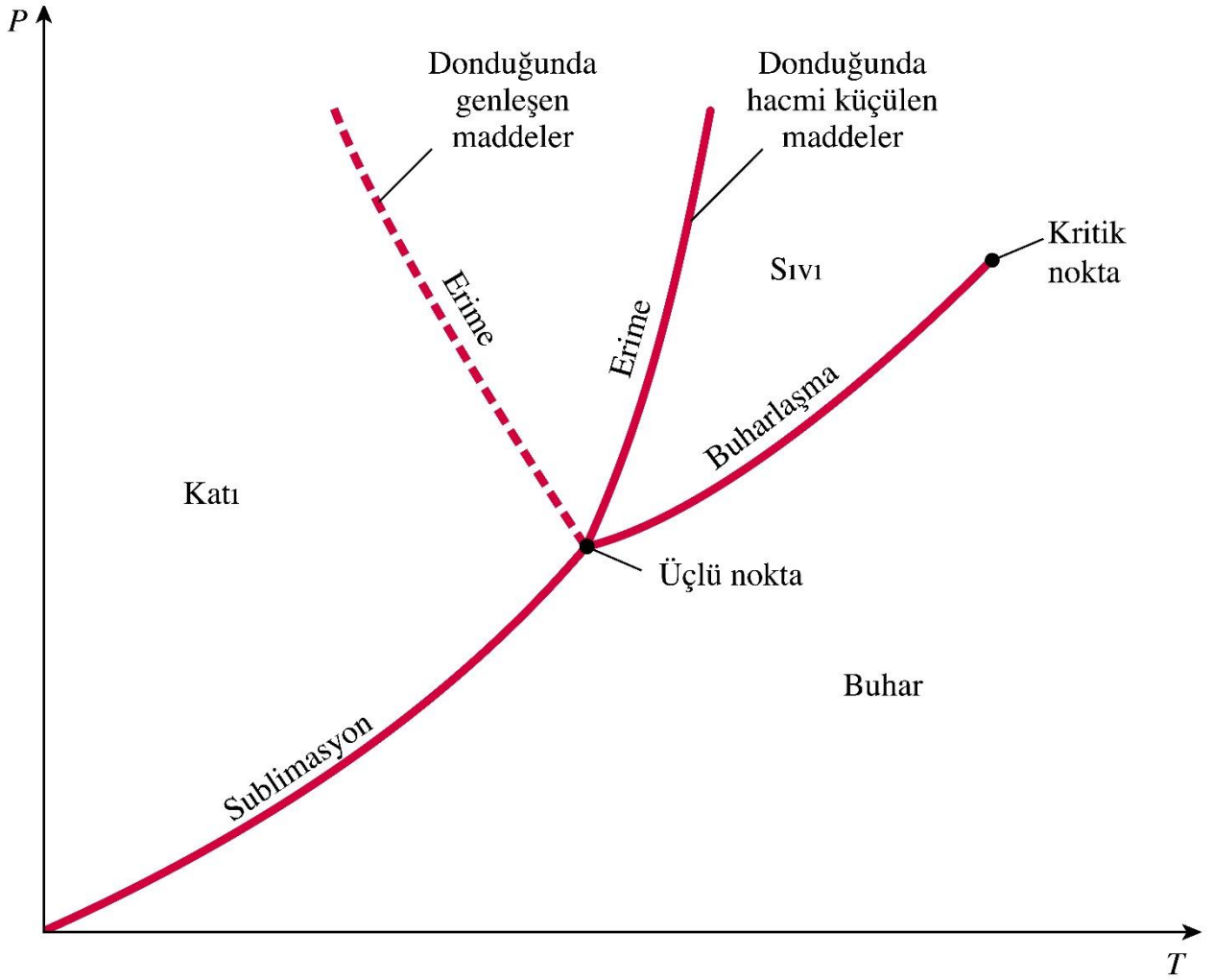


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TERMODİNAMİK I-II DERSİ İÇİN TABLO VE DİYAGRAMLAR

(Tables and Diagrams for Thermodynamics I-II)

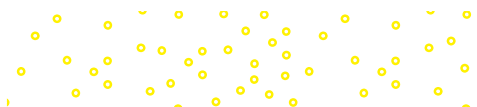
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Not: B ile verilen tablolar; “<https://onlinelibrary.wiley.com/doi/pdf/10.1002/9780470970751.app2>” sitesindeki ve çeşitli ücretsiz kaynaklardaki bilgiler derlenerek oluşturulmuştur.

TABLE A-1

Molar mass, gas constant, and critical-point properties

Substance	Formula	Molar mass, M kg/kmol	Gas constant, R kJ/kg·K*	Critical-point properties		
				Temperature, K	Pressure, MPa	Volume, m ³ /kmol
Air	—	28.97	0.2870	132.5	3.77	0.0883
Ammonia	NH ₃	17.03	0.4882	405.5	11.28	0.0724
Argon	Ar	39.948	0.2081	151	4.86	0.0749
Benzene	C ₆ H ₆	78.115	0.1064	562	4.92	0.2603
Bromine	Br ₂	159.808	0.0520	584	10.34	0.1355
<i>n</i> -Butane	C ₄ H ₁₀	58.124	0.1430	425.2	3.80	0.2547
Carbon dioxide	CO ₂	44.01	0.1889	304.2	7.39	0.0943
Carbon monoxide	CO	28.011	0.2968	133	3.50	0.0930
Carbon tetrachloride	CCl ₄	153.82	0.05405	556.4	4.56	0.2759
Chlorine	Cl ₂	70.906	0.1173	417	7.71	0.1242
Chloroform	CHCl ₃	119.38	0.06964	536.6	5.47	0.2403
Dichlorodifluoromethane (R-12)	CCl ₂ F ₂	120.91	0.06876	384.7	4.01	0.2179
Dichlorofluoromethane (R-21)	CHCl ₂ F	102.92	0.08078	451.7	5.17	0.1973
Ethane	C ₂ H ₆	30.070	0.2765	305.5	4.48	0.1480
Ethyl alcohol	C ₂ H ₅ OH	46.07	0.1805	516	6.38	0.1673
Ethylene	C ₂ H ₄	28.054	0.2964	282.4	5.12	0.1242
Helium	He	4.003	2.0769	5.3	0.23	0.0578
<i>n</i> -Hexane	C ₆ H ₁₄	86.179	0.09647	507.9	3.03	0.3677
Hydrogen (normal)	H ₂	2.016	4.1240	33.3	1.30	0.0649
Krypton	Kr	83.80	0.09921	209.4	5.50	0.0924
Methane	CH ₄	16.043	0.5182	191.1	4.64	0.0993
Methyl alcohol	CH ₃ OH	32.042	0.2595	513.2	7.95	0.1180
Methyl chloride	CH ₃ Cl	50.488	0.1647	416.3	6.68	0.1430
Neon	Ne	20.183	0.4119	44.5	2.73	0.0417
Nitrogen	N ₂	28.013	0.2968	126.2	3.39	0.0899
Nitrous oxide	N ₂ O	44.013	0.1889	309.7	7.27	0.0961
Oxygen	O ₂	31.999	0.2598	154.8	5.08	0.0780
Propane	C ₃ H ₈	44.097	0.1885	370	4.26	0.1998
Propylene	C ₃ H ₆	42.081	0.1976	365	4.62	0.1810
Sulfur dioxide	SO ₂	64.063	0.1298	430.7	7.88	0.1217
Tetrafluoroethane (R-134a)	CF ₃ CH ₂ F	102.03	0.08149	374.2	4.059	0.1993
Trichlorofluoromethane (R-11)	CCl ₃ F	137.37	0.06052	471.2	4.38	0.2478
Water	H ₂ O	18.015	0.4615	647.1	22.06	0.0560
Xenon	Xe	131.30	0.06332	289.8	5.88	0.1186

*The unit kJ/kg·K is equivalent to kPa·m³/kg·K. The gas constant is calculated from $R = R_u/M$, where $R_u = 8.31447$ kJ/kmol·K and M is the molar mass.

TABLO A-1

Mol kütlesi, gaz sabiti ve kritik nokta özellikleri

Madde	Kimyasal formül	Mol kütlesi, M kg/kmol	Gaz sabiti, R kJ/kg·K*	Kritik nokta özellikleri		
				Sıcaklık, K	Basınç, MPa	Hacim, m ³ /kmol

TABLE A-2

Ideal-gas specific heats of various common gases

(a) At 300 K

Gas	Formula	Gas constant, R kJ/kg·K	c_p kJ/kg·K	c_v kJ/kg·K	k
Air	—	0.2870	1.005	0.718	1.400
Argon	Ar	0.2081	0.5203	0.3122	1.667
Butane	C ₄ H ₁₀	0.1433	1.7164	1.5734	1.091
Carbon dioxide	CO ₂	0.1889	0.846	0.657	1.289
Carbon monoxide	CO	0.2968	1.040	0.744	1.400
Ethane	C ₂ H ₆	0.2765	1.7662	1.4897	1.186
Ethylene	C ₂ H ₄	0.2964	1.5482	1.2518	1.237
Helium	He	2.0769	5.1926	3.1156	1.667
Hydrogen	H ₂	4.1240	14.307	10.183	1.405
Methane	CH ₄	0.5182	2.2537	1.7354	1.299
Neon	Ne	0.4119	1.0299	0.6179	1.667
Nitrogen	N ₂	0.2968	1.039	0.743	1.400
Octane	C ₈ H ₁₈	0.0729	1.7113	1.6385	1.044
Oxygen	O ₂	0.2598	0.918	0.658	1.395
Propane	C ₃ H ₈	0.1885	1.6794	1.4909	1.126
Steam	H ₂ O	0.4615	1.8723	1.4108	1.327

Note: The unit kJ/kg·K is equivalent to kJ/kg·°C.

TABLO A-2

Bilinen bazı gazların mükemmel gaz-özgül ısıları

(a) At 300 K

Gaz	Kimyasal formülü	Gaz sabiti, R kJ/kg·K	c_p kJ/kg·K	c_v kJ/kg·K	k
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TABLE A-2

Ideal-gas specific heats of various common gases (*Continued*)

(b) At various temperatures

Temperature, K	c_p	c_v	k	c_p	c_v	k	c_p	c_v	k
	kJ/kg·K	kJ/kg·K		kJ/kg·K	kJ/kg·K		kJ/kg·K	kJ/kg·K	
	<i>Air</i>			<i>Carbon dioxide, CO₂</i>			<i>Carbon monoxide, CO</i>		
250	1.003	0.716	1.401	0.791	0.602	1.314	1.039	0.743	1.400
300	1.005	0.718	1.400	0.846	0.657	1.288	1.040	0.744	1.399
350	1.008	0.721	1.398	0.895	0.706	1.268	1.043	0.746	1.398
400	1.013	0.726	1.395	0.939	0.750	1.252	1.047	0.751	1.395
450	1.020	0.733	1.391	0.978	0.790	1.239	1.054	0.757	1.392
500	1.029	0.742	1.387	1.014	0.825	1.229	1.063	0.767	1.387
550	1.040	0.753	1.381	1.046	0.857	1.220	1.075	0.778	1.382
600	1.051	0.764	1.376	1.075	0.886	1.213	1.087	0.790	1.376
650	1.063	0.776	1.370	1.102	0.913	1.207	1.100	0.803	1.370
700	1.075	0.788	1.364	1.126	0.937	1.202	1.113	0.816	1.364
750	1.087	0.800	1.359	1.148	0.959	1.197	1.126	0.829	1.358
800	1.099	0.812	1.354	1.169	0.980	1.193	1.139	0.842	1.353
900	1.121	0.834	1.344	1.204	1.015	1.186	1.163	0.866	1.343
1000	1.142	0.855	1.336	1.234	1.045	1.181	1.185	0.888	1.335
	<i>Hydrogen, H₂</i>			<i>Nitrogen, N₂</i>			<i>Oxygen, O₂</i>		
250	14.051	9.927	1.416	1.039	0.742	1.400	0.913	0.653	1.398
300	14.307	10.183	1.405	1.039	0.743	1.400	0.918	0.658	1.395
350	14.427	10.302	1.400	1.041	0.744	1.399	0.928	0.668	1.389
400	14.476	10.352	1.398	1.044	0.747	1.397	0.941	0.681	1.382
450	14.501	10.377	1.398	1.049	0.752	1.395	0.956	0.696	1.373
500	14.513	10.389	1.397	1.056	0.759	1.391	0.972	0.712	1.365
550	14.530	10.405	1.396	1.065	0.768	1.387	0.988	0.728	1.358
600	14.546	10.422	1.396	1.075	0.778	1.382	1.003	0.743	1.350
650	14.571	10.447	1.395	1.086	0.789	1.376	1.017	0.758	1.343
700	14.604	10.480	1.394	1.098	0.801	1.371	1.031	0.771	1.337
750	14.645	10.521	1.392	1.110	0.813	1.365	1.043	0.783	1.332
800	14.695	10.570	1.390	1.121	0.825	1.360	1.054	0.794	1.327
900	14.822	10.698	1.385	1.145	0.849	1.349	1.074	0.814	1.319
1000	14.983	10.859	1.380	1.167	0.870	1.341	1.090	0.830	1.313

TABLO A-2

Bilinen bazı gazların mükemmel-gaz özgül ısıları (*Devami*)

(b) Değişik sıcaklıklarda

Temperature, K	c_p	c_v	k	c_p	c_v	k	c_p	c_v	k
	kJ/kg·K	kJ/kg·K		kJ/kg·K	kJ/kg·K		kJ/kg·K	kJ/kg·K	

TABLE A-2

Ideal-gas specific heats of various common gases (Concluded)

(c) As a function of temperature

$$\bar{c}_p = a + bT + cT^2 + dT^3$$

(T in K, c_p in kJ/kmol·K)

Substance	Formula	a	b	c	d	Temperature range, K	% error	
							Max.	Avg.
Nitrogen	N ₂	28.90	-0.1571×10^{-2}	0.8081×10^{-5}	-2.873×10^{-9}	273–1800	0.59	0.34
Oxygen	O ₂	25.48	1.520×10^{-2}	-0.7155×10^{-5}	1.312×10^{-9}	273–1800	1.19	0.28
Air	—	28.11	0.1967×10^{-2}	0.4802×10^{-5}	-1.966×10^{-9}	273–1800	0.72	0.33
Hydrogen	H ₂	29.11	-0.1916×10^{-2}	0.4003×10^{-5}	-0.8704×10^{-9}	273–1800	1.01	0.26
Carbon monoxide	CO	28.16	0.1675×10^{-2}	0.5372×10^{-5}	-2.222×10^{-9}	273–1800	0.89	0.37
Carbon dioxide	CO ₂	22.26	5.981×10^{-2}	-3.501×10^{-5}	7.469×10^{-9}	273–1800	0.67	0.22
Water vapor	H ₂ O	32.24	0.1923×10^{-2}	1.055×10^{-5}	-3.595×10^{-9}	273–1800	0.53	0.24
Nitric oxide	NO	29.34	-0.09395×10^{-2}	0.9747×10^{-5}	-4.187×10^{-9}	273–1500	0.97	0.36
Nitrous oxide	N ₂ O	24.11	5.8632×10^{-2}	-3.562×10^{-5}	10.58×10^{-9}	273–1500	0.59	0.26
Nitrogen dioxide	NO ₂	22.9	5.715×10^{-2}	-3.52×10^{-5}	7.87×10^{-9}	273–1500	0.46	0.18
Ammonia	NH ₃	27.568	2.5630×10^{-2}	0.99072×10^{-5}	-6.6909×10^{-9}	273–1500	0.91	0.36
Sulfur	S	27.21	2.218×10^{-2}	-1.628×10^{-5}	3.986×10^{-9}	273–1800	0.99	0.38
Sulfur dioxide	SO ₂	25.78	5.795×10^{-2}	-3.812×10^{-5}	8.612×10^{-9}	273–1800	0.45	0.24
Sulfur trioxide	SO ₃	16.40	14.58×10^{-2}	-11.20×10^{-5}	32.42×10^{-9}	273–1300	0.29	0.13
Acetylene	C ₂ H ₂	21.8	9.2143×10^{-2}	-6.527×10^{-5}	18.21×10^{-9}	273–1500	1.46	0.59
Benzene	C ₆ H ₆	-36.22	48.475×10^{-2}	-31.57×10^{-5}	77.62×10^{-9}	273–1500	0.34	0.20
Methanol	CH ₄ O	19.0	9.152×10^{-2}	-1.22×10^{-5}	-8.039×10^{-9}	273–1000	0.18	0.08
Ethanol	C ₂ H ₆ O	19.9	20.96×10^{-2}	-10.38×10^{-5}	20.05×10^{-9}	273–1500	0.40	0.22
Hydrogen chloride	HCl	30.33	-0.7620×10^{-2}	1.327×10^{-5}	-4.338×10^{-9}	273–1500	0.22	0.08
Methane	CH ₄	19.89	5.024×10^{-2}	1.269×10^{-5}	-11.01×10^{-9}	273–1500	1.33	0.57
Ethane	C ₂ H ₆	6.900	17.27×10^{-2}	-6.406×10^{-5}	7.285×10^{-9}	273–1500	0.83	0.28
Propane	C ₃ H ₈	-4.04	30.48×10^{-2}	-15.72×10^{-5}	31.74×10^{-9}	273–1500	0.40	0.12
<i>n</i> -Butane	C ₄ H ₁₀	3.96	37.15×10^{-2}	-18.34×10^{-5}	35.00×10^{-9}	273–1500	0.54	0.24
<i>i</i> -Butane	C ₄ H ₁₀	-7.913	41.60×10^{-2}	-23.01×10^{-5}	49.91×10^{-9}	273–1500	0.25	0.13
<i>n</i> -Pentane	C ₅ H ₁₂	6.774	45.43×10^{-2}	-22.46×10^{-5}	42.29×10^{-9}	273–1500	0.56	0.21
<i>n</i> -Hexane	C ₆ H ₁₄	6.938	55.22×10^{-2}	-28.65×10^{-5}	57.69×10^{-9}	273–1500	0.72	0.20
Ethylene	C ₂ H ₄	3.95	15.64×10^{-2}	-8.344×10^{-5}	17.67×10^{-9}	273–1500	0.54	0.13
Propylene	C ₃ H ₆	3.15	23.83×10^{-2}	-12.18×10^{-5}	24.62×10^{-9}	273–1500	0.73	0.17

TABLO A-2

Bilinen bazı gazların mükemmel-gaz ısıları (Devam)

(c) Sıcaklığın fonksiyonu olarak

$$\bar{c}_p = a + bT + cT^2 + dT^3$$

Madde	Kimyasal formülü	a	b	c	d	Sıcaklık aralığı, K	% hata	
							Maks.	Ort.

TABLE A-3

Properties of common liquids, solids, and foods (Concluded)

(b) Solids (values are for room temperature unless indicated otherwise)

Substance	Density, ρ kg/m ³	Specific heat, c_p kJ/kg·K	Substance	Density, ρ kg/m ³	Specific heat, c_p kJ/kg·K
Metals			Nonmetals		
Aluminum			Asphalt	2110	0.920
200 K		0.797	Brick, common	1922	0.79
250 K		0.859	Brick, fireclay (500°C)	2300	0.960
300 K	2,700	0.902	Concrete	2300	0.653
350 K		0.929	Clay	1000	0.920
400 K		0.949	Diamond	2420	0.616
450 K		0.973	Glass, window	2700	0.800
500 K		0.997	Glass, pyrex	2230	0.840
Bronze (76% Cu, 2% Zn, 2% Al)	8,280	0.400	Graphite	2500	0.711
Brass, yellow (65% Cu, 35% Zn)	8,310	0.400	Granite	2700	1.017
Copper			Gypsum or plaster board	800	1.09
−173°C		0.254	Ice		
−100°C		0.342	200 K		1.56
−50°C		0.367	220 K		1.71
0°C		0.381	240 K		1.86
27°C	8,900	0.386	260 K		2.01
100°C		0.393	273 K	921	2.11
200°C		0.403	Limestone	1650	0.909
Iron	7,840	0.45	Marble	2600	0.880
Lead	11,310	0.128	Plywood (Douglas Fir)	545	1.21
Magnesium	1,730	1.000	Rubber (soft)	1100	1.840
Nickel	8,890	0.440	Rubber (hard)	1150	2.009
Silver	10,470	0.235	Sand	1520	0.800
Steel, mild	7,830	0.500	Stone	1500	0.800
Tungsten	19,400	0.130	Woods, hard (maple, oak, etc.)	721	1.26
			Woods, soft (fir, pine, etc.)	513	1.38

(c) Foods

Food	Water		Specific heat, kJ/kg·K		Latent heat of fusion, kJ/kg	Food	Water		Specific heat, kJ/kg·K		Latent heat of fusion, kJ/kg
	content, % (mass)	Freezing point, °C	Above freezing	Below freezing			content, % (mass)	Freezing point, °C	Above freezing	Below freezing	
Apples	84	−1.1	3.65	1.90	281	Lettuce	95	−0.2	4.02	2.04	317
Bananas	75	−0.8	3.35	1.78	251	Milk, whole	88	−0.6	3.79	1.95	294
Beef round	67	—	3.08	1.68	224	Oranges	87	−0.8	3.75	1.94	291
Broccoli	90	−0.6	3.86	1.97	301	Potatoes	78	−0.6	3.45	1.82	261
Butter	16	—	—	1.04	53	Salmon fish	64	−2.2	2.98	1.65	214
Cheese, swiss	39	−10.0	2.15	1.33	130	Shrimp	83	−2.2	3.62	1.89	277
Cherries	80	−1.8	3.52	1.85	267	Spinach	93	−0.3	3.96	2.01	311
Chicken	74	−2.8	3.32	1.77	247	Strawberries	90	−0.8	3.86	1.97	301
Corn, sweet	74	−0.6	3.32	1.77	247	Tomatoes, ripe	94	−0.5	3.99	2.02	314
Eggs, whole	74	−0.6	3.32	1.77	247	Turkey	64	—	2.98	1.65	214
Ice cream	63	−5.6	2.95	1.63	210	Watermelon	93	−0.4	3.96	2.01	311

TABLO A-3

Bilinen bazı sıvı, katı ve yiyeceklerin özellikleri (Devamı)

(b) Katılar (aksi belirtilmediği sürece değerler oda sıcaklığındadır.)

TABLE A-4

Saturated water—Temperature table

Temp., T °C	Sat. Press., P_{sat} kPa	Specific volume, m^3/kg		Internal energy, kJ/kg			Enthalpy, kJ/kg			Entropy, kJ/kg·K		
		Sat. liquid, v_f	Sat. vapor, v_g	Sat. liquid, u_f	Evap., u_{fg}	Sat. vapor, u_g	Sat. liquid, h_f	Evap., h_{fg}	Sat. vapor, h_g	Sat. liquid, s_f	Evap., s_{fg}	Sat. vapor, s_g
0.01	0.6117	0.001000	206.00	0.000	2374.9	2374.9	0.001	2500.9	2500.9	0.0000	9.1556	9.1556
5	0.8725	0.001000	147.03	21.019	2360.8	2381.8	21.020	2489.1	2510.1	0.0763	8.9487	9.0249
10	1.2281	0.001000	106.32	42.020	2346.6	2388.7	42.022	2477.2	2519.2	0.1511	8.7488	8.8999
15	1.7057	0.001001	77.885	62.980	2332.5	2395.5	62.982	2465.4	2528.3	0.2245	8.5559	8.7803
20	2.3392	0.001002	57.762	83.913	2318.4	2402.3	83.915	2453.5	2537.4	0.2965	8.3696	8.6661
25	3.1698	0.001003	43.340	104.83	2304.3	2409.1	104.83	2441.7	2546.5	0.3672	8.1895	8.5567
30	4.2469	0.001004	32.879	125.73	2290.2	2415.9	125.74	2429.8	2555.6	0.4368	8.0152	8.4520
35	5.6291	0.001006	25.205	146.63	2276.0	2422.7	146.64	2417.9	2564.6	0.5051	7.8466	8.3517
40	7.3851	0.001008	19.515	167.53	2261.9	2429.4	167.53	2406.0	2573.5	0.5724	7.6832	8.2556
45	9.5953	0.001010	15.251	188.43	2247.7	2436.1	188.44	2394.0	2582.4	0.6386	7.5247	8.1633
50	12.352	0.001012	12.026	209.33	2233.4	2442.7	209.34	2382.0	2591.3	0.7038	7.3710	8.0748
55	15.763	0.001015	9.5639	230.24	2219.1	2449.3	230.26	2369.8	2600.1	0.7680	7.2218	7.9898
60	19.947	0.001017	7.6670	251.16	2204.7	2455.9	251.18	2357.7	2608.8	0.8313	7.0769	7.9082
65	25.043	0.001020	6.1935	272.09	2190.3	2462.4	272.12	2345.4	2617.5	0.8937	6.9360	7.8296
70	31.202	0.001023	5.0396	293.04	2175.8	2468.9	293.07	2333.0	2626.1	0.9551	6.7989	7.7540
75	38.597	0.001026	4.1291	313.99	2161.3	2475.3	314.03	2320.6	2634.6	1.0158	6.6655	7.6812
80	47.416	0.001029	3.4053	334.97	2146.6	2481.6	335.02	2308.0	2643.0	1.0756	6.5355	7.6111
85	57.868	0.001032	2.8261	355.96	2131.9	2487.8	356.02	2295.3	2651.4	1.1346	6.4089	7.5435
90	70.183	0.001036	2.3593	376.97	2117.0	2494.0	377.04	2282.5	2659.6	1.1929	6.2853	7.4782
95	84.609	0.001040	1.9808	398.00	2102.0	2500.1	398.09	2269.6	2667.6	1.2504	6.1647	7.4151
100	101.42	0.001043	1.6720	419.06	2087.0	2506.0	419.17	2256.4	2675.6	1.3072	6.0470	7.3542
105	120.90	0.001047	1.4186	440.15	2071.8	2511.9	440.28	2243.1	2683.4	1.3634	5.9319	7.2952
110	143.38	0.001052	1.2094	461.27	2056.4	2517.7	461.42	2229.7	2691.1	1.4188	5.8193	7.2382
115	169.18	0.001056	1.0360	482.42	2040.9	2523.3	482.59	2216.0	2698.6	1.4737	5.7092	7.1829
120	198.67	0.001060	0.89133	503.60	2025.3	2528.9	503.81	2202.1	2706.0	1.5279	5.6013	7.1292
125	232.23	0.001065	0.77012	524.83	2009.5	2534.3	525.07	2188.1	2713.1	1.5816	5.4956	7.0771
130	270.28	0.001070	0.66808	546.10	1993.4	2539.5	546.38	2173.7	2720.1	1.6346	5.3919	7.0265
135	313.22	0.001075	0.58179	567.41	1977.3	2544.7	567.75	2159.1	2726.9	1.6872	5.2901	6.9773
140	361.53	0.001080	0.50850	588.77	1960.9	2549.6	589.16	2144.3	2733.5	1.7392	5.1901	6.9294
145	415.68	0.001085	0.44600	610.19	1944.2	2554.4	610.64	2129.2	2739.8	1.7908	5.0919	6.8827
150	476.16	0.001091	0.39248	631.66	1927.4	2559.1	632.18	2113.8	2745.9	1.8418	4.9953	6.8371
155	543.49	0.001096	0.34648	653.19	1910.3	2563.5	653.79	2098.0	2751.8	1.8924	4.9002	6.7927
160	618.23	0.001102	0.30680	674.79	1893.0	2567.8	675.47	2082.0	2757.5	1.9426	4.8066	6.7492
165	700.93	0.001108	0.27244	696.46	1875.4	2571.9	697.24	2065.6	2762.8	1.9923	4.7143	6.7067
170	792.18	0.001114	0.24260	718.20	1857.5	2575.7	719.08	2048.8	2767.9	2.0417	4.6233	6.6650
175	892.60	0.001121	0.21659	740.02	1839.4	2579.4	741.02	2031.7	2772.7	2.0906	4.5335	6.6242
180	1002.8	0.001127	0.19384	761.92	1820.9	2582.8	763.05	2014.2	2777.2	2.1392	4.4448	6.5841
185	1123.5	0.001134	0.17390	783.91	1802.1	2586.0	785.19	1996.2	2781.4	2.1875	4.3572	6.5447
190	1255.2	0.001141	0.15636	806.00	1783.0	2589.0	807.43	1977.9	2785.3	2.2355	4.2705	6.5059
195	1398.8	0.001149	0.14089	828.18	1763.6	2591.7	829.78	1959.0	2788.8	2.2831	4.1847	6.4678
200	1554.9	0.001157	0.12721	850.46	1743.7	2594.2	852.26	1939.8	2792.0	2.3305	4.0997	6.4302

TABLO A-4

Doymuş su—Sıcaklık tablosu

Sıcaklık, T °C	Doymuş basınç, P_{doy} kPa	Özgül hacim, m^3/kg		İç enerji, kJ/kg			Entalpi, kJ/kg			Entropi, kJ/kg·K		
		Doymuş sıvı, v_f	Doymuş buhar, v_g	Doymuş sıvı, u_f	Doymuş Buhar, u_{fg}	Doymuş buhar, u_g	Doymuş sıvı, h_f	Doymuş Buhar, h_{fg}	Doymuş buhar, h_g	Doymuş sıvı, s_f	Doymuş Buhar, s_{fg}	Doymuş buhar, s_g
0.01	0.6117	0.001000	206.00	0.000	2374.9	2374.9	0.001	2500.9	2500.9	0.0000	9.1556	9.1556
5	0.8725	0.001000	147.03	21.019	2360.8	2381.8	21.020	2489.1	2510.1	0.0763	8.9487	9.0249
10	1.2281	0.001000	106.32	42.020	2346.6	2388.7	42.022	2477.2	2519.2	0.1511	8.7488	8.8999
15	1.7057	0.001001	77.885	62.980	2332.5	2395.5	62.982	2465.4	2528.3	0.2245	8.5559	8.7803
20	2.3392	0.001002	57.762	83.913	2318.4	2402.3	83.915	2453.5	2537.4	0.2965	8.3696	8.6661
25	3.1698	0.001003	43.340	104.83	2304.3	2409.1	104.83	2441.7	2546.5	0.3672	8.1895	8.5567
30	4.2469	0.001004	32.879	125.73	2290.2	2415.9	125.74	2429.8	2555.6	0.4368	8.0152	8.4520
35	5.6291	0.001006	25.205	146.63	2276.0	2422.7	146.64	2417.9	2564.6	0.5051	7.8466	8.3517
40	7.3851	0.001008	19.515	167.53	2261.9	2429.4	167.53	2406.0	2573.5	0.5724	7.6832	8.2556
45	9.5953	0.001010	15.251	188.43	2247.7	2436.1	188.44	2394.0	2582.4	0.6386	7.5247	8.1633
50	12.352	0.001012	12.026	209.33	2233.4	2442.7	209.34	2382.0	2591.3	0.7038	7.3710	8.0748
55	15.763	0.001015	9.5639	230.24	2219.1	2449.3	230.26	2369.8	2600.1	0.7680	7.2218	7.9898
60	19.947	0.001017	7.6670	251.16	2204.7	2455.9	251.18	2357.7	2608.8	0.8313	7.0769	7.9082
65	25.043	0.001020	6.1935	272.09	2190.3	2462.4	272.12	2345.4	2617.5	0.8937	6.9360	7.8296
70	31.202	0.001023	5.0396	293.04	2175.8	2468.9	293.07	2333.0	2626.1	0.9551	6.7989	7.7540
75	38.597	0.001026	4.1291	313.99	2161.3	2475.3	314.03	2320.6	2634.6	1.0158	6.6655	7.6812
80	47.416	0.001029	3.4053	334.97	2146.6	2481.6	335.02	2308.0	2643.0	1.0756	6.5355	7.6111
85	57.868	0.001032	2.8261	355.96	2131.9	2487.8	356.02	2295.3	2651.4	1.1346	6.4089	7.5435
90	70.183	0.001036	2.3593	376.97	2117.0	2494.0	377.04	2282.5	2659.6	1.1929	6.2853	7.4782
95	84.609	0.001040	1.9808	398.00	2102.0	2500.1	398.09	2269.6	2667.6	1.2504	6.1647	7.4151
100	101.42	0.001043	1.6720	419.06	2087.0	2506.0	419.17	2256.4	2675.6	1.3072	6.0470	7.3542
105	120.90	0.001047	1.4186	440.15	2071.8	2511.9	440.28	2243.1	2683.4	1.3634	5.9319	7.2952
110	143.38	0.001052	1.2094	461.27	2056.4	2517.7	461.42	2229.7	2691.1	1.4188	5.8193	7.2382
115	169.18	0.001056	1.0360	482.42	2040.9	2523.3	482.59	2216.0	2698.6	1.4737	5.7092	7.1829
120	198.67	0.001060	0.89133	503.60	2025.3	2528.9	503.81	2202.1	2706.0	1.5279	5.6013	7.1292
125	232.23	0.001065	0.77012	524.83	2009.5	2534.3	525.07	2188.1	2713.1	1.5816	5.4956	7.0771
130	270.28	0.001070	0.66808	546.10	1993.4	2539.5	546.38	2173.7	2720.1	1.6346	5.3919	7.0265
135	313.22	0.001075	0.58179	567.41	1977.3	2544.7	567.75	2159.1	2726.9	1.6872	5.2901	6.9773
140	361.53	0.001080	0.50850	588.77	1960.9	2549.6	589.16	2144.3	2733.5	1.7392	5.1901	6.9294
145	415.68	0.001085	0.44600	610.19	1944.2	2554.4	610.64	2129.2	2739.8	1.7908	5.0919	6.8827
150	476.16	0.001091	0.39248	631.66	1927.4	2559.1	632.18	2113.8	2745.9	1.8418	4.9953	6.8371
155	543.49	0.001096	0.34648	653.19	1910.3	2563.5	653.79	2098.0	2751.8	1.8924	4.9002	6.7927
160	618.23	0.001102	0.30680	674.79	1893.0	2567.8	675.47	2082.0	2757.5	1.9426	4.8066	6.7492
165	700.93	0.001108	0.27244	696.46	1875.4	2571.9	697.24	2065.6	2762.8	1.9923	4.7143	6.7067
170	792.18	0.001114	0.24260	718.20	1857.5	2575.7	719.08	2048.8	2767.9	2.0417	4.6233	6.6650
175	892.60	0.001121	0.21659	740.02	1839.4	2579.4	741.02	2031.7	2772.7	2.0906	4.5335	6.6242

TABLE A-4

Saturated water—Temperature table (Concluded)

