	4.7817	152.84	223.90	2.4620	0.87968	2.7987	0.002030	935.1	11.39
−200	0.49727	900.71	−435.64	−4.0267	1.9149	4.8870	149.55	206.63	2.2941	0.86707	2.6458	0.002629	917.6	10.91
−198	0.64543	891.88	−431.79	−3.9751	1.9202	5.0008	146.24	191.26	2.1444	0.85388	2.5114	0.003354	899.8	10.45
−196	0.82562	882.94	−427.93	−3.9246	1.9267	5.1242	142.91	177.53	2.0107	0.84010	2.3934	0.004221	881.7	9.983
−194	1.0421	873.87	−424.06	−3.8754	1.9344	5.2583	139.58	165.23	1.8908	0.82570	2.2899	0.005248	863.3	9.525
−192	1.2993	864.67	−420.16	−3.8271	1.9434	5.4044	136.22	154.17	1.7830	0.81068	2.1993	0.006449	844.7	9.071
−190	1.6019	855.32	−416.25	−3.7799	1.9538	5.5640	132.86	144.18	1.6857	0.79501	2.1204	0.007845	825.8	8.622
−188	1.9545	845.81	−412.31	−3.7336	1.9659	5.7389	129.53	135.14	1.5977	0.77902	2.0509	0.009452	806.5	8.179
−186	2.3620	836.12	−408.34	−3.688	1.9798	5.9310	126.19	126.90	1.5178	0.76228	1.9911	0.011290	787.0	7.741
−184	2.8295	826.24	−404.33	−3.6433	1.9957	6.1428	122.82	119.39	1.4449	0.74482	1.9399	0.013379	767.1	7.308
−182	3.3619	816.15	−400.30	−3.5992	2.0139	6.3772	119.44	112.49	1.3783	0.72666	1.8967	0.015740	746.9	6.880
−180	3.9644	805.83	−396.22	−3.5558	2.0347	6.6374	116.05	106.13	1.3170	0.70779	1.8608	0.018394	726.4	6.458
−178	4.6422	795.25	−392.10	−3.5129	2.0584	6.9277	112.65	100.25	1.2606	0.6882	1.8317	0.021367	705.5	6.043
−176	5.4006	784.39	−387.92	−3.4705	2.0854	7.2530	109.25	94.782	1.2084	0.66789	1.8092	0.024683	684.2	5.633
−174	6.2450	773.22	−383.69	−3.4285	2.1164	7.6195	105.85	89.677	1.1598	0.64686	1.7930	0.028371	662.6	5.230
−172	7.1809	761.70	−379.40	−3.3868	2.1518	8.0348	102.45	84.887	1.1144	0.62508	1.7829	0.032462	640.6	4.833
−170	8.2139	749.80	−375.03	−3.3454	2.1927	8.5085	99.062	80.373	1.0719	0.60255	1.7790	0.036989	618.2	4.444
−168	9.3494	737.47	−370.59	−3.3042	2.2398	9.0531	95.680	76.099	1.0319	0.57924	1.7815	0.041992	595.3	4.062
−166	10.593	724.66	−366.05	−3.2631	2.2947	9.6846	92.313	72.033	0.99402	0.55514	1.7906	0.047516	572.1	3.687
−164	11.951	711.31	−361.42	−3.2220	2.3590	10.4250	88.966	68.146	0.95804	0.53019	1.8070	0.053613	548.4	3.321
−162	13.429	697.34	−356.67	−3.1808	2.4352	11.3020	85.644	64.413	0.92369	0.50433	1.8315	0.060343	524.3	2.963
−160	15.032	682.66	−351.79	−3.1393	2.5266	12.3600	82.353	60.809	0.89076	0.47745	1.8656	0.067781	499.6	2.615
−158	16.767	667.17	−346.75	−3.0974	2.6382	13.6570	79.097	57.312	0.85903	0.44939	1.9116	0.076017	474.4	2.276
−156	18.640	650.70	−341.53	−3.0550	2.7773	15.2870	75.879	53.898	0.82831	0.41987	1.9728	0.085165	448.5	1.949
−154	20.656	633.06	−336.10	−3.0116	2.9560	17.4020	72.701	50.544	0.79840	0.38850	2.0551	0.095377	421.9	1.632
−152	22.821	613.97	−330.40	−2.9671	3.1948	20.2620	69.564	47.220	0.76910	0.35464	2.1687	0.10686	394.2	1.329
−150	25.140	592.99	−324.35	−2.9207	3.5324	24.3640	66.469	43.890	0.74016	0.31733	2.3325	0.11990	365.2	1.040
−148	27.618	569.39	−317.83	−2.8716	4.0503	30.7800	63.433	40.496	0.71123	0.27506	2.5857	0.13499	334.3	0.768
−146	30.259	541.83	−310.60	−2.8181	4.9562	42.2910	60.546	36.939	0.68176	0.22546	3.0238	0.15298	300.6	0.516
−144	33.060	507.16	−302.13	−2.7562	6.9740	68.8600	58.297	32.997	0.65062	0.16482	3.9474	0.17580	262.3	0.289
−142	35.992	454.16	−290.48	−2.6714	15.256	184.2900	60.168	27.911	0.61458	0.08684	7.0773	0.21046	215.0	0.097

D2.2. Table 3. Properties of the saturated vapor

ϑ °C	p'' bar	ρ'' kg/m³	h'' kJ/kg	s'' kJ/(kg K)	c_p'' kJ/(kg K)	β'' 10^{-3}/K	λ'' mW/(m K)	η'' μ Pa*s	ν'' 10^{-7} m²/s	a'' 10^{-7} m²/s	Pr″ –	Z″ –	w_s m/s
−212	0.033892	0.19366	−237.64	−0.61444	1.0106	16.529	5.4401	4.3230	223.230	277.95	0.80310	0.9968	156.57
−210	0.052874	0.29293	−235.71	−0.71069	1.0137	16.072	5.6497	4.4701	152.600	190.26	0.80202	0.9955	158.99
−208	0.079916	0.42988	−233.82	−0.79906	1.0175	15.661	5.8602	4.6167	107.400	133.98	0.80156	0.99384	161.33
−206	0.11739	0.61391	−231.95	−0.88042	1.0221	15.294	6.0718	4.7628	77.581	96.766	0.80174	0.99178	163.59
−204	0.16804	0.85556	−230.11	−0.95552	1.0276	14.970	6.2848	4.9085	57.372	71.483	0.80260	0.98927	165.76
−202	0.23499	1.1663	−228.32	−1.0250	1.0342	14.688	6.4997	5.0538	43.330	53.883	0.80415	0.98625	167.85
−200	0.32171	1.5587	−226.57	−1.0895	1.0419	14.447	6.7169	5.1987	33.352	41.358	0.80642	0.98269	169.83
−198	0.43200	2.0461	−224.86	−1.1496	1.0508	14.246	6.9368	5.3434	26.115	32.263	0.80945	0.97854	171.72
−196	0.56999	2.6425	−223.22	−1.2057	1.0611	14.086	7.1600	5.4879	20.768	25.537	0.81327	0.97378	173.50
−194	0.74008	3.3630	−221.63	−1.2581	1.0727	13.966	7.3872	5.6325	16.749	20.478	0.81789	0.96838	175.17
−192	0.9469	4.2233	−220.10	−1.3074	1.0859	13.886	7.6190	5.7773	13.680	16.614	0.82337	0.9623	176.73
−190	1.1953	5.2399	−218.65	−1.3539	1.1007	13.847	7.8564	5.9225	11.303	13.622	0.82974	0.95552	178.17
−188	1.4904	6.4304	−217.27	−1.3977	1.1173	13.850	8.1002	6.0684	9.4371	11.274	0.83704	0.94803	179.50
−186	1.8374	7.8132	−215.97	−1.4394	1.1359	13.897	8.3516	6.2153	7.9549	9.4103	0.84533	0.93980	180.70
−184	2.2415	9.4081	−214.75	−1.4790	1.1566	13.989	8.6118	6.3636	6.7640	7.9140	0.85468	0.93082	181.77
−182	2.7085	11.236	−213.63	−1.5168	1.1798	14.130	8.8823	6.5137	5.7971	6.7006	0.86516	0.92107	182.72
−180	3.2438	13.320	−212.60	−1.5531	1.2056	14.323	9.165	6.6662	5.0045	5.7072	0.87688	0.91053	183.53
−178	3.8531	15.686	−211.67	−1.5880	1.2344	14.574	9.4618	6.8216	4.3490	4.8866	0.88997	0.89918	184.21
−176	4.5424	18.359	−210.86	−1.6217	1.2668	14.888	9.7755	6.9806	3.8022	4.2032	0.90460	0.88700	184.76
−174	5.3174	21.372	−210.16	−1.6544	1.3031	15.274	10.109	7.1442	3.3427	3.6296	0.92096	0.87396	185.17
−172	6.1843	24.760	−209.60	−1.6864	1.3443	15.743	10.466	7.3132	2.9537	3.1444	0.93934	0.86004	185.43
−170	7.1491	28.560	−209.17	−1.7177	1.3911	16.309	10.851	7.4889	2.6221	2.7311	0.96008	0.84520	185.56
−168	8.2181	32.821	−208.89	−1.7485	1.4448	16.989	11.269	7.6727	2.3378	2.3766	0.98364	0.82938	185.54
−166	9.3976	37.594	−208.78	−1.7791	1.5069	17.809	11.729	7.8663	2.0924	2.0704	1.01060	0.81254	185.36
−164	10.694	42.945	−208.84	−1.8095	1.5796	18.800	12.238	8.0719	1.8796	1.8041	1.04180	0.79460	185.04
−162	12.115	48.952	−209.11	−1.8401	1.6659	20.007	12.809	8.2920	1.6939	1.5708	1.07840	0.77548	184.55
−160	13.666	55.710	−209.61	−1.8710	1.7698	21.495	13.458	8.5299	1.5311	1.3649	1.12180	0.75506	183.91
−158	15.354	63.341	−210.37	−1.9025	1.8975	23.354	14.205	8.7900	1.3877	1.1818	1.17420	0.73320	183.10
−156	17.188	72.001	−211.42	−1.9350	2.0581	25.723	15.079	9.0779	1.2608	1.0176	1.23900	0.70971	182.13
−154	19.175	81.902	−212.83	−1.9688	2.2658	28.819	16.124	9.4012	1.1479	0.8689	1.32110	0.68435	180.98
−152	21.323	93.336	−214.67	−2.0045	2.5446	33.001	17.404	9.7708	1.0468	0.7328	1.42860	0.65677	179.67
−150	23.642	106.73	−217.04	−2.0429	2.9374	38.912	19.021	10.203	0.9560	0.6067	1.57570	0.62649	178.19
−148	26.144	122.75	−220.10	−2.0852	3.5294	47.822	21.152	10.724	0.8737	0.4883	1.78940	0.59274	176.55
−146	28.843	142.55	−224.14	−2.1334	4.5166	62.639	24.144	11.380	0.7983	0.3750	2.12880	0.55424	174.77
−144	31.764	168.49	−229.71	−2.1916	6.4725	91.847	28.812	12.270	0.7282	0.2642	2.75650	0.50839	172.82
−142	34.964	207.50	−238.43	−2.2718	12.181	176.500	38.048	13.697	0.6601	0.1505	4.38490	0.44749	170.61

