~~Designation:D3984–93 (Reapproved 2003)~~ Designation: D 3984 – 08

Standard Specification for Ethane Thermophysical Property Tables[1]

This standard is issued under the fixed designation D 3984; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

~~1.1The ethane thermophysical property tables are for use in the calculation of the pressure-volume-temperature (PVT), thermodynamic, and transport properties of ethane for process design and operations. Tables are provided for gaseous and liquid ethane at temperatures between 90 and 600K at pressures to 70 MPa. These tables were developed by the National Institute of Standards and Technology (formerly the National Bureau of Standards) upon culmination of four years of effort in acquiring available physical properties data, in performing experimental measurements, and in formulating these tables for use in thermal computations.~~

1.1 The thermophysical property tables for ethane are for use in the calculation of the pressure-volume-temperature (PVT), thermodynamic, and transport properties of ethane for process design and operations. Tables are provided for gaseous and liquid ethane at temperatures between 92 and 600 K at pressures to 20 MPa. One table provides properties at the conditions of liquid-vapor equilibrium (saturation properties). The other table provides properties at selected *T*, *p* points for the equilibrium phase at those conditions. The tables were developed by the National Institute of Standards and Technology from a Standard Reference Database product REFPROP, version 8.0.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

2. ~~Sponsorship~~

~~2.1The preparation of the tables and supporting work was done by the National Institute of Standards and Technology (NIST) under the sponsorship of the Gas Research Institute, the American Gas Association, and the Standard Reference Data Program of NIST.~~

~~3.~~Applicability

~~3.1These~~2.1 These tables apply directly only to pure gaseous ~~and liquid~~ ethane. However, it is expected that they ~~will~~may find substantial use in mathematical models and tables for the thermophysical properties of mixtures containing ~~ethane, such as natural gas.~~ ethane.

~~4.~~3. Tables

~~4.1These thermophysical property tables are:~~

~~4.1.1~~

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3.1.1 *Thermophysical Properties of Coexisting Gaseous and Liquid Ethane*~~, in SI units (Table in Appendix F, pp. 642–643).~~

~~4.1.2*Thermophysical Properties of Ethane*, along isobars, in SI units (Table in Appendix F, pp. 645–684).[3]~~

~~4.2These tables were produced by equations from a computer package, "NIST Thermophysical Properties of Fluids Database 12" (also designated MIPROPS) of the Standard Reference Data Program of NIST. A wide selection of units (SI units, engineering units, chemical units) is available with this program.~~

~~5.~~, in SI units. See Table 1.

3.1.2 *Thermophysical Properties of Ethane Along Isobars*, in SI units. See Table 2.

3.2 The tabulated thermophysical properties are:

ρ, molar density ($mol \cdot l^{-1}$)

H, molar enthalpy ($J \cdot mol^{-1}$)

S, molar entropy ($J \cdot K^{-1} \cdot mol^{-1}$)

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[1] This specification is under the jurisdiction of ASTM Committee D03 on Gaseous Fuels and is the direct responsibility of Subcommittee D03.08 on Thermophysical Properties.

~~Current edition approved May 10, 2003. Published May 2003. Originally approved in 1982. Last previous edition approved in 1998 as D3984–93 (1998).~~

Current edition approved Dec. 1, 2008. Published January 2009. Originally approved in 1982. Last previous edition approved in 2003 as D 3984 – 93 (2003).