Temp., T °C	Specific volume, m^3/kg			Internal energy, kJ/kg			Enthalpy, kJ/kg			Entropy, $kJ/kg \cdot K$		
	Sat. Press., P_{sat} kPa	Sat. liquid, v_f	Sat. vapor, v_g	Sat. liquid, u_f	Evap., u_{fg}	Sat. vapor, u_g	Sat. liquid, h_f	Evap., h_{fg}	Sat. vapor, h_g	Sat. liquid, s_f	Evap., s_{fg}	Sat. vapor, s_g
205	1724.3	0.001164	0.11508	872.86	1723.5	2596.4	874.87	1920.0	2794.8	2.3776	4.0154	6.3930
210	1907.7	0.001173	0.10429	895.38	1702.9	2598.3	897.61	1899.7	2797.3	2.4245	3.9318	6.3563
215	2105.9	0.001181	0.094680	918.02	1681.9	2599.9	920.50	1878.8	2799.3	2.4712	3.8489	6.3200
220	2319.6	0.001190	0.086094	940.79	1660.5	2601.3	943.55	1857.4	2801.0	2.5176	3.7664	6.2840
225	2549.7	0.001199	0.078405	963.70	1638.6	2602.3	966.76	1835.4	2802.2	2.5639	3.6844	6.2483
230	2797.1	0.001209	0.071505	986.76	1616.1	2602.9	990.14	1812.8	2802.9	2.6100	3.6028	6.2128
235	3062.6	0.001219	0.065300	1010.0	1593.2	2603.2	1013.7	1789.5	2803.2	2.6560	3.5216	6.1775
240	3347.0	0.001229	0.059707	1033.4	1569.8	2603.1	1037.5	1765.5	2803.0	2.7018	3.4405	6.1424
245	3651.2	0.001240	0.054656	1056.9	1545.7	2602.7	1061.5	1740.8	2802.2	2.7476	3.3596	6.1072
250	3976.2	0.001252	0.050085	1080.7	1521.1	2601.8	1085.7	1715.3	2801.0	2.7933	3.2788	6.0721
255	4322.9	0.001263	0.045941	1104.7	1495.8	2600.5	1110.1	1689.0	2799.1	2.8390	3.1979	6.0369
260	4692.3	0.001276	0.042175	1128.8	1469.9	2598.7	1134.8	1661.8	2796.6	2.8847	3.1169	6.0017
265	5085.3	0.001289	0.038748	1153.3	1443.2	2596.5	1159.8	1633.7	2793.5	2.9304	3.0358	5.9662
270	5503.0	0.001303	0.035622	1177.9	1415.7	2593.7	1185.1	1604.6	2789.7	2.9762	2.9542	5.9305
275	5946.4	0.001317	0.032767	1202.9	1387.4	2590.3	1210.7	1574.5	2785.2	3.0221	2.8723	5.8944
280	6416.6	0.001333	0.030153	1228.2	1358.2	2586.4	1236.7	1543.2	2779.9	3.0681	2.7898	5.8579
285	6914.6	0.001349	0.027756	1253.7	1328.1	2581.8	1263.1	1510.7	2773.7	3.1144	2.7066	5.8210
290	7441.8	0.001366	0.025554	1279.7	1296.9	2576.5	1289.8	1476.9	2766.7	3.1608	2.6225	5.7834
295	7999.0	0.001384	0.023528	1306.0	1264.5	2570.5	1317.1	1441.6	2758.7	3.2076	2.5374	5.7450
300	8587.9	0.001404	0.021659	1332.7	1230.9	2563.6	1344.8	1404.8	2749.6	3.2548	2.4511	5.7059
305	9209.4	0.001425	0.019932	1360.0	1195.9	2555.8	1373.1	1366.3	2739.4	3.3024	2.3633	5.6657
310	9865.0	0.001447	0.018333	1387.7	1159.3	2547.1	1402.0	1325.9	2727.9	3.3506	2.2737	5.6243
315	10,556	0.001472	0.016849	1416.1	1121.1	2537.2	1431.6	1283.4	2715.0	3.3994	2.1821	5.5816
320	11,284	0.001499	0.015470	1445.1	1080.9	2526.0	1462.0	1238.5	2700.6	3.4491	2.0881	5.5372
325	12,051	0.001528	0.014183	1475.0	1038.5	2513.4	1493.4	1191.0	2684.3	3.4998	1.9911	5.4908
330	12,858	0.001560	0.012979	1505.7	993.5	2499.2	1525.8	1140.3	2666.0	3.5516	1.8906	5.4422
335	13,707	0.001597	0.011848	1537.5	945.5	2483.0	1559.4	1086.0	2645.4	3.6050	1.7857	5.3907
340	14,601	0.001638	0.010783	1570.7	893.8	2464.5	1594.6	1027.4	2622.0	3.6602	1.6756	5.3358
345	15,541	0.001685	0.009772	1605.5	837.7	2443.2	1631.7	963.4	2595.1	3.7179	1.5585	5.2765
350	16,529	0.001741	0.008806	1642.4	775.9	2418.3	1671.2	892.7	2563.9	3.7788	1.4326	5.2114
355	17,570	0.001808	0.007872	1682.2	706.4	2388.6	1714.0	812.9	2526.9	3.8442	1.2942	5.1384
360	18,666	0.001895	0.006950	1726.2	625.7	2351.9	1761.5	720.1	2481.6	3.9165	1.1373	5.0537
365	19,822	0.002015	0.006009	1777.2	526.4	2303.6	1817.2	605.5	2422.7	4.0004	0.9489	4.9493
370	21,044	0.002217	0.004953	1844.5	385.6	2230.1	1891.2	443.1	2334.3	4.1119	0.6890	4.8009
373.95	22,064	0.003106	0.003106	2015.7	0	2015.7	2084.3	0	2084.3	4.4070	0	4.4070

TABLO A-4

Doymuş su—Sıcaklık tablosu (Devamı)

Sıcaklık, T °C	Doymuş basınç, P_{doy} kPa	Özgül hacim, m^3/kg		İç enerji, kJ/kg			Entalpi, kJ/kg			Entropi, $kJ/kg \cdot K$		
		Doymuş sıvı, v_f	Doymuş. buhar, v_g	Doymuş sıvı, u_f	Doymuş Buhar, u_{fg}	Doymuş buhar, u_g	Doymuş sıvı, h_f	Doymuş Buhar, h_{fg}	Doymuş buhar, h_g	Doymuş sıvı, s_f	Doymuş Buhar, s_{fg}	Doymuş buhar, s_g

TABLE A-5

Saturated water—Pressure table

Press., <i>P</i> kPa	Sat. temp., <i>T</i> _{sat} °C	Specific volume, m ³ /kg		Internal energy, kJ/kg			Enthalpy, kJ/kg			Entropy, kJ/kg·K		
		Sat. liquid, <i>v</i> _f	Sat. vapor, <i>v</i> _g	Sat. liquid, <i>u</i> _f	Evap., <i>u</i> _{fg}	Sat. vapor, <i>u</i> _g	Sat. liquid, <i>h</i> _f	Evap., <i>h</i> _{fg}	Sat. vapor, <i>h</i> _g	Sat. liquid, <i>s</i> _f	Evap., <i>s</i> _{fg}	Sat. vapor, <i>s</i> _g
1.0	6.97	0.001000	129.19	29.302	2355.2	2384.5	29.303	2484.4	2513.7	0.1059	8.8690	8.9749
1.5	13.02	0.001001	87.964	54.686	2338.1	2392.8	54.688	2470.1	2524.7	0.1956	8.6314	8.8270
2.0	17.50	0.001001	66.990	73.431	2325.5	2398.9	73.433	2459.5	2532.9	0.2606	8.4621	8.7227
2.5	21.08	0.001002	54.242	88.422	2315.4	2403.8	88.424	2451.0	2539.4	0.3118	8.3302	8.6421
3.0	24.08	0.001003	45.654	100.98	2306.9	2407.9	100.98	2443.9	2544.8	0.3543	8.2222	8.5765
4.0	28.96	0.001004	34.791	121.39	2293.1	2414.5	121.39	2432.3	2553.7	0.4224	8.0510	8.4734
5.0	32.87	0.001005	28.185	137.75	2282.1	2419.8	137.75	2423.0	2560.7	0.4762	7.9176	8.3938
7.5	40.29	0.001008	19.233	168.74	2261.1	2429.8	168.75	2405.3	2574.0	0.5763	7.6738	8.2501
10	45.81	0.001010	14.670	191.79	2245.4	2437.2	191.81	2392.1	2583.9	0.6492	7.4996	8.1488
15	53.97	0.001014	10.020	225.93	2222.1	2448.0	225.94	2372.3	2598.3	0.7549	7.2522	8.0071
20	60.06	0.001017	7.6481	251.40	2204.6	2456.0	251.42	2357.5	2608.9	0.8320	7.0752	7.9073
25	64.96	0.001020	6.2034	271.93	2190.4	2462.4	271.96	2345.5	2617.5	0.8932	6.9370	7.8302
30	69.09	0.001022	5.2287	289.24	2178.5	2467.7	289.27	2335.3	2624.6	0.9441	6.8234	7.7675
40	75.86	0.001026	3.9933	317.58	2158.8	2476.3	317.62	2318.4	2636.1	1.0261	6.6430	7.6691
50	81.32	0.001030	3.2403	340.49	2142.7	2483.2	340.54	2304.7	2645.2	1.0912	6.5019	7.5931
75	91.76	0.001037	2.2172	384.36	2111.8	2496.1	384.44	2278.0	2662.4	1.2132	6.2426	7.4558
100	99.61	0.001043	1.6941	417.40	2088.2	2505.6	417.51	2257.5	2675.0	1.3028	6.0562	7.3589
101.325	99.97	0.001043	1.6734	418.95	2087.0	2506.0	419.06	2256.5	2675.6	1.3069	6.0476	7.3545
125	105.97	0.001048	1.3750	444.23	2068.8	2513.0	444.36	2240.6	2684.9	1.3741	5.9100	7.2841
150	111.35	0.001053	1.1594	466.97	2052.3	2519.2	467.13	2226.0	2693.1	1.4337	5.7894	7.2231
175	116.04	0.001057	1.0037	486.82	2037.7	2524.5	487.01	2213.1	2700.2	1.4850	5.6865	7.1716
200	120.21	0.001061	0.88578	504.50	2024.6	2529.1	504.71	2201.6	2706.3	1.5302	5.5968	7.1270
225	123.97	0.001064	0.79329	520.47	2012.7	2533.2	520.71	2191.0	2711.7	1.5706	5.5171	7.0877
250	127.41	0.001067	0.71873	535.08	2001.8	2536.8	535.35	2181.2	2716.5	1.6072	5.4453	7.0525
275	130.58	0.001070	0.65732	548.57	1991.6	2540.1	548.86	2172.0	2720.9	1.6408	5.3800	7.0207
300	133.52	0.001073	0.60582	561.11	1982.1	2543.2	561.43	2163.5	2724.9	1.6717	5.3200	6.9917
325	136.27	0.001076	0.56199	572.84	1973.1	2545.9	573.19	2155.4	2728.6	1.7005	5.2645	6.9650
350	138.86	0.001079	0.52422	583.89	1964.6	2548.5	584.26	2147.7	2732.0	1.7274	5.2128	6.9402
375	141.30	0.001081	0.49133	594.32	1956.6	2550.9	594.73	2140.4	2735.1	1.7526	5.1645	6.9171
400	143.61	0.001084	0.46242	604.22	1948.9	2553.1	604.66	2133.4	2738.1	1.7765	5.1191	6.8955
450	147.90	0.001088	0.41392	622.65	1934.5	2557.1	623.14	2120.3	2743.4	1.8205	5.0356	6.8561
500	151.83	0.001093	0.37483	639.54	1921.2	2560.7	640.09	2108.0	2748.1	1.8604	4.9603	6.8207
550	155.46	0.001097	0.34261	655.16	1908.8	2563.9	655.77	2096.6	2752.4	1.8970	4.8916	6.7886
600	158.83	0.001101	0.31560	669.72	1897.1	2566.8	670.38	2085.8	2756.2	1.9308	4.8285	6.7593
650	161.98	0.001104	0.29260	683.37	1886.1	2569.4	684.08	2075.5	2759.6	1.9623	4.7699	6.7322
700	164.95	0.001108	0.27278	696.23	1875.6	2571.8	697.00	2065.8	2762.8	1.9918	4.7153	6.7071
750	167.75	0.001111	0.25552	708.40	1865.6	2574.0	709.24	2056.4	2765.7	2.0195	4.6642	6.6837

TABLO A-5

Doymuş su—Basınç tablosu

Basınç, <i>P</i> kPa	Doyma sıcaklığı, <i>T</i> _{doym} °C	Özgül hacim, m ³ /kg		İç enerji, kJ/kg			Entalpi, kJ/kg			Entropi, kJ/kg·K		
		Doymuş sıvı, <i>v</i> _f	Doymuş buhar, <i>v</i> _g	Doymuş sıvı, <i>u</i> _f	Doymuş Buhar, <i>u</i> _{fg}	Doymuş buhar, <i>u</i> _g	Doymuş sıvı, <i>h</i> _f	Doymuş Buhar, <i>h</i> _{fg}	Doymuş buhar, <i>h</i> _g	Doymuş sıvı, <i>s</i> _f	Doymuş Buhar, <i>s</i> _{fg}	Doymuş buhar, <i>s</i> _g
1.0	6.97	0.001000	129.19	29.302	2355.2	2384.5	29.303	2484.4	2513.7	0.1059	8.8690	8.9749
1.5	13.02	0.001001	87.964	54.686	2338.1	2392.8	54.688	2470.1	2524.7	0.1956	8.6314	8.8270
2.0	17.50	0.001001	66.990	73.431	2325.5	2398.9	73.433	2459.5	2532.9	0.2606	8.4621	8.7227
2.5	21.08	0.001002	54.242	88.422	2315.4	2403.8	88.424	2451.0	2539.4	0.3118	8.3302	8.6421
3.0	24.08	0.001003	45.654	100.98	2306.9	2407.9	100.98	2443.9	2544.8	0.3543	8.2222	8.5765
4.0	28.96	0.001004	34.791	121.39	2293.1	2414.5	121.39	2432.3	2553.7	0.4224	8.0510	8.4734
5.0	32.87	0.001005	28.185	137.75	2282.1	2419.8	137.75	2423.0	2560.7	0.4762	7.9176	8.3938
7.5	40.29	0.001008	19.233	168.74	2261.1	2429.8	168.75	2405.3	2574.0	0.5763	7.6738	8.2501
10	45.81	0.001010	14.670	191.79	2245.4	2437.2	191.81	2392.1	2583.9	0.6492	7.4996	8.1488
15	53.97	0.001014	10.020	225.93	2222.1	2448.0	225.94	2372.3	2598.3	0.7549	7.2522	8.0071
20	60.06	0.001017	7.6481	251.40	2204.6	2456.0	251.42	2357.5	2608.9	0.8320	7.0752	7.9073
25	64.96	0.001020	6.2034	271.93	2190.4	2462.4	271.96	2345.5	2617.5	0.8932	6.9370	7.8302
30	69.09	0.001022	5.2287	289.24	2178.5	2467.7	289.27	2335.3	2624.6	0.9441	6.8234	7.7675
40	75.86	0.001026	3.9933	317.58	2158.8	2476.3	317.62	2318.4	2636.1	1.0261	6.6430	7.6691
50	81.32	0.001030	3.2403	340.49	2142.7	2483.2	340.54	2304.7	2645.2	1.0912	6.5019	7.5931
75	91.76	0.001037	2.2172	384.36	2111.8	2496.1	384.44	2278.0	2662.4	1.2132	6.2426	7.4558
100	99.61	0.001043	1.6941	417.40	2088.2	2505.6	417.51	2257.5	2675.0	1.3028	6.0562	7.3589
101.325	99.97	0.001043	1.6734	418.95	2087.0	2506.0	419.06	2256.5	2675.6	1.3069	6.0476	7.3545
125	105.97	0.001048	1.3750	444.23	2068.8	2513.0	444.36	2240.6	2684.9	1.3741	5.9100	7.2841
150	111.35	0.001053	1.1594	466.97	2052.3	2519.2	467.13	2226.0	2693.1	1.4337	5.7894	7.2231
175	116.04	0.001057	1.0037	486.82	2037.7	2524.5	487.01	2213.1	2700.2	1.4850	5.6865	7.1716
200	120.21	0.001061	0.88578	504.50	2024.6	2529.1	504.71	2201.6	2706.3	1.5302	5.5968	7.1270
225	123.97	0.001064	0.79329	520.47	2012.7	2533.2	520.71	2191.0	2711.7	1.5706	5.5171	7.0877
250	127.41	0.001067	0.71873	535.08	2001.8	2536.8	535.35	2181.2	2716.5	1.6072	5.4453	7.0525
275	130.58	0.001070	0.65732	548.57	1991.6	2540.1	548.86	2172.0	2720.9	1.6408	5.3800	7.0207
300	133.52	0.001073	0.60582	561.11	1982.1	2543.2	561.43	2163.5	2724.9	1.6717	5.3200	6.9917
325	136.27	0.001076	0.56199	572.84	1973.1	2545.9	573.19	2155.4	2728.6	1.7005	5.2645	6.9650
350	138.86	0.001079	0.52422	583.89	1964.6	2548.5	584.26	2147.7	2732.0	1.7274	5.2128	6.9402
375	141.30	0.001081	0.49133	594.32	1956.6	2550.9	594.73	2140.4	2735.1	1.7526	5.1645	6.9171
400	143.61	0.001084	0.46242	604.22	1948.9	2553.1	604.66	2133.4	2738.1	1.7765	5.1191	6.8955
450	147.90	0.001088	0.41392	622.65	1934.5	2557.1	623.14	2120.3	2743.4	1.8205	5.0356	6.8561
500	151.83	0.001093	0.37483	639.54	1921.2	2560.7	640.09	2108.0	2748.1	1.8604	4.9603	6.8207
550	155.46	0.001097	0.34261	655.16	1908.8	2563.9	655.77	2096.6	2752.4	1.8970	4.8916	6.7886
600	158.83	0.001101	0.31560	669.72	1897.1	2566.8	670.38	2085.8	2756.2	1.9308	4.8285	6.7593
650	161.98	0.001104	0.29260	683.37	1886.1	2569.4	684.08	2075.5	2759.6	1.9623	4.7699	6.7322
700	164.95	0.001108	0.27278	696.23	1875.6	2571.8	697.00	2065.8	2762.8	1.9918	4.7153	6.7071
750	167.75	0.001111	0.25552	708.40	1865.6	2574.0	709.24	2056.4	2765.7	2.0195	4.6642	6.6837

TABLE A-5

Saturated water—Pressure table (Concluded)

Press., <i>P</i> kPa	Sat. temp., <i>T</i> _{sat} °C	Specific volume, m ³ /kg		Internal energy, kJ/kg			Enthalpy, kJ/kg			Entropy, kJ/kg·K		
		Sat. liquid, <i>v</i> _f	Sat. vapor, <i>v</i> _g	Sat. liquid, <i>u</i> _f	Evap., <i>u</i> _{fg}	Sat. vapor, <i>u</i> _g	Sat. liquid, <i>h</i> _f	Evap., <i>h</i> _{fg}	Sat. vapor, <i>h</i> _g	Sat. liquid, <i>s</i> _f	Evap., <i>s</i> _{fg}	Sat. vapor, <i>s</i> _g
800	170.41	0.001115	0.24035	719.97	1856.1	2576.0	720.87	2047.5	2768.3	2.0457	4.6160	6.6616
850	172.94	0.001118	0.22690	731.00	1846.9	2577.9	731.95	2038.8	2770.8	2.0705	4.5705	6.6409
900	175.35	0.001121	0.21489	741.55	1838.1	2579.6	742.56	2030.5	2773.0	2.0941	4.5273	6.6213
950	177.66	0.001124	0.20411	751.67	1829.6	2581.3	752.74	2022.4	2775.2	2.1166	4.4862	6.6027
1000	179.88	0.001127	0.19436	761.39	1821.4	2582.8	762.51	2014.6	2777.1	2.1381	4.4470	6.5850
1100	184.06	0.001133	0.17745	779.78	1805.7	2585.5	781.03	1999.6	2780.7	2.1785	4.3735	6.5520
1200	187.96	0.001138	0.16326	796.96	1790.9	2587.8	798.33	1985.4	2783.8	2.2159	4.3058	6.5217
1300	191.60	0.001144	0.15119	813.10	1776.8	2589.9	814.59	1971.9	2786.5	2.2508	4.2428	6.4936
1400	195.04	0.001149	0.14078	828.35	1763.4	2591.8	829.96	1958.9	2788.9	2.2835	4.1840	6.4675
1500	198.29	0.001154	0.13171	842.82	1750.6	2593.4	844.55	1946.4	2791.0	2.3143	4.1287	6.4430
1750	205.72	0.001166	0.11344	876.12	1720.6	2596.7	878.16	1917.1	2795.2	2.3844	4.0033	6.3877
2000	212.38	0.001177	0.099587	906.12	1693.0	2599.1	908.47	1889.8	2798.3	2.4467	3.8923	6.3390
2250	218.41	0.001187	0.088717	933.54	1667.3	2600.9	936.21	1864.3	2800.5	2.5029	3.7926	6.2954
2500	223.95	0.001197	0.079952	958.87	1643.2	2602.1	961.87	1840.1	2801.9	2.5542	3.7016	6.2558
3000	233.85	0.001217	0.066667	1004.6	1598.5	2603.2	1008.3	1794.9	2803.2	2.6454	3.5402	6.1856
3500	242.56	0.001235	0.057061	1045.4	1557.6	2603.0	1049.7	1753.0	2802.7	2.7253	3.3991	6.1244
4000	250.35	0.001252	0.049779	1082.4	1519.3	2601.7	1087.4	1713.5	2800.8	2.7966	3.2731	6.0696
5000	263.94	0.001286	0.039448	1148.1	1448.9	2597.0	1154.5	1639.7	2794.2	2.9207	3.0530	5.9737
6000	275.59	0.001319	0.032449	1205.8	1384.1	2589.9	1213.8	1570.9	2784.6	3.0275	2.8627	5.8902
7000	285.83	0.001352	0.027378	1258.0	1323.0	2581.0	1267.5	1505.2	2772.6	3.1220	2.6927	5.8148
8000	295.01	0.001384	0.023525	1306.0	1264.5	2570.5	1317.1	1441.6	2758.7	3.2077	2.5373	5.7450
9000	303.35	0.001418	0.020489	1350.9	1207.6	2558.5	1363.7	1379.3	2742.9	3.2866	2.3925	5.6791
10,000	311.00	0.001452	0.018028	1393.3	1151.8	2545.2	1407.8	1317.6	2725.5	3.3603	2.2556	5.6159
11,000	318.08	0.001488	0.015988	1433.9	1096.6	2530.4	1450.2	1256.1	2706.3	3.4299	2.1245	5.5544
12,000	324.68	0.001526	0.014264	1473.0	1041.3	2514.3	1491.3	1194.1	2685.4	3.4964	1.9975	5.4939
13,000	330.85	0.001566	0.012781	1511.0	985.5	2496.6	1531.4	1131.3	2662.7	3.5606	1.8730	5.4336
14,000	336.67	0.001610	0.011487	1548.4	928.7	2477.1	1571.0	1067.0	2637.9	3.6232	1.7497	5.3728
15,000	342.16	0.001657	0.010341	1585.5	870.3	2455.7	1610.3	1000.5	2610.8	3.6848	1.6261	5.3108
16,000	347.36	0.001710	0.009312	1622.6	809.4	2432.0	1649.9	931.1	2581.0	3.7461	1.5005	5.2466
17,000	352.29	0.001770	0.008374	1660.2	745.1	2405.4	1690.3	857.4	2547.7	3.8082	1.3709	5.1791
18,000	356.99	0.001840	0.007504	1699.1	675.9	2375.0	1732.2	777.8	2510.0	3.8720	1.2343	5.1064
19,000	361.47	0.001926	0.006677	1740.3	598.9	2339.2	1776.8	689.2	2466.0	3.9396	1.0860	5.0256
20,000	365.75	0.002038	0.005862	1785.8	509.0	2294.8	1826.6	585.5	2412.1	4.0146	0.9164	4.9310
21,000	369.83	0.002207	0.004994	1841.6	391.9	2233.5	1888.0	450.4	2338.4	4.1071	0.7005	4.8076
22,000	373.71	0.002703	0.003644	1951.7	140.8	2092.4	2011.1	161.5	2172.6	4.2942	0.2496	4.5439
22,064	373.95	0.003106	0.003106	2015.7	0	2015.7	2084.3	0	2084.3	4.4070	0	4.4070

TABLO A-5

Doymuş su—Basınç tablosu (Devamı)

Basınç, <i>P</i> kPa	Doyma sıcaklığı, <i>T</i> _{doym} °C	Özgül hacim, m ³ /kg		İç enerji, kJ/kg			Entalpi, kJ/kg			Entropi, kJ/kg·K		
		Doymuş sıvı, <i>v</i> _f	Doymuş buhar, <i>v</i> _g	Doymuş sıvı, <i>u</i> _f	Doymuş Buhar, <i>u</i> _{fg}	Doymuş buhar, <i>u</i> _g	Doymuş sıvı, <i>h</i> _f	Doymuş Buhar, <i>h</i> _{fg}	Doymuş buhar, <i>h</i> _g	Doymuş sıvı, <i>s</i> _f	Doymuş Buhar, <i>s</i> _{fg}	Doymuş buhar, <i>s</i> _g

TABLE A-6

Superheated water

<i>T</i> °C	<i>v</i> m ³ /kg	<i>u</i> kJ/kg	<i>h</i> kJ/kg	<i>s</i> kJ/kg·K	<i>v</i> m ³ /kg	<i>u</i> kJ/kg	<i>h</i> kJ/kg	<i>s</i> kJ/kg·K	<i>v</i> m ³ /kg	<i>u</i> kJ/kg	<i>h</i> kJ/kg	<i>s</i> kJ/kg·K
<i>P</i> = 0.01 MPa (45.81°C)*				<i>P</i> = 0.05 MPa (81.32°C)				<i>P</i> = 0.10 MPa (99.61°C)				
Sat.†	14.670	2437.2	2583.9	8.1488	3.2403	2483.2	2645.2	7.5931	1.6941	2505.6	2675.0	7.3589
50	14.867	2443.3	2592.0	8.1741								
100	17.196	2515.5	2687.5	8.4489	3.4187	2511.5	2682.4	7.6953	1.6959	2506.2	2675.8	7.3611
150	19.513	2587.9	2783.0	8.6893	3.8897	2585.7	2780.2	7.9413	1.9367	2582.9	2776.6	7.6148
200	21.826	2661.4	2879.6	8.9049	4.3562	2660.0	2877.8	8.1592	2.1724	2658.2	2875.5	7.8356
250	24.136	2736.1	2977.5	9.1015	4.8206	2735.1	2976.2	8.3568	2.4062	2733.9	2974.5	8.0346
300	26.446	2812.3	3076.7	9.2827	5.2841	2811.6	3075.8	8.5387	2.6389	2810.7	3074.5	8.2172
400	31.063	2969.3	3280.0	9.6094	6.2094	2968.9	3279.3	8.8659	3.1027	2968.3	3278.6	8.5452
500	35.680	3132.9	3489.7	9.8998	7.1338	3132.6	3489.3	9.1566	3.5655	3132.2	3488.7	8.8362
600	40.296	3303.3	3706.3	10.1631	8.0577	3303.1	3706.0	9.4201	4.0279	3302.8	3705.6	9.0999
700	44.911	3480.8	3929.9	10.4056	8.9813	3480.6	3929.7	9.6626	4.4900	3480.4	3929.4	9.3424
800	49.527	3665.4	4160.6	10.6312	9.9047	3665.2	4160.4	9.8883	4.9519	3665.0	4160.2	9.5682
900	54.143	3856.9	4398.3	10.8429	10.8280	3856.8	4398.2	10.1000	5.4137	3856.7	4398.0	9.7800
1000	58.758	4055.3	4642.8	11.0429	11.7513	4055.2	4642.7	10.3000	5.8755	4055.0	4642.6	9.9800
1100	63.373	4260.0	4893.8	11.2326	12.6745	4259.9	4893.7	10.4897	6.3372	4259.8	4893.6	10.1698
1200	67.989	4470.9	5150.8	11.4132	13.5977	4470.8	5150.7	10.6704	6.7988	4470.7	5150.6	10.3504
1300	72.604	4687.4	5413.4	11.5857	14.5209	4687.3	5413.3	10.8429	7.2605	4687.2	5413.3	10.5229
<i>P</i> = 0.20 MPa (120.21°C)				<i>P</i> = 0.30 MPa (133.52°C)				<i>P</i> = 0.40 MPa (143.61°C)				
Sat.	0.88578	2529.1	2706.3	7.1270	0.60582	2543.2	2724.9	6.9917	0.46242	2553.1	2738.1	6.8955
150	0.95986	2577.1	2769.1	7.2810	0.63402	2571.0	2761.2	7.0792	0.47088	2564.4	2752.8	6.9306
200	1.08049	2654.6	2870.7	7.5081	0.71643	2651.0	2865.9	7.3132	0.53434	2647.2	2860.9	7.1723
250	1.19890	2731.4	2971.2	7.7100	0.79645	2728.9	2967.9	7.5180	0.59520	2726.4	2964.5	7.3804
300	1.31623	2808.8	3072.1	7.8941	0.87535	2807.0	3069.6	7.7037	0.65489	2805.1	3067.1	7.5677
400	1.54934	2967.2	3277.0	8.2236	1.03155	2966.0	3275.5	8.0347	0.77265	2964.9	3273.9	7.9003
500	1.78142	3131.4	3487.7	8.5153	1.18672	3130.6	3486.6	8.3271	0.88936	3129.8	3485.5	8.1933
600	2.01302	3302.2	3704.8	8.7793	1.34139	3301.6	3704.0	8.5915	1.00558	3301.0	3703.3	8.4580
700	2.24434	3479.9	3928.8	9.0221	1.49580	3479.5	3928.2	8.8345	1.12152	3479.0	3927.6	8.7012
800	2.47550	3664.7	4159.8	9.2479	1.65004	3664.3	4159.3	9.0605	1.23730	3663.9	4158.9	8.9274
900	2.70656	3856.3	4397.7	9.4598	1.80417	3856.0	4397.3	9.2725	1.35298	3855.7	4396.9	9.1394
1000	2.93755	4054.8	4642.3	9.6599	1.95824	4054.5	4642.0	9.4726	1.46859	4054.3	4641.7	9.3396
1100	3.16848	4259.6	4893.3	9.8497	2.11226	4259.4	4893.1	9.6624	1.58414	4259.2	4892.9	9.5295
1200	3.39938	4470.5	5150.4	10.0304	2.26624	4470.3	5150.2	9.8431	1.69966	4470.2	5150.0	9.7102
1300	3.63026	4687.1	5413.1	10.2029	2.42019	4686.9	5413.0	10.0157	1.81516	4686.7	5412.8	9.8828
<i>P</i> = 0.50 MPa (151.83°C)				<i>P</i> = 0.60 MPa (158.83°C)				<i>P</i> = 0.80 MPa (170.41°C)				
Sat.	0.37483	2560.7	2748.1	6.8207	0.31560	2566.8	2756.2	6.7593	0.24035	2576.0	2768.3	6.6616
200	0.42503	2643.3	2855.8	7.0610	0.35212	2639.4	2850.6	6.9683	0.26088	2631.1	2839.8	6.8177
250	0.47443	2723.8	2961.0	7.2725	0.39390	2721.2	2957.6	7.1833	0.29321	2715.9	2950.4	7.0402
300	0.52261	2803.3	3064.6	7.4614	0.43442	2801.4	3062.0	7.3740	0.32416	2797.5	3056.9	7.2345
350	0.57015	2883.0	3168.1	7.6346	0.47428	2881.6	3166.1	7.5481	0.35442	2878.6	3162.2	7.4107
400	0.61731	2963.7	3272.4	7.7956	0.51374	2962.5	3270.8	7.7097	0.38429	2960.2	3267.7	7.5735
500	0.71095	3129.0	3484.5	8.0893	0.59200	3128.2	3483.4	8.0041	0.44332	3126.6	3481.3	7.8692
600	0.80409	3300.4	3702.5	8.3544	0.66976	3299.8	3701.7	8.2695	0.50186	3298.7	3700.1	8.1354
700	0.89696	3478.6	3927.0	8.5978	0.74725	3478.1	3926.4	8.5132	0.56011	3477.2	3925.3	8.3794
800	0.98966	3663.6	4158.4	8.8240	0.82457	3663.2	4157.9	8.7395	0.61820	3662.5	4157.0	8.6061
900	1.08227	3855.4	4396.6	9.0362	0.90179	3855.1	4396.2	8.9518	0.67619	3854.5	4395.5	8.8185
1000	1.17480	4054.0	4641.4	9.2364	0.97893	4053.8	4641.1	9.1521	0.73411	4053.3	4640.5	9.0189
1100	1.26728	4259.0	4892.6	9.4263	1.05603	4258.8	4892.4	9.3420	0.79197	4258.3	4891.9	9.2090
1200	1.35972	4470.0	5149.8	9.6071	1.13309	4469.8	5149.6	9.5229	0.84980	4469.4	5149.3	9.3898
1300	1.45214	4686.6	5412.6	9.7797	1.21012	4686.4	5412.5	9.6955	0.90761	4686.1	5412.2	9.5625

*The temperature in parentheses is the saturation temperature at the specified pressure.

† Properties of saturated vapor at the specified pressure.

TABLO A-6

Kızgın su buharı

<i>T</i> °C	<i>v</i> m ³ /kg	<i>u</i> kJ/kg	<i>h</i> kJ/kg	<i>s</i> kJ/kg·K	<i>v</i> m ³ /kg	<i>u</i> kJ/kg	<i>h</i> kJ/kg	<i>s</i> kJ/kg·K	<i>v</i> m ³ /kg	<i>u</i> kJ/kg	<i>h</i> kJ/kg	<i>s</i> kJ/kg·K
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TABLE A-6

Superheated water (Continued)

<i>T</i> °C	<i>v</i> m ³ /kg	<i>u</i> kJ/kg	<i>h</i> kJ/kg	<i>s</i> kJ/kg·K	<i>v</i> m ³ /kg	<i>u</i> kJ/kg	<i>h</i> kJ/kg	<i>s</i> kJ/kg·K	<i>v</i> m ³ /kg	<i>u</i> kJ/kg	<i>h</i> kJ/kg	<i>s</i> kJ/kg·K
<i>P</i> = 1.00 MPa (179.88°C)				<i>P</i> = 1.20 MPa (187.96°C)				<i>P</i> = 1.40 MPa (195.04°C)				
Sat.	0.19437	2582.8	2777.1	6.5850	0.16326	2587.8	2783.8	6.5217	0.14078	2591.8	2788.9	6.4675
200	0.20602	2622.3	2828.3	6.6956	0.16934	2612.9	2816.1	6.5909	0.14303	2602.7	2803.0	6.4975
250	0.23275	2710.4	2943.1	6.9265	0.19241	2704.7	2935.6	6.8313	0.16356	2698.9	2927.9	6.7488
300	0.25799	2793.7	3051.6	7.1246	0.21386	2789.7	3046.3	7.0335	0.18233	2785.7	3040.9	6.9553
350	0.28250	2875.7	3158.2	7.3029	0.23455	2872.7	3154.2	7.2139	0.20029	2869.7	3150.1	7.1379
400	0.30661	2957.9	3264.5	7.4670	0.25482	2955.5	3261.3	7.3793	0.21782	2953.1	3258.1	7.3046
500	0.35411	3125.0	3479.1	7.7642	0.29464	3123.4	3477.0	7.6779	0.25216	3121.8	3474.8	7.6047
600	0.40111	3297.5	3698.6	8.0311	0.33395	3296.3	3697.0	7.9456	0.28597	3295.1	3695.5	7.8730
700	0.44783	3476.3	3924.1	8.2755	0.37297	3475.3	3922.9	8.1904	0.31951	3474.4	3921.7	8.1183
800	0.49438	3661.7	4156.1	8.5024	0.41184	3661.0	4155.2	8.4176	0.35288	3660.3	4154.3	8.3458
900	0.54083	3853.9	4394.8	8.7150	0.45059	3853.3	4394.0	8.6303	0.38614	3852.7	4393.3	8.5587
1000	0.58721	4052.7	4640.0	8.9155	0.48928	4052.2	4639.4	8.8310	0.41933	4051.7	4638.8	8.7595
1100	0.63354	4257.9	4891.4	9.1057	0.52792	4257.5	4891.0	9.0212	0.45247	4257.0	4890.5	8.9497
1200	0.67983	4469.0	5148.9	9.2866	0.56652	4468.7	5148.5	9.2022	0.48558	4468.3	5148.1	9.1308
1300	0.72610	4685.8	5411.9	9.4593	0.60509	4685.5	5411.6	9.3750	0.51866	4685.1	5411.3	9.3036
<i>P</i> = 1.60 MPa (201.37°C)				<i>P</i> = 1.80 MPa (207.11°C)				<i>P</i> = 2.00 MPa (212.38°C)				
Sat.	0.12374	2594.8	2792.8	6.4200	0.11037	2597.3	2795.9	6.3775	0.09959	2599.1	2798.3	6.3390
225	0.13293	2645.1	2857.8	6.5537	0.11678	2637.0	2847.2	6.4825	0.10381	2628.5	2836.1	6.4160
250	0.14190	2692.9	2919.9	6.6753	0.12502	2686.7	2911.7	6.6088	0.11150	2680.3	2903.3	6.5475
300	0.15866	2781.6	3035.4	6.8864	0.14025	2777.4	3029.9	6.8246	0.12551	2773.2	3024.2	6.7684
350	0.17459	2866.6	3146.0	7.0713	0.15460	2863.6	3141.9	7.0120	0.13860	2860.5	3137.7	6.9583
400	0.19007	2950.8	3254.9	7.2394	0.16849	2948.3	3251.6	7.1814	0.15122	2945.9	3248.4	7.1292
500	0.22029	3120.1	3472.6	7.5410	0.19551	3118.5	3470.4	7.4845	0.17568	3116.9	3468.3	7.4337
600	0.24999	3293.9	3693.9	7.8101	0.22200	3292.7	3692.3	7.7543	0.19962	3291.5	3690.7	7.7043
700	0.27941	3473.5	3920.5	8.0558	0.24822	3472.6	3919.4	8.0005	0.22326	3471.7	3918.2	7.9509
800	0.30865	3659.5	4153.4	8.2834	0.27426	3658.8	4152.4	8.2284	0.24674	3658.0	4151.5	8.1791
900	0.33780	3852.1	4392.6	8.4965	0.30020	3851.5	4391.9	8.4417	0.27012	3850.9	4391.1	8.3925
1000	0.36687	4051.2	4638.2	8.6974	0.32606	4050.7	4637.6	8.6427	0.29342	4050.2	4637.1	8.5936
1100	0.39589	4256.6	4890.0	8.8878	0.35188	4256.2	4889.6	8.8331	0.31667	4255.7	4889.1	8.7842
1200	0.42488	4467.9	5147.7	9.0689	0.37766	4467.6	5147.3	9.0143	0.33989	4467.2	5147.0	8.9654
1300	0.45383	4684.8	5410.9	9.2418	0.40341	4684.5	5410.6	9.1872	0.36308	4684.2	5410.3	9.1384
<i>P</i> = 2.50 MPa (223.95°C)				<i>P</i> = 3.00 MPa (233.85°C)				<i>P</i> = 3.50 MPa (242.56°C)				
Sat.	0.07995	2602.1	2801.9	6.2558	0.06667	2603.2	2803.2	6.1856	0.05706	2603.0	2802.7	6.1244
225	0.08026	2604.8	2805.5	6.2629								
250	0.08705	2663.3	2880.9	6.4107	0.07063	2644.7	2856.5	6.2893	0.05876	2624.0	2829.7	6.1764
300	0.09894	2762.2	3009.6	6.6459	0.08118	2750.8	2994.3	6.5412	0.06845	2738.8	2978.4	6.4484
350	0.10979	2852.5	3127.0	6.8424	0.09056	2844.4	3116.1	6.7450	0.07680	2836.0	3104.9	6.6601
400	0.12012	2939.8	3240.1	7.0170	0.09938	2933.6	3231.7	6.9235	0.08456	2927.2	3223.2	6.8428
450	0.13015	3026.2	3351.6	7.1768	0.10789	3021.2	3344.9	7.0856	0.09198	3016.1	3338.1	7.0074
500	0.13999	3112.8	3462.8	7.3254	0.11620	3108.6	3457.2	7.2359	0.09919	3104.5	3451.7	7.1593
600	0.15931	3288.5	3686.8	7.5979	0.13245	3285.5	3682.8	7.5103	0.11325	3282.5	3678.9	7.4357
700	0.17835	3469.3	3915.2	7.8455	0.14841	3467.0	3912.2	7.7590	0.12702	3464.7	3909.3	7.6855
800	0.19722	3656.2	4149.2	8.0744	0.16420	3654.3	4146.9	7.9885	0.14061	3652.5	4144.6	7.9156
900	0.21597	3849.4	4389.3	8.2882	0.17988	3847.9	4387.5	8.2028	0.15410	3846.4	4385.7	8.1304
1000	0.23466	4049.0	4635.6	8.4897	0.19549	4047.7	4634.2	8.4045	0.16751	4046.4	4632.7	8.3324
1100	0.25330	4254.7	4887.9	8.6804	0.21105	4253.6	4886.7	8.5955	0.18087	4252.5	4885.6	8.5236
1200	0.27190	4466.3	5146.0	8.8618	0.22658	4465.3	5145.1	8.7771	0.19420	4464.4	5144.1	8.7053
1300	0.29048	4683.4	5409.5	9.0349	0.24207	4682.6	5408.8	8.9502	0.20750	4681.8	5408.0	8.8786