D2.2. Table 4. Density ρ of dry air in kg/m^3

Pressure in bar	Temperature in °C										
	−150	−125	−100	−75	−50	−25	0	25	50	75	100
1	2.860	2.366	2.019	1.762	1.5632	1.4049	1.2758	1.1685	1.0779	1.0004	0.93328
5	15.007	12.146	10.257	8.897	7.8645	7.0518	6.3940	5.8500	5.3923	5.0017	4.6643
10	32.203	25.162	20.931	18.013	15.8490	14.1700	12.8230	11.7170	10.7900	10.0020	9.3227
20	79.159	54.508	43.667	36.923	32.1730	28.5940	25.7770	23.4920	21.5950	19.9920	18.617
30	605.220	90.103	68.511	56.770	48.9570	43.2480	38.8400	35.3080	32.4010	29.9600	27.876
40	624.490	135.840	95.798	77.577	66.1780	58.1070	51.9910	47.1490	43.1960	39.8960	37.091
50	639.390	199.180	125.820	99.339	83.8040	73.1430	65.2070	58.9970	53.9680	49.7920	46.257
60	651.750	288.200	158.700	122.000	101.790	88.320	78.4660	70.8380	64.7050	59.6390	55.367
70	662.390	377.410	194.180	145.440	120.060	103.600	91.7420	82.6540	75.3960	69.4300	64.415
80	671.790	437.030	231.440	169.460	138.540	118.940	105.010	94.428	86.0300	79.1560	73.397
90	680.240	476.340	269.090	193.810	157.130	134.280	118.240	106.140	96.5960	88.8100	82.307
100	687.940	504.790	305.450	218.180	175.710	149.590	131.400	117.780	107.080	98.386	91.140
150	719.020	585.850	439.950	330.190	264.770	223.640	195.260	174.280	157.980	144.850	134.010
200	742.640	631.230	515.070	413.950	340.680	290.050	253.850	226.720	205.550	188.490	174.390
250	761.990	663.570	564.110	473.840	401.340	346.750	305.730	274.170	249.190	228.890	212.020
300	778.530	688.990	600.320	518.690	449.580	394.320	350.890	316.490	288.750	265.940	246.830
350	793.060	710.100	629.070	554.080	488.720	434.340	390.060	354.030	324.420	299.750	278.900
400	806.080	728.230	652.980	583.170	521.280	468.410	424.160	387.340	356.560	330.570	308.400
450	817.910	744.200	673.490	607.850	549.020	497.830	454.110	417.050	385.580	358.700	335.540
500	828.790	758.500	691.500	629.280	573.110	523.590	480.640	443.680	411.880	384.420	360.560
600	848.280	783.400	722.120	665.230	613.390	566.930	525.770	489.550	457.750	429.790	405.110
700	865.480	804.700	747.670	694.770	646.320	602.450	563.060	527.880	496.530	468.580	443.610
800	880.920	823.410	769.700	719.920	674.180	632.490	594.720	560.630	529.920	502.250	477.290
900	894.990	840.150	789.120	741.870	698.360	658.520	622.190	589.150	559.150	531.890	507.120
1000	907.950	855.340	806.540	761.380	719.740	681.480	646.430	614.380	585.080	558.310	533.810

Pressure in bar	Temperature in °C										
	125	150	200	300	400	500	600	700	800	900	1000
1	0.87461	0.8229	0.7359	0.6075	0.5172	0.4503	0.3988	0.3578	0.3245	0.2968	0.2735
5	4.3698	4.1106	3.6749	3.0329	2.5823	2.2484	1.9911	1.7867	1.6203	1.4824	1.3660
10	8.7310	8.2109	7.3382	6.0547	5.1550	4.4888	3.9755	3.5677	3.2359	2.9606	2.7285
20	17.424	16.378	14.629	12.065	10.272	8.9456	7.9241	7.1127	6.4525	5.9047	5.4428
30	26.073	24.497	21.868	18.028	15.350	13.370	11.846	10.635	9.6500	8.8324	8.1428
40	34.673	32.564	29.055	23.945	20.388	17.762	15.741	14.135	12.828	11.744	10.829
50	43.218	40.574	36.186	29.814	25.388	22.122	19.609	17.612	15.987	14.639	13.500
60	51.705	48.525	43.260	35.635	30.348	26.449	23.450	21.067	19.128	17.517	16.158
70	60.129	56.413	50.275	41.408	35.268	30.744	27.264	24.500	22.249	20.380	18.802
80	68.486	64.237	57.230	47.131	40.149	35.007	31.052	27.910	25.351	23.226	21.431
90	76.772	71.992	64.123	52.805	44.990	39.237	34.813	31.298	28.435	26.056	24.047
100	84.986	79.678	70.954	58.429	49.791	43.435	38.547	34.663	31.499	28.870	26.649
150	124.850	116.990	104.140	85.802	73.207	63.950	56.828	51.165	46.547	42.704	39.454
200	162.500	152.300	135.640	111.930	95.653	83.686	74.471	67.135	61.143	56.152	51.925
250	197.750	185.500	165.440	136.830	117.160	102.670	91.499	82.591	75.305	69.227	64.073
300	230.580	216.560	193.540	160.530	137.750	120.930	107.940	97.554	89.049	81.943	75.909
350	261.040	245.560	219.990	183.080	157.470	138.500	123.810	112.050	102.390	94.313	87.444
400	289.260	272.580	244.850	204.520	176.360	155.410	139.140	126.080	115.350	106.350	98.689
450	315.410	297.760	268.240	224.920	194.450	171.690	153.950	139.690	127.940	118.070	109.660

D2.2. Table 4. (continued)

Temperature in °C											
Pressure in bar	125	150	200	300	400	500	600	700	800	900	1000
500	339.670	321.250	290.230	244.330	211.790	187.370	168.270	152.880	140.170	129.480	120.350
600	383.230	363.730	330.480	280.410	244.370	217.040	195.530	178.090	163.630	151.430	140.980
700	421.230	401.090	366.390	313.240	274.400	244.660	221.070	201.850	185.850	172.300	160.660
800	454.720	434.260	398.620	343.240	302.170	270.420	245.060	224.290	206.920	192.160	179.450
900	484.550	463.950	427.770	370.770	327.940	294.520	267.650	245.520	226.950	211.110	197.420
1000	511.360	490.750	454.290	396.150	351.940	317.140	288.970	265.660	246.010	229.200	214.630

D2.2. Table 5. Compression factor Z of dry air

Temperature in °C											
Pressure in bar	−150	−125	−100	−75	−50	−25	0	25	50	75	100
1	0.9889	0.9937	0.9961	0.9976	0.9984	0.9990	0.9994	0.9997	0.9999	1.0000	1.0001
5	0.9423	0.9678	0.9806	0.9879	0.9923	0.9952	0.9971	0.9984	0.9994	1.0001	1.0006
10	0.8782	0.9343	0.9610	0.9758	0.9848	0.9905	0.9944	0.9970	0.9989	1.0002	1.0012
20	0.7146	0.8626	0.9213	0.9521	0.9702	0.9817	0.9893	0.9945	0.9982	1.0008	1.0027
30	0.1402	0.7827	0.8808	0.9289	0.9564	0.9736	0.9849	0.9926	0.9979	1.0017	1.0045
40	0.1812	0.6923	0.8399	0.9063	0.9434	0.9662	0.9810	0.9911	0.9980	1.0030	1.0066
50	0.2212	0.5902	0.7993	0.8847	0.9312	0.9595	0.9777	0.9900	0.9986	1.0046	1.0089
60	0.2604	0.4894	0.7605	0.8645	0.9200	0.9535	0.9750	0.9894	0.9994	1.0065	1.0115
70	0.2989	0.4360	0.7251	0.8460	0.9100	0.9483	0.9729	0.9893	1.0007	1.0086	1.0143
80	0.3368	0.4304	0.6953	0.8298	0.9013	0.9441	0.9714	0.9897	1.0022	1.0111	1.0173
90	0.3742	0.4442	0.6728	0.8162	0.8940	0.9407	0.9706	0.9905	1.0042	1.0138	1.0206
100	0.4111	0.4657	0.6585	0.8056	0.8883	0.9383	0.9704	0.9918	1.0065	1.0168	1.0241
150	0.5900	0.6019	0.6858	0.7985	0.8842	0.9414	0.9795	1.0054	1.0234	1.0359	1.0448
200	0.7617	0.7449	0.7811	0.8492	0.9163	0.9678	1.0046	1.0305	1.0487	1.0615	1.0705
250	0.9279	0.8857	0.8914	0.9274	0.9722	1.0119	1.0427	1.0652	1.0813	1.0927	1.1006
300	1.0898	1.0236	1.0052	1.0166	1.0415	1.0678	1.0902	1.1073	1.1198	1.1285	1.1344
350	1.2482	1.1588	1.1192	1.1103	1.1178	1.1310	1.1441	1.1549	1.1628	1.1681	1.1713
400	1.4034	1.2913	1.2322	1.2056	1.1977	1.1986	1.2024	1.2063	1.2091	1.2105	1.2106
450	1.5560	1.4215	1.3440	1.3013	1.2793	1.2687	1.2635	1.2605	1.2579	1.2550	1.2518
500	1.7062	1.5497	1.4544	1.3966	1.3617	1.3403	1.3264	1.3165	1.3084	1.3012	1.2943
600	2.0004	1.8006	1.6713	1.5854	1.5267	1.4854	1.4551	1.4317	1.4127	1.3966	1.3824
700	2.2874	2.0450	1.8832	1.7709	1.6904	1.6308	1.5852	1.5491	1.5195	1.4945	1.4728
800	2.5684	2.2841	2.0907	1.9532	1.8521	1.7753	1.7152	1.6669	1.6271	1.5935	1.5645
900	2.8440	2.5184	2.2941	2.1324	2.0114	1.9182	1.8444	1.7845	1.7348	1.6927	1.6565
1000	3.1149	2.7485	2.4940	2.3086	2.1685	2.0595	1.9725	1.9014	1.8421	1.7919	1.7485
Temperature in °C											
Pressure in bar	125	150	200	300	400	500	600	700	800	900	1000
1	1.0002	1.0002	1.0003	1.0004	1.0004	1.0004	1.0003	1.0003	1.0003	1.0003	1.0003
5	1.0009	1.0012	1.0015	1.0018	1.0018	1.0018	1.0017	1.0016	1.0015	1.0014	1.0013
10	1.0019	1.0024	1.0031	1.0036	1.0037	1.0036	1.0034	1.0032	1.0030	1.0028	1.0026
20	1.0041	1.0051	1.0064	1.0074	1.0074	1.0072	1.0068	1.0064	1.0060	1.0056	1.0052
30	1.0065	1.0080	1.0098	1.0112	1.0112	1.0108	1.0102	1.0096	1.0090	1.0084	1.0079

D2.2. Table 5. (continued)

Pressure in bar	Temperature in °C										
	125	150	200	300	400	500	600	700	800	900	1000
40	1.0092	1.0111	1.0134	1.0151	1.0151	1.0145	1.0137	1.0128	1.0120	1.0112	1.0105
50	1.0120	1.0143	1.0171	1.0191	1.0190	1.0182	1.0171	1.0160	1.0150	1.0141	1.0132
60	1.0151	1.0177	1.0210	1.0232	1.0230	1.0219	1.0206	1.0193	1.0181	1.0169	1.0158
70	1.0184	1.0213	1.0249	1.0273	1.0269	1.0257	1.0241	1.0226	1.0211	1.0197	1.0185
80	1.0218	1.0251	1.0290	1.0315	1.0310	1.0295	1.0277	1.0259	1.0242	1.0226	1.0212
90	1.0255	1.0290	1.0332	1.0357	1.0350	1.0333	1.0312	1.0292	1.0273	1.0255	1.0239
100	1.0293	1.0330	1.0374	1.0400	1.0392	1.0371	1.0348	1.0325	1.0303	1.0283	1.0265
150	1.0510	1.0554	1.0603	1.0624	1.0602	1.0566	1.0529	1.0492	1.0459	1.0428	1.0401
200	1.0767	1.0809	1.0853	1.0858	1.0818	1.0766	1.0713	1.0662	1.0616	1.0574	1.0537
250	1.1059	1.1093	1.1123	1.1103	1.1041	1.0969	1.0899	1.0833	1.0774	1.0721	1.0674
300	1.1381	1.1402	1.1410	1.1356	1.1268	1.1175	1.1087	1.1006	1.0934	1.0869	1.0812
350	1.1729	1.1732	1.1712	1.1617	1.1500	1.1384	1.1276	1.1180	1.1094	1.1018	1.0950
400	1.2097	1.2079	1.2025	1.1885	1.1735	1.1594	1.1467	1.1354	1.1255	1.1166	1.1088
450	1.2480	1.2439	1.2349	1.2158	1.1974	1.1807	1.1659	1.1530	1.1416	1.1315	1.1227
500	1.2877	1.2811	1.2681	1.2436	1.2215	1.2021	1.1852	1.1705	1.1577	1.1464	1.1365
600	1.3696	1.3578	1.3364	1.3003	1.2704	1.2453	1.2241	1.2058	1.1900	1.1763	1.1642
700	1.4537	1.4365	1.4064	1.3580	1.3199	1.2889	1.2631	1.2412	1.2224	1.2062	1.1919
800	1.5390	1.5163	1.4773	1.4164	1.3698	1.3327	1.3022	1.2766	1.2548	1.2360	1.2196
900	1.6248	1.5967	1.5487	1.4751	1.4200	1.3766	1.3413	1.3119	1.2871	1.2657	1.2471
1000	1.7107	1.6772	1.6204	1.5339	1.4702	1.4205	1.3804	1.3472	1.3193	1.2953	1.2746