TABLE 1 Thermophysical Properties of Coexisting Gaseous and Liquid Ethane

T K	p MPa	ρ mol·l^{-1}	H J·mol^{-1}	S J·mol^{-1}·K^{-1}	C_v J·mol^{-1}·K^{-1}	C_p J·mol^{-1}·K^{-1}	c m·s^{-1}	η μPa·s	λ mW·m^{-1}·K^{-1}
90.4	1.15E-06	21.667	-14794	69.195	48.26	69.93	2008.5	255.6	1279
90.4	1.15E-06	1.53E-06	3089.2	267.02	26.81	35.13	180.97	2.910	3.044
92	1.74E-06	21.608	-14682	70.419	47.85	69.60	1996.7	254.3	1193
92	1.74E-06	2.28E-06	3145.5	264.2	26.90	35.22	182.48	3.000	3.089
94	2.86E-06	21.535	-14543	71.912	47.39	69.27	1982.1	252.8	1097
94	2.86E-06	3.65E-06	3216	260.84	27.02	35.34	184.36	3.113	3.145
96	4.58E-06	21.462	-14405	73.368	46.99	69.01	1967.5	251.1	1013
96	4.58E-06	5.74E-06	3286.8	257.66	27.14	35.46	186.22	3.227	3.202
98	7.2E-06	21.389	-14267	74.788	46.64	68.80	1952.9	249.5	939.1
98	7.2E-06	8.83E-06	3357.8	254.64	27.26	35.58	188.05	3.341	3.259
100	1.11E-05	21.316	-14130	76.176	46.32	68.64	1938.4	247.8	873.2
100	1.11E-05	1.33E-05	3429.1	251.77	27.38	35.70	189.86	3.456	3.316
102	1.68E-05	21.243	-13993	77.534	46.04	68.52	1924	246.1	814.5
102	1.68E-05	1.98E-05	3500.6	249.04	27.50	35.82	191.65	3.572	3.373
104	2.49E-05	21.17	-13856	78.864	45.79	68.44	1909.5	244.4	761.9
104	2.49E-05	2.88E-05	3572.3	246.44	27.63	35.94	193.42	3.689	3.430
106	3.64E-05	21.097	-13719	80.167	45.56	68.38	1895.1	242.7	714.6
106	3.64E-05	4.13E-05	3644.2	243.97	27.75	36.07	195.17	3.807	3.488
108	5.24E-05	21.024	-13582	81.445	45.36	68.36	1880.8	240.9	672.0
108	5.24E-05	5.83E-05	3716.4	241.62	27.87	36.19	196.9	3.925	3.545
110	7.43E-05	20.951	-13446	82.699	45.17	68.35	1866.4	239.1	633.4
110	7.43E-05	8.12E-05	3788.7	239.37	28.00	36.32	198.61	4.045	3.603
112	0.000104	20.878	-13309	83.931	45.00	68.36	1852	237.3	598.3
112	0.000104	0.000112	3861.3	237.24	28.12	36.45	200.3	4.165	3.662
114	0.000144	20.805	-13172	85.141	44.85	68.39	1837.6	235.5	566.3
114	0.000144	0.000152	3934.1	235.2	28.25	36.58	201.98	4.286	3.720
116	0.000196	20.731	-13035	86.331	44.71	68.43	1823.2	233.6	537.1
116	0.000196	0.000203	4007.0	233.25	28.38	36.71	203.63	4.409	3.778
118	0.000264	20.658	-12898	87.501	44.57	68.48	1808.8	231.8	510.4
118	0.000264	0.000269	4080.2	231.39	28.52	36.85	205.27	4.532	3.837
120	0.000352	20.584	-12761	88.653	44.45	68.54	1794.4	229.9	485.8
120	0.000352	0.000353	4153.5	229.61	28.65	36.99	206.89	4.657	3.896
122	0.000465	20.511	-12624	89.786	44.34	68.61	1780	228.0	463.1
122	0.000465	0.000459	4227.0	227.91	28.79	37.14	208.49	4.782	3.955
124	0.000608	20.437	-12487	90.903	44.24	68.69	1765.5	226.1	442.2
124	0.000608	0.00059	4300.6	226.29	28.93	37.29	210.07	4.909	4.015
126	0.000787	20.363	-12349	92.002	44.14	68.78	1751	224.2	422.8
126	0.000787	0.000752	4374.4	224.73	29.08	37.45	211.63	5.037	4.074
128	0.001009	20.289	-12212	93.086	44.05	68.86	1736.5	222.3	404.9
128	0.001009	0.000949	4448.3	223.24	29.23	37.61	213.17	5.166	4.134
130	0.001284	20.214	-12074	94.154	43.96	68.96	1722	220.4	388.2
130	0.001284	0.001189	4522.3	221.82	29.38	37.77	214.69	5.296	4.194
132	0.00162	20.14	-11936	95.208	43.88	69.06	1707.5	218.4	372.6
132	0.00162	0.001478	4596.4	220.45	29.53	37.94	216.19	5.427	4.254
134	0.002028	20.065	-11798	96.247	43.81	69.16	1692.9	216.4	358.1
134	0.002028	0.001824	4670.6	219.14	29.69	38.11	217.68	5.560	4.314
136	0.002521	19.991	-11659	97.273	43.74	69.27	1678.3	214.5	344.5
136	0.002521	0.002234	4744.8	217.89	29.84	38.28	219.14	5.694	4.374