TABLO A-6

Kızgın su buharı (Devamı)

<i>T</i> °C	<i>v</i> m ³ /kg	<i>u</i> kJ/kg	<i>h</i> kJ/kg	<i>s</i> kJ/kg·K	<i>v</i> m ³ /kg	<i>u</i> kJ/kg	<i>h</i> kJ/kg	<i>s</i> kJ/kg·K	<i>v</i> m ³ /kg	<i>u</i> kJ/kg	<i>h</i> kJ/kg	<i>s</i> kJ/kg·K
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TABLE A-6

Superheated water (Continued)

T °C	v m ³ /kg	u kJ/kg	h kJ/kg	s kJ/kg·K	v m ³ /kg	u kJ/kg	h kJ/kg	s kJ/kg·K	v m ³ /kg	u kJ/kg	h kJ/kg	s kJ/kg·K
$P = 4.0 \text{ MPa (250.35}^\circ\text{C)}$				$P = 4.5 \text{ MPa (257.44}^\circ\text{C)}$				$P = 5.0 \text{ MPa (263.94}^\circ\text{C)}$				
Sat.	0.04978	2601.7	2800.8	6.0696	0.04406	2599.7	2798.0	6.0198	0.03945	2597.0	2794.2	5.9737
275	0.05461	2668.9	2887.3	6.2312	0.04733	2651.4	2864.4	6.1429	0.04144	2632.3	2839.5	6.0571
300	0.05887	2726.2	2961.7	6.3639	0.05138	2713.0	2944.2	6.2854	0.04535	2699.0	2925.7	6.2111
350	0.06647	2827.4	3093.3	6.5843	0.05842	2818.6	3081.5	6.5153	0.05197	2809.5	3069.3	6.4516
400	0.07343	2920.8	3214.5	6.7714	0.06477	2914.2	3205.7	6.7071	0.05784	2907.5	3196.7	6.6483
450	0.08004	3011.0	3331.2	6.9386	0.07076	3005.8	3324.2	6.8770	0.06332	3000.6	3317.2	6.8210
500	0.08644	3100.3	3446.0	7.0922	0.07652	3096.0	3440.4	7.0323	0.06858	3091.8	3434.7	6.9781
600	0.09886	3279.4	3674.9	7.3706	0.08766	3276.4	3670.9	7.3127	0.07870	3273.3	3666.9	7.2605
700	0.11098	3462.4	3906.3	7.6214	0.09850	3460.0	3903.3	7.5647	0.08852	3457.7	3900.3	7.5136
800	0.12292	3650.6	4142.3	7.8523	0.10916	3648.8	4140.0	7.7962	0.09816	3646.9	4137.7	7.7458
900	0.13476	3844.8	4383.9	8.0675	0.11972	3843.3	4382.1	8.0118	0.10769	3841.8	4380.2	7.9619
1000	0.14653	4045.1	4631.2	8.2698	0.13020	4043.9	4629.8	8.2144	0.11715	4042.6	4628.3	8.1648
1100	0.15824	4251.4	4884.4	8.4612	0.14064	4250.4	4883.2	8.4060	0.12655	4249.3	4882.1	8.3566
1200	0.16992	4463.5	5143.2	8.6430	0.15103	4462.6	5142.2	8.5880	0.13592	4461.6	5141.3	8.5388
1300	0.18157	4680.9	5407.2	8.8164	0.16140	4680.1	5406.5	8.7616	0.14527	4679.3	5405.7	8.7124
$P = 6.0 \text{ MPa (275.59}^\circ\text{C)}$				$P = 7.0 \text{ MPa (285.83}^\circ\text{C)}$				$P = 8.0 \text{ MPa (295.01}^\circ\text{C)}$				
Sat.	0.03245	2589.9	2784.6	5.8902	0.027378	2581.0	2772.6	5.8148	0.023525	2570.5	2758.7	5.7450
300	0.03619	2668.4	2885.6	6.0703	0.029492	2633.5	2839.9	5.9337	0.024279	2592.3	2786.5	5.7937
350	0.04225	2790.4	3043.9	6.3357	0.035262	2770.1	3016.9	6.2305	0.029975	2748.3	2988.1	6.1321
400	0.04742	2893.7	3178.3	6.5432	0.039958	2879.5	3159.2	6.4502	0.034344	2864.6	3139.4	6.3658
450	0.05217	2989.9	3302.9	6.7219	0.044187	2979.0	3288.3	6.6353	0.038194	2967.8	3273.3	6.5579
500	0.05667	3083.1	3423.1	6.8826	0.048157	3074.3	3411.4	6.8000	0.041767	3065.4	3399.5	6.7266
550	0.06102	3175.2	3541.3	7.0308	0.051966	3167.9	3531.6	6.9507	0.045172	3160.5	3521.8	6.8800
600	0.06527	3267.2	3658.8	7.1693	0.055665	3261.0	3650.6	7.0910	0.048463	3254.7	3642.4	7.0221
700	0.07355	3453.0	3894.3	7.4247	0.062850	3448.3	3888.3	7.3487	0.054829	3443.6	3882.2	7.2822
800	0.08165	3643.2	4133.1	7.6582	0.069856	3639.5	4128.5	7.5836	0.061011	3635.7	4123.8	7.5185
900	0.08964	3838.8	4376.6	7.8751	0.076750	3835.7	4373.0	7.8014	0.067082	3832.7	4369.3	7.7372
1000	0.09756	4040.1	4625.4	8.0786	0.083571	4037.5	4622.5	8.0055	0.073079	4035.0	4619.6	7.9419
1100	0.10543	4247.1	4879.7	8.2709	0.090341	4245.0	4877.4	8.1982	0.079025	4242.8	4875.0	8.1350
1200	0.11326	4459.8	5139.4	8.4534	0.097075	4457.9	5137.4	8.3810	0.084934	4456.1	5135.5	8.3181
1300	0.12107	4677.7	5404.1	8.6273	0.103781	4676.1	5402.6	8.5551	0.090817	4674.5	5401.0	8.4925
$P = 9.0 \text{ MPa (303.35}^\circ\text{C)}$				$P = 10.0 \text{ MPa (311.00}^\circ\text{C)}$				$P = 12.5 \text{ MPa (327.81}^\circ\text{C)}$				
Sat.	0.020489	2558.5	2742.9	5.6791	0.018028	2545.2	2725.5	5.6159	0.013496	2505.6	2674.3	5.4638
325	0.023284	2647.6	2857.1	5.8738	0.019877	2611.6	2810.3	5.7596				
350	0.025816	2725.0	2957.3	6.0380	0.022440	2699.6	2924.0	5.9460	0.016138	2624.9	2826.6	5.7130
400	0.029960	2849.2	3118.8	6.2876	0.026436	2833.1	3097.5	6.2141	0.020030	2789.6	3040.0	6.0433
450	0.033524	2956.3	3258.0	6.4872	0.029782	2944.5	3242.4	6.4219	0.023019	2913.7	3201.5	6.2749
500	0.036793	3056.3	3387.4	6.6603	0.032811	3047.0	3375.1	6.5995	0.025630	3023.2	3343.6	6.4651
550	0.039885	3153.0	3512.0	6.8164	0.035655	3145.4	3502.0	6.7585	0.028033	3126.1	3476.5	6.6317
600	0.042861	3248.4	3634.1	6.9605	0.038378	3242.0	3625.8	6.9045	0.030306	3225.8	3604.6	6.7828
650	0.045755	3343.4	3755.2	7.0954	0.041018	3338.0	3748.1	7.0408	0.032491	3324.1	3730.2	6.9227
700	0.048589	3438.8	3876.1	7.2229	0.043597	3434.0	3870.0	7.1693	0.034612	3422.0	3854.6	7.0540
800	0.054132	3632.0	4119.2	7.4606	0.048629	3628.2	4114.5	7.4085	0.038724	3618.8	4102.8	7.2967
900	0.059562	3829.6	4365.7	7.6802	0.053547	3826.5	4362.0	7.6290	0.042720	3818.9	4352.9	7.5195
1000	0.064919	4032.4	4616.7	7.8855	0.058391	4029.9	4613.8	7.8349	0.046641	4023.5	4606.5	7.7269
1100	0.070224	4240.7	4872.7	8.0791	0.063183	4238.5	4870.3	8.0289	0.050510	4233.1	4864.5	7.9220
1200	0.075492	4454.2	5133.6	8.2625	0.067938	4452.4	5131.7	8.2126	0.054342	4447.7	5127.0	8.1065
1300	0.080733	4672.9	5399.5	8.4371	0.072667	4671.3	5398.0	8.3874	0.058147	4667.3	5394.1	8.2819

TABLO A-6

Kızgın su buharı (Devamı)

T °C	v m ³ /kg	u kJ/kg	h kJ/kg	s kJ/kg·K	v m ³ /kg	u kJ/kg	h kJ/kg	s kJ/kg·K	v m ³ /kg	u kJ/kg	h kJ/kg	s kJ/kg·K
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TABLE A-6

Superheated water (Concluded)

T °C	v m ³ /kg	u kJ/kg	h kJ/kg	s kJ/kg·K	v m ³ /kg	u kJ/kg	h kJ/kg	s kJ/kg·K	v m ³ /kg	u kJ/kg	h kJ/kg	s kJ/kg·K
$P = 15.0 \text{ MPa (342.16}^\circ\text{C)}$				$P = 17.5 \text{ MPa (354.67}^\circ\text{C)}$				$P = 20.0 \text{ MPa (365.75}^\circ\text{C)}$				
Sat.	0.010341	2455.7	2610.8	5.3108	0.007932	2390.7	2529.5	5.1435	0.005862	2294.8	2412.1	4.9310
350	0.011481	2520.9	2693.1	5.4438								
400	0.015671	2740.6	2975.7	5.8819	0.012463	2684.3	2902.4	5.7211	0.009950	2617.9	2816.9	5.5526
450	0.018477	2880.8	3157.9	6.1434	0.015204	2845.4	3111.4	6.0212	0.012721	2807.3	3061.7	5.9043
500	0.020828	2998.4	3310.8	6.3480	0.017385	2972.4	3276.7	6.2424	0.014793	2945.3	3241.2	6.1446
550	0.022945	3106.2	3450.4	6.5230	0.019305	3085.8	3423.6	6.4266	0.016571	3064.7	3396.2	6.3390
600	0.024921	3209.3	3583.1	6.6796	0.021073	3192.5	3561.3	6.5890	0.018185	3175.3	3539.0	6.5075
650	0.026804	3310.1	3712.1	6.8233	0.022742	3295.8	3693.8	6.7366	0.019695	3281.4	3675.3	6.6593
700	0.028621	3409.8	3839.1	6.9573	0.024342	3397.5	3823.5	6.8735	0.021134	3385.1	3807.8	6.7991
800	0.032121	3609.3	4091.1	7.2037	0.027405	3599.7	4079.3	7.1237	0.023870	3590.1	4067.5	7.0531
900	0.035503	3811.2	4343.7	7.4288	0.030348	3803.5	4334.6	7.3511	0.026484	3795.7	4325.4	7.2829
1000	0.038808	4017.1	4599.2	7.6378	0.033215	4010.7	4592.0	7.5616	0.029020	4004.3	4584.7	7.4950
1100	0.042062	4227.7	4858.6	7.8339	0.036029	4222.3	4852.8	7.7588	0.031504	4216.9	4847.0	7.6933
1200	0.045279	4443.1	5122.3	8.0192	0.038806	4438.5	5117.6	7.9449	0.033952	4433.8	5112.9	7.8802
1300	0.048469	4663.3	5390.3	8.1952	0.041556	4659.2	5386.5	8.1215	0.036371	4655.2	5382.7	8.0574
$P = 25.0 \text{ MPa}$				$P = 30.0 \text{ MPa}$				$P = 35.0 \text{ MPa}$				
375	0.001978	1799.9	1849.4	4.0345	0.001792	1738.1	1791.9	3.9313	0.001701	1702.8	1762.4	3.8724
400	0.006005	2428.5	2578.7	5.1400	0.002798	2068.9	2152.8	4.4758	0.002105	1914.9	1988.6	4.2144
425	0.007886	2607.8	2805.0	5.4708	0.005299	2452.9	2611.8	5.1473	0.003434	2253.3	2373.5	4.7751
450	0.009176	2721.2	2950.6	5.6759	0.006737	2618.9	2821.0	5.4422	0.004957	2497.5	2671.0	5.1946
500	0.011143	2887.3	3165.9	5.9643	0.008691	2824.0	3084.8	5.7956	0.006933	2755.3	2997.9	5.6331
550	0.012736	3020.8	3339.2	6.1816	0.010175	2974.5	3279.7	6.0403	0.008348	2925.8	3218.0	5.9093
600	0.014140	3140.0	3493.5	6.3637	0.011445	3103.4	3446.8	6.2373	0.009523	3065.6	3399.0	6.1229
650	0.015430	3251.9	3637.7	6.5243	0.012590	3221.7	3599.4	6.4074	0.010565	3190.9	3560.7	6.3030
700	0.016643	3359.9	3776.0	6.6702	0.013654	3334.3	3743.9	6.5599	0.011523	3308.3	3711.6	6.4623
800	0.018922	3570.7	4043.8	6.9322	0.015628	3551.2	4020.0	6.8301	0.013278	3531.6	3996.3	6.7409
900	0.021075	3780.2	4307.1	7.1668	0.017473	3764.6	4288.8	7.0695	0.014904	3749.0	4270.6	6.9853
1000	0.023150	3991.5	4570.2	7.3821	0.019240	3978.6	4555.8	7.2880	0.016450	3965.8	4541.5	7.2069
1100	0.025172	4206.1	4835.4	7.5825	0.020954	4195.2	4823.9	7.4906	0.017942	4184.4	4812.4	7.4118
1200	0.027157	4424.6	5103.5	7.7710	0.022630	4415.3	5094.2	7.6807	0.019398	4406.1	5085.0	7.6034
1300	0.029115	4647.2	5375.1	7.9494	0.024279	4639.2	5367.6	7.8602	0.020827	4631.2	5360.2	7.7841
$P = 40.0 \text{ MPa}$				$P = 50.0 \text{ MPa}$				$P = 60.0 \text{ MPa}$				
375	0.001641	1677.0	1742.6	3.8290	0.001560	1638.6	1716.6	3.7642	0.001503	1609.7	1699.9	3.7149
400	0.001911	1855.0	1931.4	4.1145	0.001731	1787.8	1874.4	4.0029	0.001633	1745.2	1843.2	3.9317
425	0.002538	2097.5	2199.0	4.5044	0.002009	1960.3	2060.7	4.2746	0.001816	1892.9	2001.8	4.1630
450	0.003692	2364.2	2511.8	4.9449	0.002487	2160.3	2284.7	4.5896	0.002086	2055.1	2180.2	4.4140
500	0.005623	2681.6	2906.5	5.4744	0.003890	2528.1	2722.6	5.1762	0.002952	2393.2	2570.3	4.9356
550	0.006985	2875.1	3154.4	5.7857	0.005118	2769.5	3025.4	5.5563	0.003955	2664.6	2901.9	5.3517
600	0.008089	3026.8	3350.4	6.0170	0.006108	2947.1	3252.6	5.8245	0.004833	2866.8	3156.8	5.6527
650	0.009053	3159.5	3521.6	6.2078	0.006957	3095.6	3443.5	6.0373	0.005591	3031.3	3366.8	5.8867
700	0.009930	3282.0	3679.2	6.3740	0.007717	3228.7	3614.6	6.2179	0.006265	3175.4	3551.3	6.0814
800	0.011521	3511.8	3972.6	6.6613	0.009073	3472.2	3925.8	6.5225	0.007456	3432.6	3880.0	6.4033
900	0.012980	3733.3	4252.5	6.9107	0.010296	3702.0	4216.8	6.7819	0.008519	3670.9	4182.1	6.6725
1000	0.014360	3952.9	4527.3	7.1355	0.011441	3927.4	4499.4	7.0131	0.009504	3902.0	4472.2	6.9099
1100	0.015686	4173.7	4801.1	7.3425	0.012534	4152.2	4778.9	7.2244	0.010439	4130.9	4757.3	7.1255
1200	0.016976	4396.9	5075.9	7.5357	0.013590	4378.6	5058.1	7.4207	0.011339	4360.5	5040.8	7.3248
1300	0.018239	4623.3	5352.8	7.7175	0.014620	4607.5	5338.5	7.6048	0.012213	4591.8	5324.5	7.5111

TABLO A-6

Kızgın su buharı (Devami)

T °C	v m ³ /kg	u kJ/kg	h kJ/kg	s kJ/kg·K	v m ³ /kg	u kJ/kg	h kJ/kg	s kJ/kg·K	v m ³ /kg	u kJ/kg	h kJ/kg	s kJ/kg·K
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TABLE A-7

Compressed liquid water

T °C	v m ³ /kg	u kJ/kg	h kJ/kg	s kJ/kg·K	v m ³ /kg	u kJ/kg	h kJ/kg	s kJ/kg·K	v m ³ /kg	u kJ/kg	h kJ/kg	s kJ/kg·K
$P = 5 \text{ MPa (263.94}^\circ\text{C)}$				$P = 10 \text{ MPa (311.00}^\circ\text{C)}$				$P = 15 \text{ MPa (342.16}^\circ\text{C)}$				
Sat.	0.0012862	1148.1	1154.5	2.9207	0.0014522	1393.3	1407.9	3.3603	0.0016572	1585.5	1610.3	3.6848
0	0.0009977	0.04	5.03	0.0001	0.0009952	0.12	10.07	0.0003	0.0009928	0.18	15.07	0.0004
20	0.0009996	83.61	88.61	0.2954	0.0009973	83.31	93.28	0.2943	0.0009951	83.01	97.93	0.2932
40	0.0010057	166.92	171.95	0.5705	0.0010035	166.33	176.37	0.5685	0.0010013	165.75	180.77	0.5666
60	0.0010149	250.29	255.36	0.8287	0.0010127	249.43	259.55	0.8260	0.0010105	248.58	263.74	0.8234
80	0.0010267	333.82	338.96	1.0723	0.0010244	332.69	342.94	1.0691	0.0010221	331.59	346.92	1.0659
100	0.0010410	417.65	422.85	1.3034	0.0010385	416.23	426.62	1.2996	0.0010361	414.85	430.39	1.2958
120	0.0010576	501.91	507.19	1.5236	0.0010549	500.18	510.73	1.5191	0.0010522	498.50	514.28	1.5148
140	0.0010769	586.80	592.18	1.7344	0.0010738	584.72	595.45	1.7293	0.0010708	582.69	598.75	1.7243
160	0.0010988	672.55	678.04	1.9374	0.0010954	670.06	681.01	1.9316	0.0010920	667.63	684.01	1.9259
180	0.0011240	759.47	765.09	2.1338	0.0011200	756.48	767.68	2.1271	0.0011160	753.58	770.32	2.1206
200	0.0011531	847.92	853.68	2.3251	0.0011482	844.32	855.80	2.3174	0.0011435	840.84	858.00	2.3100
220	0.0011868	938.39	944.32	2.5127	0.0011809	934.01	945.82	2.5037	0.0011752	929.81	947.43	2.4951
240	0.0012268	1031.6	1037.7	2.6983	0.0012192	1026.2	1038.3	2.6876	0.0012121	1021.0	1039.2	2.6774
260	0.0012755	1128.5	1134.9	2.8841	0.0012653	1121.6	1134.3	2.8710	0.0012560	1115.1	1134.0	2.8586
280					0.0013226	1221.8	1235.0	3.0565	0.0013096	1213.4	1233.0	3.0410
300					0.0013980	1329.4	1343.3	3.2488	0.0013783	1317.6	1338.3	3.2279
320									0.0014733	1431.9	1454.0	3.4263
340									0.0016311	1567.9	1592.4	3.6555
$P = 20 \text{ MPa (365.75}^\circ\text{C)}$				$P = 30 \text{ MPa}$				$P = 50 \text{ MPa}$				
Sat.	0.0020378	1785.8	1826.6	4.0146	0.0009857	0.29	29.86	0.0003	0.0009767	0.29	49.13	-0.0010
0	0.0009904	0.23	20.03	0.0005	0.0009886	82.11	111.77	0.2897	0.0009805	80.93	129.95	0.2845
20	0.0009929	82.71	102.57	0.2921	0.0009951	164.05	193.90	0.5607	0.0009872	161.90	211.25	0.5528
40	0.0009992	165.17	185.16	0.5646	0.0010042	246.14	276.26	0.8156	0.0009962	243.08	292.88	0.8055
60	0.0010084	247.75	267.92	0.8208	0.0010155	328.40	358.86	1.0564	0.0010072	324.42	374.78	1.0442
80	0.0010199	330.50	350.90	1.0627	0.0010290	410.87	441.74	1.2847	0.0010201	405.94	456.94	1.2705
100	0.0010337	413.50	434.17	1.2920	0.0010445	493.66	525.00	1.5020	0.0010349	487.69	539.43	1.4859
120	0.0010496	496.85	517.84	1.5105	0.0010623	576.90	608.76	1.7098	0.0010517	569.77	622.36	1.6916
140	0.0010679	580.71	602.07	1.7194	0.0010823	660.74	693.21	1.9094	0.0010704	652.33	705.85	1.8889
160	0.0010886	665.28	687.05	1.9203	0.0011049	745.40	778.55	2.1020	0.0010914	735.49	790.06	2.0790
180	0.0011122	750.78	773.02	2.1143	0.0011304	831.11	865.02	2.2888	0.0011149	819.45	875.19	2.2628
200	0.0011390	837.49	860.27	2.3027	0.0011595	918.15	952.93	2.4707	0.0011412	904.39	961.45	2.4414
220	0.0011697	925.77	949.16	2.4867	0.0011927	1006.9	1042.7	2.6491	0.0011708	990.55	1049.1	2.6156
240	0.0012053	1016.1	1040.2	2.6676	0.0012314	1097.8	1134.7	2.8250	0.0012044	1078.2	1138.4	2.7864
260	0.0012472	1109.0	1134.0	2.8469	0.0012770	1191.5	1229.8	3.0001	0.0012430	1167.7	1229.9	2.9547
280	0.0012978	1205.6	1231.5	3.0265	0.0013322	1288.9	1328.9	3.1761	0.0012879	1259.6	1324.0	3.1218
300	0.0013611	1307.2	1334.4	3.2091	0.0014014	1391.7	1433.7	3.3558	0.0013409	1354.3	1421.4	3.2888
320	0.0014450	1416.6	1445.5	3.3996	0.0014932	1502.4	1547.1	3.5438	0.0014049	1452.9	1523.1	3.4575
340	0.0015693	1540.2	1571.6	3.6086	0.0016276	1626.8	1675.6	3.7499	0.0014848	1556.5	1630.7	3.6301
360	0.0018248	1703.6	1740.1	3.8787	0.0018729	1782.0	1838.2	4.0026	0.0015884	1667.1	1746.5	3.8102

TABLO A-7

Sıkıştırılmış sıvı

T °C	v m ³ /kg	u kJ/kg	h kJ/kg	s kJ/kg·K	v m ³ /kg	u kJ/kg	h kJ/kg	s kJ/kg·K	v m ³ /kg	u kJ/kg	h kJ/kg	s kJ/kg·K
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TABLE A-8

Saturated ice–water vapor

Temp., T °C	Sat. press., P_{sat} kPa	Specific volume, m^3/kg		Internal energy, kJ/kg			Enthalpy, kJ/kg			Entropy, kJ/kg·K		
		Sat. ice, v_i	Sat. vapor, v_g	Sat. ice, u_i	Subl., u_{ig}	Sat. vapor, u_g	Sat. ice, h_i	Subl., h_{ig}	Sat. vapor, h_g	Sat. ice, s_i	Subl., s_{ig}	Sat. vapor, s_g
0.01	0.61169	0.001091	205.99	-333.40	2707.9	2374.5	-333.40	2833.9	2500.5	-1.2202	10.374	9.154
0	0.61115	0.001091	206.17	-333.43	2707.9	2374.5	-333.43	2833.9	2500.5	-1.2204	10.375	9.154
-2	0.51772	0.001091	241.62	-337.63	2709.4	2371.8	-337.63	2834.5	2496.8	-1.2358	10.453	9.218
-4	0.43748	0.001090	283.84	-341.80	2710.8	2369.0	-341.80	2835.0	2493.2	-1.2513	10.533	9.282
-6	0.36873	0.001090	334.27	-345.94	2712.2	2366.2	-345.93	2835.4	2489.5	-1.2667	10.613	9.347
-8	0.30998	0.001090	394.66	-350.04	2713.5	2363.5	-350.04	2835.8	2485.8	-1.2821	10.695	9.413
-10	0.25990	0.001089	467.17	-354.12	2714.8	2360.7	-354.12	2836.2	2482.1	-1.2976	10.778	9.480
-12	0.21732	0.001089	554.47	-358.17	2716.1	2357.9	-358.17	2836.6	2478.4	-1.3130	10.862	9.549
-14	0.18121	0.001088	659.88	-362.18	2717.3	2355.2	-362.18	2836.9	2474.7	-1.3284	10.947	9.618
-16	0.15068	0.001088	787.51	-366.17	2718.6	2352.4	-366.17	2837.2	2471.0	-1.3439	11.033	9.689
-18	0.12492	0.001088	942.51	-370.13	2719.7	2349.6	-370.13	2837.5	2467.3	-1.3593	11.121	9.761
-20	0.10326	0.001087	1131.3	-374.06	2720.9	2346.8	-374.06	2837.7	2463.6	-1.3748	11.209	9.835
-22	0.08510	0.001087	1362.0	-377.95	2722.0	2344.1	-377.95	2837.9	2459.9	-1.3903	11.300	9.909
-24	0.06991	0.001087	1644.7	-381.82	2723.1	2341.3	-381.82	2838.1	2456.2	-1.4057	11.391	9.985
-26	0.05725	0.001087	1992.2	-385.66	2724.2	2338.5	-385.66	2838.2	2452.5	-1.4212	11.484	10.063
-28	0.04673	0.001086	2421.0	-389.47	2725.2	2335.7	-389.47	2838.3	2448.8	-1.4367	11.578	10.141
-30	0.03802	0.001086	2951.7	-393.25	2726.2	2332.9	-393.25	2838.4	2445.1	-1.4521	11.673	10.221
-32	0.03082	0.001086	3610.9	-397.00	2727.2	2330.2	-397.00	2838.4	2441.4	-1.4676	11.770	10.303
-34	0.02490	0.001085	4432.4	-400.72	2728.1	2327.4	-400.72	2838.5	2437.7	-1.4831	11.869	10.386
-36	0.02004	0.001085	5460.1	-404.40	2729.0	2324.6	-404.40	2838.4	2434.0	-1.4986	11.969	10.470
-38	0.01608	0.001085	6750.5	-408.07	2729.9	2321.8	-408.07	2838.4	2430.3	-1.5141	12.071	10.557
-40	0.01285	0.001084	8376.7	-411.70	2730.7	2319.0	-411.70	2838.3	2426.6	-1.5296	12.174	10.644

TABLO A-8

Doymuş buz–su buharı

Sıcaklık, T °C	Doyma basıncı, P_{doy} kPa	Özgül hacim, m^3/kg		İç enerji, kJ/kg			Entalpi, kJ/kg			Entropi, kJ/kg·K		
		Doymuş buz, v_i	Doymuş buhar, v_g	Doymuş buz, u_i	Sübl., u_{ig}	Doymuş buhar, u_g	Doymuş buz, h_i	Sübl., h_{ig}	Doymuş buhar, h_g	Doymuş buz, s_i	Sübl., s_{ig}	Doymuş buhar, s_g

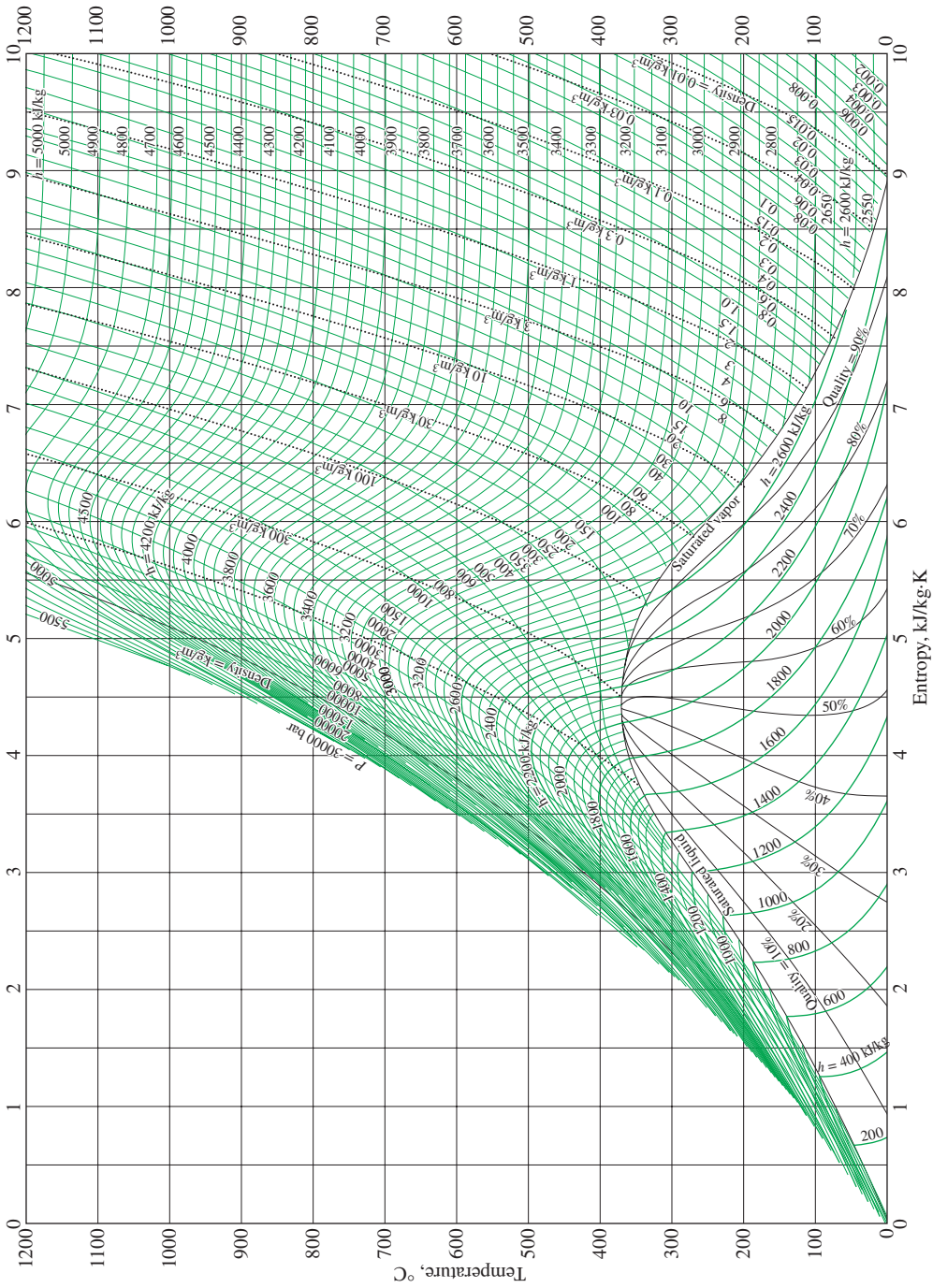


FIGURE A-9
T-s diagram for water.

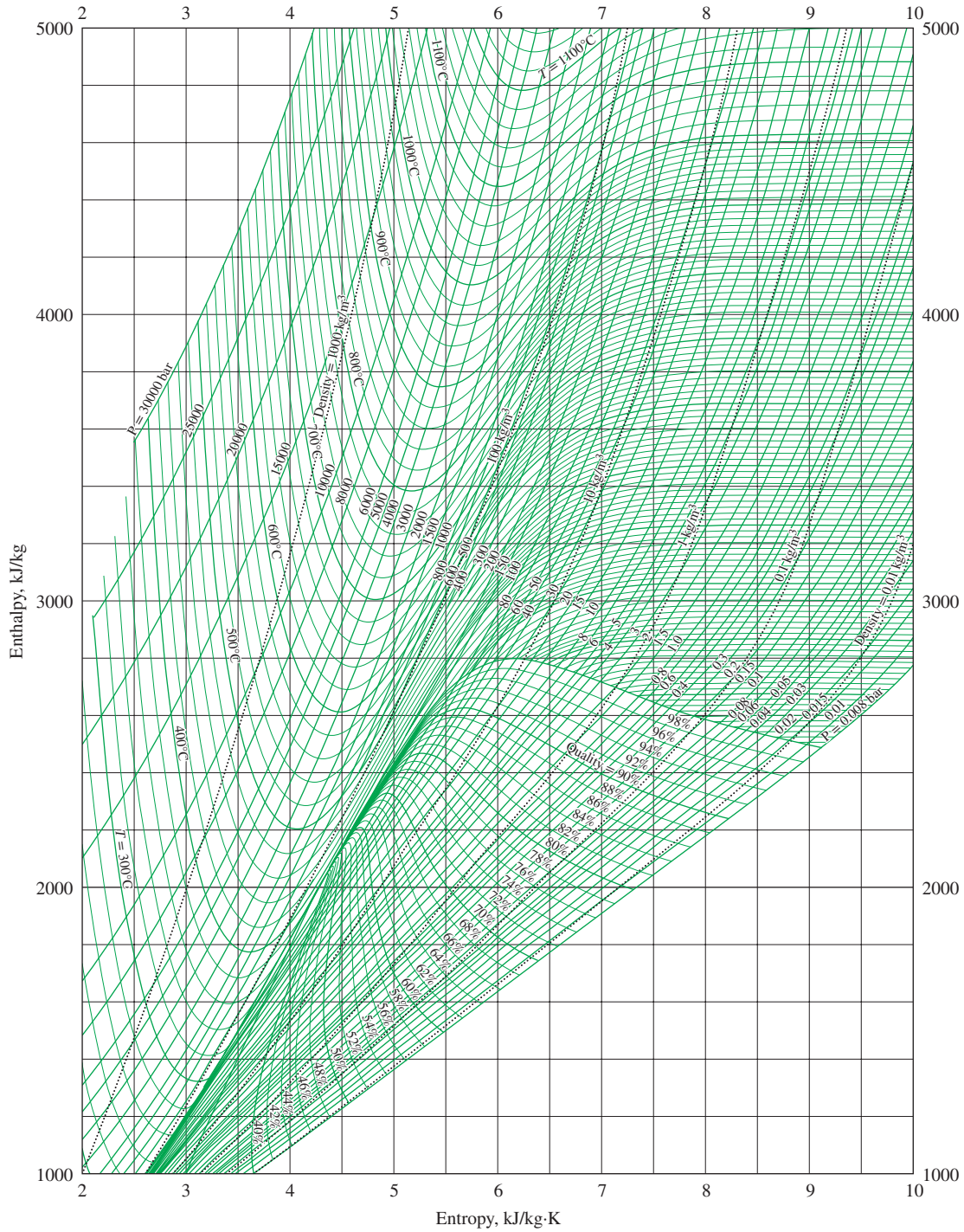


FIGURE A-10
Mollier diagram for water.