D2.2. Table 6. Specific enthalpy *h* of dry air in kJ/kg

Pressure in bar	Temperature in °C										
	−150	−125	−100	−75	−50	−25	0	25	50	75	100
1	−176.47	−151.07	−125.80	−100.61	−75.44	−50.30	−25.15	0.00	25.18	50.39	75.65
5	−181.40	−154.48	−128.36	−102.60	−77.05	−51.61	−26.24	−0.91	24.41	49.74	75.10
10	−188.29	−158.97	−131.63	−105.13	−79.07	−53.26	−27.60	−2.04	23.46	48.94	74.43
20	−206.60	−168.83	−138.45	−110.27	−83.11	−56.52	−30.29	−4.28	21.60	47.38	73.12
30	−325.76	−180.29	−145.68	−115.52	−87.17	−59.77	−32.94	−6.46	19.78	45.86	71.85
40	−327.72	−194.14	−153.34	−120.88	−91.24	−62.99	−35.54	−8.60	18.00	44.38	70.62
50	−328.98	−211.58	−161.41	−126.32	−95.30	−66.17	−38.10	−10.70	16.27	42.95	69.43
60	−329.85	−232.79	−169.80	−131.80	−99.33	−69.31	−40.62	−12.75	14.59	41.56	68.28
70	−330.44	−250.57	−178.33	−137.25	−103.32	−72.39	−43.07	−14.74	12.95	40.21	67.17
80	−330.84	−260.81	−186.72	−142.62	−107.22	−75.40	−45.47	−16.69	11.36	38.90	66.09
90	−331.09	−266.84	−194.64	−147.83	−111.02	−78.33	−47.80	−18.57	9.82	37.63	65.06
100	−331.22	−270.78	−201.79	−152.81	−114.69	−81.17	−50.06	−20.40	8.32	36.41	64.06
150	−330.72	−279.19	−223.68	−172.79	−130.43	−93.64	−60.09	−28.55	1.67	30.98	59.64
200	−329.08	−281.28	−231.98	−184.26	−141.29	−102.92	−67.82	−34.94	−3.58	26.69	56.18
250	−326.82	−281.17	−235.10	−190.09	−147.95	−109.21	−73.34	−39.62	−7.46	23.53	53.67
300	−324.15	−279.92	−235.84	−192.74	−151.65	−113.12	−76.97	−42.79	−10.12	21.39	52.02
350	−321.20	−277.98	−235.25	−193.51	−153.37	−115.24	−79.10	−44.69	−11.71	20.16	51.33
400	−318.05	−275.60	−233.84	−193.09	−153.73	−116.04	−80.04	−45.57	−12.41	19.69	50.92
450	−314.75	−272.89	−231.87	−191.88	−153.16	−115.88	−80.07	−45.63	−12.38	19.87	51.29
500	−311.34	−269.94	−229.49	−190.10	−151.90	−114.99	−79.39	−45.02	−11.74	20.59	52.14

D2.2. Table 6. (continued)

Temperature in °C											
Pressure in bar	−150	−125	−100	−75	−50	−25	0	25	50	75	100
600	−304.24	−263.54	−223.93	−185.40	−147.97	−111.67	−76.46	−42.29	−9.05	23.35	55.05
700	−296.89	−256.68	−217.64	−179.70	−142.81	−106.95	−72.07	−38.11	−4.97	27.43	59.19
800	−289.38	−249.52	−210.88	−173.35	−136.86	−101.34	−66.72	−32.93	0.10	32.46	64.23
900	−281.74	−242.14	−203.80	−166.58	−130.38	−95.11	−60.69	−27.06	5.88	38.19	69.95
1000	−274.03	−234.62	−196.49	−159.50	−123.51	−88.44	−54.18	−20.67	12.18	44.45	76.19

Temperature in °C											
Pressure in bar	125	150	200	300	400	500	600	700	800	900	1000
1	100.97	126.36	177.42	280.90	386.60	494.67	605.09	717.68	832.22	948.49	1066.30
5	100.51	125.98	177.16	280.82	386.63	494.78	605.26	717.90	832.48	948.77	1066.60
10	99.95	125.51	176.84	280.72	386.67	494.93	605.48	718.17	832.80	949.13	1067.00
20	98.85	124.60	176.23	280.53	386.76	495.22	605.92	718.73	833.44	949.84	1067.70
30	97.79	123.72	175.65	280.37	386.88	495.53	606.37	719.29	834.08	950.55	1068.50
40	96.77	122.88	175.10	280.23	387.01	495.85	606.83	719.86	834.74	951.27	1069.30
50	95.79	122.07	174.58	280.11	387.15	496.18	607.31	720.43	835.40	952.00	1070.00
60	94.84	121.30	174.09	280.01	387.31	496.53	607.78	721.02	836.06	952.73	1070.80
70	93.93	120.55	173.62	279.92	387.48	496.88	608.27	721.61	836.73	953.46	1071.60
80	93.05	119.84	173.18	279.86	387.67	497.24	608.77	722.20	837.41	954.20	1072.40
90	92.20	119.16	172.76	279.81	387.87	497.62	609.27	722.81	838.09	954.94	1073.20
100	91.39	118.51	172.37	279.78	388.08	498.00	609.78	723.41	838.77	955.69	1074.00
150	87.83	115.68	170.74	279.85	389.29	500.04	612.43	726.53	842.27	959.48	1078.00
200	85.09	113.57	169.68	280.29	390.77	502.26	615.23	729.77	845.85	963.35	1082.10
250	83.15	112.15	169.14	281.07	392.48	504.66	618.15	733.11	849.52	967.28	1086.30
300	81.95	111.37	169.08	282.16	394.40	507.21	621.18	736.53	853.25	971.27	1090.50
350	81.42	111.16	169.48	283.53	396.51	509.90	624.32	740.03	857.05	975.31	1094.70
400	81.47	111.48	170.29	285.17	398.81	512.71	627.56	743.61	860.90	979.40	1099.00
450	82.04	112.25	171.45	287.05	401.28	515.65	630.88	747.24	864.80	983.52	1103.30
500	83.04	113.41	172.95	289.16	403.90	518.70	634.29	750.94	868.75	987.67	1107.60
600	86.14	116.74	176.76	293.95	409.56	525.10	641.32	758.51	876.77	996.08	1116.40
700	90.39	121.12	181.47	299.39	415.69	531.86	648.61	766.27	884.93	1004.60	1125.20
800	95.48	126.30	186.88	305.36	422.23	538.91	656.13	774.20	893.22	1013.20	1134.10
900	101.23	132.10	192.85	311.75	429.09	546.22	663.84	782.27	901.61	1021.90	1143.00
1000	107.49	138.39	199.25	318.50	436.22	553.73	671.71	790.46	910.10	1030.60	1152.00

D2.2. Table 7. Specific entropy *s* of dry air in kJ/(kg K)

Temperature in °C											
Pressure in bar	−150	−125	−100	−75	−50	−25	0	25	50	75	100
1	−0.8886	−0.7008	−0.5432	−0.4073	−0.2877	−0.1809	−0.0843	0.0038	0.0849	0.1600	0.2301
5	−1.3777	−1.1786	−1.0156	−0.8767	−0.7552	−0.6471	−0.5497	−0.4610	−0.3794	−0.3039	−0.2336
10	−1.6157	−1.3985	−1.2279	−1.0849	−0.9610	−0.8514	−0.7529	−0.6634	−0.5812	−0.5053	−0.4346
20	−1.9258	−1.6448	−1.4551	−1.3030	−1.1739	−1.0609	−0.9602	−0.8690	−0.7857	−0.7089	−0.6375
30	−2.9387	−1.8184	−1.6019	−1.4391	−1.3042	−1.1878	−1.0848	−0.9921	−0.9075	−0.8298	−0.7577
40	−2.9678	−1.9730	−1.7173	−1.5419	−1.4010	−1.2809	−1.1755	−1.0812	−0.9955	−0.9168	−0.8440
50	−2.9910	−2.1320	−1.8164	−1.6268	−1.4792	−1.3554	−1.2477	−1.1516	−1.0648	−0.9852	−0.9118

D2.2. Table 7. (continued)