TABLE 1 *Continued*

T K	p MPa	ρ mol·l^{-1}	H J·mol^{-1}	S J·mol^{-1}·K^{-1}	C_v J·mol^{-1}·K^{-1}	C_p J·mol^{-1}·K^{-1}	c m·s^{-1}	η μPa·s	λ mW·m^{-1}·K^{-1}
138	0.003111	19.916	-11520	98.285	43.67	69.38	1663.7	212.5	331.8
138	0.003111	0.002718	4819.2	216.69	30.00	38.45	220.58	5.829	4.435
140	0.003814	19.84	-11382	99.284	43.61	69.50	1649.1	210.6	319.8
140	0.003814	0.003286	4893.6	215.53	30.15	38.62	222.01	5.966	4.496
142	0.004645	19.765	-11242	100.27	43.55	69.62	1634.4	208.6	308.5
142	0.004645	0.003947	4968.0	214.43	30.31	38.79	223.42	6.104	4.556
144	0.005623	19.689	-11103	101.24	43.49	69.74	1619.7	206.6	297.9
144	0.005623	0.004714	5042.4	213.37	30.45	38.96	224.80	6.244	4.617
146	0.006766	19.613	-10963	102.21	43.44	69.87	1605.0	204.7	287.9
146	0.006766	0.005599	5116.8	212.35	30.60	39.13	226.17	6.385	4.678
148	0.008097	19.537	-10823	103.16	43.40	70.00	1590.3	202.7	278.5
148	0.008097	0.006614	5191.2	211.37	30.74	39.29	227.51	6.528	4.740
150	0.009638	19.461	-10683	104.1	43.35	70.14	1575.5	200.7	269.6
150	0.009638	0.007773	5265.6	210.42	30.88	39.45	228.84	6.672	4.801
152	0.011413	19.384	-10543	105.03	43.31	70.28	1560.7	198.7	261.1
152	0.011413	0.009091	5339.8	209.52	31.01	39.61	230.14	6.819	4.863
154	0.013448	19.307	-10402	105.95	43.27	70.42	1545.9	196.8	253.0
154	0.013448	0.010582	5414.0	208.65	31.14	39.76	231.42	6.967	4.924
156	0.015772	19.23	-10261	106.86	43.24	70.57	1531.1	194.8	245.4
156	0.015772	0.012264	5488.1	207.81	31.26	39.92	232.68	7.116	4.986
158	0.018414	19.152	-10120	107.76	43.21	70.73	1516.2	192.8	238.1
158	0.018414	0.014151	5561.9	207.01	31.39	40.08	233.91	7.268	5.048
160	0.021405	19.074	-9977.8	108.65	43.18	70.89	1501.3	190.8	231.2
160	0.021405	0.016263	5635.6	206.23	31.51	40.24	235.12	7.422	5.110
162	0.024779	18.996	-9835.8	109.53	43.16	71.05	1486.3	188.9	224.5
162	0.024779	0.018617	5709.0	205.48	31.64	40.40	236.3	7.577	5.172
164	0.02857	18.918	-9693.3	110.4	43.14	71.22	1471.4	186.9	218.2
164	0.02857	0.021232	5782.2	204.76	31.76	40.57	237.45	7.735	5.234
166	0.032814	18.839	-9550.6	111.27	43.12	71.40	1456.4	184.9	212.2
166	0.032814	0.024127	5855.0	204.07	31.90	40.75	238.57	7.895	5.297
168	0.037551	18.759	-9407.4	112.12	43.11	71.58	1441.4	183.0	206.4
168	0.037551	0.027324	5927.6	203.4	32.03	40.94	239.67	8.057	5.360
170	0.042819	18.68	-9263.9	112.97	43.10	71.77	1426.3	181.0	200.8
170	0.042819	0.030843	5999.7	202.75	32.17	41.14	240.73	8.221	5.422
172	0.04866	18.6	-9120.0	113.81	43.09	71.96	1411.2	179.1	195.5
172	0.04866	0.034706	6071.4	202.13	32.32	41.35	241.76	8.388	5.485
174	0.055118	18.519	-8975.6	114.64	43.09	72.16	1396.1	177.1	190.4
174	0.055118	0.038935	6142.7	201.53	32.48	41.58	242.76	8.557	5.548
176	0.062235	18.438	-8830.9	115.47	43.09	72.37	1380.9	175.2	185.5
176	0.062235	0.043553	6213.5	200.95	32.65	41.83	243.72	8.728	5.612
178	0.07006	18.357	-8685.7	116.28	43.10	72.59	1365.7	173.3	180.7
178	0.07006	0.048584	6283.7	200.38	32.83	42.09	244.65	8.902	5.675
180	0.078638	18.275	-8540.0	117.1	43.11	72.81	1350.5	171.3	176.2
180	0.078638	0.054053	6353.4	199.84	33.02	42.38	245.54	9.079	5.739
182	0.088019	18.193	-8393.8	117.9	43.12	73.04	1335.2	169.4	171.8
182	0.088019	0.059985	6422.6	199.31	33.21	42.68	246.39	9.258	5.803
184	0.098253	18.11	-8247.2	118.7	43.14	73.28	1319.9	167.5	167.6
184	0.098253	0.066405	6491.2	198.8	33.42	43.00	247.2	9.441	5.867
186	0.10939	18.026	-8100.0	119.49	43.16	73.53	1304.5	165.6	163.5