TABLE A-11

Saturated refrigerant-134a—Temperature table

Temp., T °C	Specific volume, m^3/kg			Internal energy, kJ/kg			Enthalpy, kJ/kg			Entropy, $kJ/kg \cdot K$		
	Sat. press., P_{sat} kPa	Sat. liquid, v_f	Sat. vapor, v_g	Sat. liquid, u_f	Evap., u_{fg}	Sat. vapor, u_g	Sat. liquid, h_f	Evap., h_{fg}	Sat. vapor, h_g	Sat. liquid, s_f	Evap., s_{fg}	Sat. vapor, s_g
-40	51.25	0.0007053	0.36064	-0.036	207.42	207.38	0.00	225.86	225.86	0.00000	0.96869	0.96869
-38	56.86	0.0007082	0.32718	2.472	206.06	208.53	2.512	224.62	227.13	0.01071	0.95516	0.96588
-36	62.95	0.0007111	0.29740	4.987	204.69	209.68	5.032	223.37	228.40	0.02137	0.94182	0.96319
-34	69.56	0.0007141	0.27082	7.509	203.32	210.83	7.559	222.10	229.66	0.03196	0.92867	0.96063
-32	76.71	0.0007171	0.24706	10.04	201.94	211.97	10.09	220.83	230.93	0.04249	0.91569	0.95819
-30	84.43	0.0007201	0.22577	12.58	200.55	213.12	12.64	219.55	232.19	0.05297	0.90289	0.95586
-28	92.76	0.0007232	0.20666	15.12	199.15	214.27	15.19	218.25	233.44	0.06339	0.89024	0.95364
-26	101.73	0.0007264	0.18947	17.67	197.75	215.42	17.75	216.95	234.70	0.07376	0.87776	0.95152
-24	111.37	0.0007296	0.17398	20.23	196.34	216.57	20.31	215.63	235.94	0.08408	0.86542	0.94950
-22	121.72	0.0007328	0.15999	22.80	194.92	217.71	22.89	214.30	237.19	0.09435	0.85323	0.94758
-20	132.82	0.0007361	0.14735	25.37	193.49	218.86	25.47	212.96	238.43	0.10456	0.84119	0.94575
-18	144.69	0.0007394	0.13589	27.96	192.05	220.00	28.07	211.60	239.67	0.11473	0.82927	0.94401
-16	157.38	0.0007428	0.12550	30.55	190.60	221.15	30.67	210.23	240.90	0.12486	0.81749	0.94234
-14	170.93	0.0007463	0.11605	33.15	189.14	222.29	33.28	208.84	242.12	0.13493	0.80583	0.94076
-12	185.37	0.0007498	0.10744	35.76	187.66	223.42	35.90	207.44	243.34	0.14497	0.79429	0.93925
-10	200.74	0.0007533	0.099600	38.38	186.18	224.56	38.53	206.02	244.55	0.15496	0.78286	0.93782
-8	217.08	0.0007570	0.092438	41.01	184.69	225.69	41.17	204.59	245.76	0.16491	0.77154	0.93645
-6	234.44	0.0007607	0.085888	43.64	183.18	226.82	43.82	203.14	246.95	0.17482	0.76033	0.93514
-4	252.85	0.0007644	0.079889	46.29	181.66	227.94	46.48	201.66	248.14	0.18469	0.74921	0.93390
-2	272.36	0.0007683	0.074388	48.94	180.12	229.07	49.15	200.17	249.33	0.19452	0.73819	0.93271
0	293.01	0.0007722	0.069335	51.61	178.58	230.18	51.83	198.67	250.50	0.20432	0.72726	0.93158
2	314.84	0.0007761	0.064690	54.28	177.01	231.30	54.53	197.14	251.66	0.21408	0.71641	0.93050
4	337.90	0.0007802	0.060412	56.97	175.44	232.40	57.23	195.58	252.82	0.22381	0.70565	0.92946
6	362.23	0.0007843	0.056469	59.66	173.84	233.51	59.95	194.01	253.96	0.23351	0.69496	0.92847
8	387.88	0.0007886	0.052829	62.37	172.23	234.60	62.68	192.42	255.09	0.24318	0.68435	0.92752
10	414.89	0.0007929	0.049466	65.09	170.61	235.69	65.42	190.80	256.22	0.25282	0.67380	0.92661
12	443.31	0.0007973	0.046354	67.82	168.96	236.78	68.17	189.16	257.33	0.26243	0.66331	0.92574
14	473.19	0.0008018	0.043471	70.56	167.30	237.86	70.94	187.49	258.43	0.27201	0.65289	0.92490
16	504.58	0.0008064	0.040798	73.31	165.62	238.93	73.72	185.80	259.51	0.28157	0.64252	0.92409
18	537.52	0.0008112	0.038317	76.07	163.92	239.99	76.51	184.08	260.59	0.29111	0.63219	0.92330
20	572.07	0.0008160	0.036012	78.85	162.19	241.04	79.32	182.33	261.64	0.30062	0.62192	0.92254
22	608.27	0.0008209	0.033867	81.64	160.45	242.09	82.14	180.55	262.69	0.31012	0.61168	0.92180
24	646.18	0.0008260	0.031869	84.44	158.68	243.13	84.98	178.74	263.72	0.31959	0.60148	0.92107
26	685.84	0.0008312	0.030008	87.26	156.89	244.15	87.83	176.90	264.73	0.32905	0.59131	0.92036
28	727.31	0.0008366	0.028271	90.09	155.08	245.17	90.70	175.03	265.73	0.33849	0.58117	0.91967
30	770.64	0.0008421	0.026648	92.93	153.24	246.17	93.58	173.13	266.71	0.34792	0.57105	0.91897
32	815.89	0.0008477	0.025131	95.79	151.37	247.17	96.49	171.19	267.67	0.35734	0.56095	0.91829
34	863.11	0.0008535	0.023712	98.67	149.48	248.15	99.41	169.21	268.61	0.36675	0.55086	0.91760
36	912.35	0.0008595	0.022383	101.56	147.55	249.11	102.34	167.19	269.53	0.37615	0.54077	0.91692
38	963.68	0.0008657	0.021137	104.47	145.60	250.07	105.30	165.13	270.44	0.38554	0.53068	0.91622
40	1017.1	0.0008720	0.019968	107.39	143.61	251.00	108.28	163.03	271.31	0.39493	0.52059	0.91552
42	1072.8	0.0008786	0.018870	110.34	141.59	251.92	111.28	160.89	272.17	0.40432	0.51048	0.91480
44	1130.7	0.0008854	0.017837	113.30	139.53	252.83	114.30	158.70	273.00	0.41371	0.50036	0.91407

TABLO A-11

Doymuş soğutucu akışkan-134a—Sıcaklık tablosu

TABLE A-11

Saturated refrigerant-134a—Temperature table (Concluded)

Temp., T °C	Specific volume, m^3/kg			Internal energy, kJ/kg			Enthalpy, kJ/kg			Entropy, kJ/kg·K		
	Sat. press., P_{sat} kPa	Sat. liquid, v_f	Sat. vapor, v_g	Sat. liquid, u_f	Evap., u_{fg}	Sat. vapor, u_g	Sat. liquid, h_f	Evap., h_{fg}	Sat. vapor, h_g	Sat. liquid, s_f	Evap., s_{fg}	Sat. vapor, s_g
46	1191.0	0.0008924	0.016866	116.28	137.43	253.71	117.34	156.46	273.80	0.42311	0.49020	0.91331
48	1253.6	0.0008997	0.015951	119.28	135.30	254.58	120.41	154.17	274.57	0.43251	0.48001	0.91252
52	1386.2	0.0009151	0.014276	125.35	130.89	256.24	126.62	149.41	276.03	0.45136	0.45948	0.91084
56	1529.1	0.0009317	0.012782	131.52	126.29	257.81	132.94	144.41	277.35	0.47028	0.43870	0.90898
60	1682.8	0.0009498	0.011434	137.79	121.45	259.23	139.38	139.09	278.47	0.48930	0.41746	0.90676
65	1891.0	0.0009751	0.009959	145.80	115.06	260.86	147.64	132.05	279.69	0.51330	0.39048	0.90379
70	2118.2	0.0010037	0.008650	154.03	108.17	262.20	156.15	124.37	280.52	0.53763	0.36239	0.90002
75	2365.8	0.0010373	0.007486	162.55	100.62	263.17	165.01	115.87	280.88	0.56252	0.33279	0.89531
80	2635.3	0.0010774	0.006439	171.43	92.22	263.66	174.27	106.35	280.63	0.58812	0.30113	0.88925
85	2928.2	0.0011273	0.005484	180.81	82.64	263.45	184.11	95.39	279.51	0.61487	0.26632	0.88120
90	3246.9	0.0011938	0.004591	190.94	71.19	262.13	194.82	82.22	277.04	0.64354	0.22638	0.86991
95	3594.1	0.0012945	0.003713	202.49	56.25	258.73	207.14	64.94	272.08	0.67605	0.17638	0.85243
100	3975.1	0.0015269	0.002657	218.73	29.72	248.46	224.80	34.22	259.02	0.72224	0.09169	0.81393

TABLE A-12

Saturated refrigerant-134a—Pressure table

Press., <i>P</i> kPa	Sat. temp., T_{sat} °C	Specific volume, m ³ /kg		Internal energy, kJ/kg			Enthalpy, kJ/kg			Entropy, kJ/kg·K		
		Sat. liquid, v_f	Sat. vapor, v_g	Sat. liquid, u_f	Evap., u_{fg}	Sat. vapor, u_g	Sat. liquid, h_f	Evap., h_{fg}	Sat. vapor, h_g	Sat. liquid, s_f	Evap., s_{fg}	Sat. vapor, s_g
60	-36.95	0.0007097	0.31108	3.795	205.34	209.13	3.837	223.96	227.80	0.01633	0.94812	0.96445
70	-33.87	0.0007143	0.26921	7.672	203.23	210.90	7.722	222.02	229.74	0.03264	0.92783	0.96047
80	-31.13	0.0007184	0.23749	11.14	201.33	212.48	11.20	220.27	231.47	0.04707	0.91009	0.95716
90	-28.65	0.0007222	0.21261	14.30	199.60	213.90	14.36	218.67	233.04	0.06003	0.89431	0.95434
100	-26.37	0.0007258	0.19255	17.19	198.01	215.21	17.27	217.19	234.46	0.07182	0.88008	0.95191
120	-22.32	0.0007323	0.16216	22.38	195.15	217.53	22.47	214.52	236.99	0.09269	0.85520	0.94789
140	-18.77	0.0007381	0.14020	26.96	192.60	219.56	27.06	212.13	239.19	0.11080	0.83387	0.94467
160	-15.60	0.0007435	0.12355	31.06	190.31	221.37	31.18	209.96	241.14	0.12686	0.81517	0.94202
180	-12.73	0.0007485	0.11049	34.81	188.20	223.01	34.94	207.95	242.90	0.14131	0.79848	0.93979
200	-10.09	0.0007532	0.099951	38.26	186.25	224.51	38.41	206.09	244.50	0.15449	0.78339	0.93788
240	-5.38	0.0007618	0.083983	44.46	182.71	227.17	44.64	202.68	247.32	0.17786	0.75689	0.93475
280	-1.25	0.0007697	0.072434	49.95	179.54	229.49	50.16	199.61	249.77	0.19822	0.73406	0.93228
320	2.46	0.0007771	0.063681	54.90	176.65	231.55	55.14	196.78	251.93	0.21631	0.71395	0.93026
360	5.82	0.0007840	0.056809	59.42	173.99	233.41	59.70	194.15	253.86	0.23265	0.69591	0.92856
400	8.91	0.0007905	0.051266	63.61	171.49	235.10	63.92	191.68	255.61	0.24757	0.67954	0.92711
450	12.46	0.0007983	0.045677	68.44	168.58	237.03	68.80	188.78	257.58	0.26462	0.66093	0.92555
500	15.71	0.0008058	0.041168	72.92	165.86	238.77	73.32	186.04	259.36	0.28021	0.64399	0.92420
550	18.73	0.0008129	0.037452	77.09	163.29	240.38	77.54	183.44	260.98	0.29460	0.62842	0.92302
600	21.55	0.0008198	0.034335	81.01	160.84	241.86	81.50	180.95	262.46	0.30799	0.61398	0.92196
650	24.20	0.0008265	0.031680	84.72	158.51	243.23	85.26	178.56	263.82	0.32052	0.60048	0.92100
700	26.69	0.0008331	0.029392	88.24	156.27	244.51	88.82	176.26	265.08	0.33232	0.58780	0.92012
750	29.06	0.0008395	0.027398	91.59	154.11	245.70	92.22	174.03	266.25	0.34348	0.57582	0.91930
800	31.31	0.0008457	0.025645	94.80	152.02	246.82	95.48	171.86	267.34	0.35408	0.56445	0.91853
850	33.45	0.0008519	0.024091	97.88	150.00	247.88	98.61	169.75	268.36	0.36417	0.55362	0.91779
900	35.51	0.0008580	0.022703	100.84	148.03	248.88	101.62	167.69	269.31	0.37383	0.54326	0.91709
950	37.48	0.0008640	0.021456	103.70	146.11	249.82	104.52	165.68	270.20	0.38307	0.53333	0.91641
1000	39.37	0.0008700	0.020329	106.47	144.24	250.71	107.34	163.70	271.04	0.39196	0.52378	0.91574
1200	46.29	0.0008935	0.016728	116.72	137.12	253.84	117.79	156.12	273.92	0.42449	0.48870	0.91320
1400	52.40	0.0009167	0.014119	125.96	130.44	256.40	127.25	148.92	276.17	0.45325	0.45742	0.91067
1600	57.88	0.0009400	0.012134	134.45	124.05	258.50	135.96	141.96	277.92	0.47921	0.42881	0.90802
1800	62.87	0.0009639	0.010568	142.36	117.85	260.21	144.09	135.14	279.23	0.50304	0.40213	0.90517
2000	67.45	0.0009887	0.009297	149.81	111.75	261.56	151.78	128.36	280.15	0.52519	0.37684	0.90204
2500	77.54	0.0010567	0.006941	167.02	96.47	263.49	169.66	111.18	280.84	0.57542	0.31701	0.89243
3000	86.16	0.0011410	0.005272	183.09	80.17	263.26	186.51	92.57	279.08	0.62133	0.25759	0.87893

TABLO A-12

Doymuş soğutucu akışkan-134a—Basınç tablosu

TABLE A-13

Superheated refrigerant-134a

T °C	v m ³ /kg	u kJ/kg	h kJ/kg	s kJ/kg·K	v m ³ /kg	u kJ/kg	h kJ/kg	s kJ/kg·K	v m ³ /kg	u kJ/kg	h kJ/kg	s kJ/kg·K
$P = 0.06 \text{ MPa } (T_{\text{sat}} = -36.95^\circ\text{C})$				$P = 0.10 \text{ MPa } (T_{\text{sat}} = -26.37^\circ\text{C})$				$P = 0.14 \text{ MPa } (T_{\text{sat}} = -18.77^\circ\text{C})$				
Sat.	0.31108	209.13	227.80	0.9645	0.19255	215.21	234.46	0.9519	0.14020	219.56	239.19	0.9447
-20	0.33608	220.62	240.78	1.0175	0.19841	219.68	239.52	0.9721				
-10	0.35048	227.57	248.60	1.0478	0.20743	226.77	247.51	1.0031	0.14605	225.93	246.37	0.9724
0	0.36476	234.67	256.56	1.0775	0.21630	233.97	255.60	1.0333	0.15263	233.25	254.61	1.0032
10	0.37893	241.94	264.68	1.1067	0.22506	241.32	263.82	1.0628	0.15908	240.68	262.95	1.0331
20	0.39302	249.37	272.95	1.1354	0.23373	248.81	272.18	1.0919	0.16544	248.24	271.40	1.0625
30	0.40705	256.97	281.39	1.1637	0.24233	256.46	280.69	1.1204	0.17172	255.95	279.99	1.0913
40	0.42102	264.73	289.99	1.1916	0.25088	264.27	289.36	1.1485	0.17794	263.80	288.72	1.1196
50	0.43495	272.66	298.75	1.2192	0.25937	272.24	298.17	1.1762	0.18412	271.81	297.59	1.1475
60	0.44883	280.75	307.68	1.2464	0.26783	280.36	307.15	1.2036	0.19025	279.97	306.61	1.1750
70	0.46269	289.01	316.77	1.2732	0.27626	288.65	316.28	1.2306	0.19635	288.29	315.78	1.2021
80	0.47651	297.43	326.02	1.2998	0.28465	297.10	325.57	1.2573	0.20242	296.77	325.11	1.2289
90	0.49032	306.02	335.43	1.3261	0.29303	305.71	335.01	1.2836	0.20847	305.40	334.59	1.2554
100	0.50410	314.76	345.01	1.3521	0.30138	314.48	344.61	1.3097	0.21449	314.19	344.22	1.2815
$P = 0.18 \text{ MPa } (T_{\text{sat}} = -12.73^\circ\text{C})$				$P = 0.20 \text{ MPa } (T_{\text{sat}} = -10.09^\circ\text{C})$				$P = 0.24 \text{ MPa } (T_{\text{sat}} = -5.38^\circ\text{C})$				
Sat.	0.11049	223.01	242.90	0.9398	0.09995	224.51	244.50	0.9379	0.08398	227.17	247.32	0.9348
-10	0.11189	225.04	245.18	0.9485	0.09991	224.57	244.56	0.9381				
0	0.11722	232.49	253.59	0.9799	0.10481	232.11	253.07	0.9699	0.08617	231.30	251.98	0.9520
10	0.12240	240.02	262.05	1.0103	0.10955	239.69	261.60	1.0005	0.09026	239.00	260.66	0.9832
20	0.12748	247.66	270.60	1.0400	0.11418	247.36	270.20	1.0304	0.09423	246.76	269.38	1.0134
30	0.13248	255.43	279.27	1.0691	0.11874	255.16	278.91	1.0596	0.09812	254.63	278.17	1.0429
40	0.13741	263.33	288.07	1.0976	0.12322	263.09	287.74	1.0882	0.10193	262.61	287.07	1.0718
50	0.14230	271.38	297.00	1.1257	0.12766	271.16	296.70	1.1164	0.10570	270.73	296.09	1.1002
60	0.14715	279.58	306.07	1.1533	0.13206	279.38	305.79	1.1441	0.10942	278.98	305.24	1.1281
70	0.15196	287.93	315.28	1.1806	0.13641	287.75	315.03	1.1714	0.11310	287.38	314.53	1.1555
80	0.15673	296.43	324.65	1.2075	0.14074	296.27	324.41	1.1984	0.11675	295.93	323.95	1.1826
90	0.16149	305.09	334.16	1.2340	0.14504	304.93	333.94	1.2250	0.12038	304.62	333.51	1.2093
100	0.16622	313.90	343.82	1.2603	0.14933	313.75	343.62	1.2513	0.12398	313.46	343.22	1.2356
$P = 0.28 \text{ MPa } (T_{\text{sat}} = -1.25^\circ\text{C})$				$P = 0.32 \text{ MPa } (T_{\text{sat}} = 2.46^\circ\text{C})$				$P = 0.40 \text{ MPa } (T_{\text{sat}} = 8.91^\circ\text{C})$				
Sat.	0.07243	229.49	249.77	0.9323	0.06368	231.55	251.93	0.9303	0.051266	235.10	255.61	0.9271
0	0.07282	230.46	250.85	0.9362								
10	0.07646	238.29	259.70	0.9681	0.06609	237.56	258.70	0.9545	0.051506	235.99	256.59	0.9306
20	0.07997	246.15	268.54	0.9987	0.06925	245.51	267.67	0.9856	0.054213	244.19	265.88	0.9628
30	0.08338	254.08	277.42	1.0285	0.07231	253.52	276.66	1.0158	0.056796	252.37	275.09	0.9937
40	0.08672	262.12	286.40	1.0577	0.07530	261.62	285.72	1.0452	0.059292	260.60	284.32	1.0237
50	0.09000	270.28	295.48	1.0862	0.07823	269.83	294.87	1.0739	0.061724	268.92	293.61	1.0529
60	0.09324	278.58	304.69	1.1143	0.08111	278.17	304.12	1.1022	0.064104	277.34	302.98	1.0814
70	0.09644	287.01	314.01	1.1419	0.08395	286.64	313.50	1.1299	0.066443	285.88	312.45	1.1095
80	0.09961	295.59	323.48	1.1690	0.08675	295.24	323.00	1.1572	0.068747	294.54	322.04	1.1370
90	0.10275	304.30	333.07	1.1958	0.08953	303.99	332.64	1.1841	0.071023	303.34	331.75	1.1641
100	0.10587	313.17	342.81	1.2223	0.09229	312.87	342.41	1.2106	0.073274	312.28	341.59	1.1908
110	0.10897	322.18	352.69	1.2484	0.09503	321.91	352.31	1.2368	0.075504	321.35	351.55	1.2172
120	0.11205	331.34	362.72	1.2742	0.09775	331.08	362.36	1.2627	0.077717	330.56	361.65	1.2432
130	0.11512	340.65	372.88	1.2998	0.10045	340.41	372.55	1.2883	0.079913	339.92	371.89	1.2689
140	0.11818	350.11	383.20	1.3251	0.10314	349.88	382.89	1.3136	0.082096	349.42	382.26	1.2943

TABLO A-13

Kızgın soğutucu akışkan-134a

TABLE A-13

Superheated refrigerant-134a (Concluded)

T °C	v m ³ /kg	u kJ/kg	h kJ/kg	s kJ/kg·K	v m ³ /kg	u kJ/kg	h kJ/kg	s kJ/kg·K	v m ³ /kg	u kJ/kg	h kJ/kg	s kJ/kg·K
$P = 0.50 \text{ MPa } (T_{\text{sat}} = 15.71^\circ\text{C})$					$P = 0.60 \text{ MPa } (T_{\text{sat}} = 21.55^\circ\text{C})$				$P = 0.70 \text{ MPa } (T_{\text{sat}} = 26.69^\circ\text{C})$			
Sat.	0.041168	238.77	259.36	0.9242	0.034335	241.86	262.46	0.9220	0.029392	244.51	265.08	0.9201
20	0.042115	242.42	263.48	0.9384								
30	0.044338	250.86	273.03	0.9704	0.035984	249.24	270.83	0.9500	0.029966	247.49	268.47	0.9314
40	0.046456	259.27	282.50	1.0011	0.037865	257.88	280.60	0.9817	0.031696	256.41	278.59	0.9642
50	0.048499	267.73	291.98	1.0309	0.039659	266.50	290.30	1.0122	0.033322	265.22	288.54	0.9955
60	0.050485	276.27	301.51	1.0600	0.041389	275.17	300.00	1.0417	0.034875	274.03	298.44	1.0257
70	0.052427	284.91	311.12	1.0884	0.043069	283.91	309.75	1.0706	0.036373	282.88	308.34	1.0550
80	0.054331	293.65	320.82	1.1163	0.044710	292.74	319.57	1.0988	0.037829	291.81	318.29	1.0835
90	0.056205	302.52	330.63	1.1436	0.046318	301.69	329.48	1.1265	0.039250	300.84	328.31	1.1115
100	0.058053	311.52	340.55	1.1706	0.047900	310.75	339.49	1.1536	0.040642	309.96	338.41	1.1389
110	0.059880	320.65	350.59	1.1971	0.049458	319.93	349.61	1.1804	0.042010	319.21	348.61	1.1659
120	0.061687	329.91	360.75	1.2233	0.050997	329.24	359.84	1.2068	0.043358	328.57	358.92	1.1925
130	0.063479	339.31	371.05	1.2492	0.052519	338.69	370.20	1.2328	0.044688	338.06	369.34	1.2186
140	0.065256	348.85	381.47	1.2747	0.054027	348.26	380.68	1.2585	0.046004	347.67	379.88	1.2445
150	0.067021	358.52	392.04	1.3000	0.055522	357.98	391.29	1.2838	0.047306	357.42	390.54	1.2700
160	0.068775	368.34	402.73	1.3250	0.057006	367.83	402.03	1.3089	0.048597	367.31	401.32	1.2952
$P = 0.80 \text{ MPa } (T_{\text{sat}} = 31.31^\circ\text{C})$					$P = 0.90 \text{ MPa } (T_{\text{sat}} = 35.51^\circ\text{C})$				$P = 1.00 \text{ MPa } (T_{\text{sat}} = 39.37^\circ\text{C})$			
Sat.	0.025645	246.82	267.34	0.9185	0.022686	248.82	269.25	0.9169	0.020319	250.71	271.04	0.9157
40	0.027035	254.84	276.46	0.9481	0.023375	253.15	274.19	0.9328	0.020406	251.32	271.73	0.9180
50	0.028547	263.87	286.71	0.9803	0.024809	262.46	284.79	0.9661	0.021796	260.96	282.76	0.9526
60	0.029973	272.85	296.82	1.0111	0.026146	271.62	295.15	0.9977	0.023068	270.33	293.40	0.9851
70	0.031340	281.83	306.90	1.0409	0.027413	280.74	305.41	1.0280	0.024261	279.61	303.87	1.0160
80	0.032659	290.86	316.99	1.0699	0.028630	289.88	315.65	1.0574	0.025398	288.87	314.27	1.0459
90	0.033941	299.97	327.12	1.0982	0.029806	299.08	325.90	1.0861	0.026492	298.17	324.66	1.0749
100	0.035193	309.17	337.32	1.1259	0.030951	308.35	336.21	1.1141	0.027552	307.52	335.08	1.1032
110	0.036420	318.47	347.61	1.1531	0.032068	317.72	346.58	1.1415	0.028584	316.96	345.54	1.1309
120	0.037625	327.89	357.99	1.1798	0.033164	327.19	357.04	1.1684	0.029592	326.49	356.08	1.1580
130	0.038813	337.42	368.47	1.2062	0.034241	336.78	367.59	1.1949	0.030581	336.12	366.70	1.1847
140	0.039985	347.08	379.07	1.2321	0.035302	346.48	378.25	1.2211	0.031554	345.87	377.42	1.2110
150	0.041143	356.86	389.78	1.2577	0.036349	356.30	389.01	1.2468	0.032512	355.73	388.24	1.2369
160	0.042290	366.78	400.61	1.2830	0.037384	366.25	399.89	1.2722	0.033457	365.71	399.17	1.2624
170	0.043427	376.83	411.57	1.3081	0.038408	376.33	410.89	1.2973	0.034392	375.82	410.22	1.2876
180	0.044554	387.01	422.65	1.3328	0.039423	386.54	422.02	1.3221	0.035317	386.06	421.38	1.3125
$P = 1.20 \text{ MPa } (T_{\text{sat}} = 46.29^\circ\text{C})$					$P = 1.40 \text{ MPa } (T_{\text{sat}} = 52.40^\circ\text{C})$				$P = 1.60 \text{ MPa } (T_{\text{sat}} = 57.88^\circ\text{C})$			
Sat.	0.016728	253.84	273.92	0.9132	0.014119	256.40	276.17	0.9107	0.012134	258.50	277.92	0.9080
50	0.017201	257.64	278.28	0.9268								
60	0.018404	267.57	289.66	0.9615	0.015005	264.46	285.47	0.9389	0.012372	260.91	280.71	0.9164
70	0.019502	277.23	300.63	0.9939	0.016060	274.62	297.10	0.9733	0.013430	271.78	293.27	0.9536
80	0.020529	286.77	311.40	1.0249	0.017023	284.51	308.34	1.0056	0.014362	282.11	305.09	0.9875
90	0.021506	296.28	322.09	1.0547	0.017923	294.28	319.37	1.0364	0.015215	292.19	316.53	1.0195
100	0.022442	305.81	332.74	1.0836	0.018778	304.01	330.30	1.0661	0.016014	302.16	327.78	1.0501
110	0.023348	315.40	343.41	1.1119	0.019597	313.76	341.19	1.0949	0.016773	312.09	338.93	1.0795
120	0.024228	325.05	354.12	1.1395	0.020388	323.55	352.09	1.1230	0.017500	322.03	350.03	1.1081
130	0.025086	334.79	364.90	1.1665	0.021155	333.41	363.02	1.1504	0.018201	332.02	361.14	1.1360
140	0.025927	344.63	375.74	1.1931	0.021904	343.34	374.01	1.1773	0.018882	342.06	372.27	1.1633
150	0.026753	354.57	386.68	1.2192	0.022636	353.37	385.07	1.2038	0.019545	352.19	383.46	1.1901
160	0.027566	364.63	397.71	1.2450	0.023355	363.51	396.20	1.2298	0.020194	362.40	394.71	1.2164
170	0.028367	374.80	408.84	1.2704	0.024061	373.75	407.43	1.2554	0.020830	372.71	406.04	1.2422
180	0.029158	385.10	420.09	1.2955	0.024757	384.12	418.78	1.2808	0.021456	383.13	417.46	1.2677

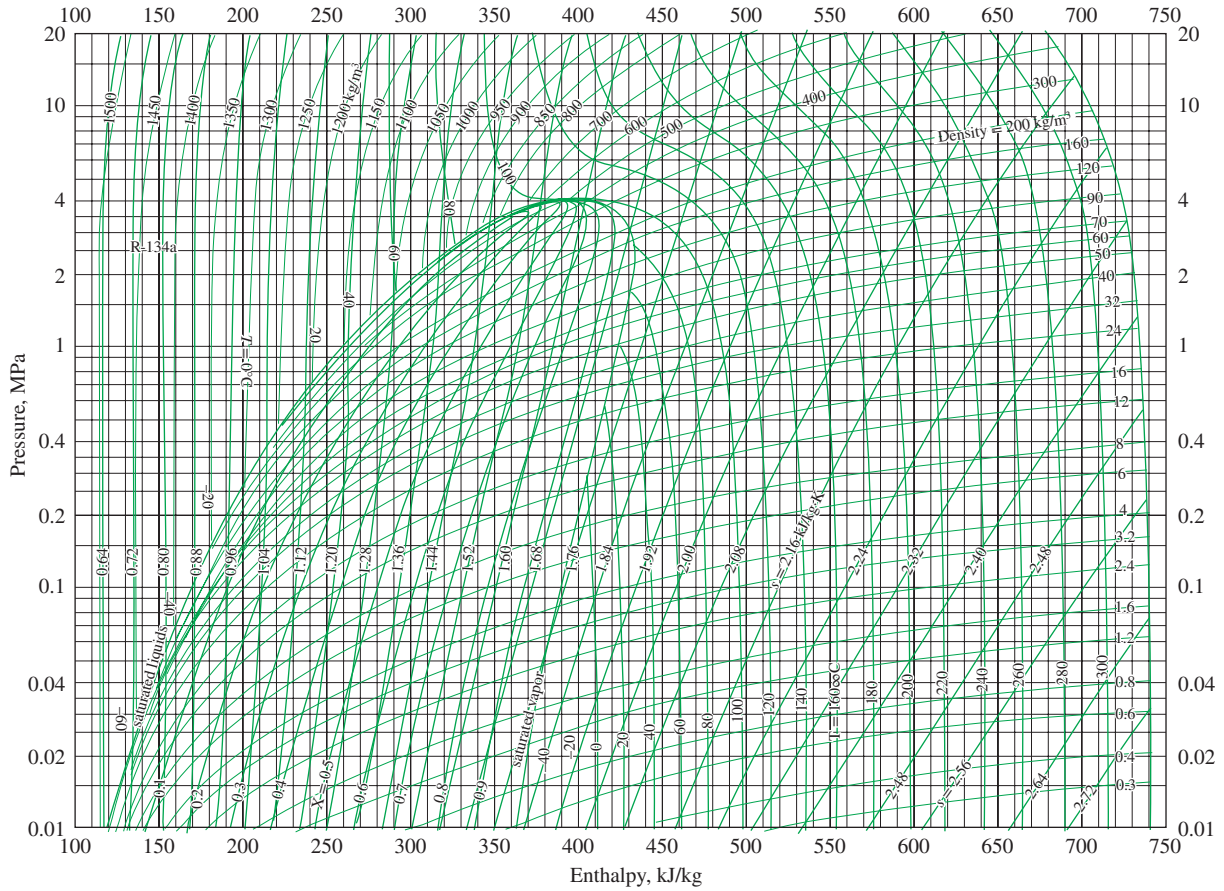
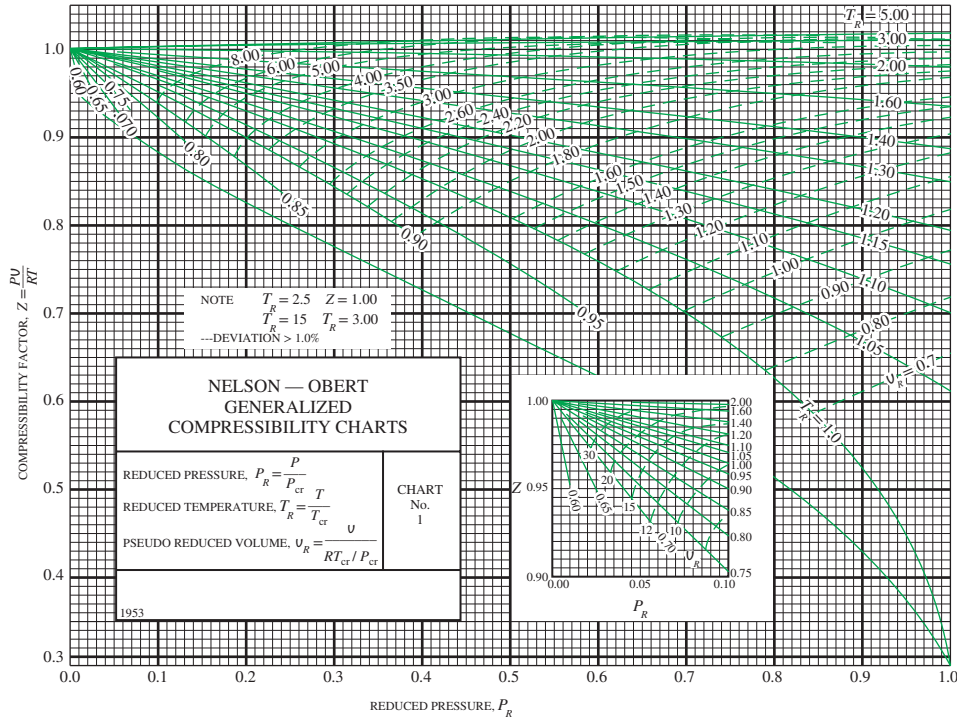


FIGURE A-14
P-h diagram for refrigerant-134a.

Note: The reference point used for the chart is different than that used in the R-134a tables. Therefore, problems should be solved using all property data either from the tables or from the chart, but not from both.