Temperature in °C											
Pressure in bar	−150	−125	−100	−75	−50	−25	0	25	50	75	100
60	−3.0106	−2.3034	−1.9057	−1.7002	−1.5458	−1.4181	−1.3080	−1.2103	−1.1223	−1.0419	−0.9677
70	−3.0277	−2.4437	−1.9879	−1.7656	−1.6041	−1.4726	−1.3601	−1.2608	−1.1716	−1.0903	−1.0156
80	−3.0431	−2.5293	−2.0636	−1.8248	−1.6563	−1.5211	−1.4061	−1.3053	−1.2149	−1.1328	−1.0574
90	−3.0572	−2.5848	−2.1325	−1.8789	−1.7037	−1.5647	−1.4475	−1.3451	−1.2536	−1.1707	−1.0946
100	−3.0701	−2.6251	−2.1938	−1.9286	−1.7471	−1.6046	−1.4851	−1.3812	−1.2886	−1.2049	−1.1282
150	−3.1237	−2.7433	−2.3972	−2.1221	−1.9204	−1.7640	−1.6351	−1.5246	−1.4272	−1.3399	−1.2604
200	−3.1659	−2.8128	−2.5053	−2.2477	−2.0432	−1.8801	−1.7452	−1.6300	−1.5290	−1.4387	−1.3569
250	−3.2015	−2.8641	−2.5768	−2.3338	−2.1334	−1.9687	−1.8309	−1.7127	−1.6091	−1.5167	−1.4331
300	−3.2325	−2.9055	−2.6306	−2.3979	−2.2026	−2.0388	−1.8999	−1.7801	−1.6749	−1.5810	−1.4960
350	−3.2603	−2.9407	−2.6741	−2.4488	−2.2580	−2.0959	−1.9571	−1.8366	−1.7303	−1.6353	−1.5494
400	−3.2855	−2.9715	−2.7110	−2.4911	−2.3040	−2.1438	−2.0055	−1.8847	−1.7779	−1.6822	−1.5956
450	−3.3087	−2.9991	−2.7431	−2.5273	−2.3432	−2.1848	−2.0473	−1.9266	−1.8195	−1.7234	−1.6362
500	−3.3302	−3.0241	−2.7717	−2.5591	−2.3775	−2.2207	−2.0840	−1.9635	−1.8563	−1.7599	−1.6724
600	−3.3694	−3.0684	−2.8213	−2.6133	−2.4354	−2.2811	−2.1459	−2.0262	−1.9191	−1.8225	−1.7346
700	−3.4045	−3.1071	−2.8635	−2.6587	−2.4834	−2.3310	−2.1971	−2.0781	−1.9713	−1.8747	−1.7866
800	−3.4365	−3.1416	−2.9006	−2.6980	−2.5246	−2.3736	−2.2407	−2.1223	−2.0159	−1.9194	−1.8313
900	−3.4659	−3.1730	−2.9337	−2.7329	−2.5608	−2.4109	−2.2788	−2.1609	−2.0548	−1.9585	−1.8704
1000	−3.4933	−3.2018	−2.9639	−2.7643	−2.5932	−2.4442	−2.3126	−2.1952	−2.0894	−1.9932	−1.9052
Temperature in °C											
Pressure in bar	125	150	200	300	400	500	600	700	800	900	1000
1	0.2958	0.3576	0.4717	0.6700	0.8399	0.9896	1.1239	1.2459	1.3580	1.4615	1.5579
5	−0.1677	−0.1057	0.0087	0.2074	0.3775	0.5272	0.6616	0.7837	0.8958	0.9994	1.0957
10	−0.3684	−0.3061	−0.1915	0.0076	0.1780	0.3279	0.4623	0.5845	0.6966	0.8003	0.8966
20	−0.5707	−0.5080	−0.3927	−0.1927	−0.0219	0.1282	0.2629	0.3852	0.4974	0.6010	0.6975
30	−0.6904	−0.6272	−0.5112	−0.3105	−0.1393	0.0112	0.1460	0.2684	0.3807	0.4844	0.5809
40	−0.7762	−0.7126	−0.5960	−0.3944	−0.2228	−0.0720	0.0629	0.1855	0.2978	0.4016	0.4982
50	−0.8434	−0.7794	−0.6621	−0.4598	−0.2877	−0.1367	−0.0016	0.1211	0.2335	0.3374	0.4339
60	−0.8989	−0.8344	−0.7165	−0.5134	−0.3409	−0.1897	−0.0544	0.0684	0.1809	0.2849	0.3815
70	−0.9461	−0.8813	−0.7627	−0.5589	−0.3860	−0.2345	−0.0990	0.0238	0.1364	0.2404	0.3371
80	−0.9875	−0.9222	−0.8030	−0.5985	−0.4252	−0.2734	−0.1378	−0.0148	0.0978	0.2019	0.2986
90	−1.0242	−0.9585	−0.8388	−0.6336	−0.4598	−0.3078	−0.1720	−0.0490	0.0638	0.1679	0.2646
100	−1.0573	−0.9913	−0.8710	−0.6650	−0.4909	−0.3387	−0.2027	−0.0795	0.0333	0.1375	0.2342
150	−1.1872	−1.1194	−0.9964	−0.7872	−0.6112	−0.4578	−0.3211	−0.1974	−0.0842	0.0202	0.1172
200	−1.2819	−1.2125	−1.0872	−0.8751	−0.6974	−0.5430	−0.4056	−0.2814	−0.1679	−0.0632	0.0339
250	−1.3566	−1.2860	−1.1587	−0.9440	−0.7649	−0.6095	−0.4715	−0.3468	−0.2330	−0.1281	−0.0307
300	−1.4183	−1.3467	−1.2177	−1.0009	−0.8204	−0.6641	−0.5255	−0.4005	−0.2863	−0.1812	−0.0836
350	−1.4708	−1.3983	−1.2680	−1.0493	−0.8676	−0.7106	−0.5714	−0.4460	−0.3315	−0.2261	−0.1285
400	−1.5163	−1.4432	−1.3118	−1.0915	−0.9087	−0.7510	−0.6113	−0.4855	−0.3707	−0.2652	−0.1674
450	−1.5564	−1.4828	−1.3506	−1.1288	−0.9451	−0.7867	−0.6466	−0.5204	−0.4054	−0.2997	−0.2017
500	−1.5922	−1.5183	−1.3852	−1.1624	−0.9778	−0.8188	−0.6782	−0.5518	−0.4365	−0.3306	−0.2325
600	−1.6539	−1.5794	−1.4453	−1.2205	−1.0346	−0.8746	−0.7332	−0.6062	−0.4905	−0.3842	−0.2858
700	−1.7057	−1.6308	−1.4960	−1.2698	−1.0828	−0.9219	−0.7799	−0.6523	−0.5362	−0.4296	−0.3310
800	−1.7502	−1.6752	−1.5398	−1.3126	−1.1246	−0.9630	−0.8204	−0.6924	−0.5760	−0.4691	−0.3702
900	−1.7892	−1.7140	−1.5783	−1.3503	−1.1616	−0.9993	−0.8563	−0.7279	−0.6111	−0.5040	−0.4049
1000	−1.8240	−1.7487	−1.6127	−1.3840	−1.1947	−1.0319	−0.8884	−0.7597	−0.6426	−0.5353	−0.4360

D2.2. Table 8. Specific isobaric heat capacity c_p of dry air in kJ/kg (kg K)

Temperature in °C											
Pressure in bar	−150	−125	−100	−75	−50	−25	0	25	50	75	100
1	1.0206	1.0126	1.0090	1.0071	1.0061	1.0058	1.0059	1.0065	1.0077	1.0093	1.0115
5	1.1049	1.0565	1.0360	1.0254	1.0194	1.0159	1.0139	1.0129	1.0129	1.0137	1.0152
10	1.2512	1.1206	1.0729	1.0496	1.0366	1.0288	1.0239	1.0210	1.0196	1.0193	1.0199
20	1.9732	1.2939	1.1589	1.1025	1.0729	1.0553	1.0443	1.0372	1.0328	1.0302	1.0292
30	3.1906	1.5720	1.2651	1.1617	1.1115	1.0829	1.0651	1.0536	1.0460	1.0412	1.0384
40	2.8042	2.0715	1.3956	1.2273	1.1524	1.1113	1.0862	1.0700	1.0591	1.0520	1.0475
50	2.5864	3.0575	1.5531	1.2989	1.1951	1.1403	1.1075	1.0863	1.0722	1.0627	1.0564
60	2.4418	4.4725	1.7355	1.3751	1.2391	1.1697	1.1288	1.1026	1.0851	1.0733	1.0652
70	2.3367	4.3335	1.9317	1.4537	1.2836	1.1991	1.1499	1.1187	1.0979	1.0836	1.0739
80	2.2560	3.5940	2.1197	1.5319	1.3278	1.2281	1.1708	1.1346	1.1104	1.0939	1.0824
90	2.1915	3.0994	2.2702	1.6064	1.3706	1.2565	1.1912	1.1501	1.1227	1.1038	1.0907
100	2.1384	2.7881	2.3592	1.6741	1.4113	1.2837	1.2109	1.1652	1.1347	1.1136	1.0988
150	1.9679	2.1643	2.2000	1.8506	1.5625	1.3960	1.2960	1.2318	1.1883	1.1578	1.1360
200	1.8729	1.9514	1.9704	1.8228	1.6184	1.4609	1.3540	1.2812	1.2302	1.1936	1.1668
250	1.8114	1.8398	1.8350	1.7521	1.6161	1.4873	1.3875	1.3143	1.2606	1.2209	1.1912
300	1.7679	1.7697	1.7507	1.6898	1.5932	1.4911	1.4035	1.3345	1.2815	1.2410	1.2100
350	1.7355	1.7213	1.6938	1.6415	1.5666	1.4843	1.4087	1.3457	1.2952	1.2554	1.2242
400	1.7105	1.6857	1.6528	1.6045	1.5420	1.4733	1.4079	1.3510	1.3037	1.2654	1.2347
450	1.6907	1.6585	1.6219	1.5757	1.5206	1.4614	1.4040	1.3525	1.3086	1.2722	1.2425
500	1.6747	1.6371	1.5979	1.5529	1.5026	1.4499	1.3987	1.3519	1.3112	1.2767	1.2481
600	1.6504	1.6058	1.5631	1.5194	1.4746	1.4300	1.3870	1.3474	1.3120	1.2813	1.2551
700	1.6334	1.5843	1.5395	1.4964	1.4546	1.4143	1.3764	1.3415	1.3101	1.2824	1.2585
800	1.6209	1.5690	1.5227	1.4800	1.4399	1.4024	1.3676	1.3359	1.3073	1.2820	1.2599
900	1.6117	1.5577	1.5105	1.4679	1.4289	1.3931	1.3605	1.3309	1.3044	1.2809	1.2604
1000	1.6048	1.5494	1.5015	1.4589	1.4207	1.3861	1.3548	1.3268	1.3018	1.2797	1.2603

Temperature in °C											
Pressure in bar	125	150	200	300	400	500	600	700	800	900	1000
1	1.0142	1.0174	1.0252	1.0454	1.0688	1.0927	1.1154	1.1361	1.1544	1.1706	1.1846
5	1.0174	1.0202	1.0274	1.0467	1.0697	1.0934	1.1159	1.1365	1.1547	1.1708	1.1849
10	1.0214	1.0237	1.0301	1.0485	1.0709	1.0942	1.1166	1.1370	1.1551	1.1711	1.1851
20	1.0294	1.0305	1.0354	1.0519	1.0732	1.0959	1.1178	1.1379	1.1559	1.1717	1.1856
30	1.0372	1.0373	1.0405	1.0552	1.0755	1.0976	1.1191	1.1389	1.1567	1.1724	1.1861
40	1.0449	1.0440	1.0456	1.0584	1.0778	1.0992	1.1203	1.1398	1.1574	1.1730	1.1866
50	1.0525	1.0505	1.0507	1.0616	1.0800	1.1008	1.1215	1.1408	1.1581	1.1735	1.1871
60	1.0600	1.0569	1.0556	1.0648	1.0821	1.1024	1.1227	1.1417	1.1589	1.1741	1.1876
70	1.0673	1.0633	1.0604	1.0678	1.0843	1.1039	1.1238	1.1426	1.1596	1.1747	1.1880
80	1.0745	1.0694	1.0651	1.0709	1.0863	1.1054	1.1250	1.1435	1.1603	1.1753	1.1885
90	1.0816	1.0755	1.0697	1.0738	1.0884	1.1069	1.1261	1.1444	1.1610	1.1758	1.1889
100	1.0885	1.0814	1.0743	1.0767	1.0904	1.1084	1.1272	1.1452	1.1617	1.1764	1.1894
150	1.1202	1.1088	1.0954	1.0904	1.1000	1.1154	1.1326	1.1494	1.1650	1.1791	1.1916
200	1.1470	1.1323	1.1138	1.1027	1.1087	1.1219	1.1375	1.1533	1.1681	1.1816	1.1937
250	1.1688	1.1519	1.1297	1.1136	1.1166	1.1279	1.1422	1.1570	1.1711	1.1840	1.1957
300	1.1861	1.1678	1.1431	1.1232	1.1238	1.1334	1.1465	1.1604	1.1739	1.1864	1.1976
350	1.1997	1.1806	1.1543	1.1317	1.1303	1.1384	1.1505	1.1637	1.1766	1.1886	1.1995
400	1.2103	1.1909	1.1637	1.1391	1.1361	1.1431	1.1542	1.1667	1.1791	1.1907	1.2012

D2.2. Table 8. (continued)

Pressure in bar	Temperature in °C										
	125	150	200	300	400	500	600	700	800	900	1000
450	1.2184	1.1990	1.1714	1.1456	1.1413	1.1473	1.1577	1.1696	1.1815	1.1927	1.2029
500	1.2246	1.2056	1.1779	1.1512	1.1460	1.1512	1.1610	1.1723	1.1837	1.1946	1.2046
600	1.2331	1.2149	1.1879	1.1605	1.1541	1.1580	1.1667	1.1772	1.1879	1.1982	1.2076
700	1.2381	1.2209	1.1950	1.1678	1.1607	1.1638	1.1718	1.1815	1.1917	1.2014	1.2105
800	1.2410	1.2248	1.2001	1.1735	1.1661	1.1687	1.1761	1.1854	1.1951	1.2044	1.2131
900	1.2426	1.2274	1.2039	1.1782	1.1707	1.1730	1.1800	1.1888	1.1981	1.2071	1.2155
1000	1.2435	1.2291	1.2068	1.1820	1.1746	1.1767	1.1833	1.1919	1.2009	1.2096	1.2177

D2.2. Table 9. Thermal conductivity λ of dry air in mW/(mK)