TABLE 1 *Continued*

T / K	p / MPa	ρ / mol·l^{-1}	H / J·mol^{-1}	S / J·mol^{-1}·K^{-1}	C_v / J·mol^{-1}·K^{-1}	C_p / J·mol^{-1}·K^{-1}	c / m·s^{-1}	η / μPa·s	λ / mW·m^{-1}·K^{-1}
186	0.10939	0.07334	6559.1	198.3	33.65	43.34	247.98	9.626	5.931
188	0.12149	17.942	-7952.3	120.28	43.18	73.79	1289.2	163.7	159.5
188	0.12149	0.080817	6626.4	197.82	33.88	43.69	248.71	9.814	5.996
190	0.13459	17.858	-7804.1	121.06	43.21	74.06	1273.7	161.8	155.7
190	0.13459	0.088865	6693.0	197.36	34.12	44.07	249.41	10.00	6.061
192	0.14876	17.773	-7655.2	121.83	43.24	74.33	1258.3	156.0	152.0
192	0.14876	0.097512	6758.9	196.91	34.37	44.46	250.06	10.20	6.126
194	0.16405	17.687	-7505.8	122.6	43.28	74.62	1242.8	158.1	148.4
194	0.16405	0.10679	6824.1	196.47	34.63	44.89	250.67	10.40	6.192
196	0.18052	17.601	-7355.8	123.37	43.32	74.92	1227.2	156.2	144.9
196	0.18052	0.11672	6888.6	196.04	34.90	45.31	251.24	10.60	6.258
198	0.19823	17.514	-7205.1	124.13	43.36	75.23	1211.7	154.4	141.5
198	0.19823	0.12735	6952.3	195.63	35.18	45.76	251.77	10.80	6.324
200	0.21723	17.426	-7053.8	124.88	43.41	75.55	1196.0	152.6	138.3
200	0.21723	0.1387	7015.2	195.23	35.46	46.22	252.26	11.01	6.391
202	0.23759	17.337	-6901.8	125.63	43.46	75.88	1180.4	150.7	135.1
202	0.23759	0.1508	7077.3	194.84	35.74	46.70	252.70	11.22	6.458
204	0.25936	17.248	-6749.1	126.38	43.52	76.23	1164.7	148.9	132.0
204	0.25936	0.1637	7138.6	194.45	36.04	47.19	253.10	11.44	6.526
206	0.28261	17.158	-6595.7	127.12	43.58	76.58	1148.9	147.1	129.0
206	0.28261	0.17742	7199.0	194.08	36.33	47.70	253.45	11.66	6.594
208	0.3074	17.068	-6441.5	127.86	43.65	76.96	1133.1	145.3	126.1
208	0.3074	0.192	7258.5	193.72	36.63	48.23	253.76	11.88	6.663