(a) Low pressures, $0 < P_R < 1.0$



(b) Intermediate pressures, $0 < P_R < 7$

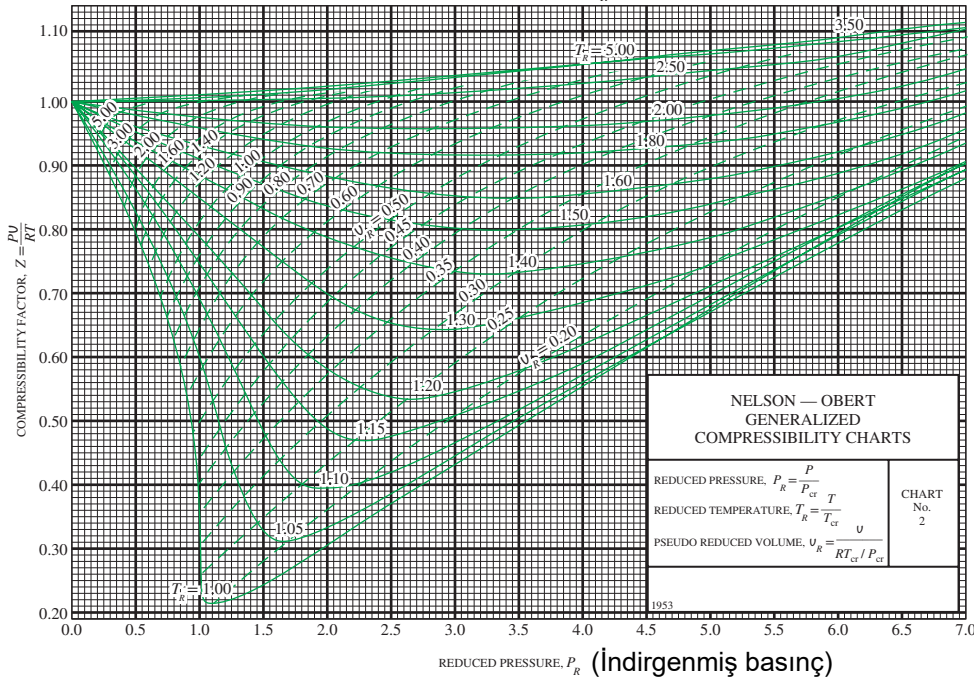
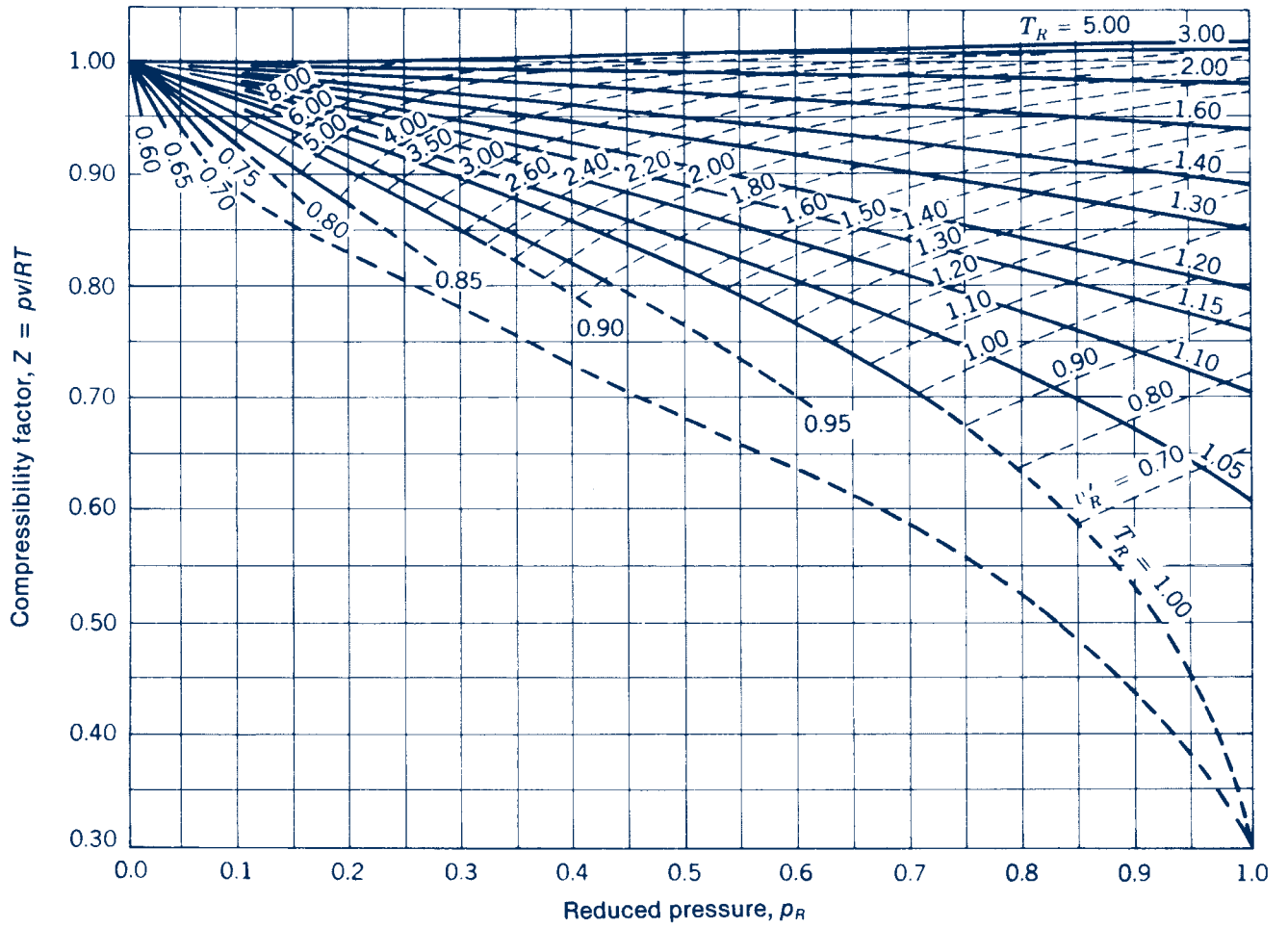


FIGURE A-15 Nelson-Oberth generalized compressibility chart.

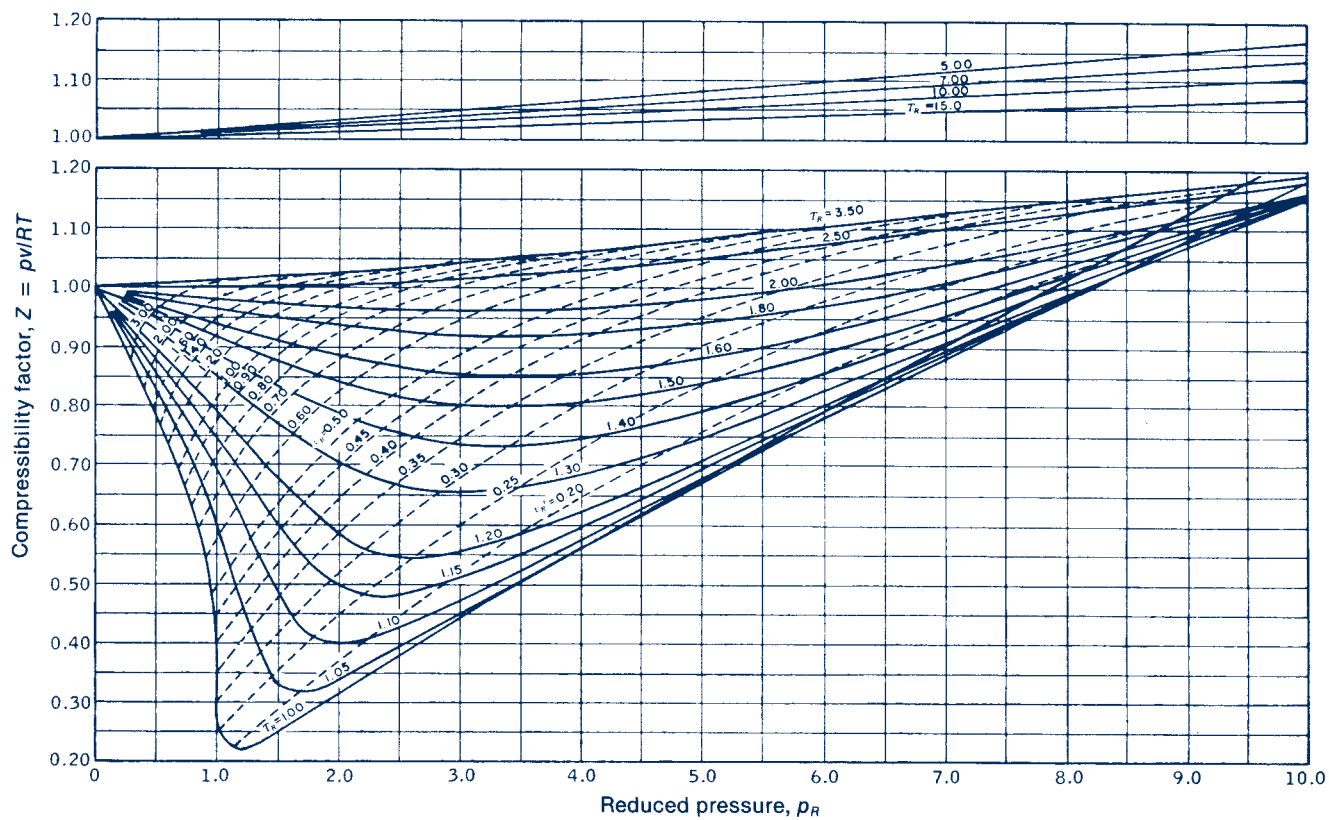
ŞEKİL A-15 Nelson-Oberth'in geliştirilmiş sıkıştırılabilirlik diyagramı

Z: Sıkıştırılabilirlik faktörü



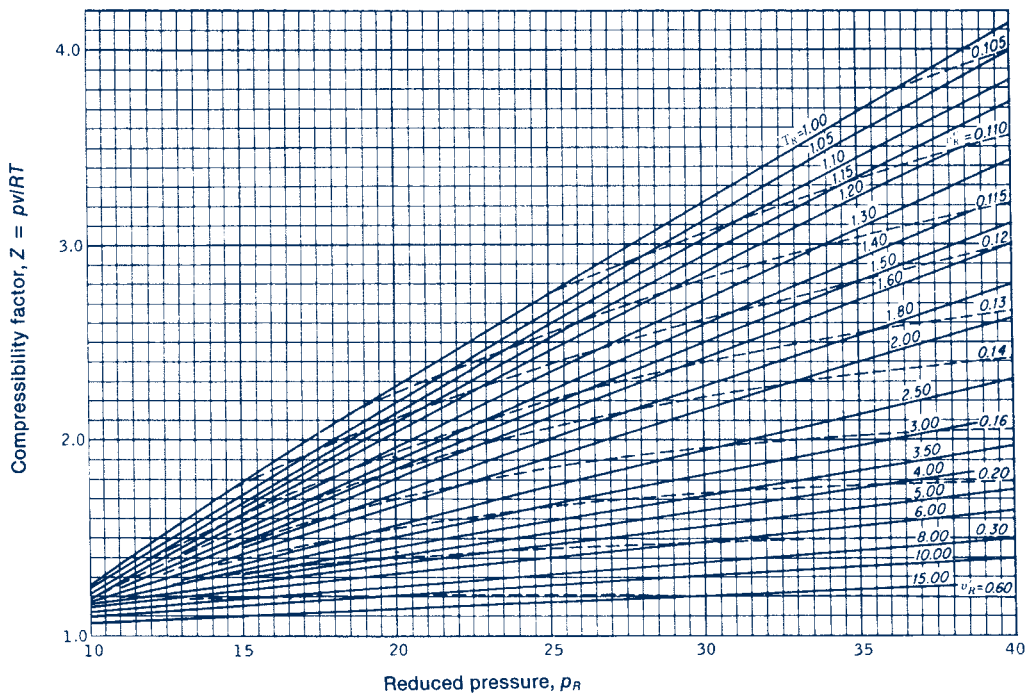
Generalized compressibility chart, $p_R \leq 1.0$.

Şekil-A15A



Generalized compressibility chart, $p_R \leq 10.0$.

ŞEKİL-A15B



Generalized compressibility chart, $10 \leq p_R \leq 40$.

ŞEKİL-A15C

TABLE A-16

Properties of the atmosphere at high altitude

Altitude, m	Temperature, °C	Pressure, kPa	Gravity g, m/s ²	Speed of sound, m/s	Density, kg/m ³	Viscosity μ , kg/m·s	Thermal conductivity, W/m·K
0	15.00	101.33	9.807	340.3	1.225	1.789×10^{-5}	0.0253
200	13.70	98.95	9.806	339.5	1.202	1.783×10^{-5}	0.0252
400	12.40	96.61	9.805	338.8	1.179	1.777×10^{-5}	0.0252
600	11.10	94.32	9.805	338.0	1.156	1.771×10^{-5}	0.0251
800	9.80	92.08	9.804	337.2	1.134	1.764×10^{-5}	0.0250
1000	8.50	89.88	9.804	336.4	1.112	1.758×10^{-5}	0.0249
1200	7.20	87.72	9.803	335.7	1.090	1.752×10^{-5}	0.0248
1400	5.90	85.60	9.802	334.9	1.069	1.745×10^{-5}	0.0247
1600	4.60	83.53	9.802	334.1	1.048	1.739×10^{-5}	0.0245
1800	3.30	81.49	9.801	333.3	1.027	1.732×10^{-5}	0.0244
2000	2.00	79.50	9.800	332.5	1.007	1.726×10^{-5}	0.0243
2200	0.70	77.55	9.800	331.7	0.987	1.720×10^{-5}	0.0242
2400	-0.59	75.63	9.799	331.0	0.967	1.713×10^{-5}	0.0241
2600	-1.89	73.76	9.799	330.2	0.947	1.707×10^{-5}	0.0240
2800	-3.19	71.92	9.798	329.4	0.928	1.700×10^{-5}	0.0239
3000	-4.49	70.12	9.797	328.6	0.909	1.694×10^{-5}	0.0238
3200	-5.79	68.36	9.797	327.8	0.891	1.687×10^{-5}	0.0237
3400	-7.09	66.63	9.796	327.0	0.872	1.681×10^{-5}	0.0236
3600	-8.39	64.94	9.796	326.2	0.854	1.674×10^{-5}	0.0235
3800	-9.69	63.28	9.795	325.4	0.837	1.668×10^{-5}	0.0234
4000	-10.98	61.66	9.794	324.6	0.819	1.661×10^{-5}	0.0233
4200	-12.3	60.07	9.794	323.8	0.802	1.655×10^{-5}	0.0232
4400	-13.6	58.52	9.793	323.0	0.785	1.648×10^{-5}	0.0231
4600	-14.9	57.00	9.793	322.2	0.769	1.642×10^{-5}	0.0230
4800	-16.2	55.51	9.792	321.4	0.752	1.635×10^{-5}	0.0229
5000	-17.5	54.05	9.791	320.5	0.736	1.628×10^{-5}	0.0228
5200	-18.8	52.62	9.791	319.7	0.721	1.622×10^{-5}	0.0227
5400	-20.1	51.23	9.790	318.9	0.705	1.615×10^{-5}	0.0226
5600	-21.4	49.86	9.789	318.1	0.690	1.608×10^{-5}	0.0224
5800	-22.7	48.52	9.785	317.3	0.675	1.602×10^{-5}	0.0223
6000	-24.0	47.22	9.788	316.5	0.660	1.595×10^{-5}	0.0222
6200	-25.3	45.94	9.788	315.6	0.646	1.588×10^{-5}	0.0221
6400	-26.6	44.69	9.787	314.8	0.631	1.582×10^{-5}	0.0220
6600	-27.9	43.47	9.786	314.0	0.617	1.575×10^{-5}	0.0219
6800	-29.2	42.27	9.785	313.1	0.604	1.568×10^{-5}	0.0218
7000	-30.5	41.11	9.785	312.3	0.590	1.561×10^{-5}	0.0217
8000	-36.9	35.65	9.782	308.1	0.526	1.527×10^{-5}	0.0212
9000	-43.4	30.80	9.779	303.8	0.467	1.493×10^{-5}	0.0206
10,000	-49.9	26.50	9.776	299.5	0.414	1.458×10^{-5}	0.0201
12,000	-56.5	19.40	9.770	295.1	0.312	1.422×10^{-5}	0.0195
14,000	-56.5	14.17	9.764	295.1	0.228	1.422×10^{-5}	0.0195
16,000	-56.5	10.53	9.758	295.1	0.166	1.422×10^{-5}	0.0195
18,000	-56.5	7.57	9.751	295.1	0.122	1.422×10^{-5}	0.0195

TABLO A-16

Yüksek seviyede atmosferin özellikleri

Yükseklik, m	Sıcaklık, °C	Basınç, kPa	Yerçek. ivmesi g, m/s ²	Ses hızı, m/s	Yoğunluk, kg/m ³	Viskozite μ , kg/m·s	Isıl iletkenlik, W/m·K
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TABLE A-17

Ideal-gas properties of air

T K	h kJ/kg	P_r	u kJ/kg	v_r	s° kJ/kg·K	T K	h kJ/kg	P_r	u kJ/kg	v_r	s° kJ/kg·K
200	199.97	0.3363	142.56	1707.0	1.29559	580	586.04	14.38	419.55	115.7	2.37348
210	209.97	0.3987	149.69	1512.0	1.34444	590	596.52	15.31	427.15	110.6	2.39140
220	219.97	0.4690	156.82	1346.0	1.39105	600	607.02	16.28	434.78	105.8	2.40902
230	230.02	0.5477	164.00	1205.0	1.43557	610	617.53	17.30	442.42	101.2	2.42644
240	240.02	0.6355	171.13	1084.0	1.47824	620	628.07	18.36	450.09	96.92	2.44356
250	250.05	0.7329	178.28	979.0	1.51917	630	638.63	19.84	457.78	92.84	2.46048
260	260.09	0.8405	185.45	887.8	1.55848	640	649.22	20.64	465.50	88.99	2.47716
270	270.11	0.9590	192.60	808.0	1.59634	650	659.84	21.86	473.25	85.34	2.49364
280	280.13	1.0889	199.75	738.0	1.63279	660	670.47	23.13	481.01	81.89	2.50985
285	285.14	1.1584	203.33	706.1	1.65055	670	681.14	24.46	488.81	78.61	2.52589
290	290.16	1.2311	206.91	676.1	1.66802	680	691.82	25.85	496.62	75.50	2.54175
295	295.17	1.3068	210.49	647.9	1.68515	690	702.52	27.29	504.45	72.56	2.55731
298	298.18	1.3543	212.64	631.9	1.69528	700	713.27	28.80	512.33	69.76	2.57277
300	300.19	1.3860	214.07	621.2	1.70203	710	724.04	30.38	520.23	67.07	2.58810
305	305.22	1.4686	217.67	596.0	1.71865	720	734.82	32.02	528.14	64.53	2.60319
310	310.24	1.5546	221.25	572.3	1.73498	730	745.62	33.72	536.07	62.13	2.61803
315	315.27	1.6442	224.85	549.8	1.75106	740	756.44	35.50	544.02	59.82	2.63280
320	320.29	1.7375	228.42	528.6	1.76690	750	767.29	37.35	551.99	57.63	2.64737
325	325.31	1.8345	232.02	508.4	1.78249	760	778.18	39.27	560.01	55.54	2.66176
330	330.34	1.9352	235.61	489.4	1.79783	780	800.03	43.35	576.12	51.64	2.69013
340	340.42	2.149	242.82	454.1	1.82790	800	821.95	47.75	592.30	48.08	2.71787
350	350.49	2.379	250.02	422.2	1.85708	820	843.98	52.59	608.59	44.84	2.74504
360	360.58	2.626	257.24	393.4	1.88543	840	866.08	57.60	624.95	41.85	2.77170
370	370.67	2.892	264.46	367.2	1.91313	860	888.27	63.09	641.40	39.12	2.79783
380	380.77	3.176	271.69	343.4	1.94001	880	910.56	68.98	657.95	36.61	2.82344
390	390.88	3.481	278.93	321.5	1.96633	900	932.93	75.29	674.58	34.31	2.84856
400	400.98	3.806	286.16	301.6	1.99194	920	955.38	82.05	691.28	32.18	2.87324
410	411.12	4.153	293.43	283.3	2.01699	940	977.92	89.28	708.08	30.22	2.89748
420	421.26	4.522	300.69	266.6	2.04142	960	1000.55	97.00	725.02	28.40	2.92128
430	431.43	4.915	307.99	251.1	2.06533	980	1023.25	105.2	741.98	26.73	2.94468
440	441.61	5.332	315.30	236.8	2.08870	1000	1046.04	114.0	758.94	25.17	2.96770
450	451.80	5.775	322.62	223.6	2.11161	1020	1068.89	123.4	776.10	23.72	2.99034
460	462.02	6.245	329.97	211.4	2.13407	1040	1091.85	133.3	793.36	23.29	3.01260
470	472.24	6.742	337.32	200.1	2.15604	1060	1114.86	143.9	810.62	21.14	3.03449
480	482.49	7.268	344.70	189.5	2.17760	1080	1137.89	155.2	827.88	19.98	3.05608
490	492.74	7.824	352.08	179.7	2.19876	1100	1161.07	167.1	845.33	18.896	3.07732
500	503.02	8.411	359.49	170.6	2.21952	1120	1184.28	179.7	862.79	17.886	3.09825
510	513.32	9.031	366.92	162.1	2.23993	1140	1207.57	193.1	880.35	16.946	3.11883
520	523.63	9.684	374.36	154.1	2.25997	1160	1230.92	207.2	897.91	16.064	3.13916
530	533.98	10.37	381.84	146.7	2.27967	1180	1254.34	222.2	915.57	15.241	3.15916
540	544.35	11.10	389.34	139.7	2.29906	1200	1277.79	238.0	933.33	14.470	3.17888
550	554.74	11.86	396.86	133.1	2.31809	1220	1301.31	254.7	951.09	13.747	3.19834
560	565.17	12.66	404.42	127.0	2.33685	1240	1324.93	272.3	968.95	13.069	3.21751
570	575.59	13.50	411.97	121.2	2.35531						

TABLO A-17

Havanın mükemmel-gaz özellikleri

T K	h kJ/kg	P_r	u kJ/kg	v_r	s° kJ/kg·K	T K	h kJ/kg	P_r	u kJ/kg	v_r	s° kJ/kg·K
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TABLE A-17

Ideal-gas properties of air (Concluded)

T K	h kJ/kg	P_r	u kJ/kg	v_r	s° kJ/kg-K	T K	h kJ/kg	P_r	u kJ/kg	v_r	s° kJ/kg-K
1260	1348.55	290.8	986.90	12.435	3.23638	1600	1757.57	791.2	1298.30	5.804	3.52364
1280	1372.24	310.4	1004.76	11.835	3.25510	1620	1782.00	834.1	1316.96	5.574	3.53879
1300	1395.97	330.9	1022.82	11.275	3.27345	1640	1806.46	878.9	1335.72	5.355	3.55381
1320	1419.76	352.5	1040.88	10.747	3.29160	1660	1830.96	925.6	1354.48	5.147	3.56867
1340	1443.60	375.3	1058.94	10.247	3.30959	1680	1855.50	974.2	1373.24	4.949	3.58335
1360	1467.49	399.1	1077.10	9.780	3.32724	1700	1880.1	1025	1392.7	4.761	3.5979
1380	1491.44	424.2	1095.26	9.337	3.34474	1750	1941.6	1161	1439.8	4.328	3.6336
1400	1515.42	450.5	1113.52	8.919	3.36200	1800	2003.3	1310	1487.2	3.994	3.6684
1420	1539.44	478.0	1131.77	8.526	3.37901	1850	2065.3	1475	1534.9	3.601	3.7023
1440	1563.51	506.9	1150.13	8.153	3.39586	1900	2127.4	1655	1582.6	3.295	3.7354
1460	1587.63	537.1	1168.49	7.801	3.41247	1950	2189.7	1852	1630.6	3.022	3.7677
1480	1611.79	568.8	1186.95	7.468	3.42892	2000	2252.1	2068	1678.7	2.776	3.7994
1500	1635.97	601.9	1205.41	7.152	3.44516	2050	2314.6	2303	1726.8	2.555	3.8303
1520	1660.23	636.5	1223.87	6.854	3.46120	2100	2377.7	2559	1775.3	2.356	3.8605
1540	1684.51	672.8	1242.43	6.569	3.47712	2150	2440.3	2837	1823.8	2.175	3.8901
1560	1708.82	710.5	1260.99	6.301	3.49276	2200	2503.2	3138	1872.4	2.012	3.9191
1580	1733.17	750.0	1279.65	6.046	3.50829	2250	2566.4	3464	1921.3	1.864	3.9474

Note: The properties P_r (relative pressure) and v_r (relative specific volume) are dimensionless quantities used in the analysis of isentropic processes, and should not be confused with the properties pressure and specific volume.

TABLE A-18

Ideal-gas properties of nitrogen, N_2

T K	\bar{h} kJ/kmol	\bar{u} kJ/kmol	\bar{s}° kJ/kmol·K	T K	\bar{h} kJ/kmol	\bar{u} kJ/kmol	\bar{s}° kJ/kmol·K
0	0	0	0	600	17,563	12,574	212.066
220	6,391	4,562	182.639	610	17,864	12,792	212.564
230	6,683	4,770	183.938	620	18,166	13,011	213.055
240	6,975	4,979	185.180	630	18,468	13,230	213.541
250	7,266	5,188	186.370	640	18,772	13,450	214.018
260	7,558	5,396	187.514	650	19,075	13,671	214.489
270	7,849	5,604	188.614	660	19,380	13,892	214.954
280	8,141	5,813	189.673	670	19,685	14,114	215.413
290	8,432	6,021	190.695	680	19,991	14,337	215.866
298	8,669	6,190	191.502	690	20,297	14,560	216.314
300	8,723	6,229	191.682	700	20,604	14,784	216.756
310	9,014	6,437	192.638	710	20,912	15,008	217.192
320	9,306	6,645	193.562	720	21,220	15,234	217.624
330	9,597	6,853	194.459	730	21,529	15,460	218.059
340	9,888	7,061	195.328	740	21,839	15,686	218.472
350	10,180	7,270	196.173	750	22,149	15,913	218.889
360	10,471	7,478	196.995	760	22,460	16,141	219.301
370	10,763	7,687	197.794	770	22,772	16,370	219.709
380	11,055	7,895	198.572	780	23,085	16,599	220.113
390	11,347	8,104	199.331	790	23,398	16,830	220.512
400	11,640	8,314	200.071	800	23,714	17,061	220.907
410	11,932	8,523	200.794	810	24,027	17,292	221.298
420	12,225	8,733	201.499	820	24,342	17,524	221.684
430	12,518	8,943	202.189	830	24,658	17,757	222.067
440	12,811	9,153	202.863	840	24,974	17,990	222.447
450	13,105	9,363	203.523	850	25,292	18,224	222.822
460	13,399	9,574	204.170	860	25,610	18,459	223.194
470	13,693	9,786	204.803	870	25,928	18,695	223.562
480	13,988	9,997	205.424	880	26,248	18,931	223.927
490	14,285	10,210	206.033	890	26,568	19,168	224.288
500	14,581	10,423	206.630	900	26,890	19,407	224.647
510	14,876	10,635	207.216	910	27,210	19,644	225.002
520	15,172	10,848	207.792	920	27,532	19,883	225.353
530	15,469	11,062	208.358	930	27,854	20,122	225.701
540	15,766	11,277	208.914	940	28,178	20,362	226.047
550	16,064	11,492	209.461	950	28,501	20,603	226.389
560	16,363	11,707	209.999	960	28,826	20,844	226.728
570	16,662	11,923	210.528	970	29,151	21,086	227.064
580	16,962	12,139	211.049	980	29,476	21,328	227.398
590	17,262	12,356	211.562	990	29,803	21,571	227.728

TABLE A-18

Ideal-gas properties of nitrogen, N_2 (Concluded)

T K	\bar{h} kJ/kmol	\bar{u} kJ/kmol	\bar{s}° kJ/kmol·K	T K	\bar{h} kJ/kmol	\bar{u} kJ/kmol	\bar{s}° kJ/kmol·K
1000	30,129	21,815	228.057	1760	56,227	41,594	247.396
1020	30,784	22,304	228.706	1780	56,938	42,139	247.798
1040	31,442	22,795	229.344	1800	57,651	42,685	248.195
1060	32,101	23,288	229.973	1820	58,363	43,231	248.589
1080	32,762	23,782	230.591	1840	59,075	43,777	248.979
1100	33,426	24,280	231.199	1860	59,790	44,324	249.365
1120	34,092	24,780	231.799	1880	60,504	44,873	249.748
1140	34,760	25,282	232.391	1900	61,220	45,423	250.128
1160	35,430	25,786	232.973	1920	61,936	45,973	250.502
1180	36,104	26,291	233.549	1940	62,654	46,524	250.874
1200	36,777	26,799	234.115	1960	63,381	47,075	251.242
1220	37,452	27,308	234.673	1980	64,090	47,627	251.607
1240	38,129	27,819	235.223	2000	64,810	48,181	251.969
1260	38,807	28,331	235.766	2050	66,612	49,567	252.858
1280	39,488	28,845	236.302	2100	68,417	50,957	253.726
1300	40,170	29,361	236.831	2150	70,226	52,351	254.578
1320	40,853	29,378	237.353	2200	72,040	53,749	255.412
1340	41,539	30,398	237.867	2250	73,856	55,149	256.227
1360	42,227	30,919	238.376	2300	75,676	56,553	257.027
1380	42,915	31,441	238.878	2350	77,496	57,958	257.810
1400	43,605	31,964	239.375	2400	79,320	59,366	258.580
1420	44,295	32,489	239.865	2450	81,149	60,779	259.332
1440	44,988	33,014	240.350	2500	82,981	62,195	260.073
1460	45,682	33,543	240.827	2550	84,814	63,613	260.799
1480	46,377	34,071	241.301	2600	86,650	65,033	261.512
1500	47,073	34,601	241.768	2650	88,488	66,455	262.213
1520	47,771	35,133	242.228	2700	90,328	67,880	262.902
1540	48,470	35,665	242.685	2750	92,171	69,306	263.577
1560	49,168	36,197	243.137	2800	94,014	70,734	264.241
1580	49,869	36,732	243.585	2850	95,859	72,163	264.895
1600	50,571	37,268	244.028	2900	97,705	73,593	265.538
1620	51,275	37,806	244.464	2950	99,556	75,028	266.170
1640	51,980	38,344	244.896	3000	101,407	76,464	266.793
1660	52,686	38,884	245.324	3050	103,260	77,902	267.404
1680	53,393	39,424	245.747	3100	105,115	79,341	268.007
1700	54,099	39,965	246.166	3150	106,972	80,782	268.601
1720	54,807	40,507	246.580	3200	108,830	82,224	269.186
1740	55,516	41,049	246.990	3250	110,690	83,668	269.763

TABLE A-19

Ideal-gas properties of oxygen, O₂

T K	\bar{h} kJ/kmol	\bar{u} kJ/kmol	\bar{s}° kJ/kmol·K	T K	\bar{h} kJ/kmol	\bar{u} kJ/kmol	\bar{s}° kJ/kmol·K
0	0	0	0	600	17,929	12,940	226.346
220	6,404	4,575	196.171	610	18,250	13,178	226.877
230	6,694	4,782	197.461	620	18,572	13,417	227.400
240	6,984	4,989	198.696	630	18,895	13,657	227.918
250	7,275	5,197	199.885	640	19,219	13,898	228.429
260	7,566	5,405	201.027	650	19,544	14,140	228.932
270	7,858	5,613	202.128	660	19,870	14,383	229.430
280	8,150	5,822	203.191	670	20,197	14,626	229.920
290	8,443	6,032	204.218	680	20,524	14,871	230.405
298	8,682	6,203	205.033	690	20,854	15,116	230.885
300	8,736	6,242	205.213	700	21,184	15,364	231.358
310	9,030	6,453	206.177	710	21,514	15,611	231.827
320	9,325	6,664	207.112	720	21,845	15,859	232.291
330	9,620	6,877	208.020	730	22,177	16,107	232.748
340	9,916	7,090	208.904	740	22,510	16,357	233.201
350	10,213	7,303	209.765	750	22,844	16,607	233.649
360	10,511	7,518	210.604	760	23,178	16,859	234.091
370	10,809	7,733	211.423	770	23,513	17,111	234.528
380	11,109	7,949	212.222	780	23,850	17,364	234.960
390	11,409	8,166	213.002	790	24,186	17,618	235.387
400	11,711	8,384	213.765	800	24,523	17,872	235.810
410	12,012	8,603	214.510	810	24,861	18,126	236.230
420	12,314	8,822	215.241	820	25,199	18,382	236.644
430	12,618	9,043	215.955	830	25,537	18,637	237.055
440	12,923	9,264	216.656	840	25,877	18,893	237.462
450	13,228	9,487	217.342	850	26,218	19,150	237.864
460	13,525	9,710	218.016	860	26,559	19,408	238.264
470	13,842	9,935	218.676	870	26,899	19,666	238.660
480	14,151	10,160	219.326	880	27,242	19,925	239.051
490	14,460	10,386	219.963	890	27,584	20,185	239.439
500	14,770	10,614	220.589	900	27,928	20,445	239.823
510	15,082	10,842	221.206	910	28,272	20,706	240.203
520	15,395	11,071	221.812	920	28,616	20,967	240.580
530	15,708	11,301	222.409	930	28,960	21,228	240.953
540	16,022	11,533	222.997	940	29,306	21,491	241.323
550	16,338	11,765	223.576	950	29,652	21,754	241.689
560	16,654	11,998	224.146	960	29,999	22,017	242.052
570	16,971	12,232	224.708	970	30,345	22,280	242.411
580	17,290	12,467	225.262	980	30,692	22,544	242.768
590	17,609	12,703	225.808	990	31,041	22,809	242.120

TABLE A-19

Ideal-gas properties of oxygen, O₂ (Concluded)

T K	\bar{h} kJ/kmol	\bar{u} kJ/kmol	\bar{s}° kJ/kmol·K	T K	\bar{h} kJ/kmol	\bar{u} kJ/kmol	\bar{s}° kJ/kmol·K
1000	31,389	23,075	243.471	1760	58,880	44,247	263.861
1020	32,088	23,607	244.164	1780	59,624	44,825	264.283
1040	32,789	24,142	244.844	1800	60,371	45,405	264.701
1060	33,490	24,677	245.513	1820	61,118	45,986	265.113
1080	34,194	25,214	246.171	1840	61,866	46,568	265.521
1100	34,899	25,753	246.818	1860	62,616	47,151	265.925
1120	35,606	26,294	247.454	1880	63,365	47,734	266.326
1140	36,314	26,836	248.081	1900	64,116	48,319	266.722
1160	37,023	27,379	248.698	1920	64,868	48,904	267.115
1180	37,734	27,923	249.307	1940	65,620	49,490	267.505
1200	38,447	28,469	249.906	1960	66,374	50,078	267.891
1220	39,162	29,018	250.497	1980	67,127	50,665	268.275
1240	39,877	29,568	251.079	2000	67,881	51,253	268.655
1260	40,594	30,118	251.653	2050	69,772	52,727	269.588
1280	41,312	30,670	252.219	2100	71,668	54,208	270.504
1300	42,033	31,224	252.776	2150	73,573	55,697	271.399
1320	42,753	31,778	253.325	2200	75,484	57,192	272.278
1340	43,475	32,334	253.868	2250	77,397	58,690	273.136
1360	44,198	32,891	254.404	2300	79,316	60,193	273.891
1380	44,923	33,449	254.932	2350	81,243	61,704	274.809
1400	45,648	34,008	255.454	2400	83,174	63,219	275.625
1420	46,374	34,567	255.968	2450	85,112	64,742	276.424
1440	47,102	35,129	256.475	2500	87,057	66,271	277.207
1460	47,831	35,692	256.978	2550	89,004	67,802	277.979
1480	48,561	36,256	257.474	2600	90,956	69,339	278.738
1500	49,292	36,821	257.965	2650	92,916	70,883	279.485
1520	50,024	37,387	258.450	2700	94,881	72,433	280.219
1540	50,756	37,952	258.928	2750	96,852	73,987	280.942
1560	51,490	38,520	259.402	2800	98,826	75,546	281.654
1580	52,224	39,088	259.870	2850	100,808	77,112	282.357
1600	52,961	39,658	260.333	2900	102,793	78,682	283.048
1620	53,696	40,227	260.791	2950	104,785	80,258	283.728
1640	54,434	40,799	261.242	3000	106,780	81,837	284.399
1660	55,172	41,370	261.690	3050	108,778	83,419	285.060
1680	55,912	41,944	262.132	3100	110,784	85,009	285.713
1700	56,652	42,517	262.571	3150	112,795	86,601	286.355
1720	57,394	43,093	263.005	3200	114,809	88,203	286.989
1740	58,136	43,669	263.435	3250	116,827	89,804	287.614

TABLE A-20

Ideal-gas properties of carbon dioxide, CO₂

T K	\bar{h} kJ/kmol	\bar{u} kJ/kmol	\bar{s}° kJ/kmol·K	T K	\bar{h} kJ/kmol	\bar{u} kJ/kmol	\bar{s}° kJ/kmol·K
0	0	0	0	600	22,280	17,291	243.199
220	6,601	4,772	202.966	610	22,754	17,683	243.983
230	6,938	5,026	204.464	620	23,231	18,076	244.758
240	7,280	5,285	205.920	630	23,709	18,471	245.524
250	7,627	5,548	207.337	640	24,190	18,869	246.282
260	7,979	5,817	208.717	650	24,674	19,270	247.032
270	8,335	6,091	210.062	660	25,160	19,672	247.773
280	8,697	6,369	211.376	670	25,648	20,078	248.507
290	9,063	6,651	212.660	680	26,138	20,484	249.233
298	9,364	6,885	213.685	690	26,631	20,894	249.952
300	9,431	6,939	213.915	700	27,125	21,305	250.663
310	9,807	7,230	215.146	710	27,622	21,719	251.368
320	10,186	7,526	216.351	720	28,121	22,134	252.065
330	10,570	7,826	217.534	730	28,622	22,522	252.755
340	10,959	8,131	218.694	740	29,124	22,972	253.439
350	11,351	8,439	219.831	750	29,629	23,393	254.117
360	11,748	8,752	220.948	760	30,135	23,817	254.787
370	12,148	9,068	222.044	770	30,644	24,242	255.452
380	12,552	9,392	223.122	780	31,154	24,669	256.110
390	12,960	9,718	224.182	790	31,665	25,097	256.762
400	13,372	10,046	225.225	800	32,179	25,527	257.408
410	13,787	10,378	226.250	810	32,694	25,959	258.048
420	14,206	10,714	227.258	820	33,212	26,394	258.682
430	14,628	11,053	228.252	830	33,730	26,829	259.311
440	15,054	11,393	229.230	840	34,251	27,267	259.934
450	15,483	11,742	230.194	850	34,773	27,706	260.551
460	15,916	12,091	231.144	860	35,296	28,125	261.164
470	16,351	12,444	232.080	870	35,821	28,588	261.770
480	16,791	12,800	233.004	880	36,347	29,031	262.371
490	17,232	13,158	233.916	890	36,876	29,476	262.968
500	17,678	13,521	234.814	900	37,405	29,922	263.559
510	18,126	13,885	235.700	910	37,935	30,369	264.146
520	18,576	14,253	236.575	920	38,467	30,818	264.728
530	19,029	14,622	237.439	930	39,000	31,268	265.304
540	19,485	14,996	238.292	940	39,535	31,719	265.877
550	19,945	15,372	239.135	950	40,070	32,171	266.444
560	20,407	15,751	239.962	960	40,607	32,625	267.007
570	20,870	16,131	240.789	970	41,145	33,081	267.566
580	21,337	16,515	241.602	980	41,685	33,537	268.119
590	21,807	16,902	242.405	990	42,226	33,995	268.670