Pressure in bar	Temperature in °C										
	−150	−125	−100	−75	−50	−25	0	25	50	75	100
1	11.679	13.984	16.205	18.347	20.416	22.418	24.360	26.247	28.082	29.872	31.620
5	12.088	14.293	16.456	18.558	20.599	22.579	24.504	26.376	28.201	29.981	31.720
10	12.809	14.765	16.817	18.854	20.849	22.797	24.696	26.549	28.357	30.124	31.852
20	15.903	16.074	17.714	19.550	21.422	23.284	25.118	26.925	28.696	30.432	32.134
30	68.194	18.097	18.865	20.386	22.086	23.836	25.589	27.340	29.067	30.767	32.439
40	71.300	21.364	20.305	21.360	22.835	24.447	26.102	27.789	29.466	31.126	32.765
50	74.010	26.955	22.064	22.469	23.663	25.111	26.653	28.269	29.892	31.508	33.111
60	76.460	35.540	24.166	23.708	24.564	25.823	27.238	28.777	30.340	31.909	33.473
70	78.718	42.807	26.611	25.071	25.530	26.577	27.853	29.309	30.808	32.327	33.851
80	80.829	47.734	29.356	26.547	26.557	27.370	28.495	29.862	31.295	32.761	34.243
90	82.820	51.522	32.298	28.127	27.639	28.198	29.160	30.435	31.798	33.209	34.646
100	84.710	54.641	35.290	29.795	28.770	29.056	29.846	31.024	32.314	33.669	35.061
150	93.066	65.987	47.908	38.623	34.939	33.716	33.534	34.170	35.065	36.115	37.263
200	100.160	74.556	56.916	46.559	41.223	38.672	37.508	37.550	38.011	38.731	39.617
250	106.410	81.886	64.314	53.295	46.985	43.506	41.545	41.025	41.059	41.445	42.064
300	112.030	88.410	70.883	59.302	52.228	48.044	45.469	44.465	44.115	44.190	44.552
350	117.150	94.330	76.900	64.864	57.126	52.319	49.228	47.800	47.112	46.908	47.037
400	121.850	99.765	82.487	70.108	61.798	56.414	52.848	51.020	50.021	49.566	49.484
450	126.170	104.800	87.712	75.092	66.302	60.392	56.371	54.149	52.848	52.154	51.876
500	130.300	109.480	92.621	79.846	70.664	64.285	59.831	57.219	55.613	54.682	54.213
600	137.810	117.990	101.630	88.733	78.994	71.852	66.630	63.266	61.041	59.618	58.761
700	144.540	125.530	109.720	96.878	86.815	79.127	73.285	69.251	66.424	64.496	63.226
800	150.640	132.430	117.060	104.370	94.144	86.084	79.767	75.169	71.796	69.375	67.683
900	156.220	138.710	123.710	111.270	101.010	92.706	86.039	80.986	77.140	74.267	72.164
1000	161.380	144.490	129.930	117.660	107.430	98.991	92.074	86.664	82.423	79.149	76.665

Pressure in bar	Temperature in °C										
	125	150	200	300	400	500	600	700	800	900	1000
1	33.328	35.000	38.248	44.417	50.240	55.795	61.139	66.312	71.348	76.271	81.099
5	33.421	35.088	38.325	44.479	50.292	55.839	61.177	66.347	71.379	76.298	81.124
10	33.543	35.201	38.425	44.559	50.358	55.896	61.227	66.390	71.418	76.334	81.157
20	33.803	35.442	38.635	44.726	50.496	56.014	61.329	66.480	71.499	76.406	81.223
30	34.084	35.701	38.860	44.903	50.641	56.136	61.435	66.574	71.582	76.481	81.291

D2.2. Table 9. (continued)

Pressure in bar	Temperature in °C										
	125	150	200	300	400	500	600	700	800	900	1000
40	34.382	35.977	39.097	45.088	50.793	56.264	61.545	66.670	71.667	76.558	81.361
50	34.698	36.267	39.347	45.282	50.951	56.396	61.659	66.770	71.756	76.638	81.433
60	35.028	36.570	39.607	45.484	51.114	56.533	61.776	66.872	71.847	76.719	81.506
70	35.372	36.886	39.877	45.692	51.283	56.674	61.897	66.978	71.940	76.803	81.582
80	35.729	37.212	40.156	45.907	51.457	56.819	62.021	67.086	72.035	76.888	81.659
90	36.096	37.549	40.444	46.129	51.635	56.968	62.148	67.196	72.133	76.975	81.737
100	36.473	37.894	40.739	46.356	51.818	57.121	62.278	67.309	72.233	77.064	81.818
150	38.475	39.728	42.307	47.562	52.791	57.931	62.969	67.909	72.761	77.535	82.241
200	40.615	41.690	43.987	48.860	53.840	58.806	63.715	68.556	73.331	78.042	82.698
250	42.843	43.735	45.742	50.222	54.946	59.730	64.505	69.243	73.936	78.581	83.183
300	45.117	45.828	47.546	51.629	56.093	60.693	65.330	69.962	74.570	79.147	83.692
350	47.402	47.941	49.378	53.069	57.271	61.685	66.183	70.707	75.228	79.735	84.221
400	49.667	50.047	51.220	54.530	58.474	62.701	67.059	71.473	75.907	80.342	84.769
450	51.893	52.127	53.055	56.002	59.693	63.736	67.953	72.257	76.603	80.966	85.333
500	54.072	54.171	54.872	57.477	60.924	64.785	68.863	73.057	77.314	81.604	85.910
600	58.306	58.144	58.424	60.407	63.397	66.909	70.714	74.691	78.772	82.915	87.098
700	62.437	62.004	61.868	63.281	65.858	69.047	72.592	76.358	80.265	84.263	88.324
800	66.542	65.816	65.238	66.087	68.284	71.176	74.479	78.044	81.782	85.638	89.577
900	70.664	69.632	68.580	68.836	70.666	73.282	76.360	79.735	83.312	87.031	90.851
1000	74.817	73.478	71.928	71.551	73.007	75.359	78.226	81.424	84.848	88.434	92.139

D2.2. Table 10. Dynamic viscosity η of dry air in 10^{-6} Pa·s

Pressure in bar	Temperature in °C										
	−150	−125	−100	−75	−50	−25	0	25	50	75	100
1	8.664	10.261	11.780	13.229	14.614	15.942	17.218	18.448	19.635	20.783	21.896
5	8.750	10.344	11.859	13.303	14.684	16.008	17.280	18.506	19.690	20.836	21.946
10	8.918	10.480	11.977	13.409	14.780	16.097	17.363	18.583	19.762	20.904	22.010
20	9.631	10.884	12.285	13.666	15.004	16.296	17.544	18.749	19.916	21.047	22.144
30	45.850	11.539	12.701	13.984	15.267	16.523	17.745	18.931	20.082	21.200	22.286
40	49.163	12.617	13.247	14.369	15.571	16.778	17.966	19.127	20.259	21.361	22.435
50	51.933	14.525	13.947	14.823	15.916	17.059	18.205	19.337	20.447	21.532	22.591
60	54.379	18.094	14.829	15.350	16.300	17.366	18.463	19.560	20.644	21.709	22.753
70	56.603	23.028	15.918	15.952	16.725	17.698	18.737	19.795	20.851	21.894	22.921
80	58.665	27.373	17.223	16.629	17.187	18.053	19.028	20.042	21.066	22.086	23.094
90	60.602	30.839	18.729	17.379	17.687	18.430	19.333	20.300	21.290	22.284	23.272
100	62.438	33.705	20.388	18.197	18.221	18.829	19.653	20.568	21.521	22.488	23.455
150	70.614	43.949	28.901	23.009	21.323	21.090	21.431	22.036	22.774	23.583	24.429
200	77.771	51.399	36.003	28.162	24.859	23.671	23.437	23.671	24.154	24.776	25.480
250	84.346	57.676	41.945	33.032	28.507	26.419	25.590	25.423	25.624	26.041	26.590
300	90.546	63.288	47.165	37.524	32.095	29.230	27.828	27.254	27.162	27.362	27.746
350	96.486	68.468	51.906	41.691	35.561	32.038	30.109	29.138	28.751	28.727	28.939
400	102.240	73.345	56.308	45.596	38.893	34.810	32.405	31.057	30.377	30.129	30.164
450	107.860	77.997	60.458	49.291	42.099	37.532	34.697	32.994	32.032	31.559	31.417
500	113.370	82.479	64.412	52.816	45.191	40.197	36.974	34.940	33.706	33.013	32.694

D2.2. Table 10. (continued)

Pressure in bar	Temperature in °C										
	−150	−125	−100	−75	−50	−25	0	25	50	75	100
600	124.190	91.067	71.885	59.472	51.086	45.358	41.457	38.827	37.087	35.973	35.306
700	134.830	99.307	78.939	65.731	56.669	50.315	45.833	42.681	40.483	38.977	37.976
800	145.380	107.310	85.697	71.699	62.009	55.095	50.102	46.484	43.872	42.001	40.684
900	155.890	115.160	92.242	77.446	67.156	59.727	54.270	50.232	47.240	45.032	43.417
1000	166.410	122.910	98.627	83.021	72.146	64.233	58.348	53.922	50.581	48.058	46.163

Pressure in bar	Temperature in °C										
	125	150	200	300	400	500	600	700	800	900	1000
1	22.977	24.027	26.046	29.811	33.284	36.530	39.597	42.517	45.317	48.018	50.635
5	23.024	24.072	26.087	29.845	33.314	36.557	39.621	42.538	45.337	48.036	50.651
10	23.085	24.129	26.139	29.890	33.352	36.591	39.650	42.565	45.361	48.058	50.672
20	23.211	24.249	26.247	29.980	33.429	36.658	39.710	42.619	45.410	48.103	50.713
30	23.344	24.374	26.358	30.071	33.508	36.726	39.771	42.674	45.459	48.148	50.754
40	23.482	24.503	26.473	30.165	33.587	36.796	39.832	42.728	45.509	48.193	50.796
50	23.626	24.637	26.591	30.261	33.668	36.865	39.893	42.783	45.558	48.238	50.837
60	23.775	24.775	26.712	30.358	33.750	36.936	39.955	42.838	45.608	48.284	50.879
70	23.929	24.917	26.836	30.457	33.832	37.007	40.018	42.894	45.658	48.329	50.921
80	24.087	25.063	26.962	30.557	33.915	37.078	40.080	42.950	45.709	48.375	50.963
90	24.249	25.212	27.090	30.658	33.999	37.150	40.143	43.006	45.759	48.421	51.005
100	24.415	25.364	27.221	30.761	34.084	37.223	40.207	43.062	45.810	48.467	51.047
150	25.293	26.164	27.902	31.290	34.518	37.591	40.527	43.346	46.065	48.698	51.259
200	26.234	27.016	28.620	31.838	34.964	37.967	40.853	43.634	46.322	48.931	51.472
250	27.222	27.907	29.366	32.402	35.419	38.349	41.183	43.924	46.581	49.165	51.685
300	28.248	28.830	30.133	32.978	35.881	38.736	41.515	44.216	46.842	49.401	51.900
350	29.306	29.779	30.920	33.564	36.348	39.126	41.850	44.509	47.103	49.636	52.114
400	30.392	30.752	31.724	34.159	36.821	39.519	42.186	44.804	47.365	49.872	52.329
450	31.502	31.747	32.544	34.764	37.300	39.915	42.525	45.099	47.627	50.108	52.543
500	32.635	32.762	33.380	35.377	37.783	40.314	42.865	45.396	47.890	50.344	52.758
600	34.960	34.847	35.098	36.633	38.767	41.122	43.551	45.992	48.418	50.818	53.188
700	37.348	36.997	36.874	37.926	39.775	41.946	44.247	46.595	48.950	51.294	53.618
800	39.784	39.199	38.701	39.259	40.810	42.787	44.954	47.205	49.486	51.772	54.050
900	42.255	41.443	40.574	40.630	41.873	43.648	45.675	47.824	50.029	52.255	54.486
1000	44.752	43.720	42.487	42.038	42.964	44.529	46.411	48.454	50.579	52.744	54.925