210	0.3338	16.976	-6286.6	128.59	43.72	77.34	1117.3	143.5	123.2
210	0.3338	0.20749	7317.1	193.37	36.94	48.77	254.02	12.11	6.732
212	0.36185	16.884	-6130.8	129.32	43.79	77.75	1101.4	141.7	120.5
212	0.36185	0.22392	7374.8	193.03	37.24	49.33	254.24	12.34	6.802
214	0.39164	16.79	-5974.2	130.05	43.87	78.17	1085.4	139.9	117.8
214	0.39164	0.24133	7431.5	192.69	37.55	49.90	254.41	12.58	6.872
216	0.42323	16.696	-5816.7	130.77	43.95	78.60	1069.5	138.1	115.1
216	0.42323	0.25976	7487.1	192.36	37.86	50.49	254.54	12.82	6.944
218	0.45667	16.601	-5658.3	131.49	44.04	79.06	1053.4	136.4	112.6
218	0.45667	0.27927	7541.7	192.04	38.17	51.09	254.62	13.07	7.016
220	0.49205	16.504	-5498.9	132.21	44.13	79.53	1037.3	134.6	110.0
220	0.49205	0.29989	7595.2	191.73	38.49	51.72	254.65	13.32	7.089
222	0.52941	16.407	-5338.6	132.93	44.23	80.02	1021.2	132.8	107.6
222	0.52941	0.32168	7647.6	191.42	38.80	52.36	254.63	13.58	7.163
224	0.56884	16.309	-5177.3	133.64	44.33	80.54	1005.0	131.1	105.2
224	0.56884	0.34468	7698.8	191.12	39.12	53.03	254.56	13.84	7.238
226	0.6104	16.209	-5015.0	134.35	44.44	81.07	988.76	129.4	102.9
226	0.6104	0.36896	7748.7	190.83	39.43	53.72	254.44	14.11	7.313
228	0.65416	16.108	-4851.5	135.06	44.54	81.64	972.46	127.7	100.6
228	0.65416	0.39457	7797.4	190.53	39.76	54.43	254.27	14.38	7.390
230	0.70018	16.006	-4687.0	135.76	44.66	82.22	956.09	126.0	98.34
230	0.70018	0.42157	7844.7	190.25	40.08	55.18	254.05	14.66	7.469
232	0.74854	15.903	-4521.2	136.47	44.78	82.84	939.66	124.2	96.15
232	0.74854	0.45003	7890.6	189.97	40.40	55.95	253.78	14.95	7.548
236	0.85256	15.692	-4186.0	137.87	45.04	84.16	906.6	120.9	91.89
236	0.85256	0.51158	7977.9	189.41	41.06	57.60	253.07	15.55	7.712