TABLE A-20

Ideal-gas properties of carbon dioxide, CO₂ (Concluded)

T K	\bar{h} kJ/kmol	\bar{u} kJ/kmol	\bar{s}° kJ/kmol·K	T K	\bar{h} kJ/kmol	\bar{u} kJ/kmol	\bar{s}° kJ/kmol·K
1000	42,769	34,455	269.215	1760	86,420	71,787	301.543
1020	43,859	35,378	270.293	1780	87,612	72,812	302.217
1040	44,953	36,306	271.354	1800	88,806	73,840	302.884
1060	46,051	37,238	272.400	1820	90,000	74,868	303.544
1080	47,153	38,174	273.430	1840	91,196	75,897	304.198
1100	48,258	39,112	274.445	1860	92,394	76,929	304.845
1120	49,369	40,057	275.444	1880	93,593	77,962	305.487
1140	50,484	41,006	276.430	1900	94,793	78,996	306.122
1160	51,602	41,957	277.403	1920	95,995	80,031	306.751
1180	52,724	42,913	278.361	1940	97,197	81,067	307.374
1200	53,848	43,871	297.307	1960	98,401	82,105	307.992
1220	54,977	44,834	280.238	1980	99,606	83,144	308.604
1240	56,108	45,799	281.158	2000	100,804	84,185	309.210
1260	57,244	46,768	282.066	2050	103,835	86,791	310.701
1280	58,381	47,739	282.962	2100	106,864	89,404	312.160
1300	59,522	48,713	283.847	2150	109,898	92,023	313.589
1320	60,666	49,691	284.722	2200	112,939	94,648	314.988
1340	61,813	50,672	285.586	2250	115,984	97,277	316.356
1360	62,963	51,656	286.439	2300	119,035	99,912	317.695
1380	64,116	52,643	287.283	2350	122,091	102,552	319.011
1400	65,271	53,631	288.106	2400	125,152	105,197	320.302
1420	66,427	54,621	288.934	2450	128,219	107,849	321.566
1440	67,586	55,614	289.743	2500	131,290	110,504	322.808
1460	68,748	56,609	290.542	2550	134,368	113,166	324.026
1480	66,911	57,606	291.333	2600	137,449	115,832	325.222
1500	71,078	58,606	292.114	2650	140,533	118,500	326.396
1520	72,246	59,609	292.888	2700	143,620	121,172	327.549
1540	73,417	60,613	292.654	2750	146,713	123,849	328.684
1560	74,590	61,620	294.411	2800	149,808	126,528	329.800
1580	76,767	62,630	295.161	2850	152,908	129,212	330.896
1600	76,944	63,741	295.901	2900	156,009	131,898	331.975
1620	78,123	64,653	296.632	2950	159,117	134,589	333.037
1640	79,303	65,668	297.356	3000	162,226	137,283	334.084
1660	80,486	66,592	298.072	3050	165,341	139,982	335.114
1680	81,670	67,702	298.781	3100	168,456	142,681	336.126
1700	82,856	68,721	299.482	3150	171,576	145,385	337.124
1720	84,043	69,742	300.177	3200	174,695	148,089	338.109
1740	85,231	70,764	300.863	3250	177,822	150,801	339.069

TABLE A-21

Ideal-gas properties of carbon monoxide, CO

T K	\bar{h} kJ/kmol	\bar{u} kJ/kmol	\bar{s}° kJ/kmol·K	T K	\bar{h} kJ/kmol	\bar{u} kJ/kmol	\bar{s}° kJ/kmol·K
0	0	0	0	600	17,611	12,622	218.204
220	6,391	4,562	188.683	610	17,915	12,843	218.708
230	6,683	4,771	189.980	620	18,221	13,066	219.205
240	6,975	4,979	191.221	630	18,527	13,289	219.695
250	7,266	5,188	192.411	640	18,833	13,512	220.179
260	7,558	5,396	193.554	650	19,141	13,736	220.656
270	7,849	5,604	194.654	660	19,449	13,962	221.127
280	8,140	5,812	195.713	670	19,758	14,187	221.592
290	8,432	6,020	196.735	680	20,068	14,414	222.052
298	8,669	6,190	197.543	690	20,378	14,641	222.505
300	8,723	6,229	197.723	700	20,690	14,870	222.953
310	9,014	6,437	198.678	710	21,002	15,099	223.396
320	9,306	6,645	199.603	720	21,315	15,328	223.833
330	9,597	6,854	200.500	730	21,628	15,558	224.265
340	9,889	7,062	201.371	740	21,943	15,789	224.692
350	10,181	7,271	202.217	750	22,258	16,022	225.115
360	10,473	7,480	203.040	760	22,573	16,255	225.533
370	10,765	7,689	203.842	770	22,890	16,488	225.947
380	11,058	7,899	204.622	780	23,208	16,723	226.357
390	11,351	8,108	205.383	790	23,526	16,957	226.762
400	11,644	8,319	206.125	800	23,844	17,193	227.162
410	11,938	8,529	206.850	810	24,164	17,429	227.559
420	12,232	8,740	207.549	820	24,483	17,665	227.952
430	12,526	8,951	208.252	830	24,803	17,902	228.339
440	12,821	9,163	208.929	840	25,124	18,140	228.724
450	13,116	9,375	209.593	850	25,446	18,379	229.106
460	13,412	9,587	210.243	860	25,768	18,617	229.482
470	13,708	9,800	210.880	870	26,091	18,858	229.856
480	14,005	10,014	211.504	880	26,415	19,099	230.227
490	14,302	10,228	212.117	890	26,740	19,341	230.593
500	14,600	10,443	212.719	900	27,066	19,583	230.957
510	14,898	10,658	213.310	910	27,392	19,826	231.317
520	15,197	10,874	213.890	920	27,719	20,070	231.674
530	15,497	11,090	214.460	930	28,046	20,314	232.028
540	15,797	11,307	215.020	940	28,375	20,559	232.379
550	16,097	11,524	215.572	950	28,703	20,805	232.727
560	16,399	11,743	216.115	960	29,033	21,051	233.072
570	16,701	11,961	216.649	970	29,362	21,298	233.413
580	17,003	12,181	217.175	980	29,693	21,545	233.752
590	17,307	12,401	217.693	990	30,024	21,793	234.088

TABLE A-21

Ideal-gas properties of carbon monoxide, CO (Concluded)

T K	\bar{h} kJ/kmol	\bar{u} kJ/kmol	\bar{s}° kJ/kmol·K	T K	\bar{h} kJ/kmol	\bar{u} kJ/kmol	\bar{s}° kJ/kmol·K
1000	30,355	22,041	234.421	1760	56,756	42,123	253.991
1020	31,020	22,540	235.079	1780	57,473	42,673	254.398
1040	31,688	23,041	235.728	1800	58,191	43,225	254.797
1060	32,357	23,544	236.364	1820	58,910	43,778	255.194
1080	33,029	24,049	236.992	1840	59,629	44,331	255.587
1100	33,702	24,557	237.609	1860	60,351	44,886	255.976
1120	34,377	25,065	238.217	1880	61,072	45,441	256.361
1140	35,054	25,575	238.817	1900	61,794	45,997	256.743
1160	35,733	26,088	239.407	1920	62,516	46,552	257.122
1180	36,406	26,602	239.989	1940	63,238	47,108	257.497
1200	37,095	27,118	240.663	1960	63,961	47,665	257.868
1220	37,780	27,637	241.128	1980	64,684	48,221	258.236
1240	38,466	28,156	241.686	2000	65,408	48,780	258.600
1260	39,154	28,678	242.236	2050	67,224	50,179	259.494
1280	39,844	29,201	242.780	2100	69,044	51,584	260.370
1300	40,534	29,725	243.316	2150	70,864	52,988	261.226
1320	41,226	30,251	243.844	2200	72,688	54,396	262.065
1340	41,919	30,778	244.366	2250	74,516	55,809	262.887
1360	42,613	31,306	244.880	2300	76,345	57,222	263.692
1380	43,309	31,836	245.388	2350	78,178	58,640	264.480
1400	44,007	32,367	245.889	2400	80,015	60,060	265.253
1420	44,707	32,900	246.385	2450	81,852	61,482	266.012
1440	45,408	33,434	246.876	2500	83,692	62,906	266.755
1460	46,110	33,971	247.360	2550	85,537	64,335	267.485
1480	46,813	34,508	247.839	2600	87,383	65,766	268.202
1500	47,517	35,046	248.312	2650	89,230	67,197	268.905
1520	48,222	35,584	248.778	2700	91,077	68,628	269.596
1540	48,928	36,124	249.240	2750	92,930	70,066	270.285
1560	49,635	36,665	249.695	2800	94,784	71,504	270.943
1580	50,344	37,207	250.147	2850	96,639	72,945	271.602
1600	51,053	37,750	250.592	2900	98,495	74,383	272.249
1620	51,763	38,293	251.033	2950	100,352	75,825	272.884
1640	52,472	38,837	251.470	3000	102,210	77,267	273.508
1660	53,184	39,382	251.901	3050	104,073	78,715	274.123
1680	53,895	39,927	252.329	3100	105,939	80,164	274.730
1700	54,609	40,474	252.751	3150	107,802	81,612	275.326
1720	55,323	41,023	253.169	3200	109,667	83,061	275.914
1740	56,039	41,572	253.582	3250	111,534	84,513	276.494

TABLE A-22

Ideal-gas properties of hydrogen, H₂

T K	\bar{h} kJ/kmol	\bar{u} kJ/kmol	\bar{s}° kJ/kmol·K	T K	\bar{h} kJ/kmol	\bar{u} kJ/kmol	\bar{s}° kJ/kmol·K
0	0	0	0	1440	42,808	30,835	177.410
260	7,370	5,209	126.636	1480	44,091	31,786	178.291
270	7,657	5,412	127.719	1520	45,384	32,746	179.153
280	7,945	5,617	128.765	1560	46,683	33,713	179.995
290	8,233	5,822	129.775	1600	47,990	34,687	180.820
298	8,468	5,989	130.574	1640	49,303	35,668	181.632
300	8,522	6,027	130.754	1680	50,622	36,654	182.428
320	9,100	6,440	132.621	1720	51,947	37,646	183.208
340	9,680	6,853	134.378	1760	53,279	38,645	183.973
360	10,262	7,268	136.039	1800	54,618	39,652	184.724
380	10,843	7,684	137.612	1840	55,962	40,663	185.463
400	11,426	8,100	139.106	1880	57,311	41,680	186.190
420	12,010	8,518	140.529	1920	58,668	42,705	186.904
440	12,594	8,936	141.888	1960	60,031	43,735	187.607
460	13,179	9,355	143.187	2000	61,400	44,771	188.297
480	13,764	9,773	144.432	2050	63,119	46,074	189.148
500	14,350	10,193	145.628	2100	64,847	47,386	189.979
520	14,935	10,611	146.775	2150	66,584	48,708	190.796
560	16,107	11,451	148.945	2200	68,328	50,037	191.598
600	17,280	12,291	150.968	2250	70,080	51,373	192.385
640	18,453	13,133	152.863	2300	71,839	52,716	193.159
680	19,630	13,976	154.645	2350	73,608	54,069	193.921
720	20,807	14,821	156.328	2400	75,383	55,429	194.669
760	21,988	15,669	157.923	2450	77,168	56,798	195.403
800	23,171	16,520	159.440	2500	78,960	58,175	196.125
840	24,359	17,375	160.891	2550	80,755	59,554	196.837
880	25,551	18,235	162.277	2600	82,558	60,941	197.539
920	26,747	19,098	163.607	2650	84,368	62,335	198.229
960	27,948	19,966	164.884	2700	86,186	63,737	198.907
1000	29,154	20,839	166.114	2750	88,008	65,144	199.575
1040	30,364	21,717	167.300	2800	89,838	66,558	200.234
1080	31,580	22,601	168.449	2850	91,671	67,976	200.885
1120	32,802	23,490	169.560	2900	93,512	69,401	201.527
1160	34,028	24,384	170.636	2950	95,358	70,831	202.157
1200	35,262	25,284	171.682	3000	97,211	72,268	202.778
1240	36,502	26,192	172.698	3050	99,065	73,707	203.391
1280	37,749	27,106	173.687	3100	100,926	75,152	203.995
1320	39,002	28,027	174.652	3150	102,793	76,604	204.592
1360	40,263	28,955	175.593	3200	104,667	78,061	205.181
1400	41,530	29,889	176.510	3250	106,545	79,523	205.765

TABLE A-23

Ideal-gas properties of water vapor, H₂O

T K	\bar{h} kJ/kmol	\bar{u} kJ/kmol	\bar{s}° kJ/kmol·K	T K	\bar{h} kJ/kmol	\bar{u} kJ/kmol	\bar{s}° kJ/kmol·K
0	0	0	0	600	20,402	15,413	212.920
220	7,295	5,466	178.576	610	20,765	15,693	213.529
230	7,628	5,715	180.054	620	21,130	15,975	214.122
240	7,961	5,965	181.471	630	21,495	16,257	214.707
250	8,294	6,215	182.831	640	21,862	16,541	215.285
260	8,627	6,466	184.139	650	22,230	16,826	215.856
270	8,961	6,716	185.399	660	22,600	17,112	216.419
280	9,296	6,968	186.616	670	22,970	17,399	216.976
290	9,631	7,219	187.791	680	23,342	17,688	217.527
298	9,904	7,425	188.720	690	23,714	17,978	218.071
300	9,966	7,472	188.928	700	24,088	18,268	218.610
310	10,302	7,725	190.030	710	24,464	18,561	219.142
320	10,639	7,978	191.098	720	24,840	18,854	219.668
330	10,976	8,232	192.136	730	25,218	19,148	220.189
340	11,314	8,487	193.144	740	25,597	19,444	220.707
350	11,652	8,742	194.125	750	25,977	19,741	221.215
360	11,992	8,998	195.081	760	26,358	20,039	221.720
370	12,331	9,255	196.012	770	26,741	20,339	222.221
380	12,672	9,513	196.920	780	27,125	20,639	222.717
390	13,014	9,771	197.807	790	27,510	20,941	223.207
400	13,356	10,030	198.673	800	27,896	21,245	223.693
410	13,699	10,290	199.521	810	28,284	21,549	224.174
420	14,043	10,551	200.350	820	28,672	21,855	224.651
430	14,388	10,813	201.160	830	29,062	22,162	225.123
440	14,734	11,075	201.955	840	29,454	22,470	225.592
450	15,080	11,339	202.734	850	29,846	22,779	226.057
460	15,428	11,603	203.497	860	30,240	23,090	226.517
470	15,777	11,869	204.247	870	30,635	23,402	226.973
480	16,126	12,135	204.982	880	31,032	23,715	227.426
490	16,477	12,403	205.705	890	31,429	24,029	227.875
500	16,828	12,671	206.413	900	31,828	24,345	228.321
510	17,181	12,940	207.112	910	32,228	24,662	228.763
520	17,534	13,211	207.799	920	32,629	24,980	229.202
530	17,889	13,482	208.475	930	33,032	25,300	229.637
540	18,245	13,755	209.139	940	33,436	25,621	230.070
550	18,601	14,028	209.795	950	33,841	25,943	230.499
560	18,959	14,303	210.440	960	34,247	26,265	230.924
570	19,318	14,579	211.075	970	34,653	26,588	231.347
580	19,678	14,856	211.702	980	35,061	26,913	231.767
590	20,039	15,134	212.320	990	35,472	27,240	232.184

TABLE A-23

Ideal-gas properties of water vapor, H₂O (Continued)

T K	\bar{h} kJ/kmol	\bar{u} kJ/kmol	\bar{s}° kJ/kmol·K	T K	\bar{h} kJ/kmol	\bar{u} kJ/kmol	\bar{s}° kJ/kmol·K
1000	35,882	27,568	232.597	1760	70,535	55,902	258.151
1020	36,709	28,228	233.415	1780	71,523	56,723	258.708
1040	37,542	28,895	234.223	1800	72,513	57,547	259.262
1060	38,380	29,567	235.020	1820	73,507	58,375	259.811
1080	39,223	30,243	235.806	1840	74,506	59,207	260.357
1100	40,071	30,925	236.584	1860	75,506	60,042	260.898
1120	40,923	31,611	237.352	1880	76,511	60,880	261.436
1140	41,780	32,301	238.110	1900	77,517	61,720	261.969
1160	42,642	32,997	238.859	1920	78,527	62,564	262.497
1180	43,509	33,698	239.600	1940	79,540	63,411	263.022
1200	44,380	34,403	240.333	1960	80,555	64,259	263.542
1220	45,256	35,112	241.057	1980	81,573	65,111	264.059
1240	46,137	35,827	241.773	2000	82,593	65,965	264.571
1260	47,022	36,546	242.482	2050	85,156	68,111	265.838
1280	47,912	37,270	243.183	2100	87,735	70,275	267.081
1300	48,807	38,000	243.877	2150	90,330	72,454	268.301
1320	49,707	38,732	244.564	2200	92,940	74,649	269.500
1340	50,612	39,470	245.243	2250	95,562	76,855	270.679
1360	51,521	40,213	245.915	2300	98,199	79,076	271.839
1380	52,434	40,960	246.582	2350	100,846	81,308	272.978
1400	53,351	41,711	247.241	2400	103,508	83,553	274.098
1420	54,273	42,466	247.895	2450	106,183	85,811	275.201
1440	55,198	43,226	248.543	2500	108,868	88,082	276.286
1460	56,128	43,989	249.185	2550	111,565	90,364	277.354
1480	57,062	44,756	249.820	2600	114,273	92,656	278.407
1500	57,999	45,528	250.450	2650	116,991	94,958	279.441
1520	58,942	46,304	251.074	2700	119,717	97,269	280.462
1540	59,888	47,084	251.693	2750	122,453	99,588	281.464
1560	60,838	47,868	252.305	2800	125,198	101,917	282.453
1580	61,792	48,655	252.912	2850	127,952	104,256	283.429
1600	62,748	49,445	253.513	2900	130,717	106,605	284.390
1620	63,709	50,240	254.111	2950	133,486	108,959	285.338
1640	64,675	51,039	254.703	3000	136,264	111,321	286.273
1660	65,643	51,841	255.290	3050	139,051	113,692	287.194
1680	66,614	52,646	255.873	3100	141,846	116,072	288.102
1700	67,589	53,455	256.450	3150	144,648	118,458	288.999
1720	68,567	54,267	257.022	3200	147,457	120,851	289.884
1740	69,550	55,083	257.589	3250	150,272	123,250	290.756

TABLE A-24

Ideal-gas properties of monatomic oxygen, O

T K	\bar{h} kJ/kmol	\bar{u} kJ/kmol	\bar{s}° kJ/kmol·K	T K	\bar{h} kJ/kmol	\bar{u} kJ/kmol	\bar{s}° kJ/kmol·K
0	0	0	0	2400	50,894	30,940	204.932
298	6,852	4,373	160.944	2450	51,936	31,566	205.362
300	6,892	4,398	161.079	2500	52,979	32,193	205.783
500	11,197	7,040	172.088	2550	54,021	32,820	206.196
1000	21,713	13,398	186.678	2600	55,064	33,447	206.601
1500	32,150	19,679	195.143	2650	56,108	34,075	206.999
1600	34,234	20,931	196.488	2700	57,152	34,703	207.389
1700	36,317	22,183	197.751	2750	58,196	35,332	207.772
1800	38,400	23,434	198.941	2800	59,241	35,961	208.148
1900	40,482	24,685	200.067	2850	60,286	36,590	208.518
2000	42,564	25,935	201.135	2900	61,332	37,220	208.882
2050	43,605	26,560	201.649	2950	62,378	37,851	209.240
2100	44,646	27,186	202.151	3000	63,425	38,482	209.592
2150	45,687	27,811	202.641	3100	65,520	39,746	210.279
2200	46,728	28,436	203.119	3200	67,619	41,013	210.945
2250	47,769	29,062	203.588	3300	69,720	42,283	211.592
2300	48,811	29,688	204.045	3400	71,824	43,556	212.220
2350	49,852	30,314	204.493	3500	73,932	44,832	212.831

TABLE A-25

Ideal-gas properties of hydroxyl, OH

T K	\bar{h} kJ/kmol	\bar{u} kJ/kmol	\bar{s}° kJ/kmol·K	T K	\bar{h} kJ/kmol	\bar{u} kJ/kmol	\bar{s}° kJ/kmol·K
0	0	0	0	2400	77,015	57,061	248.628
298	9,188	6,709	183.594	2450	78,801	58,431	249.364
300	9,244	6,749	183.779	2500	80,592	59,806	250.088
500	15,181	11,024	198.955	2550	82,388	61,186	250.799
1000	30,123	21,809	219.624	2600	84,189	62,572	251.499
1500	46,046	33,575	232.506	2650	85,995	63,962	252.187
1600	49,358	36,055	234.642	2700	87,806	65,358	252.864
1700	52,706	38,571	236.672	2750	89,622	66,757	253.530
1800	56,089	41,123	238.606	2800	91,442	68,162	254.186
1900	59,505	43,708	240.453	2850	93,266	69,570	254.832
2000	62,952	46,323	242.221	2900	95,095	70,983	255.468
2050	64,687	47,642	243.077	2950	96,927	72,400	256.094
2100	66,428	48,968	243.917	3000	98,763	73,820	256.712
2150	68,177	50,301	244.740	3100	102,447	76,673	257.919
2200	69,932	51,641	245.547	3200	106,145	79,539	259.093
2250	71,694	52,987	246.338	3300	109,855	82,418	260.235
2300	73,462	54,339	247.116	3400	113,578	85,309	261.347
2350	75,236	55,697	247.879	3500	117,312	88,212	262.429

TABLE A-26

Enthalpy of formation, Gibbs function of formation, and absolute entropy at 25°C, 1 atm

Substance	Formula	\bar{h}_f° kJ/kmol	\bar{g}_f° kJ/kmol	\bar{s}° kJ/kmol·K
Carbon	C(s)	0	0	5.74
Hydrogen	H ₂ (g)	0	0	130.68
Nitrogen	N ₂ (g)	0	0	191.61
Oxygen	O ₂ (g)	0	0	205.04
Carbon monoxide	CO(g)	-110,530	-137,150	197.65
Carbon dioxide	CO ₂ (g)	-393,520	-394,360	213.80
Water vapor	H ₂ O(g)	-241,820	-228,590	188.83
Water	H ₂ O(l)	-285,830	-237,180	69.92
Hydrogen peroxide	H ₂ O ₂ (g)	-136,310	-105,600	232.63
Ammonia	NH ₃ (g)	-46,190	-16,590	192.33
Methane	CH ₄ (g)	-74,850	-50,790	186.16
Acetylene	C ₂ H ₂ (g)	+226,730	+209,170	200.85
Ethylene	C ₂ H ₄ (g)	+52,280	+68,120	219.83
Ethane	C ₂ H ₆ (g)	-84,680	-32,890	229.49
Propylene	C ₃ H ₆ (g)	+20,410	+62,720	266.94
Propane	C ₃ H ₈ (g)	-103,850	-23,490	269.91
<i>n</i> -Butane	C ₄ H ₁₀ (g)	-126,150	-15,710	310.12
<i>n</i> -Octane	C ₈ H ₁₈ (g)	-208,450	+16,530	466.73
<i>n</i> -Octane	C ₈ H ₁₈ (l)	-249,950	+6,610	360.79
<i>n</i> -Dodecane	C ₁₂ H ₂₆ (g)	-291,010	+50,150	622.83
Benzene	C ₆ H ₆ (g)	+82,930	+129,660	269.20
Methyl alcohol	CH ₃ OH(g)	-200,670	-162,000	239.70
Methyl alcohol	CH ₃ OH(l)	-238,660	-166,360	126.80
Ethyl alcohol	C ₂ H ₅ OH(g)	-235,310	-168,570	282.59
Ethyl alcohol	C ₂ H ₅ OH(l)	-277,690	-174,890	160.70
Oxygen	O(g)	+249,190	+231,770	161.06
Hydrogen	H(g)	+218,000	+203,290	114.72
Nitrogen	N(g)	+472,650	+455,510	153.30
Hydroxyl	OH(g)	+39,460	+34,280	183.70

TABLE A-27

Properties of some common fuels and hydrocarbons

Fuel (phase)	Formula	Molar mass, kg/kmol	Density, ¹ kg/L	Enthalpy of vaporization, ² kJ/kg	Specific heat, ¹ c_p kJ/kg·K	Higher heating value, ³ kJ/kg	Lower heating value, ³ kJ/kg
Carbon (s)	C	12.011	2	—	0.708	32,800	32,800
Hydrogen (g)	H ₂	2.016	—	—	14.4	141,800	120,000
Carbon monoxide (g)	CO	28.013	—	—	1.05	10,100	10,100
Methane (g)	CH ₄	16.043	—	509	2.20	55,530	50,050
Methanol (l)	CH ₄ O	32.042	0.790	1168	2.53	22,660	19,920
Acetylene (g)	C ₂ H ₂	26.038	—	—	1.69	49,970	48,280
Ethane (g)	C ₂ H ₆	30.070	—	172	1.75	51,900	47,520
Ethanol (l)	C ₂ H ₆ O	46.069	0.790	919	2.44	29,670	26,810
Propane (l)	C ₃ H ₈	44.097	0.500	335	2.77	50,330	46,340
Butane (l)	C ₄ H ₁₀	58.123	0.579	362	2.42	49,150	45,370
1-Pentene (l)	C ₅ H ₁₀	70.134	0.641	363	2.20	47,760	44,630
Isopentane (l)	C ₅ H ₁₂	72.150	0.626	—	2.32	48,570	44,910
Benzene (l)	C ₆ H ₆	78.114	0.877	433	1.72	41,800	40,100
Hexene (l)	C ₆ H ₁₂	84.161	0.673	392	1.84	47,500	44,400
Hexane (l)	C ₆ H ₁₄	86.177	0.660	366	2.27	48,310	44,740
Toluene (l)	C ₇ H ₈	92.141	0.867	412	1.71	42,400	40,500
Heptane (l)	C ₇ H ₁₆	100.204	0.684	365	2.24	48,100	44,600
Octane (l)	C ₈ H ₁₈	114.231	0.703	363	2.23	47,890	44,430
Decane (l)	C ₁₀ H ₂₂	142.285	0.730	361	2.21	47,640	44,240
Gasoline (l)	C _n H _{1.87n}	100–110	0.72–0.78	350	2.4	47,300	44,000
Light diesel (l)	C _n H _{1.8n}	170	0.78–0.84	270	2.2	46,100	43,200
Heavy diesel (l)	C _n H _{1.7n}	200	0.82–0.88	230	1.9	45,500	42,800
Natural gas (g)	C _n H _{3.8n} N _{0.1n}	18	—	—	2	50,000	45,000

¹At 1 atm and 20°C.²At 25°C for liquid fuels, and 1 atm and normal boiling temperature for gaseous fuels.³At 25°C. Multiply by molar mass to obtain heating values in kJ/kmol.

TABLE A-28

Natural logarithms of the equilibrium constant K_p

The equilibrium constant K_p for the reaction $\nu_A A + \nu_B B \rightleftharpoons \nu_C C + \nu_D D$ is defined as $K_p \equiv \frac{P_C^{\nu_C} P_D^{\nu_D}}{P_A^{\nu_A} P_B^{\nu_B}}$

Temp., K	$H_2 \rightleftharpoons 2H$	$O_2 \rightleftharpoons 2O$	$N_2 \rightleftharpoons 2N$	$H_2O \rightleftharpoons H_2 + \frac{1}{2}O_2$	$H_2O \rightleftharpoons \frac{1}{2}H_2 + OH$	$CO_2 \rightleftharpoons CO + \frac{1}{2}O_2$	$\frac{1}{2}N_2 + \frac{1}{2}O_2 \rightleftharpoons NO$
298	-164.005	-186.975	-367.480	-92.208	-106.208	-103.762	-35.052
500	-92.827	-105.630	-213.372	-52.691	-60.281	-57.616	-20.295
1000	-39.803	-45.150	-99.127	-23.163	-26.034	-23.529	-9.388
1200	-30.874	-35.005	-80.011	-18.182	-20.283	-17.871	-7.569
1400	-24.463	-27.742	-66.329	-14.609	-16.099	-13.842	-6.270
1600	-19.637	-22.285	-56.055	-11.921	-13.066	-10.830	-5.294
1800	-15.866	-18.030	-48.051	-9.826	-10.657	-8.497	-4.536
2000	-12.840	-14.622	-41.645	-8.145	-8.728	-6.635	-3.931
2200	-10.353	-11.827	-36.391	-6.768	-7.148	-5.120	-3.433
2400	-8.276	-9.497	-32.011	-5.619	-5.832	-3.860	-3.019
2600	-6.517	-7.521	-28.304	-4.648	-4.719	-2.801	-2.671
2800	-5.002	-5.826	-25.117	-3.812	-3.763	-1.894	-2.372
3000	-3.685	-4.357	-22.359	-3.086	-2.937	-1.111	-2.114
3200	-2.534	-3.072	-19.937	-2.451	-2.212	-0.429	-1.888
3400	-1.516	-1.935	-17.800	-1.891	-1.576	0.169	-1.690
3600	-0.609	-0.926	-15.898	-1.392	-1.088	0.701	-1.513
3800	0.202	-0.019	-14.199	-0.945	-0.501	1.176	-1.356
4000	0.934	0.796	-12.660	-0.542	-0.044	1.599	-1.216
4500	2.486	2.513	-9.414	0.312	0.920	2.490	-0.921
5000	3.725	3.895	-6.807	0.996	1.689	3.197	-0.686
5500	4.743	5.023	-4.666	1.560	2.318	3.771	-0.497
6000	5.590	5.963	-2.865	2.032	2.843	4.245	-0.341

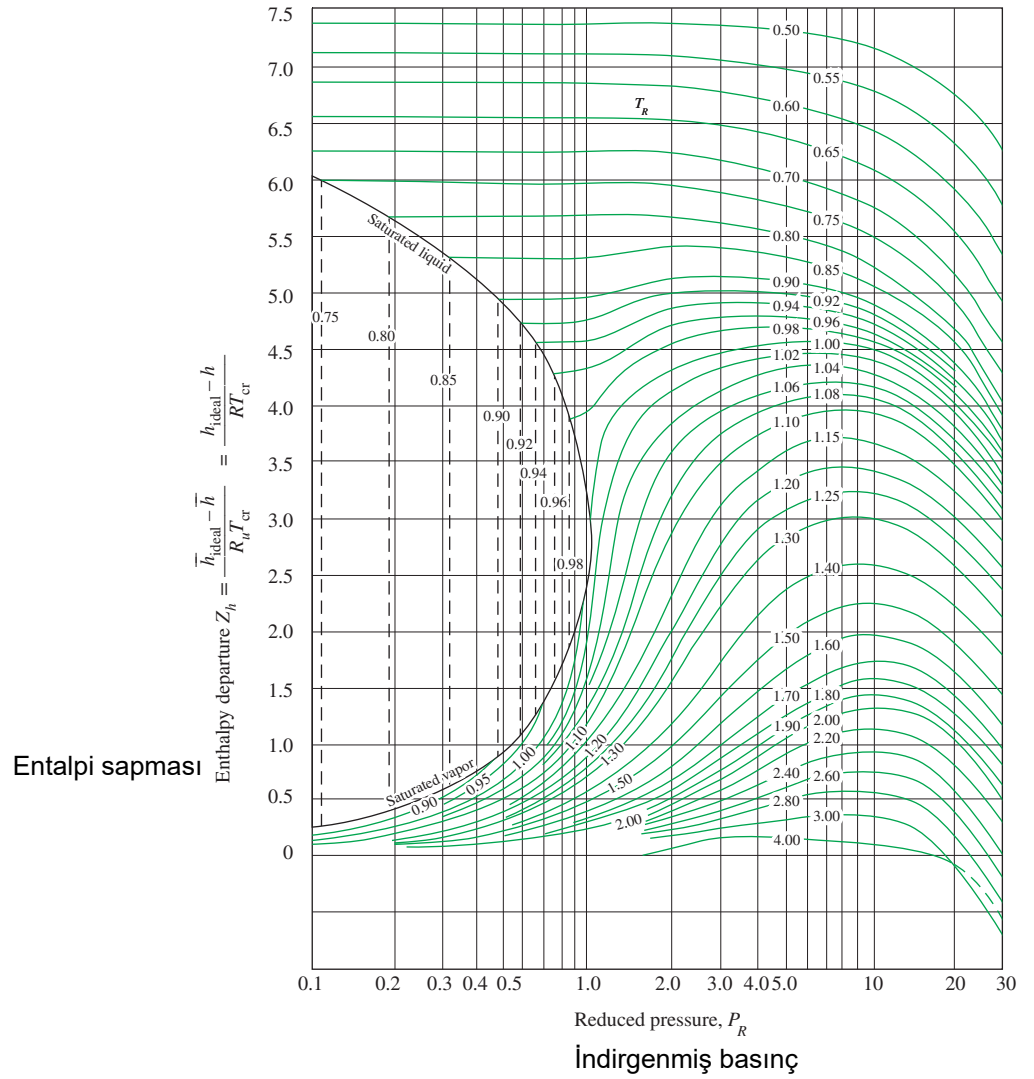
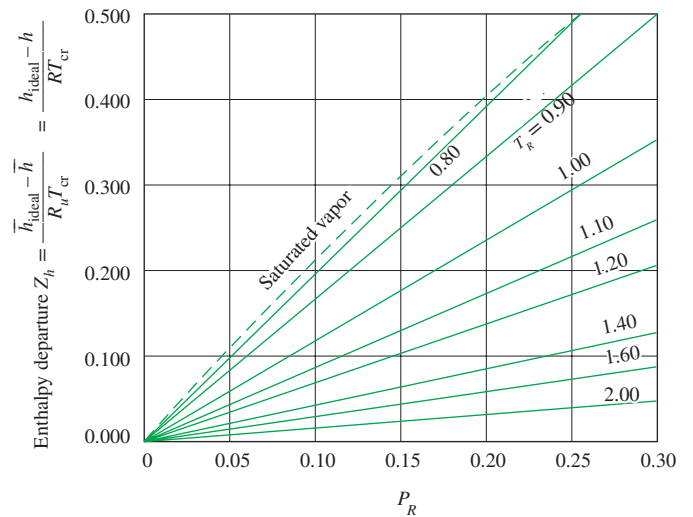


FIGURE A-29

Generalized enthalpy departure chart.