D2.2. Table 11. Kinematic viscosity ν of dry air in 10^{-7} m^2/s

Pressure in bar	Temperature in °C										
	−150	−125	−100	−75	−50	−25	0	25	50	75	100
1	30.293	43.371	58.338	75.078	93.485	113.470	134.960	157.870	182.150	207.750	234.620
5	5.8303	8.5168	11.5630	14.9530	18.6710	22.7000	27.0260	31.6350	36.5160	41.6570	47.0510
10	2.7694	4.1651	5.7224	7.4443	9.3256	11.3600	13.5400	15.8600	18.3150	20.9000	23.6090
20	1.2166	1.9969	2.8133	3.7011	4.6634	5.6991	6.8059	7.9812	9.2226	10.5280	11.8950
30	0.7576	1.2806	1.8539	2.4633	3.1185	3.8206	4.5687	5.3616	6.1979	7.0761	7.9949
40	0.7873	0.9288	1.3828	1.8522	2.3529	2.8874	3.4556	4.0568	4.6900	5.3543	6.0487

D2.2. Table 11. (continued)

Temperature in °C											
Pressure in bar	−150	−125	−100	−75	−50	−25	0	25	50	75	100
50	0.8122	0.7293	1.1085	1.4922	1.8991	2.3323	2.7919	3.2776	3.7886	4.3243	4.8839
60	0.8344	0.6278	0.9344	1.2582	1.6014	1.9662	2.3530	2.7612	3.1905	3.6401	4.1096
70	0.8545	0.6102	0.8198	1.0968	1.3930	1.7083	2.0424	2.3950	2.7655	3.1535	3.5583
80	0.8733	0.6263	0.7442	0.9813	1.2406	1.5178	1.8120	2.1225	2.4487	2.7902	3.1465
90	0.8909	0.6474	0.6960	0.8967	1.1257	1.3725	1.6351	1.9125	2.2040	2.5092	2.8275
100	0.9076	0.6677	0.6675	0.8340	1.0370	1.2587	1.4956	1.7462	2.0098	2.2857	2.5735
150	0.9821	0.7502	0.6569	0.6968	0.8053	0.9430	1.0976	1.2644	1.4416	1.6280	1.8230
200	1.0472	0.8143	0.6990	0.6803	0.7297	0.8161	0.9233	1.0441	1.1751	1.3144	1.4611
250	1.1069	0.8692	0.7436	0.6971	0.7103	0.7619	0.8370	0.9273	1.0283	1.1377	1.2541
300	1.1630	0.9186	0.7857	0.7234	0.7139	0.7413	0.7931	0.8611	0.9407	1.0289	1.1241
350	1.2166	0.9642	0.8251	0.7525	0.7276	0.7376	0.7719	0.8231	0.8862	0.9584	1.0376
400	1.2684	1.0072	0.8623	0.7819	0.7461	0.7432	0.7640	0.8018	0.8520	0.9114	0.9781
450	1.3187	1.0481	0.8977	0.8109	0.7668	0.7539	0.7641	0.7911	0.8307	0.8798	0.9363
500	1.3680	1.0874	0.9315	0.8393	0.7885	0.7677	0.7693	0.7875	0.8183	0.8588	0.9068
600	1.4640	1.1625	0.9955	0.8940	0.8328	0.8001	0.7885	0.7931	0.8102	0.8370	0.8715
700	1.5579	1.2341	1.0558	0.9461	0.8768	0.8352	0.8140	0.8085	0.8153	0.8318	0.8561
800	1.6503	1.3033	1.1134	0.9959	0.9198	0.8711	0.8425	0.8292	0.8279	0.8363	0.8524
900	1.7419	1.3708	1.1689	1.0439	0.9616	0.9070	0.8723	0.8526	0.8449	0.8466	0.8562
1000	1.8328	1.4369	1.2228	1.0904	1.0024	0.9426	0.9026	0.8777	0.8645	0.8608	0.8648

Temperature in °C											
Pressure in bar	125	150	200	300	400	500	600	700	800	900	1000
1	262.700	291.980	353.940	490.740	643.520	811.210	993.010	1188.300	1396.700	1617.800	1851.400
5	52.6880	58.5610	70.9870	98.4060	129.0100	162.5900	198.9900	238.0900	279.8000	324.0500	370.7900
10	26.4400	29.3870	35.6210	49.3660	64.6980	81.5150	99.7370	119.3100	140.1800	162.3300	185.7100
20	13.3210	14.8060	17.9420	24.8490	32.5450	40.9790	50.1130	59.9200	70.3760	81.4650	93.1750
30	8.9531	9.9495	12.0530	16.6800	21.8300	27.4690	33.5740	40.1250	47.1080	54.5130	62.3300
40	6.7725	7.5246	9.1115	12.5980	16.4740	20.7160	25.3050	30.2290	35.4750	41.0370	46.9090
50	5.4667	6.0721	7.3485	10.1500	13.2610	16.6650	20.3450	24.2920	28.4960	32.9530	37.6560
60	4.5982	5.1056	6.1748	8.5191	11.1210	13.9650	17.0390	20.3340	23.8440	27.5640	31.4880
70	3.9796	4.4169	5.3378	7.3553	9.5928	12.0370	14.6780	17.5080	20.5220	23.7150	27.0830
80	3.5171	3.9016	4.7111	6.4834	8.4475	10.5920	12.9080	15.3890	18.0300	20.8280	23.7800
90	3.1586	3.5020	4.2247	5.8060	7.5572	9.4681	11.5310	13.7410	16.0930	18.5830	21.2100
100	2.8728	3.1833	3.8364	5.2647	6.8455	8.5697	10.4310	12.4230	14.5430	16.7880	19.1550
150	2.0259	2.2364	2.6794	3.6467	4.7151	5.8782	7.1316	8.4718	9.8965	11.4040	12.9920
200	1.6144	1.7739	2.1099	2.8445	3.6553	4.5369	5.4858	6.4994	7.5760	8.7141	9.9126
250	1.3766	1.5045	1.7750	2.3681	3.0232	3.7352	4.5009	5.3182	6.1857	7.1021	8.0666
300	1.2251	1.3312	1.5569	2.0543	2.6047	3.2031	3.8463	4.5324	5.2602	6.0287	6.8371
350	1.1227	1.2127	1.4055	1.8333	2.3082	2.8249	3.3802	3.9724	4.6003	5.2629	5.9597
400	1.0507	1.1282	1.2956	1.6702	2.0879	2.5428	3.0320	3.5535	4.1063	4.6894	5.3024
450	0.9988	1.0662	1.2133	1.5456	1.9182	2.3248	2.7622	3.2286	3.7228	4.2440	4.7917
500	0.9608	1.0198	1.1501	1.4479	1.7840	2.1516	2.5473	2.9694	3.4166	3.8882	4.3836
600	0.9122	0.9581	1.0620	1.3064	1.5864	1.8947	2.2274	2.5826	2.9590	3.3558	3.7726
700	0.8866	0.9224	1.0064	1.2108	1.4496	1.7145	2.0015	2.3084	2.6338	2.9770	3.3374
800	0.8749	0.9027	0.9709	1.1438	1.3506	1.5822	1.8344	2.1046	2.3915	2.6942	3.0120
900	0.8721	0.8933	0.9485	1.0958	1.2768	1.4820	1.7065	1.9478	2.2044	2.4753	2.7599
1000	0.8752	0.8909	0.9352	1.0612	1.2208	1.4041	1.6061	1.8239	2.0560	2.3012	2.5591

D2.2. Table 12. Thermal diffusivity a of dry air in 10^{-7} m^2/s

Pressure in bar	Temperature in °C										
	−150	−125	−100	−75	−50	−25	0	25	50	75	100
1	40.011	58.368	79.536	103.390	129.810	158.660	189.810	223.150	258.540	295.850	334.960
5	7.291	11.138	15.487	20.343	25.693	31.519	37.800	44.512	51.630	59.130	66.986
10	3.179	5.236	7.489	9.972	12.690	15.639	18.809	22.193	25.777	29.550	33.499
20	1.018	2.279	3.500	4.803	6.206	7.716	9.331	11.050	12.866	14.775	16.771
30	0.3532	1.2776	2.1767	3.0911	4.0587	5.0894	6.1854	7.3495	8.5764	9.8633	11.2070
40	0.4072	0.7592	1.5188	2.2434	2.9942	3.7857	4.6220	5.5086	6.4405	7.4163	8.4335
50	0.4475	0.4426	1.1290	1.7414	2.3626	3.0106	3.6908	4.4108	5.1657	5.9546	6.7759
60	0.4805	0.2757	0.8774	1.4132	1.9475	2.4996	3.0753	3.6843	4.3210	4.9851	5.6756
70	0.5086	0.2617	0.7095	1.1858	1.6566	2.1395	2.6402	3.1697	3.7218	4.2967	4.8936
80	0.5333	0.3039	0.5984	1.0226	1.4437	1.8738	2.3177	2.7873	3.2759	3.7837	4.3104
90	0.5556	0.3490	0.5287	0.9034	1.2834	1.6713	2.0704	2.4931	2.9321	3.3876	3.8594
100	0.5758	0.3882	0.4897	0.8157	1.1602	1.5131	1.8757	2.2606	2.6596	3.0731	3.5010
150	0.6577	0.5204	0.4950	0.6321	0.8446	1.0800	1.3251	1.5917	1.8678	2.1533	2.4478
200	0.7201	0.6053	0.5608	0.6170	0.7477	0.9127	1.0913	1.2927	1.5031	1.7215	1.9470
250	0.7710	0.6708	0.6213	0.6420	0.7244	0.8436	0.9794	1.1385	1.3070	1.4830	1.6654
300	0.8140	0.7251	0.6745	0.6766	0.7292	0.8171	0.9233	1.0528	1.1922	1.3389	1.4917
350	0.8511	0.7718	0.7217	0.7132	0.7461	0.8116	0.8959	1.0033	1.1212	1.2465	1.3777
400	0.8837	0.8127	0.7643	0.7493	0.7688	0.8175	0.8849	0.9750	1.0761	1.1849	1.2995
450	0.9124	0.8490	0.8030	0.7840	0.7942	0.8301	0.8842	0.9600	1.0474	1.1429	1.2443
500	0.9388	0.8817	0.8383	0.8171	0.8206	0.8468	0.8900	0.9540	1.0298	1.1141	1.2047
600	0.9843	0.9379	0.9004	0.8779	0.8733	0.8863	0.9137	0.9591	1.0164	1.0826	1.1557
700	1.0225	0.9846	0.9533	0.9318	0.9235	0.9286	0.9456	0.9779	1.0211	1.0733	1.1325
800	1.0550	1.0251	0.9987	0.9795	0.9698	0.9705	0.9807	1.0037	1.0364	1.0774	1.1255
900	1.0830	1.0599	1.0379	1.0218	1.0122	1.0105	1.0164	1.0328	1.0576	1.0900	1.1290
1000	1.1075	1.0902	1.0729	1.0593	1.0506	1.0480	1.0513	1.0632	1.0821	1.1078	1.1395