TABLE 1 *Continued*

T / K	p / MPa	ρ / mol·l^{-1}	H / J·mol^{-1}	S / J·mol^{-1}·K^{-1}	C_v / J·mol^{-1}·K^{-1}	C_p / J·mol^{-1}·K^{-1}	c / m·s^{-1}	η / μPa·s	λ / mW·m^{-1}·K^{-1}
238	0.90836	15.584	-4016.5	138.57	45.17	84.86	889.97	119.2	89.82
238	0.90836	0.54482	8019.2	189.14	41.40	58.49	252.64	15.86	7.796
240	0.96679	15.475	-3845.6	139.27	45.31	85.61	873.25	117.5	87.80
240	0.96679	0.57983	8058.7	188.87	41.74	59.42	252.14	16.18	7.881
242	1.0279	15.364	-3673.2	139.97	45.46	86.40	856.45	115.8	85.81
242	1.0279	0.61668	8096.6	188.61	42.09	60.40	251.59	16.51	7.969
244	1.0918	15.251	-3499.3	140.67	45.61	87.23	839.57	114.2	83.86
244	1.0918	0.65547	8132.5	188.34	42.44	61.44	250.98	16.85	8.059
246	1.1585	15.136	-3323.9	141.37	45.77	88.11	822.59	112.6	81.94
246	1.1585	0.6963	8166.5	188.08	42.80	62.54	250.31	17.20	8.151
248	1.2282	15.019	-3146.8	142.06	45.94	89.04	805.51	110.9	80.05
248	1.2282	0.73929	8198.5	187.81	43.17	63.71	249.58	17.56	8.245
250	1.3008	14.901	-2968.0	142.76	46.11	90.02	788.33	109.3	78.19
250	1.3008	0.78456	8228.2	187.55	43.55	64.96	248.79	17.93	8.342
252	1.3766	14.779	-2787.4	143.46	46.29	91.08	771.03	107.7	76.36
252	1.3766	0.83224	8255.7	187.28	43.93	66.29	247.93	18.32	8.442
254	1.4555	14.656	-2604.9	144.16	46.47	92.20	753.60	106.0	74.56
254	1.4555	0.88247	8280.8	187.02	44.33	67.72	247.00	18.72	8.545
256	1.5376	14.53	-2420.3	144.86	46.66	93.39	736.05	104.4	72.78
256	1.5376	0.93543	8303.3	186.75	44.74	69.26	246.01	19.14	8.652
258	1.623	14.401	-2233.7	145.57	46.87	94.68	718.36	102.8	71.03
258	1.623	0.99127	8323.0	186.49	45.16	70.91	244.95	19.57	8.762
260	1.7118	14.27	-2044.8	146.27	47.08	96.06	700.52	101.2	69.30
260	1.7118	1.0502	8339.9	186.21	45.59	72.71	243.81	20.02	8.876
262	1.8041	14.135	-1853.6	146.98	47.29	97.55	682.53	99.64	67.60
262	1.8041	1.1124	8353.6	185.94	46.03	74.67	242.61	20.50	8.995
264	1.9	13.997	-1659.8	147.69	47.52	99.17	664.38	98.05	65.91
264	1.9	1.1782	8364.0	185.66	46.49	76.80	241.33	21.00	9.119
266	1.9996	13.855	-1463.3	148.41	47.76	100.93	646.06	96.47	64.24
266	1.9996	1.2478	8370.9	185.38	46.96	79.15	239.97	21.52	9.248
268	2.1029	13.709	-1264	149.12	48.01	102.8	627.58	94.89	62.58
268	2.1029	1.3215	8373.9	185.09	47.46	81.75	238.54	22.08	9.384
270	2.21	13.559	-1061.5	149.85	48.27	105.0	608.92	93.31	60.94
270	2.21	1.3998	8372.7	184.79	47.97	84.63	237.02	22.67	9.526
272	2.321	13.405	-855.75	150.58	48.54	107.3	590.08	91.73	59.30
272	2.321	1.4829	8367.0	184.48	48.51	87.86	235.42	23.29	9.676
274	2.4361	13.245	-646.35	151.31	48.82	109.9	571.04	90.16	57.68
274	2.4361	1.5713	8356.4	184.17	49.08	91.51	233.73	23.97	9.834
276	2.5554	13.079	-433.02	152.06	49.11	112.8	551.77	88.58	56.06
276	2.5554	1.6657	8340.3	183.84	49.68	95.65	231.95	24.69	10.00
278	2.6789	12.907	-215.36	152.81	49.42	116.1	532.23	87.01	54.45
278	2.6789	1.7666	8318.2	183.5	50.31	100.4	230.07	25.47	10.18
280	2.8067	12.728	7.0624	153.57	49.74	119.9	512.38	85.43	52.84
280	2.8067	1.8748	8289.5	183.15	50.99	105.9	228.1	26.33	10.37
282	2.9391	12.541	234.80	154.34	50.09	124.3	492.15	83.86	51.22
282	2.9391	1.9913	8253.3	182.78	51.70	112.4	226.01	27.26	10.58
284	3.076	12.345	468.51	155.13	50.47	129.4	471.46	82.28	49.60
284	3.076	2.1172	8208.7	182.38	52.47	120.0	223.82	28.31	10.80