Genelleştirilmiş entalpi sapma diyagramı



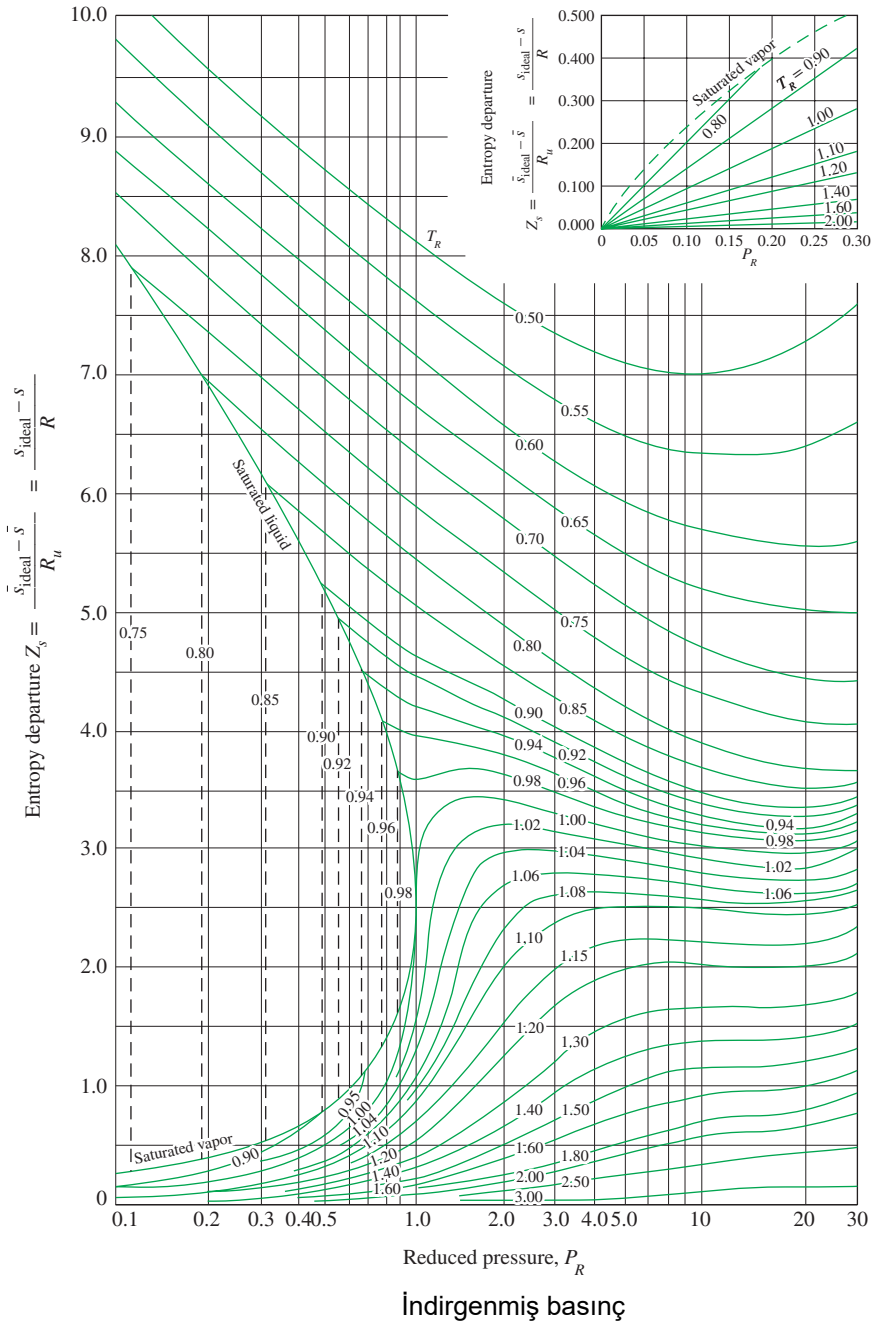


FIGURE A-30

Generalized entropy departure chart.

Genelleştirilmiş entropi sapma diyagramı

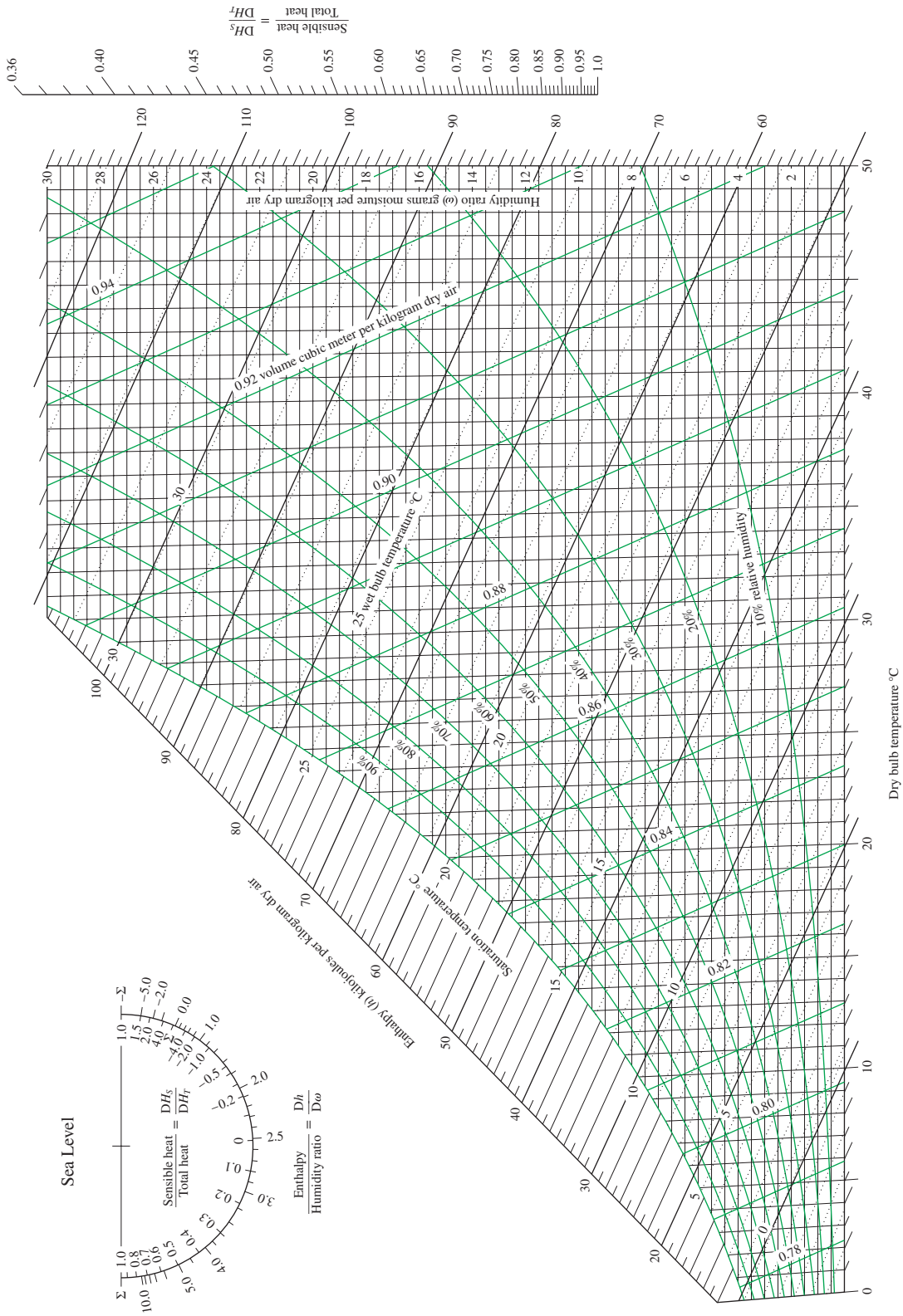


FIGURE A-31 Psychrometric chart at 1 atm total pressure.

TABLE A-32

One-dimensional isentropic compressible-flow functions for an ideal gas with $k = 1.4$

Ma	Ma*	A/A*	P/P ₀	ρ/ρ ₀	T/T ₀
0	0	∞	1.0000	1.0000	1.0000
0.1	0.1094	5.8218	0.9930	0.9950	0.9980
0.2	0.2182	2.9635	0.9725	0.9803	0.9921
0.3	0.3257	2.0351	0.9395	0.9564	0.9823
0.4	0.4313	1.5901	0.8956	0.9243	0.9690
0.5	0.5345	1.3398	0.8430	0.8852	0.9524
0.6	0.6348	1.1882	0.7840	0.8405	0.9328
0.7	0.7318	1.0944	0.7209	0.7916	0.9107
0.8	0.8251	1.0382	0.6560	0.7400	0.8865
0.9	0.9146	1.0089	0.5913	0.6870	0.8606
1.0	1.0000	1.0000	0.5283	0.6339	0.8333
1.2	1.1583	1.0304	0.4124	0.5311	0.7764
1.4	1.2999	1.1149	0.3142	0.4374	0.7184
1.6	1.4254	1.2502	0.2353	0.3557	0.6614
1.8	1.5360	1.4390	0.1740	0.2868	0.6068
2.0	1.6330	1.6875	0.1278	0.2300	0.5556
2.2	1.7179	2.0050	0.0935	0.1841	0.5081
2.4	1.7922	2.4031	0.0684	0.1472	0.4647
2.6	1.8571	2.8960	0.0501	0.1179	0.4252
2.8	1.9140	3.5001	0.0368	0.0946	0.3894
3.0	1.9640	4.2346	0.0272	0.0760	0.3571
5.0	2.2361	25.000	0.0019	0.0113	0.1667
∞	2.2495	∞	0	0	0

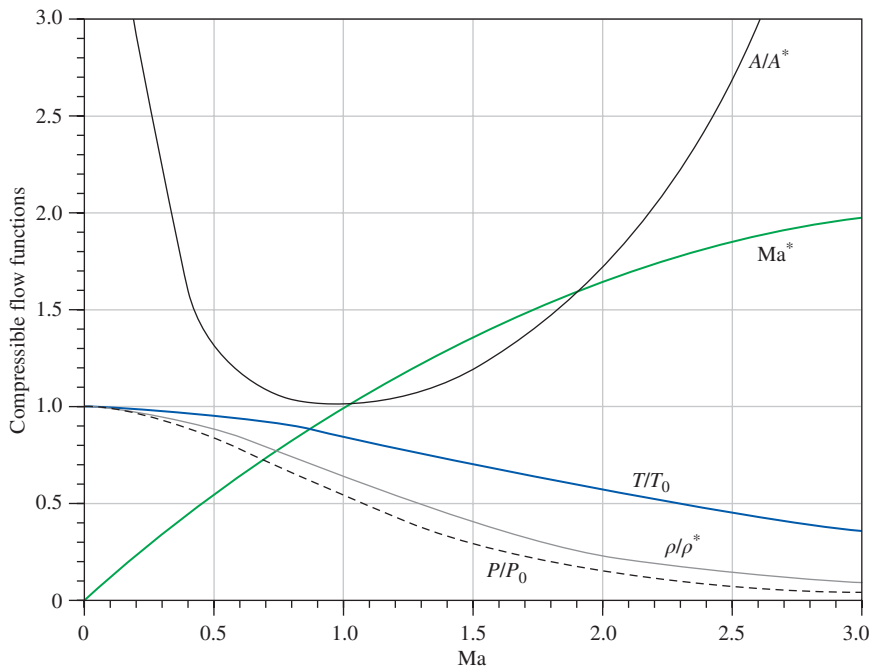
$$\text{Ma}^* = \text{Ma} \sqrt{\frac{k+1}{2+(k-1)\text{Ma}^2}}$$

$$\frac{A}{A^*} = \frac{1}{\text{Ma}} \left(\frac{2}{k+1} \right) \left(1 + \frac{k-1}{2} \text{Ma}^2 \right)^{0.5(k+1)/(k-1)}$$

$$\frac{P}{P_0} = \left(1 + \frac{k-1}{2} \text{Ma}^2 \right)^{-k/(k-1)}$$

$$\frac{\rho}{\rho_0} = \left(1 + \frac{k-1}{2} \text{Ma}^2 \right)^{-1/(k-1)}$$

$$\frac{T}{T_0} = \left(1 + \frac{k-1}{2} \text{Ma}^2 \right)^{-1}$$



$$T_{01} = T_{02}$$

$$\text{Ma}_2 = \sqrt{\frac{(k-1)\text{Ma}_1^2 + 2}{2k\text{Ma}_1^2 - k + 1}}$$

$$\frac{P_2}{P_1} = \frac{1 + k\text{Ma}_1^2}{1 + k\text{Ma}_2^2} = \frac{2k\text{Ma}_1^2 - k + 1}{k + 1}$$

$$\frac{\rho_2}{\rho_1} = \frac{P_2/P_1}{T_2/T_1} = \frac{(k+1)\text{Ma}_1^2}{2+(k-1)\text{Ma}_1^2} = \frac{V_1}{V_2}$$

$$\frac{T_2}{T_1} = \frac{2 + \text{Ma}_1^2(k-1)}{2 + \text{Ma}_2^2(k-1)}$$

$$\frac{P_{02}}{P_{01}} = \frac{\text{Ma}_1}{\text{Ma}_2} \left[\frac{1 + \text{Ma}_2^2(k-1)/2}{1 + \text{Ma}_1^2(k-1)/2} \right]^{(k+1)[2(k-1)]}$$

$$\frac{P_{02}}{P_{01}} = \frac{(1 + k\text{Ma}_1^2)[1 + \text{Ma}_2^2(k-1)/2]^{k/(k-1)}}{1 + k\text{Ma}_2^2}$$

TABLE A-33

One-dimensional normal-shock functions for an ideal gas with $k = 1.4$

Ma_1	Ma_2	P_2/P_1	ρ_2/ρ_1	T_2/T_1	P_{02}/P_{01}	P_{02}/P_1
1.0	1.0000	1.0000	1.0000	1.0000	1.0000	1.8929
1.1	0.9118	1.2450	1.1691	1.0649	0.9989	2.1328
1.2	0.8422	1.5133	1.3416	1.1280	0.9928	2.4075
1.3	0.7860	1.8050	1.5157	1.1909	0.9794	2.7136
1.4	0.7397	2.1200	1.6897	1.2547	0.9582	3.0492
1.5	0.7011	2.4583	1.8621	1.3202	0.9298	3.4133
1.6	0.6684	2.8200	2.0317	1.3880	0.8952	3.8050
1.7	0.6405	3.2050	2.1977	1.4583	0.8557	4.2238
1.8	0.6165	3.6133	2.3592	1.5316	0.8127	4.6695
1.9	0.5956	4.0450	2.5157	1.6079	0.7674	5.1418
2.0	0.5774	4.5000	2.6667	1.6875	0.7209	5.6404
2.1	0.5613	4.9783	2.8119	1.7705	0.6742	6.1654
2.2	0.5471	5.4800	2.9512	1.8569	0.6281	6.7165
2.3	0.5344	6.0050	3.0845	1.9468	0.5833	7.2937
2.4	0.5231	6.5533	3.2119	2.0403	0.5401	7.8969
2.5	0.5130	7.1250	3.3333	2.1375	0.4990	8.5261
2.6	0.5039	7.7200	3.4490	2.2383	0.4601	9.1813
2.7	0.4956	8.3383	3.5590	2.3429	0.4236	9.8624
2.8	0.4882	8.9800	3.6636	2.4512	0.3895	10.5694
2.9	0.4814	9.6450	3.7629	2.5632	0.3577	11.3022
3.0	0.4752	10.3333	3.8571	2.6790	0.3283	12.0610
4.0	0.4350	18.5000	4.5714	4.0469	0.1388	21.0681
5.0	0.4152	29.0000	5.0000	5.8000	0.0617	32.6335
∞	0.3780	∞	6.0000	∞	0	∞

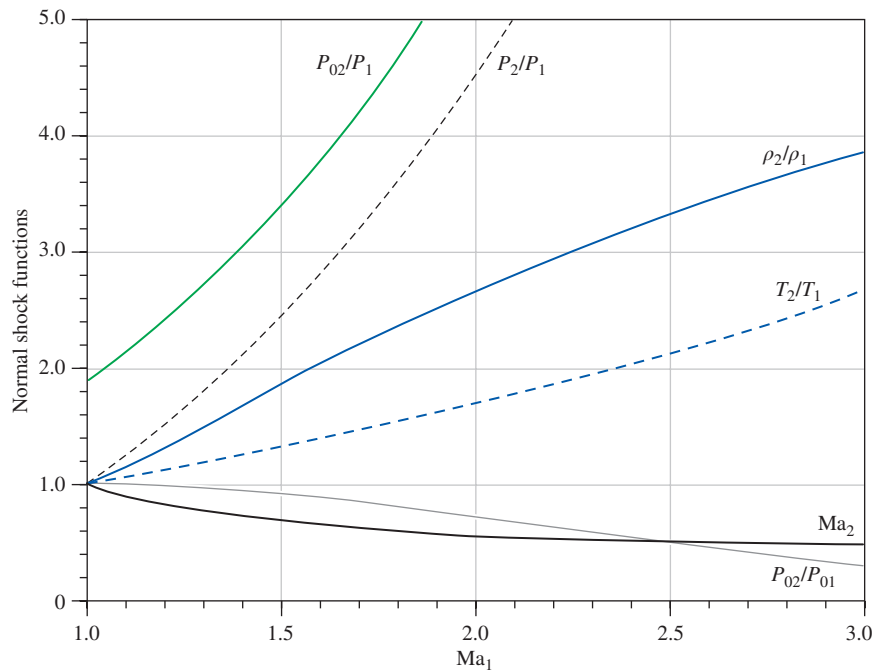


TABLE A-34

Rayleigh flow functions for an ideal gas with $k = 1.4$

Ma	T_0/T_0^*	P_0/P_0^*	T/T^*	P/P^*	V/V^*
0.0	0.0000	1.2679	0.0000	2.4000	0.0000
0.1	0.0468	1.2591	0.0560	2.3669	0.0237
0.2	0.1736	1.2346	0.2066	2.2727	0.0909
0.3	0.3469	1.1985	0.4089	2.1314	0.1918
0.4	0.5290	1.1566	0.6151	1.9608	0.3137
0.5	0.6914	1.1141	0.7901	1.7778	0.4444
0.6	0.8189	1.0753	0.9167	1.5957	0.5745
0.7	0.9085	1.0431	0.9929	1.4235	0.6975
0.8	0.9639	1.0193	1.0255	1.2658	0.8101
0.9	0.9921	1.0049	1.0245	1.1246	0.9110
1.0	1.0000	1.0000	1.0000	1.0000	1.0000
1.2	0.9787	1.0194	0.9118	0.7958	1.1459
1.4	0.9343	1.0777	0.8054	0.6410	1.2564
1.6	0.8842	1.1756	0.7017	0.5236	1.3403
1.8	0.8363	1.3159	0.6089	0.4335	1.4046
2.0	0.7934	1.5031	0.5289	0.3636	1.4545
2.2	0.7561	1.7434	0.4611	0.3086	1.4938
2.4	0.7242	2.0451	0.4038	0.2648	1.5252
2.6	0.6970	2.4177	0.3556	0.2294	1.5505
2.8	0.6738	2.8731	0.3149	0.2004	1.5711
3.0	0.6540	3.4245	0.2803	0.1765	1.5882

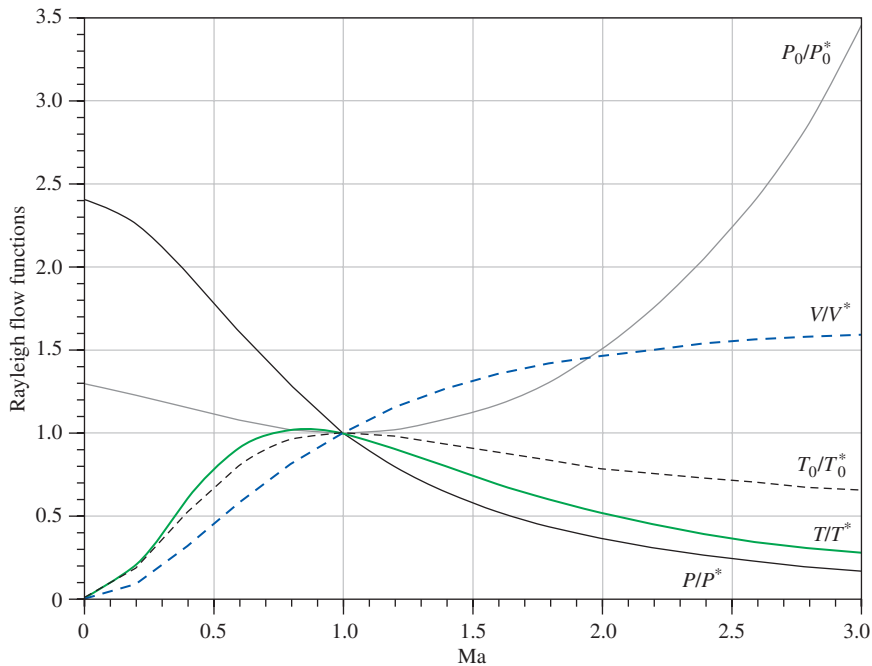
$$\frac{T_0}{T_0^*} = \frac{(k+1)Ma^2[2+(k-1)Ma^2]}{(1+kMa^2)^2}$$

$$\frac{P_0}{P_0^*} = \frac{k+1}{1+kMa^2} \left(\frac{2+(k-1)Ma^2}{k+1} \right)^{k/(k-1)}$$

$$\frac{T}{T^*} = \left(\frac{Ma(1+k)}{1+kMa^2} \right)^2$$

$$\frac{P}{P^*} = \frac{1+k}{1+kMa^2}$$

$$\frac{V}{V^*} = \frac{\rho^*}{\rho} = \frac{(1+k)Ma^2}{1+kMa^2}$$



B ile verilen TABLO ve ŞEKİLLER

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Not: B ile verilen tablolar; “<https://onlinelibrary.wiley.com/doi/pdf/10.1002/9780470970751.app2>” sitesindeki ve çeşitli ücretsiz kaynaklardaki bilgiler derlenerek oluşturulmuştur.

TABLO-B1

Kritik Sabitler

Madde	Kimyasal Formül	Mol Kütlesi (kg/kmol)	Sıcaklık (K)	Basınç (MPa)	Özgül Hacim (m ³ /kg)
Amonyak	NH ₃	17.031	405.5	11.35	0.00426
Argon	Ar	39.948	150.8	4.87	0.00188
Bromin	Br ₂	159.808	588	10.30	0.000796
Karbon dioksit	CO ₂	44.01	304.1	7.38	0.00212
Karbon monoksit	CO	28.01	132.9	3.50	0.00333
Klorin	Cl ₂	70.906	416.9	7.98	0.00175
Fluorin	F ₂	37.997	144.3	5.22	0.00174
Helyum	He	4.003	5.19	0.227	0.0143
Hidrojen (normal)	H ₂	2.016	33.2	1.30	0.0323
Kripton	Kr	83.80	209.4	5.50	0.00109
Neon	Ne	20.183	44.4	2.76	0.00206
Azot monoksit	NO	30.006	180	6.48	0.00192
Azot	N ₂	28.013	126.2	3.39	0.0032
Azot dioksit	NO ₂	46.006	431	10.1	0.00365
Nitröz asit	N ₂ O	44.013	309.6	7.24	0.00221
Oksijen	O ₂	31.999	154.6	5.04	0.00229
Kükürt dioksit	SO ₂	64.063	430.8	7.88	0.00191
Su	H ₂ O	18.015	647.3	22.12	0.00317
Xenon	Xe	131.30	289.7	5.84	0.000902
Asetilen	C ₂ H ₂	26.038	308.3	6.14	0.00433
Benzen	C ₆ H ₆	78.114	562.2	4.89	0.00332
<i>n</i> -Butan	C ₄ H ₁₀	58.124	425.2	3.80	0.00439
Chlorodifluoroethane (142b)	CH ₃ CClF ₂	100.495	410.3	4.25	0.00230
Chlorodifluoromethane (22)	CHClF ₂	86.469	369.3	4.97	0.00191
Dichlorofluoroethane (141)	CH ₃ CCl ₂ F	116.95	481.5	4.54	0.00215
Dichlorotrifluoroethane (123)	CHCl ₂ CF ₃	152.93	456.9	3.66	0.00182
Difluoroethane (152a)	CHF ₂ CH ₃	66.05	386.4	4.52	0.00272
Difluoromethane	CF ₂ H ₂	52.024	351.3	5.78	0.00236
Ethan	C ₂ H ₆	30.070	305.4	4.88	0.00493
Etil alkol	C ₂ H ₅ OH	46.069	513.9	6.14	0.00363
Etilen	C ₂ H ₄	28.054	282.4	5.04	0.00465
<i>n</i> -Heptan	C ₇ H ₁₆	100.205	540.3	2.74	0.00431
<i>n</i> -Hexan	C ₆ H ₁₄	86.178	507.5	3.01	0.00429
Methan	CH ₄	16.043	190.4	4.60	0.00615
Metil alkol	CH ₃ OH	32.042	512.6	8.09	0.00368
<i>n</i> -Octan	C ₈ H ₁₈	114.232	568.8	2.49	0.00431
Pentafluoroethane (125)	CHF ₂ CF ₃	120.022	339.2	3.62	0.00176
<i>n</i> -Pentan	C ₅ H ₁₂	72.151	469.7	3.37	0.00421
Propan	C ₃ H ₈	44.094	369.8	4.25	0.00454
Propen	C ₃ H ₆	42.081	364.9	4.60	0.00430
Soğutkan karışımı	R-410A	72.585	344.5	4.90	0.00218
Tetrafluoroethane (134a)	CF ₃ CH ₂ F	102.03	374.2	4.06	0.00197

TABLO-B2

Bazı katıların 25°C'daki Özellikleri

Madde	ρ (kg/m ³)	C_p (kJ/kg·K)
Asfalt	2120	0.92
Tuğla, bilinen	1800	0.84
Karbon, elmas	3250	0.51
Karbon, grafit	2000–2500	0.61
Kömür	1200–1500	1.26
Beton	2200	0.88
Cam, levha	2500	0.80
Cam, elyaf (yün)	20	0.66
Granit	2750	0.89
Buz(0°C)	917	2.04
Kağıt	700	1.2
Fleksiglas (Plexiglass)	1180	1.44
Polistren	920	2.3
Polivinil klorid	1380	0.96
Lastik, yumuşak	1100	1.67
Kum, kuru	1500	0.8
Tuz, kaya	2100–2500	0.92
Silikon	2330	0.70
Kar, katı,sıkı	560	2.1
Tahta, sert(akçaağaç v.b.)	720	1.26
Tahta, yumuşak(çam v.b.)	510	1.38
Yün	100	1.72
Metaller		
Alüminyum	2700	0.90
Prinç, 60–40	8400	0.38
Bakır, ticari	8300	0.42
Altın	19300	0.13
Demir, döküm	7272	0.42
Demir, 304 St Çelik	7820	0.46
Kurşun	11340	0.13
Magnesium, %2 Mn	1778	1.00
Nikel, %10 Cr	8666	0.44
Gümüş, %99.9 Ag	10524	0.24
Sodyum	971	1.21
Kalay	7304	0.22
Tungsten	19300	0.13
Çinko	7144	0.39

TABLO-B2 (Devam)

Bazı sıvıların 25°C'daki Özellikleri

Madde	ρ (kg/m ³)	C_p (kJ/kg·K)
Amonyak	604	4.84
Benzen	879	1.72
Bütan	556	2.47
CCl ₄	1584	0.83
CO ₂	680	2.9
Etanol	783	2.46
Benzin	750	2.08
Gliserin	1260	2.42
Gaz yağı (Kerosene)	815	2.0
Metanol	787	2.55
n-Octan	692	2.23
Motor yağı	885	1.9
Yağ, hafif	910	1.8
Propan	510	2.54
R-12	1310	0.97
R-22	1190	1.26
R-32	961	1.94
R-125	1191	1.41
R-134a	1206	1.43
R-410A	1059	1.69
Su	997	4.18
Sıvı metaller		
Bizmut, Bi	10040	0.14
Kurşun, Pb	10660	0.16
Civa, Hg	13580	0.14
NaK (56/44)	887	1.13
Potasyum, K	828	0.81
Sodyum, Na	929	1.38
Kalay, Sn	6950	0.24
Çinko, Zn	6570	0.50

*Veya daha büyükse, T_{ergime}

TABLO-B3

Değişik Mükemmel Gazların Özellikleri, 25°C, 100 kPa* (SI Birimleri)

Gaz	Kimyasal Formül	Moleküler Kütle (kg/kmol)	R (kJ/kg·K)	ρ (kg/m ³)	C_{p0} (kJ/kg·K)	C_{v0} (kJ/kg·K)	$k = \frac{C_p}{C_v}$
Buhar (su)	H ₂ O	18.015	0.4615	0.0231	1.872	1.410	1.327
Asetilen	C ₂ H ₂	26.038	0.3193	1.05	1.699	1.380	1.231
Hava	—	28.97	0.287	1.169	1.004	0.717	1.400
Amonyak	NH ₃	17.031	0.4882	0.694	2.130	1.642	1.297
Argon	Ar	39.948	0.2081	1.613	0.520	0.312	1.667
Butan	C ₄ H ₁₀	58.124	0.1430	2.407	1.716	1.573	1.091
Carbon dioksit	CO ₂	44.01	0.1889	1.775	0.842	0.653	1.289
Carbon monoksit	CO	28.01	0.2968	1.13	1.041	0.744	1.399
Ethan	C ₂ H ₆	30.07	0.2765	1.222	1.766	1.490	1.186
Etanol	C ₂ H ₅ OH	46.069	0.1805	1.883	1.427	1.246	1.145
Etilen	C ₂ H ₄	28.054	0.2964	1.138	1.548	1.252	1.237
Helyum	He	4.003	2.0771	0.1615	5.193	3.116	1.667
Hidrojen	H ₂	2.016	4.1243	0.0813	14.209	10.085	1.409
Metan	CH ₄	16.043	0.5183	0.648	2.254	1.736	1.299
Metanol	CH ₃ OH	32.042	0.2595	1.31	1.405	1.146	1.227
Neon	Ne	20.183	0.4120	0.814	1.03	0.618	1.667
Azot monoksit	NO	30.006	0.2771	1.21	0.993	0.716	1.387
Azot	N ₂	28.013	0.2968	1.13	1.042	0.745	1.400
Nitröz asit	N ₂ O	44.013	0.1889	1.775	0.879	0.690	1.274
n-Octan	C ₈ H ₁₈	114.23	0.07279	0.092	1.711	1.638	1.044
Oksijen	O ₂	31.999	0.2598	1.292	0.922	0.662	1.393
Propan	C ₃ H ₈	44.094	0.1886	1.808	1.679	1.490	1.126
R-12	CCl ₂ F ₂	120.914	0.06876	4.98	0.616	0.547	1.126
R-22	CHClF ₂	86.469	0.09616	3.54	0.658	0.562	1.171
R-32	CF ₂ H ₂	52.024	0.1598	2.125	0.822	0.662	1.242
R-125	CHF ₂ CF ₃	120.022	0.06927	4.918	0.791	0.722	1.097
R-134a	CF ₃ CH ₂ F	102.03	0.08149	4.20	0.852	0.771	1.106
R-410A	—	72.585	0.11455	2.967	0.809	0.694	1.165
Kükürt dioksit	SO ₂	64.059	0.1298	2.618	0.624	0.494	1.263
Kükürt trioksit	SO ₃	80.053	0.10386	3.272	0.635	0.531	1.196

*Veya 100 kPa'dan daha az ise doyma basıncı

TABLO-B4

Değişik Mükemmel Gazların,* Sabit-Basınç Özgül Isıları

		$C_{p0} = C_0 + C_1\theta + C_2\theta^2 + C_3\theta^3$ (kJ/kg·K)			$\theta = T(\text{Kelvin})/1000$	
Gaz	Kimyasal Formül	C_0	C_1	C_2	C_3	
Buhar (su)	H ₂ O	1.79	0.107	0.586	-0.20	
Asetilen	C ₂ H ₂	1.03	2.91	-1.92	0.54	
Hava	—	1.05	-0.365	0.85	-0.39	
Amonyak	NH ₃	1.60	1.4	1.0	-0.7	
Argon	Ar	0.52	0	0	0	
Butan	C ₄ H ₁₀	0.163	5.70	-1.906	-0.049	
Carbon dioksit	CO ₂	0.45	1.67	-1.27	0.39	
Carbon monoksit	CO	1.10	-0.46	1.0	-0.454	
Ethan	C ₂ H ₆	0.18	5.92	-2.31	0.29	
Etanol	C ₂ H ₅ OH	0.2	4.65	-1.82	0.03	
Etilen	C ₂ H ₄	0.136	5.58	-3.0	0.63	
Helyum	He	5.193	0	0	0	
Hidrojen	H ₂	13.46	4.6	-6.85	3.79	
Metan	CH ₄	1.2	3.25	0.75	-0.71	
Metanol	CH ₃ OH	0.66	2.21	0.81	-0.89	
Neon	Ne	1.03	0	0	0	
Azot monoksit	NO	0.98	-0.031	0.325	-0.14	
Azot	N ₂	1.11	-0.48	0.96	-0.42	
Nitröz asit	N ₂ O	0.49	1.65	-1.31	0.42	
n-Octan	C ₈ H ₁₈	-0.053	6.75	-3.67	0.775	
Oksijen	O ₂	0.88	-0.0001	0.54	-0.33	
Propan	C ₃ H ₈	-0.096	6.95	-3.6	0.73	
R-12 [†]	CCl ₂ F ₂	0.26	1.47	-1.25	0.36	
R-22 [†]	CHClF ₂	0.2	1.87	-1.35	0.35	
R-32 [†]	CF ₂ H ₂	0.227	2.27	-0.93	0.041	
R-125 [†]	CHF ₂ CF ₃	0.305	1.68	-0.284	0	
R-134a [†]	CF ₃ CH ₂ F	0.165	2.81	-2.23	1.11	
Kükürt dioksit	SO ₂	0.37	1.05	-0.77	0.21	
Kükürt trioksit	SO ₃	0.24	1.7	-1.5	0.46	

*Yaklaşım formlarının geçerli olduğu sıcaklık aralığı,:: 250 K ile 1200 K arasındır.

[†]Eşitlik kullanımı en çok 500 K ile sınırlıdır.

TABLO-B5

Hava Mükemmel Gaz özellikleri, Standard Entropi, 0.1 MPa (1 Bar)

T (K)	u (kJ/kg)	h (kJ/kg)	s_T^0 (kJ/kg·K)	T (K)	u (kJ/kg)	h (kJ/kg)	s_T^0 (kJ/kg·K)
200	142.77	200.17	6.46260	1100	845.45	1161.18	8.24449
220	157.07	220.22	6.55812	1150	889.21	1219.30	8.29616
240	171.38	240.27	6.64535	1200	933.37	1277.81	8.34596
260	185.70	260.32	6.72562	1250	977.89	1336.68	8.39402
280	200.02	280.39	6.79998	1300	1022.75	1395.89	8.44046
290	207.19	290.43	6.83521	1350	1067.94	1455.43	8.48539
298.15	213.04	298.62	6.86305	1400	1113.43	1515.27	8.52891
300	214.36	300.47	6.86926	1450	1159.20	1575.40	8.57111
320	228.73	320.58	6.93413	1500	1205.25	1635.80	8.61208
340	243.11	340.70	6.99515	1550	1251.55	1696.45	8.65185
360	257.53	360.86	7.05276	1600	1298.08	1757.33	8.69051
380	271.99	381.06	7.10735	1650	1344.83	1818.44	8.72811
400	286.49	401.30	7.15926	1700	1391.80	1879.76	8.76472
420	301.04	421.59	7.20875	1750	1438.97	1941.28	8.80039
440	315.64	441.93	7.25607	1800	1486.33	2002.99	8.83516
460	330.31	462.34	7.30142	1850	1533.87	2064.88	8.86908
480	345.04	482.81	7.34499	1900	1581.59	2126.95	8.90219
500	359.84	503.36	7.38692	1950	1629.47	2189.19	8.93452
520	374.73	523.98	7.42736	2000	1677.52	2251.58	8.96611
540	389.69	544.69	7.46642	2050	1725.71	2314.13	8.99699
560	404.74	565.47	7.50422	2100	1774.06	2376.82	9.02721
580	419.87	586.35	7.54084	2150	1822.54	2439.66	9.05678
600	435.10	607.32	7.57638	2200	1871.16	2502.63	9.08573
620	450.42	628.38	7.61090	2250	1919.91	2565.73	9.11409
640	465.83	649.53	7.64448	2300	1968.79	2628.96	9.14189
660	481.34	670.78	7.67717	2350	2017.79	2692.31	9.16913
680	496.94	692.12	7.70903	2400	2066.91	2755.78	9.19586
700	512.64	713.56	7.74010	2450	2116.14	2819.37	9.22208
720	528.44	735.10	7.77044	2500	2165.48	2883.06	9.24781
740	544.33	756.73	7.80008	2550	2214.93	2946.86	9.27308
760	560.32	778.46	7.82905	2600	2264.48	3010.76	9.29790
780	576.40	800.28	7.85740	2650	2314.13	3074.77	9.32228
800	592.58	822.20	7.88514	2700	2363.88	3138.87	9.34625
850	633.42	877.40	7.95207	2750	2413.73	3203.06	9.36980
900	674.82	933.15	8.01581	2800	2463.66	3267.35	9.39297
950	716.76	989.44	8.07667	2850	2513.69	3331.73	9.41576
1000	759.19	1046.22	8.13493	2900	2563.80	3396.19	9.43818
1050	802.10	1103.48	8.19081	2950	2613.99	3460.73	9.46025
1100	845.45	1161.18	8.24449	3000	2664.27	3525.36	9.48198

TABLO-B6

Hava Mükemmel Gaz özellikleri, Standard Entropi, 0.1 MPa (1 Bar)

T[K]	P_r	v_r	T[K]	P_r	v_r	T[K]	P_r	v_r
200	0.2703	493.47	700	23.160	20.155	1900	1327.5	0.95445
220	0.3770	389.15	720	25.742	18.652	1950	1485.8	0.87521
240	0.5109	313.27	740	28.542	17.289	2000	1658.6	0.80410
260	0.6757	256.58	760	31.573	16.052	2050	1847.1	0.74012
280	0.8756	213.26	780	34.851	14.925	2100	2052.1	0.68242
290	0.9899	195.36	800	38.388	13.897	2150	2274.8	0.63027
298.15	1.0907	182.29	850	48.468	11.695	2200	2516.2	0.58305
300	1.1146	179.49	900	60.520	9.9169	2250	2777.5	0.54020
320	1.3972	152.73	950	74.815	8.4677	2300	3059.9	0.50124
340	1.7281	131.20	1000	91.651	7.2760	2350	3364.6	0.46576
360	2.1123	113.65	1050	111.35	6.2885	2400	3693.0	0.43338
380	2.5548	99.188	1100	134.25	5.4641	2450	4046.2	0.40378
400	3.0612	87.137	1150	160.73	4.7714	2500	4425.8	0.37669
420	3.6373	77.003	1200	191.17	4.1859	2550	4833.0	0.35185
440	4.2892	68.409	1250	226.02	3.6880	2600	5269.5	0.32903
460	5.0233	61.066	1300	265.72	3.2626	2650	5736.7	0.30805
480	5.8466	54.748	1350	310.74	2.8971	2700	6236.2	0.28872
500	6.7663	49.278	1400	361.62	2.5817	2750	6769.7	0.27089
520	7.7900	44.514	1450	418.89	2.3083	2800	7338.7	0.25443
540	8.9257	40.344	1500	483.16	2.0703	2850	7945.1	0.23921
560	10.182	36.676	1550	554.96	1.8625	2900	8590.7	0.22511
580	11.568	33.436	1600	634.97	1.6804	2950	9277.2	0.21205
600	13.092	30.561	1650	723.86	1.52007	3000	10007	0.19992
620	14.766	28.001	1700	822.33	1.37858			
640	16.598	25.713	1750	931.14	1.25330			
660	18.600	23.662	1800	1051.05	1.14204			
680	20.784	21.818	1850	1182.9	1.04294			
700	23.160	20.155	1900	1327.5	0.95445			

Bağıl basınç ve bağıl özgül hacim ölçeklendirme sabitleri ile hesaplanan sıcaklığa bağlı fonksiyonlardır, A_1, A_2

$$P_r = \exp[s_T^0/R - A_1]; \quad v_r = A_2 T/P_r$$

izantropik proses için ($s_1 = s_2$)

$$\frac{P_2}{P_1} = \frac{P_{r2}}{P_{r1}} = \frac{e^{s_{T2}^0/R}}{e^{s_{T1}^0/R}} \approx \left(\frac{T_2}{T_1}\right)^{C_p/R} \quad \text{ve} \quad \frac{v_2}{v_1} = \frac{v_{r2}}{v_{r1}} \approx \left(\frac{T_1}{T_2}\right)^{C_v/R}$$

burada sabit özgül ısılar yaklaşımı için hemen hemen eşit durumu geçerlidir.