Pressure in bar	Temperature in °C										
	125	150	200	300	400	500	600	700	800	900	1000
1	375.740	418.070	506.98	699.48	908.87	1133.90	1374.60	1631.40	1904.90	2195.30	2503.10
5	75.175	83.672	101.510	140.110	182.060	227.140	275.340	326.750	381.480	439.620	501.210
10	37.613	41.881	50.835	70.192	91.220	113.800	137.930	163.670	191.070	220.160	250.980
20	18.847	20.999	25.509	35.245	45.806	57.136	69.238	82.137	95.862	110.430	125.870
30	12.6030	14.0500	17.0770	23.6040	30.6750	38.2540	46.3440	54.9640	64.1310	73.8620	84.1670
40	9.4899	10.5830	12.8690	17.7900	23.1150	28.8170	34.9010	41.3800	4.2690	55.5790	63.3200
50	7.6278	8.5086	10.3490	14.3060	18.5830	23.1590	28.0380	33.2330	38.7540	44.6110	50.8130
60	6.3912	7.1303	8.6737	11.9870	15.5640	19.3890	23.4660	27.8030	32.4120	37.3010	42.4760
70	5.5116	6.1495	7.4802	10.3340	13.4110	16.6990	20.2010	23.9270	27.8840	32.0810	36.5230
80	4.8551	5.4169	6.5878	9.0959	11.7980	14.6830	17.7540	21.0210	24.4900	28.1680	32.0600
90	4.3470	4.8496	5.8961	8.1352	10.5450	13.1160	15.8530	18.7620	21.8500	25.1250	28.5890
100	3.9428	4.3979	5.3448	7.3684	9.5443	11.8650	14.3330	16.9560	19.7400	22.6910	25.8130
150	2.7511	3.0626	3.7090	5.0838	6.5559	8.1215	9.7836	11.5470	13.4180	15.3990	17.4930
200	2.1792	2.4175	2.9114	3.9588	5.0770	6.2635	7.5213	8.8545	10.2670	11.7620	13.3420
250	1.8536	2.0469	2.4474	3.2960	4.2002	5.1581	6.1723	7.2464	8.3838	9.5869	10.8580
300	1.6496	1.8121	2.1491	2.8633	3.6235	4.4281	5.2793	6.1801	7.1335	8.1416	9.2060
350	1.5136	1.6537	1.9445	2.5613	3.2178	3.9121	4.6463	5.4230	6.2446	7.1131	8.0298
400	1.4187	1.5418	1.7977	2.3406	2.9185	3.5296	4.1755	4.8587	5.5812	6.3448	7.1506

D2.2. Table 12. (continued)

Pressure in bar	Temperature in °C										
	125	150	200	300	400	500	600	700	800	900	1000
450	1.3503	1.4601	1.6885	2.1735	2.6897	3.2356	3.8126	4.4227	5.0679	5.7497	6.4691
500	1.2999	1.3987	1.6050	2.0435	2.5101	3.0035	3.5250	4.0764	4.6596	5.2758	5.9259
600	1.2338	1.3158	1.4882	1.8562	2.2480	2.6621	3.0998	3.5627	4.0524	4.5698	5.1157
700	1.1972	1.2661	1.4130	1.7299	2.0679	2.4250	2.8024	3.2017	3.6241	4.0706	4.5417
800	1.1792	1.2374	1.3637	1.6407	1.9379	2.2520	2.5841	2.9354	3.3072	3.7002	4.1150
900	1.1736	1.2228	1.3317	1.5758	1.8406	2.1212	2.4179	2.7318	3.0640	3.4153	3.7861
1000	1.1766	1.2181	1.3120	1.5281	1.7661	2.0195	2.2876	2.5715	2.8720	3.1899	3.5254

D2.2. Table 13. Prandtl number Pr of dry air

Pressure in bar	Temperature in °C										
	−150	−125	−100	−75	−50	−25	0	25	50	75	100
1	0.7571	0.7431	0.7335	0.7262	0.7202	0.7152	0.7110	0.7075	0.7045	0.7022	0.7004
5	0.7997	0.7646	0.7466	0.7351	0.7267	0.7202	0.7150	0.7107	0.7073	0.7045	0.7024
10	0.8711	0.7954	0.7641	0.7465	0.7349	0.7264	0.7199	0.7147	0.7105	0.7073	0.7048
20	1.1950	0.8761	0.8038	0.7707	0.7514	0.7386	0.7294	0.7223	0.7168	0.7125	0.7093
30	2.1452	1.0023	0.8517	0.7969	0.7684	0.7507	0.7386	0.7295	0.7227	0.7174	0.7134
40	1.9336	1.2234	0.9105	0.8256	0.7858	0.7627	0.7476	0.7365	0.7282	0.7220	0.7172
50	1.8149	1.6476	0.9818	0.8569	0.8038	0.7747	0.7565	0.7431	0.7334	0.7262	0.7208
60	1.7366	2.2770	1.0650	0.8903	0.8223	0.7866	0.7651	0.7495	0.7384	0.7302	0.7241
70	1.6802	2.3312	1.1555	0.9250	0.8409	0.7985	0.7736	0.7556	0.7431	0.7339	0.7271
80	1.6374	2.0609	1.2436	0.9596	0.8593	0.8100	0.7818	0.7615	0.7475	0.7374	0.7300
90	1.6036	1.8552	1.3164	0.9926	0.8771	0.8212	0.7898	0.7671	0.7517	0.7407	0.7326
100	1.5762	1.7198	1.3629	1.0224	0.8939	0.8319	0.7974	0.7725	0.7557	0.7438	0.7351
150	1.4931	1.4415	1.3272	1.1025	0.9535	0.8732	0.8283	0.7944	0.7718	0.7561	0.7447
200	1.4542	1.3453	1.2464	1.1026	0.9759	0.8942	0.8461	0.8077	0.7817	0.7636	0.7505
250	1.4358	1.2958	1.1968	1.0859	0.9805	0.9032	0.8546	0.8144	0.7867	0.7672	0.7530
300	1.4289	1.2668	1.1649	1.0693	0.9790	0.9072	0.8590	0.8179	0.7890	0.7684	0.7536
350	1.4295	1.2494	1.1432	1.0551	0.9752	0.9089	0.8616	0.8203	0.7904	0.7688	0.7532
400	1.4352	1.2393	1.1282	1.0435	0.9705	0.9091	0.8633	0.8224	0.7917	0.7692	0.7527
450	1.4453	1.2344	1.1179	1.0343	0.9656	0.9082	0.8642	0.8241	0.7932	0.7698	0.7525
500	1.4572	1.2333	1.1112	1.0272	0.9609	0.9066	0.8643	0.8255	0.7947	0.7708	0.7527
600	1.4873	1.2394	1.1056	1.0184	0.9537	0.9027	0.8630	0.8269	0.7971	0.7731	0.7541
700	1.5237	1.2533	1.1076	1.0153	0.9495	0.8994	0.8608	0.8268	0.7985	0.7750	0.7559
800	1.5644	1.2714	1.1148	1.0168	0.9484	0.8975	0.8590	0.8261	0.7989	0.7762	0.7574
900	1.6083	1.2933	1.1263	1.0217	0.9501	0.8976	0.8582	0.8255	0.7988	0.7767	0.7583
1000	1.6549	1.3180	1.1397	1.0294	0.9541	0.8994	0.8586	0.8255	0.7989	0.7770	0.7589
Pressure in bar	Temperature in °C										
	125	150	200	300	400	500	600	700	800	900	1000
1	0.6992	0.6984	0.6981	0.7016	0.7081	0.7154	0.7224	0.7284	0.7333	0.7370	0.7396
5	0.7009	0.6999	0.6993	0.7024	0.7086	0.7158	0.7227	0.7286	0.7335	0.7371	0.7398
10	0.7029	0.7017	0.7007	0.7033	0.7093	0.7163	0.7231	0.7289	0.7337	0.7373	0.7399
20	0.7068	0.7051	0.7034	0.7051	0.7105	0.7172	0.7238	0.7295	0.7341	0.7377	0.7403

D2.2. Table 13. (continued)

Pressure in bar	Temperature in °C										
	125	150	200	300	400	500	600	700	800	900	1000
30	0.7104	0.7082	0.7058	0.7067	0.7116	0.7181	0.7245	0.7300	0.7346	0.7380	0.7406
40	0.7137	0.7110	0.7080	0.7081	0.7127	0.7189	0.7251	0.7305	0.7350	0.7384	0.7408
50	0.7167	0.7136	0.7101	0.7095	0.7136	0.7196	0.7256	0.7310	0.7353	0.7387	0.7411
60	0.7195	0.7161	0.7119	0.7107	0.7145	0.7202	0.7261	0.7314	0.7357	0.7390	0.7413
70	0.7220	0.7183	0.7136	0.7118	0.7153	0.7208	0.7266	0.7317	0.7360	0.7392	0.7415
80	0.7244	0.7203	0.7151	0.7128	0.7160	0.7214	0.7270	0.7321	0.7362	0.7394	0.7417
90	0.7266	0.7221	0.7165	0.7137	0.7167	0.7219	0.7274	0.7324	0.7365	0.7397	0.7419
100	0.7286	0.7238	0.7178	0.7145	0.7172	0.7223	0.7277	0.7327	0.7367	0.7399	0.7421
150	0.7364	0.7302	0.7224	0.7173	0.7192	0.7238	0.7289	0.7337	0.7376	0.7406	0.7427
200	0.7409	0.7338	0.7247	0.7185	0.7200	0.7243	0.7294	0.7340	0.7379	0.7409	0.7430
250	0.7427	0.7350	0.7253	0.7185	0.7198	0.7241	0.7292	0.7339	0.7378	0.7408	0.7429
300	0.7427	0.7346	0.7245	0.7175	0.7188	0.7234	0.7286	0.7334	0.7374	0.7405	0.7427
350	0.7417	0.7333	0.7228	0.7158	0.7173	0.7221	0.7275	0.7325	0.7367	0.7399	0.7422
400	0.7406	0.7317	0.7207	0.7136	0.7154	0.7204	0.7261	0.7314	0.7357	0.7391	0.7415
450	0.7396	0.7302	0.7186	0.7111	0.7132	0.7185	0.7245	0.7300	0.7346	0.7381	0.7407
500	0.7391	0.7291	0.7166	0.7086	0.7107	0.7164	0.7227	0.7284	0.7332	0.7370	0.7397
600	0.7394	0.7282	0.7137	0.7038	0.7057	0.7117	0.7186	0.7249	0.7302	0.7343	0.7375
700	0.7406	0.7285	0.7122	0.6999	0.7010	0.7070	0.7142	0.7210	0.7268	0.7313	0.7348
800	0.7419	0.7295	0.7119	0.6972	0.6969	0.7026	0.7099	0.7170	0.7231	0.7281	0.7320
900	0.7431	0.7305	0.7123	0.6954	0.6937	0.6986	0.7058	0.7130	0.7195	0.7248	0.7290
1000	0.7438	0.7314	0.7128	0.6944	0.6912	0.6953	0.7021	0.7093	0.7159	0.7214	0.7259

D2.2. Table 14. Isobaric expansion coefficient β of dry air in 10^{-3}/K

Pressure in bar	Temperature in °C										
	−150	−125	−100	−75	−50	−25	0	25	50	75	100
1	8.3947	6.8834	5.8490	5.0909	4.5094	4.0485	3.6738	3.3630	3.1010	2.8770	2.6833
5	9.6919	7.4647	6.1576	5.2720	4.6231	4.1233	3.7248	3.3987	3.1264	2.8954	2.6968
10	11.9870	8.3180	6.5768	5.5083	4.7678	4.2171	3.7880	3.4426	3.1576	2.9179	2.7132
20	23.4830	10.6350	7.5455	6.0152	5.0658	4.4052	3.9127	3.5281	3.2177	2.9608	2.7442
30	20.3790	14.3470	8.7203	6.5682	5.3735	4.5933	4.0346	3.6103	3.2747	3.0012	2.7732
40	15.9500	20.8880	10.1310	7.1628	5.6876	4.7795	4.1530	3.6891	3.3288	3.0391	2.8001
50	13.4970	33.1700	11.7720	7.7866	6.0026	4.9616	4.2669	3.7640	3.3797	3.0745	2.8250
60	11.8890	48.2830	13.5650	8.4182	6.3114	5.1369	4.3751	3.8345	3.4272	3.1073	2.8479
70	10.7310	41.2590	15.3220	9.0276	6.6055	5.3023	4.4766	3.9002	3.4713	3.1374	2.8688
80	9.8472	29.2540	16.7560	9.5802	6.8759	5.4548	4.5701	3.9605	3.5115	3.1648	2.8876
90	9.1449	22.0780	17.5530	10.0420	7.1142	5.5915	4.6544	4.0150	3.5479	3.1895	2.9045
100	8.5696	17.8280	17.5460	10.3870	7.3134	5.7100	4.7286	4.0634	3.5801	3.2113	2.9193
150	6.7302	9.8964	12.3270	10.1820	7.6376	5.9945	4.9334	4.2052	3.6771	3.2768	2.9626
200	5.7054	7.3535	8.7385	8.4420	7.0936	5.8302	4.8844	4.1920	3.6736	3.2742	2.9581
250	5.0330	6.0436	6.8646	6.9330	6.2757	5.4248	4.6713	4.0684	3.5942	3.2182	2.9150
300	4.5500	5.2236	5.7483	5.8604	5.5196	4.9577	4.3848	3.8842	3.4683	3.1268	2.8451
350	4.1821	4.6530	5.0060	5.0985	4.9004	4.5179	4.0845	3.6764	3.3194	3.0158	2.7590
400	3.8903	4.2285	4.4733	4.5382	4.4066	4.1332	3.8002	3.4676	3.1635	2.8962	2.6647