TABLE 1 *Continued*

T K	p MPa	ρ mol·l^{-1}	H J·mol^{-1}	S J·mol^{-1}·K^{-1}	C_v J·mol^{-1}·K^{-1}	C_p J·mol^{-1}·K^{-1}	c m·s^{-1}	η μPa·s	λ mW·m^{-1}·K^{-1}
286	3.2177	12.138	709.01	155.93	50.89	135.5	450.22	80.71	47.96
286	3.2177	2.254	8154.3	181.96	53.30	129.3	221.51	29.47	11.05
288	3.3643	11.918	957.38	156.75	51.37	142.9	428.34	79.14	46.30
288	3.3643	2.4034	8088.7	181.52	54.20	140.8	219.07	30.80	11.32
290	3.5159	11.684	1215.0	157.6	51.93	152.2	405.7	77.57	44.60
290	3.5159	2.5679	8009.7	181.03	55.18	155.2	216.5	32.32	11.62
292	3.6728	11.431	1483.7	158.48	52.59	164.2	382.18	76.04	42.87
292	3.6728	2.7507	7914.6	180.5	56.27	174.1	213.78	34.11	11.95
294	3.8351	11.155	1766.3	159.39	53.39	180.2	357.64	74.55	41.07
294	3.8351	2.9566	7799.3	179.91	57.49	199.9	210.88	36.27	12.34
296	4.0031	10.849	2066.6	160.36	54.40	203.2	331.84	73.18	39.19
296	4.0031	3.1925	7658.2	179.25	58.92	237.1	207.77	38.95	12.79
298	4.177	10.502	2391.2	161.4	55.70	238.7	304.47	72.04	37.18
298	4.177	3.4695	7481.7	178.48	60.63	295.5	204.37	42.48	13.34
300	4.3573	10.094	2751.6	162.54	57.49	301.4	274.91	71.49	34.97
300	4.3573	3.8079	7253.0	177.55	62.82	399.9	200.51	47.46	14.02
302	4.5442	9.5785	3173.2	163.88	60.28	443.3	241.95	72.47	32.40
302	4.5442	4.2525	6935.7	176.34	65.96	637.9	195.74	55.66	14.97
304	4.7387	8.8094	3740.0	165.68	66.07	1064	202.16	79.53	28.94
304	4.7387	4.9503	6411.8	174.47	71.74	1657	188.14	75.46	16.57
305	4.8392	8.0469	4242.7	167.29	74.26	4934	175.12	106.3	25.90
305	4.8392	5.6788	5852.4	172.57	78.86	7441	178.83	122.1	18.40

C_v, constant volume molar heat capacity (J·K^{-1}·mol^{-1})
C_p, constant pressure molar heat capacity (J·K^{-1}·mol^{-1})
c, speed of sound (m·s^{-1})
η, viscosity (μPa·s)
λ, thermal conductivity (mW·m^{-1}·K^{-1})

3.3 These tables were produced by equations from a computer package, "NIST Standard Reference Database 23; Reference Fluid Thermodynamic and Transport Properties Database (REFPROP): Version =8.0" A wide selection of units (SI units, engineering units, chemical units) is available with this program.[2]

4. Additional Information

~~5.1These tables were originally published by the American Chemical Society and the American Institute of Physics for the National Institute of Standards and Technology in a comprehensive report titled "Thermophysical Properties of Fluids. II. Methane, Ethane, Propane, Isobutane and Normal Butane." This report also contains the following:~~

~~5.1.1Properties and uncertainties data.~~

~~5.1.2Correlation equations for ethane.~~

~~5.1.3Description of the research study culminating in the tables.~~

~~5.1.4References to properties data.~~

~~5.1.5Computational methods used.~~

~~6.~~

4.1 Reference state properties are required to calculate certain of the thermodynamic properties (enthalpy, entropy, etc.) from an equation of state formulation. The reference state properties used to generate the tables in this specification are: enthalpy, *H*, and entropy, *S*, at 298.15 K and 0.101325 MPa (*H* = 11874.2 J/mol and *S* = 221.116 J/(mol K). The molar mass of ethane is 30.069 g/mol.

5. Keywords

~~6.1natural gas tables~~

[3] Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR: D03–1005.
[2] Available from Standard Reference Data, National Institute of Standards and Technology (NIST), 100 Bureau Drive, Stop 3460, Gaithersburg, MD 20899.