D2.2. Table 14. (continued)

Temperature in °C											
Pressure in bar	−150	−125	−100	−75	−50	−25	0	25	50	75	100
450	3.6517	3.8981	4.0698	4.1105	4.0115	3.8050	3.5429	3.2694	3.0101	2.7755	2.5678
500	3.4520	3.6320	3.7521	3.7733	3.6911	3.5269	3.3147	3.0868	2.8643	2.6581	2.4719
600	3.1346	3.2271	3.2805	3.2740	3.2060	3.0882	2.9375	2.7713	2.6030	2.4414	2.2908
700	2.8914	2.9305	2.9443	2.9200	2.8568	2.7617	2.6447	2.5156	2.3830	2.2529	2.1290
800	2.6976	2.7021	2.6904	2.6543	2.5930	2.5106	2.4135	2.3078	2.1990	2.0912	1.9873
900	2.5385	2.5195	2.4908	2.4466	2.3860	2.3115	2.2271	2.1370	2.0446	1.9529	1.8638
1000	2.4048	2.3694	2.3289	2.2791	2.2188	2.1495	2.0739	1.9945	1.9139	1.8340	1.7561

Temperature in °C											
Pressure in bar	125	150	200	300	400	500	600	700	800	900	1000
1	2.5142	2.3651	2.1145	1.7450	1.4855	1.2932	1.1451	1.0274	0.9317	0.8522	0.7853
5	2.5241	2.3724	2.1185	1.7458	1.4852	1.2926	1.1443	1.0266	0.9309	0.8515	0.7846
10	2.5361	2.3813	2.1232	1.7468	1.4849	1.2917	1.1433	1.0256	0.9299	0.8506	0.7838
20	2.5587	2.3978	2.1318	1.7484	1.4839	1.2899	1.1412	1.0235	0.9280	0.8488	0.7822
30	2.5796	2.4129	2.1395	1.7495	1.4828	1.2880	1.1391	1.0214	0.9260	0.8470	0.7805
40	2.5988	2.4266	2.1463	1.7502	1.4814	1.2859	1.1369	1.0193	0.9240	0.8452	0.7789
50	2.6165	2.4391	2.1523	1.7505	1.4798	1.2838	1.1346	1.0171	0.9220	0.8433	0.7772
60	2.6325	2.4503	2.1575	1.7505	1.4781	1.2815	1.1323	1.0149	0.9199	0.8415	0.7755
70	2.6470	2.4603	2.1619	1.7501	1.4762	1.2792	1.1299	1.0127	0.9179	0.8396	0.7738
80	2.6600	2.4691	2.1655	1.7494	1.4741	1.2767	1.1275	1.0104	0.9158	0.8377	0.7721
90	2.6715	2.4768	2.1685	1.7484	1.4719	1.2742	1.1251	1.0081	0.9137	0.8359	0.7704
100	2.6814	2.4833	2.1708	1.7471	1.4696	1.2717	1.1226	1.0058	0.9117	0.8340	0.7687
150	2.7089	2.4994	2.1724	1.7368	1.4561	1.2581	1.1098	0.9941	0.9011	0.8245	0.7602
200	2.7018	2.4899	2.1593	1.7208	1.4402	1.2433	1.0965	0.9822	0.8905	0.8150	0.7518
250	2.6664	2.4592	2.1339	1.7001	1.4223	1.2277	1.0828	0.9702	0.8799	0.8056	0.7434
300	2.6104	2.4127	2.0988	1.6756	1.4029	1.2114	1.0689	0.9581	0.8693	0.7963	0.7351
350	2.5414	2.3556	2.0569	1.6482	1.3822	1.1947	1.0548	0.9461	0.8589	0.7871	0.7270
400	2.4650	2.2922	2.0106	1.6187	1.3606	1.1776	1.0407	0.9341	0.8485	0.7780	0.7189
450	2.3856	2.2259	1.9618	1.5880	1.3384	1.1604	1.0266	0.9222	0.8383	0.7691	0.7110
500	2.3060	2.1587	1.9120	1.5565	1.3160	1.1430	1.0125	0.9104	0.8282	0.7603	0.7033
600	2.1530	2.0280	1.8132	1.4934	1.2709	1.1085	0.9847	0.8873	0.8084	0.7432	0.6882
700	2.0134	1.9067	1.7193	1.4319	1.2268	1.0747	0.9576	0.8648	0.7893	0.7267	0.6738
800	1.8888	1.7968	1.6324	1.3736	1.1845	1.0421	0.9315	0.8432	0.7710	0.7108	0.6598
900	1.7787	1.6983	1.5529	1.3188	1.1442	1.0109	0.9064	0.8224	0.7533	0.6955	0.6465
1000	1.6814	1.6104	1.4806	1.2679	1.1063	0.9813	0.8825	0.8025	0.7364	0.6809	0.6337

D2.2. Table 15. Isentropic speed of sound w_s in dry air in m/s

Temperature in °C											
Pressure in bar	−150	−125	−100	−75	−50	−25	0	25	50	75	100
1	221.3	243.4	263.5	282.1	299.5	315.9	331.5	346.3	360.5	374.0	387.0
5	215.8	240.4	261.9	281.3	299.2	316.0	331.8	346.7	361.0	374.7	387.8
10	208.3	236.7	259.9	280.3	298.9	316.1	332.2	347.4	361.8	375.6	388.8
20	188.9	229.0	256.3	278.8	298.6	316.6	333.2	348.8	363.5	377.5	390.8

D2.2. Table 15. (continued)

Temperature in °C											
Pressure in bar	−150	−125	−100	−75	−50	−25	0	25	50	75	100
30	389.0	221.4	253.2	277.7	298.7	317.4	334.5	350.5	365.4	379.6	393.0
40	427.5	214.7	250.9	277.3	299.3	318.6	336.1	352.3	367.5	381.8	395.3
50	458.1	211.3	249.9	277.6	300.3	320.2	338.0	354.5	369.8	384.2	397.8
60	484.1	219.0	250.7	278.8	302.0	322.1	340.2	356.8	372.2	386.7	400.4
70	506.9	248.8	253.9	281.0	304.2	324.5	342.7	359.4	374.8	389.3	403.0
80	527.5	287.9	260.0	284.4	307.1	327.3	345.4	362.1	377.6	392.1	405.8
90	546.2	324.1	269.3	289.0	310.6	330.5	348.5	365.1	380.6	395.1	408.7
100	563.5	355.6	281.8	294.9	314.9	334.1	351.9	368.3	383.7	398.1	411.7
150	635.2	468.7	366.3	340.3	345.5	358.4	372.9	387.5	401.6	415.2	428.2
200	691.6	546.1	445.8	399.0	387.3	390.8	399.9	411.1	423.0	435.0	446.8
250	738.8	607.0	511.5	456.5	433.1	427.5	430.6	437.8	446.9	456.9	467.2
300	779.8	658.0	567.0	509.0	478.3	465.7	463.2	466.4	472.5	480.2	488.7
350	816.2	702.2	615.2	556.3	521.3	503.3	496.2	495.6	498.8	504.3	511.0
400	849.2	741.6	658.0	599.1	561.4	539.7	528.8	525.0	525.5	528.8	533.7
450	879.4	777.1	696.6	638.2	598.9	574.4	560.5	553.9	552.0	553.2	556.5
500	907.3	809.7	731.9	674.1	633.8	607.3	591.1	582.1	578.1	577.5	579.3
600	957.9	867.8	794.7	738.6	697.4	668.4	648.7	636.1	628.7	625.0	623.9
700	1002.9	918.9	849.8	795.4	754.1	723.7	701.9	686.7	676.7	670.5	667.1
800	1043.8	964.7	899.0	846.3	805.3	774.1	750.9	734.0	722.0	713.8	708.5
900	1081.3	1006.4	943.7	892.7	852.2	820.6	796.4	778.2	764.7	754.9	748.1
1000	1116.2	1044.9	984.8	935.3	895.4	863.7	838.9	819.7	805.0	794.0	785.9

Temperature in °C											
Pressure in bar	125	150	200	300	400	500	600	700	800	900	1000
1	399.6	411.7	434.7	476.6	514.3	549.0	581.3	611.7	640.6	668.3	694.8
5	400.4	412.5	435.6	477.5	515.2	549.9	582.1	612.5	641.4	669.0	695.6
10	401.4	413.6	436.7	478.7	516.4	551.0	583.2	613.6	642.4	670.0	696.5
20	403.6	415.8	439.0	481.1	518.7	553.3	585.4	615.7	644.5	672.0	698.4
30	405.9	418.2	441.4	483.5	521.1	555.6	587.6	617.8	646.5	674.0	700.3
40	408.3	420.6	443.9	486.0	523.5	557.9	589.9	620.0	648.6	676.0	702.2
50	410.8	423.2	446.5	488.5	526.0	560.2	592.1	622.1	650.7	677.9	704.1
60	413.4	425.8	449.1	491.0	528.4	562.6	594.4	624.3	652.8	679.9	706.1
70	416.1	428.5	451.8	493.6	530.9	565.0	596.7	626.5	654.8	682.0	708.0
80	418.8	431.2	454.5	496.3	533.4	567.4	598.9	628.7	656.9	684.0	709.9
90	421.7	434.1	457.3	498.9	536.0	569.8	601.2	630.9	659.0	686.0	711.9
100	424.7	437.0	460.1	501.6	538.5	572.2	603.6	633.1	661.2	688.0	713.8
150	440.6	452.5	475.0	515.4	551.5	584.5	615.2	644.2	671.8	698.2	723.6
200	458.3	469.5	490.9	529.8	564.8	597.0	627.0	655.4	682.5	708.5	733.5
250	477.5	487.7	507.6	544.6	578.4	609.7	639.0	666.7	693.3	718.8	743.4
300	497.7	506.8	525.0	559.8	592.2	622.4	651.0	678.1	704.1	729.1	753.3
350	518.5	526.4	542.8	575.3	606.2	635.3	663.0	689.5	714.9	739.5	763.2
400	539.8	546.5	561.0	590.9	620.2	648.2	675.1	700.9	725.7	749.8	773.1
450	561.2	566.7	579.3	606.7	634.3	661.2	687.2	712.3	736.6	760.1	783.0
500	582.6	586.9	597.7	622.5	648.5	674.2	699.3	723.6	747.3	770.4	792.9

D2.2. Table 15. (continued)

Temperature in °C											
Pressure in bar	125	150	200	300	400	500	600	700	800	900	1000
600	624.8	627.1	634.3	654.2	676.8	700.1	723.3	746.3	768.8	790.9	812.5
700	665.9	666.2	670.3	685.5	704.9	725.8	747.2	768.7	790.1	811.2	832.0
800	705.5	704.2	705.4	716.3	732.6	751.2	770.9	791.0	811.2	831.3	851.3
900	743.6	740.9	739.5	746.4	759.8	776.3	794.2	812.9	832.0	851.2	870.3
1000	780.2	776.2	772.6	775.9	786.6	800.9	817.2	834.6	852.5	870.8	889.1

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