TABLO-B7

Değişik Gazlar için, Mükemmel Gaz Özellikleri, Entropiler 0.1 MPa (1 Bar) Basınç ve birim kütle içindir.

T (K)	Azot, İki Atomlu (N_2) $R = 0.2968 \text{ kJ/kg}\cdot\text{K}$ $M = 28.013 \text{ kg/kmol}$			Oksijen, İki Atomlu (O_2) $R = 0.2598 \text{ kJ/kg}\cdot\text{K}$ $M = 31.999 \text{ kg/kmol}$		
	u (kJ/kg)	h (kJ/kg)	s_T^0 (kJ/kg·K)	u (kJ/kg)	h (kJ/kg)	s_T^0 (kJ/kg·K)
200	148.39	207.75	6.4250	129.84	181.81	6.0466
250	185.50	259.70	6.6568	162.41	227.37	6.2499
300	222.63	311.67	6.8463	195.20	273.15	6.4168
350	259.80	363.68	7.0067	228.37	319.31	6.5590
400	297.09	415.81	7.1459	262.10	366.03	6.6838
450	334.57	468.13	7.2692	296.52	413.45	6.7954
500	372.35	520.75	7.3800	331.72	461.63	6.8969
550	410.52	573.76	7.4811	367.70	510.61	6.9903
600	449.16	627.24	7.5741	404.46	560.36	7.0768
650	488.34	681.26	7.6606	441.97	610.86	7.1577
700	528.09	735.86	7.7415	480.18	662.06	7.2336
750	568.45	791.05	7.8176	519.02	713.90	7.3051
800	609.41	846.85	7.8897	558.46	766.33	7.3728
850	650.98	903.26	7.9581	598.44	819.30	7.4370
900	693.13	960.25	8.0232	638.90	872.75	7.4981
950	735.85	1017.81	8.0855	679.80	926.65	7.5564
1000	779.11	1075.91	8.1451	721.11	980.95	7.6121
1100	867.14	1193.62	8.2572	804.80	1090.62	7.7166
1200	957.00	1313.16	8.3612	889.72	1201.53	7.8131
1300	1048.46	1434.31	8.4582	975.72	1313.51	7.9027
1400	1141.35	1556.87	8.5490	1062.67	1426.44	7.9864
1500	1235.50	1680.70	8.6345	1150.48	1540.23	8.0649
1600	1330.72	1805.60	8.7151	1239.10	1654.83	8.1389
1700	1426.89	1931.45	8.7914	1328.49	1770.21	8.2088
1800	1523.90	2058.15	8.8638	1418.63	1886.33	8.2752
1900	1621.66	2185.58	8.9327	1509.50	2003.19	8.3384
2000	1720.07	2313.68	8.9984	1601.10	2120.77	8.3987
2100	1819.08	2442.36	9.0612	1693.41	2239.07	8.4564
2200	1918.62	2571.58	9.1213	1786.44	2358.08	8.5117
2300	2018.63	2701.28	9.1789	1880.17	2477.79	8.5650
2400	2119.08	2831.41	9.2343	1974.60	2598.20	8.6162
2500	2219.93	2961.93	9.2876	2069.71	2719.30	8.6656
2600	2321.13	3092.81	9.3389	2165.50	2841.07	8.7134
2700	2422.66	3224.03	9.3884	2261.94	2963.49	8.7596
2800	2524.50	3355.54	9.4363	2359.01	3086.55	8.8044
2900	2626.62	3487.34	9.4825	2546.70	3210.22	8.8478
3000	2729.00	3619.41	9.5273	2554.97	3334.48	8.8899

TABLO-B7 (Devam)

Değişik Gazlar için, Mükemmel Gaz Özellikleri, Entropiler 0.1 MPa (1 Bar) Basınç ve birim kütle içindir.

T (K)	Karbon Dioksit (CO ₂) $R = 0.1889$ kJ/kg·K $M = 44.010$ kg/kmol			Su (H ₂ O) $R = 0.4615$ kJ/kg·K $M = 18.015$ kg/kmol		
	u (kJ/kg)	h (kJ/kg)	s_T^0 (kJ/kg·K)	u (kJ/kg)	h (kJ/kg)	s_T^0 (kJ/kg·K)
200	97.49	135.28	4.5439	276.38	368.69	9.7412
250	126.21	173.44	4.7139	345.98	461.36	10.1547
300	157.70	214.38	4.8631	415.87	554.32	10.4936
350	191.78	257.90	4.9972	486.37	647.90	10.7821
400	228.19	303.76	5.1196	557.79	742.40	11.0345
450	266.69	351.70	5.2325	630.40	838.09	11.2600
500	307.06	401.52	5.3375	704.36	935.12	11.4644
550	349.12	453.03	5.4356	779.79	1033.63	11.6522
600	392.72	506.07	5.5279	856.75	1133.67	11.8263
650	437.71	560.51	5.6151	935.31	1235.30	11.9890
700	483.97	616.22	5.6976	1015.49	1338.56	12.1421
750	531.40	673.09	5.7761	1097.35	1443.49	12.2868
800	579.89	731.02	5.8508	1180.90	1550.13	12.4244
850	629.35	789.93	5.9223	1266.19	1658.49	12.5558
900	676.69	849.72	5.9906	1353.23	1768.60	12.6817
950	730.85	910.33	6.0561	1442.03	1880.48	12.8026
1000	782.75	971.67	6.1190	1532.61	1994.13	12.9192
1100	888.55	1096.36	6.2379	1719.05	2226.73	13.1408
1200	996.64	1223.34	6.3483	1912.42	2466.25	13.3492
1300	1106.68	1352.28	6.4515	2112.47	2712.46	13.5462
1400	1218.38	1482.87	6.5483	2318.89	2965.03	13.7334
1500	1331.50	1614.88	6.6394	2531.28	3223.57	13.9117
1600	1445.85	1748.12	6.7254	2749.24	3487.69	14.0822
1700	1561.26	1882.43	6.8068	2972.35	3756.95	14.2454
1800	1677.61	2017.67	6.8841	3200.17	4030.92	14.4020
1900	1794.78	2153.73	6.9577	3432.28	4309.18	14.5524
2000	1912.67	2290.51	7.0278	3668.24	4591.30	14.6971
2100	2031.21	2427.95	7.0949	3908.08	4877.29	14.8366
2200	2150.34	2565.97	7.1591	4151.28	5166.64	14.9712
2300	2270.00	2704.52	7.2206	4397.56	5459.08	15.1012
2400	2390.14	2843.55	7.2798	4646.71	5754.37	15.2269
2500	2510.74	2983.04	7.3368	4898.49	6052.31	15.3485
2600	2631.73	3122.93	7.3917	5152.73	6352.70	15.4663
2700	2753.10	3263.19	7.4446	5409.24	6655.36	15.5805
2800	2874.81	3403.79	7.4957	5667.86	6960.13	15.6914
2900	2996.84	3544.71	7.5452	5928.44	7266.87	15.7990
3000	3119.18	3685.95	7.5931	6190.86	7575.44	15.9036

TABLO-B8

Değişik gazların mükemmel gaz özellikleri, Entropiler, 0.1 MPa (1 Bar) Basınc ve birim kmol içindir (molar).

T K	Azot, İki Atomlu (N ₂) $\bar{h}_{f,298}^0 = 0$ kJ/kmol $M = 28.013$ kg/kmol		Azot, Tek atomlu (N) $\bar{h}_{f,298}^0 = 472\,680$ kJ/kmol $M = 14.007$ kg/kmol	
	$(\bar{h} - \bar{h}_{298}^0)$ kJ/kmol	\bar{s}_T^0 kJ/kmol·K	$(\bar{h} - \bar{h}_{298}^0)$ kJ/kmol	\bar{s}_T^0 kJ/kmol·K
0	-8670	0	-6197	0
100	-5768	159.812	-4119	130.593
200	-2857	179.985	-2040	145.001
298	0	191.609	0	153.300
300	54	191.789	38	153.429
400	2971	200.181	2117	159.409
500	5911	206.740	4196	164.047
600	8894	212.177	6274	167.837
700	11937	216.865	8353	171.041
800	15046	221.016	10431	173.816
900	18223	224.757	12510	176.265
1000	21463	228.171	14589	178.455
1100	24760	231.314	16667	180.436
1200	28109	234.227	18746	182.244
1300	31503	236.943	20825	183.908
1400	34936	239.487	22903	185.448
1500	38405	241.881	24982	186.883
1600	41904	244.139	27060	188.224
1700	45430	246.276	29139	189.484
1800	48979	248.304	31218	190.672
1900	52549	250.234	33296	191.796
2000	56137	252.075	35375	192.863
2200	63362	255.518	39534	194.845
2400	70640	258.684	43695	196.655
2600	77963	261.615	47860	198.322
2800	85323	264.342	52033	199.868
3000	92715	266.892	56218	201.311
3200	100134	269.286	60420	202.667
3400	107577	271.542	64646	203.948
3600	115042	273.675	68902	205.164
3800	122526	275.698	73194	206.325
4000	130027	277.622	77532	207.437
4400	145078	281.209	86367	209.542
4800	160188	284.495	95457	211.519
5200	175352	287.530	104843	213.397
5600	190572	290.349	114550	215.195
6000	205848	292.984	124590	216.926

TABLO-B8 (Devam)

Değişik gazların mükemmel gaz özellikleri, Entropiler, 0.1 MPa (1 Bar) Basınç ve birim kmol içindir (molar).

T K	Oksijen, İki Atomlu (O ₂) $\bar{h}_{f,298}^0 = 0 \text{ kJ/kmol}$ $M = 31.999 \text{ kg/kmol}$		Oksijen, tek Atomlu (O) $\bar{h}_{f,298}^0 = 249 170 \text{ kJ/kmol}$ $M = 16.00 \text{ kg/kmol}$	
	$(\bar{h} - \bar{h}_{298}^0)$ kJ/kmol	\bar{s}_T^0 kJ/kmol·K	$(\bar{h} - \bar{h}_{298}^0)$ kJ/kmol	\bar{s}_T^0 kJ/kmol·K
0	-8683	0	-6725	0
100	-5777	173.308	-4518	135.947
200	-2868	193.483	-2186	152.153
298	0	205.148	0	161.059
300	54	205.329	41	161.194
400	3027	213.873	2207	167.431
500	6086	220.693	4343	172.198
600	9245	226.450	6462	176.060
700	12499	231.465	8570	179.310
800	15836	235.920	10671	182.116
900	19241	239.931	12767	184.585
1000	22703	243.579	14860	186.790
1100	26212	246.923	16950	188.783
1200	29761	250.011	19039	190.600
1300	33345	252.878	21126	192.270
1400	36958	255.556	23212	193.816
1500	40600	258.068	25296	195.254
1600	44267	260.434	27381	196.599
1700	47959	262.673	29464	197.862
1800	51674	264.797	31547	199.053
1900	55414	266.819	33630	200.179
2000	59176	268.748	35713	201.247
2200	66770	272.366	39878	203.232
2400	74453	275.708	44045	205.045
2600	82225	278.818	48216	206.714
2800	90080	281.729	52391	208.262
3000	98013	284.466	56574	209.705
3200	106022	287.050	60767	211.058
3400	114101	289.499	64971	212.332
3600	122245	291.826	69190	213.538
3800	130447	294.043	73424	214.682
4000	138705	296.161	77675	215.773
4400	155374	300.133	86234	217.812
4800	172240	303.801	94873	219.691
5200	189312	307.217	103592	221.435
5600	206618	310.423	112391	223.066
6000	224210	313.457	121264	224.597

TABLO B-8 (Devam)

Değişik gazların mükemmel gaz özellikleri, Entropiler, 0.1 MPa (1 Bar) Basınç ve birim kmol içindir (molar).

T K	Karbon Dioksit (CO ₂) $\bar{h}_{f,298}^0 = -393\,522$ kJ/kmol $M = 44.01$ kg/kmol		Carbon Monoksit (CO) $\bar{h}_{f,298}^0 = -110\,527$ kJ/kmol $M = 28.01$ kg/kmol	
	$(\bar{h} - \bar{h}_{298}^0)$ kJ/kmol	\bar{s}_T^0 kJ/kmol·K	$(\bar{h} - \bar{h}_{298}^0)$ kJ/kmol	\bar{s}_T^0 kJ/kmol·K
0	-9364	0	-8671	0
100	-6457	179.010	-5772	165.852
200	-3413	199.976	-2860	186.024
298	0	213.794	0	197.651
300	69	214.024	54	197.831
400	4003	225.314	2977	206.240
500	8305	234.902	5932	212.833
600	12906	243.284	8942	218.321
700	17754	250.752	12021	223.067
800	22806	257.496	15174	227.277
900	28030	263.646	18397	231.074
1000	33397	269.299	21686	234.538
1100	38885	274.528	25031	237.726
1200	44473	279.390	28427	240.679
1300	50148	283.931	31867	243.431
1400	55895	288.190	35343	246.006
1500	61705	292.199	38852	248.426
1600	67569	295.984	42388	250.707
1700	73480	299.567	45948	252.866
1800	79432	302.969	49529	254.913
1900	85420	306.207	53128	256.860
2000	91439	309.294	56743	258.716
2200	103562	315.070	64012	262.182
2400	115779	320.384	71326	265.361
2600	128074	325.307	78679	268.302
2800	140435	329.887	86070	271.044
3000	152853	334.170	93504	273.607
3200	165321	338.194	100962	276.012
3400	177836	341.988	108440	278.279
3600	190394	345.576	115938	280.422
3800	202990	348.981	123454	282.454
4000	215624	352.221	130989	284.387
4400	240992	358.266	146108	287.989
4800	266488	363.812	161285	291.290
5200	292112	368.939	176510	294.337
5600	317870	373.711	191782	297.167
6000	343782	378.180	207105	299.809

TABLO-B8 (Devam)

Değişik gazların mükemmel gaz özellikleri, Entropiler, 0.1 MPa (1 Bar) Basınç ve birim kmol içindir (molar).

<i>T</i> K	Su buharı (H ₂ O) $\bar{h}_{f,298}^0 = -241\,826 \text{ kJ/kmol}$ $M = 18.015 \text{ kg/kmol}$		Hidroksil (OH) ⁻ $\bar{h}_{f,298}^0 = 38\,987 \text{ kJ/kmol}$ $M = 17.007 \text{ kg/kmol}$	
	$(\bar{h} - \bar{h}_{298}^0)$ kJ/kmol	\bar{s}_T^0 kJ/kmol·K	$(\bar{h} - \bar{h}_{298}^0)$ kJ/kmol	\bar{s}_T^0 kJ/kmol·K
0	-9904	0	-9172	0
100	-6617	152.386	-6140	149.591
200	-3282	175.488	-2975	171.592
298	0	188.835	0	183.709
300	62	189.043	55	183.894
400	3450	198.787	3034	192.466
500	6922	206.532	5991	199.066
600	10499	213.051	8943	204.448
700	14190	218.739	11902	209.008
800	18002	223.826	14881	212.984
900	21937	228.460	17889	216.526
1000	26000	232.739	20935	219.735
1100	30190	236.732	24024	222.680
1200	34506	240.485	27159	225.408
1300	38941	244.035	30340	227.955
1400	43491	247.406	33567	230.347
1500	48149	250.620	36838	232.604
1600	52907	253.690	40151	234.741
1700	57757	256.631	43502	236.772
1800	62693	259.452	46890	238.707
1900	67706	262.162	50311	240.556
2000	72788	264.769	53763	242.328
2200	83153	269.706	60751	245.659
2400	93741	274.312	67840	248.743
2600	104520	278.625	75018	251.614
2800	115463	282.680	82268	254.301
3000	126548	286.504	89585	256.825
3200	137756	290.120	96960	259.205
3400	149073	293.550	104388	261.456
3600	160484	296.812	111864	263.592
3800	171981	299.919	119382	265.625
4000	183552	302.887	126940	267.563
4400	206892	308.448	142165	271.191
4800	230456	313.573	157522	274.531
5200	254216	318.328	173002	277.629
5600	278161	322.764	188598	280.518
6000	302295	326.926	204309	283.227

TABLO-B8 (Devam)

Değişik gazların mükemmel gaz özellikleri, Entropiler, 0.1 MPa (1 Bar) Basınç ve birim kmol içindir (molar).

<i>T</i> K	Hidrojen (H ₂) $\bar{h}_{f,298}^0 = 0$ kJ/kmol $M = 2.016$ kg/kmol		Hidrojen, Tek Atomlu (H) ⁻ $\bar{h}_{f,298}^0 = 217\,999$ kJ/kmol $M = 1.008$ kg/kmol	
	$(\bar{h} - \bar{h}_{298}^0)$ kJ/kmol	\bar{s}_T^0 kJ/kmol·K	$(\bar{h} - \bar{h}_{298}^0)$ kJ/kmol	\bar{s}_T^0 kJ/kmol·K
0	-8467	0	-6197	0
100	-5467	100.727	-4119	92.009
200	-2774	119.410	-2040	106.417
298	0	130.678	0	114.716
300	53	130.856	38	114.845
400	2961	139.219	2117	120.825
500	5883	145.738	4196	125.463
600	8799	151.078	6274	129.253
700	11730	155.609	8353	132.457
800	14681	159.554	10431	135.233
900	17657	163.060	12510	137.681
1000	20663	166.225	14589	139.871
1100	23704	169.121	16667	141.852
1200	26785	171.798	18746	143.661
1300	29907	174.294	20825	145.324
1400	33073	176.637	22903	146.865
1500	36281	178.849	24982	148.299
1600	39533	180.946	27060	149.640
1700	42826	182.941	29139	150.900
1800	46160	184.846	31218	152.089
1900	49532	186.670	33296	153.212
2000	52942	188.419	35375	154.279
2200	59865	191.719	39532	156.260
2400	66915	194.789	43689	158.069
2600	74082	197.659	47847	159.732
2800	81355	200.355	52004	161.273
3000	88725	202.898	56161	162.707
3200	96187	205.306	60318	164.048
3400	103736	207.593	64475	165.308
3600	111367	209.773	68633	166.497
3800	119077	211.856	72790	167.620
4000	126864	213.851	76947	168.687
4400	142658	217.612	85261	170.668
4800	158730	221.109	93576	172.476
5200	175057	224.379	101890	174.140
5600	191607	227.447	110205	175.681
6000	208332	230.322	118519	177.114

TABLO-B8 (Devam)

Değişik gazların mükemmel gaz özellikleri, Entropiler, 0.1 MPa (1 Bar) Basınç ve birim kmol içindir (molar).

<i>T</i> K	Azot Monoksit (NO) $\bar{h}_{f,298}^0 = 90\,291$ kJ/kmol $M = 30.006$ kg/kmol		Azot dioksit (NO ₂) ⁻ $\bar{h}_{f,298}^0 = 33\,100$ kJ/kmol $M = 46.005$ kg/kmol	
	$(\bar{h} - \bar{h}_{298}^0)$ kJ/kmol	\bar{s}_T^0 kJ/kmol·K	$(\bar{h} - \bar{h}_{298}^0)$ kJ/kmol	\bar{s}_T^0 kJ/kmol·K
0	-9192	0	-10186	0
100	-6073	177.031	-6861	202.563
200	-2951	198.747	-3495	225.852
298	0	210.759	0	240.034
300	55	210.943	68	240.263
400	3040	219.529	3927	251.342
500	6059	226.263	8099	260.638
600	9144	231.886	12555	268.755
700	12308	236.762	17250	275.988
800	15548	241.088	22138	282.513
900	18858	244.985	27180	288.450
1000	22229	248.536	32344	293.889
1100	25653	251.799	37606	298.904
1200	29120	254.816	42946	303.551
1300	32626	257.621	48351	307.876
1400	36164	260.243	53808	311.920
1500	39729	262.703	59309	315.715
1600	43319	265.019	64846	319.289
1700	46929	267.208	70414	322.664
1800	50557	269.282	76008	325.861
1900	54201	271.252	81624	328.898
2000	57859	273.128	87259	331.788
2200	65212	276.632	98578	337.182
2400	72606	279.849	109948	342.128
2600	80034	282.822	121358	346.695
2800	87491	285.585	132800	350.934
3000	94973	288.165	144267	354.890
3200	102477	290.587	155756	358.597
3400	110000	292.867	167262	362.085
3600	117541	295.022	178783	365.378
3800	125099	297.065	190316	368.495
4000	132671	299.007	201860	371.456
4400	147857	302.626	224973	376.963
4800	163094	305.940	248114	381.997
5200	178377	308.998	271276	386.632
5600	193703	311.838	294455	390.926
6000	209070	314.488	317648	394.926

TABLO-B9

Değişik Maddeler için Oluşum Entalpisi ve Mutlak Entropi, 25°C, 100 kPa Basınç için.

Madde	Kimyasal Formül	M kg/kmol	State	\bar{h}_f^0 kJ/ kmol	\bar{s}_f^0 kJ/ kmol· K
Acetilen	C ₂ H ₂	26.038	gas	+ 226 731	200.958
Amonyak	NH ₃	17.031	gas	- 45 720	192.572
Benzen	C ₆ H ₆	78.114	gas	+ 82 980	269.562
Karbon dioksit	CO ₂	44.010	gas	- 393 522	213.795
Karbon (grafit)	C	12.011	solid	0	5.740
Karbon monoksit	CO	28.011	gas	- 110 527	197.653
Ethan	C ₂ H ₆	30.070	gas	- 84 740	229.597
Ethen	C ₂ H ₄	28.054	gas	+ 52 467	219.330
Etanol (Etil alkol)	C ₂ H ₅ OH	46.069	gas	- 235 000	282.444
Etanol (Etil alkol)	C ₂ H ₅ OH	46.069	liq	- 277 380	160.554
Heptan	C ₇ H ₁₆	100.205	gas	- 187 900	427.805
Hekzan	C ₆ H ₁₄	86.178	gas	- 167 300	387.979
Hidrojen peroksit	H ₂ O ₂	34.015	gas	- 136 106	232.991
Methan	CH ₄	16.043	gas	- 74 873	186.251
Metanol (Metil alkol)	CH ₃ OH	32.042	gas	- 201 300	239.709
Metanol (Metil alkol)	CH ₃ OH	32.042	liq	- 239 220	126.809
<i>n</i> -Butan	C ₄ H ₁₀	58.124	gas	- 126 200	306.647
Nitröz asit	N ₂ O	44.013	gas	+ 82 050	219.957
Nitrometan	CH ₃ NO ₂	61.04	liq	- 113 100	171.80
<i>n</i> -Octan	C ₈ H ₁₈	114.232	gas	- 208 600	466.514
<i>n</i> -Octan	C ₈ H ₁₈	114.232	liq	- 250 105	360.575
Ozon	O ₃	47.998	gas	+ 142 674	238.932
Pentan	C ₅ H ₁₂	72.151	gas	- 146 500	348.945
Propan	C ₃ H ₈	44.094	gas	- 103 900	269.917
Propen	C ₃ H ₆	42.081	gas	+ 20 430	267.066
Kükürt	S	32.06	solid	0	32.056
Kükürt dioksit	SO ₂	64.059	gas	- 296 842	248.212
Kükürt trioksit	SO ₃	80.058	gas	- 395 765	256.769
<i>T-T</i> -Diesel	C _{14,4} H _{24,9}	198.06	liq	- 174 000	525.90
Su	H ₂ O	18.015	gas	- 241 826	188.834
Su	H ₂ O	18.015	liq	- 285 830	69.950

TABLE-B10

Denge Sabiti K'nun e Tabanına Göre Logaritması.

Reaksiyon için $\nu_A A + \nu_B B \rightleftharpoons \nu_C C + \nu_D D$ K denge sabiti aşağıdaki gibidir:

$$K = \frac{y_C^{\nu_C} y_D^{\nu_D}}{y_A^{\nu_A} y_B^{\nu_B}} \left(\frac{P}{P^0} \right)^{\nu_C + \nu_D - \nu_A - \nu_B}, P^0 = 0.1 \text{ MPa}$$

Temp K	H ₂ ⇌ 2H	O ₂ ⇌ 2O	2H ₂ ⇌ 2H ₂	N ₂ ⇌ 2N	2H ₂ O ⇌ 2H ₂ + O ₂	2H ₂ O ⇌ H ₂ + 2OH	2CO ₂ ⇌ 2CO + O ₂	N ₂ + O ₂ ⇌ 2NO	N ₂ + 2O ₂ ⇌ 2NO ₂
298	-164.003	-186.963	-367.528	-184.420	-212.075	-207.529	-69.868	-41.355	
500	-92.830	-105.623	-213.405	-105.385	-120.331	-115.234	-40.449	-30.725	
1000	-39.810	-45.146	-99.146	-46.321	-51.951	-47.052	-18.709	-23.039	
1200	-30.878	-35.003	-80.025	-36.363	-40.467	-35.736	-15.082	-21.752	
1400	-24.467	-27.741	-66.345	-29.222	-32.244	-27.679	-12.491	-20.826	
1600	-19.638	-22.282	-56.069	-23.849	-26.067	-21.656	-10.547	-20.126	
1800	-15.868	-18.028	-48.066	-19.658	-21.258	-16.987	-9.035	-19.577	
2000	-12.841	-14.619	-41.655	-16.299	-17.406	-13.266	-7.825	-19.136	
2200	-10.356	-11.826	-36.404	-13.546	-14.253	-10.232	-6.836	-18.773	
2400	-8.280	-9.495	-32.023	-11.249	-11.625	-7.715	-6.012	-18.470	
2600	-6.519	-7.520	-28.313	-9.303	-9.402	-5.594	-5.316	-18.214	
2800	-5.005	-5.826	-25.129	-7.633	-7.496	-3.781	-4.720	-17.994	
3000	-3.690	-4.356	-22.367	-6.184	-5.845	-2.217	-4.205	-17.805	
3200	-2.538	-3.069	-19.947	-4.916	-4.401	-0.853	-3.755	-17.640	
3400	-1.519	-1.932	-17.810	-3.795	-3.128	0.346	-3.359	-17.496	
3600	-0.611	-0.922	-15.909	-2.799	-1.996	1.408	-3.008	-17.369	
3800	0.201	-0.017	-14.205	-1.906	-0.984	2.355	-2.694	-17.257	
4000	0.934	0.798	-12.671	-1.101	-0.074	3.204	-2.413	-17.157	
4500	2.483	2.520	-9.423	0.602	1.847	4.985	-1.824	-16.953	
5000	3.724	3.898	-6.816	1.972	3.383	6.397	-1.358	-16.797	
5500	4.739	5.027	-4.672	3.098	4.639	7.542	-0.980	-16.678	
6000	5.587	5.969	-2.876	4.040	5.684	8.488	-0.671	-16.588	

TABLO-B15

Doymuş Katı-Doymuş Buhar, Su

Sıcaklık (°C)	Basınç (kPa)	Özgül Hacim, m ³ /kg			İç Enerji, kJ/kg		
		Doymuş katı v_i	Süblimleşme v_{ig}	Doymuş Buhar v_g	Doymuş Katı u_i	Süblimleşme u_{ig}	Doymuş Buhar u_g
0.01	0.6113	0.0010908	206.152	206.153	-333.40	2708.7	2375.3
0	0.6108	0.0010908	206.314	206.315	-333.42	2708.7	2375.3
-2	0.5177	0.0010905	241.662	241.663	-337.61	2710.2	2372.5
-4	0.4376	0.0010901	283.798	283.799	-341.78	2711.5	2369.8
-6	0.3689	0.0010898	334.138	334.139	-345.91	2712.9	2367.0
-8	0.3102	0.0010894	394.413	394.414	-350.02	2714.2	2364.2
-10	0.2601	0.0010891	466.756	466.757	-354.09	2715.5	2361.4
-12	0.2176	0.0010888	553.802	553.803	-358.14	2716.8	2358.7
-14	0.1815	0.0010884	658.824	658.824	-362.16	2718.0	2355.9
-16	0.1510	0.0010881	785.906	785.907	-366.14	2719.2	2353.1
-18	0.1252	0.0010878	940.182	940.183	-370.10	2720.4	2350.3
-20	0.10355	0.0010874	1128.112	1128.113	-374.03	2721.6	2347.5
-22	0.08535	0.0010871	1357.863	1357.864	-377.93	2722.7	2344.7
-24	0.07012	0.0010868	1639.752	1639.753	-381.80	2723.7	2342.0
-26	0.05741	0.0010864	1986.775	1986.776	-385.64	2724.8	2339.2
-28	0.04684	0.0010861	2415.200	2415.201	-389.45	2725.8	2336.4
-30	0.03810	0.0010858	2945.227	2945.228	-393.23	2726.8	2333.6
-32	0.03090	0.0010854	3601.822	3601.823	-396.98	2727.8	2330.8
-34	0.02499	0.0010851	4416.252	4416.253	-400.71	2728.7	2328.0
-36	0.02016	0.0010848	5430.115	5430.116	-404.40	2729.6	2325.2
-38	0.01618	0.0010844	6707.021	6707.022	-408.06	2730.5	2322.4
-40	0.01286	0.0010841	8366.395	8366.396	-411.70	2731.3	2319.6

TABLO-B15 (Devam)

Doymuş Katı-Doymuş Buhar, Su

Sıcaklık (°C)	Basınç (kPa)	Entalpi, kJ/kg			Entropi, kJ/kg-K		
		Doymuş katı h_i	Süblimleşme h_{ig}	Doymuş Buhar h_g	Doymuş Katı s_i	Süblimleşme s_{ig}	Doymuş Buhar s_g
0.01	0.6113	-333.40	2834.7	2501.3	-1.2210	10.3772	9.1562
0	0.6108	-333.42	2834.8	2501.3	-1.2211	10.3776	9.1565
-2	0.5177	-337.61	2835.3	2497.6	-1.2369	10.4562	9.2193
-4	0.4376	-341.78	2835.7	2494.0	-1.2526	10.5358	9.2832
-6	0.3689	-345.91	2836.2	2490.3	-1.2683	10.6165	9.3482
-8	0.3102	-350.02	2836.6	2486.6	-1.2839	10.6982	9.4143
-10	0.2601	-354.09	2837.0	2482.9	-1.2995	10.7809	9.4815
-12	0.2176	-358.14	2837.3	2479.2	-1.3150	10.8648	9.5498
-14	0.1815	-362.16	2837.6	2475.5	-1.3306	10.9498	9.6192
-16	0.1510	-366.14	2837.9	2471.8	-1.3461	11.0359	9.6898
-18	0.1252	-370.10	2838.2	2468.1	-1.3617	11.1233	9.7616
-20	0.10355	-374.03	2838.4	2464.3	-1.3772	11.2120	9.8348
-22	0.08535	-377.93	2838.6	2460.6	-1.3928	11.3020	9.9093
-24	0.07012	-381.80	2838.7	2456.9	-1.4083	11.3935	9.9852
-26	0.05741	-385.64	2838.9	2453.2	-1.4239	11.4864	10.0625
-28	0.04684	-389.45	2839.0	2449.5	-1.4394	11.5808	10.1413
-30	0.03810	-393.23	2839.0	2445.8	-1.4550	11.6765	10.2215
-32	0.03090	-396.98	2839.1	2442.1	-1.4705	11.7733	10.3028
-34	0.02499	-400.71	2839.1	2438.4	-1.4860	11.8713	10.3853
-36	0.02016	-404.40	2839.1	2434.7	-1.5014	11.9704	10.4690
-38	0.01618	-408.06	2839.0	2431.0	-1.5168	12.0714	10.5546
-40	0.01286	-411.70	2838.9	2427.2	-1.5321	12.1768	10.6447

TABLO-B16

Termodinamik Özellikler, Amonyak

Doymuş Amonyak

Sıcaklık (°C)	Basınç (kPa)	Özgül Hacim, m ³ /kg			İç Enerji, kJ/kg		
		Doymuş Sıvı v_f	Buharlaştırma v_{fg}	Doymuş Buhar v_g	Doymuş Sıvı u_f	Buharlaştırma u_{fg}	Doymuş Buhar u_g
-50	40.9	0.001424	2.62557	2.62700	-43.82	1309.1	1265.2
-45	54.5	0.001437	2.00489	2.00632	-22.01	1293.5	1271.4
-40	71.7	0.001450	1.55111	1.55256	-0.10	1277.6	1277.4
-35	93.2	0.001463	1.21466	1.21613	21.93	1261.3	1283.3
-30	119.5	0.001476	0.96192	0.96339	44.08	1244.8	1288.9
-25	151.6	0.001490	0.76970	0.77119	66.36	1227.9	1294.3
-20	190.2	0.001504	0.62184	0.62334	88.76	1210.7	1299.5
-15	236.3	0.001519	0.50686	0.50838	111.30	1193.2	1304.5
-10	290.9	0.001534	0.41655	0.41808	133.96	1175.2	1309.2
-5	354.9	0.001550	0.34493	0.34648	156.76	1157.0	1313.7
0	429.6	0.001566	0.28763	0.28920	179.69	1138.3	1318.0
5	515.9	0.001583	0.24140	0.24299	202.77	1119.2	1322.0
10	615.2	0.001600	0.20381	0.20541	225.99	1099.7	1325.7
15	728.6	0.001619	0.17300	0.17462	249.36	1079.7	1329.1
20	857.5	0.001638	0.14758	0.14922	272.89	1059.3	1332.2
25	1003.2	0.001658	0.12647	0.12813	296.59	1038.4	1335.0
30	1167.0	0.001680	0.10881	0.11049	320.46	1016.9	1337.4
35	1350.4	0.001702	0.09397	0.09567	344.50	994.9	1339.4
40	1554.9	0.001725	0.08141	0.08313	368.74	972.2	1341.0
45	1782.0	0.001750	0.07073	0.07248	393.19	948.9	1342.1
50	2033.1	0.001777	0.06159	0.06337	417.87	924.8	1342.7
55	2310.1	0.001804	0.05375	0.05555	442.79	899.9	1342.7
60	2614.4	0.001834	0.04697	0.04880	467.99	874.2	1342.1
65	2947.8	0.001866	0.04109	0.04296	493.51	847.4	1340.9
70	3312.0	0.001900	0.03597	0.03787	519.39	819.5	1338.9
75	3709.0	0.001937	0.03148	0.03341	545.70	790.4	1336.1
80	4140.5	0.001978	0.02753	0.02951	572.50	759.9	1332.4
85	4608.6	0.002022	0.02404	0.02606	599.90	727.8	1327.7
90	5115.3	0.002071	0.02093	0.02300	627.99	693.7	1321.7
95	5662.9	0.002126	0.01815	0.02028	656.95	657.4	1314.4
100	6253.7	0.002188	0.01565	0.01784	686.96	618.4	1305.3
105	6890.4	0.002261	0.01337	0.01564	718.30	575.9	1294.2
110	7575.7	0.002347	0.01128	0.01363	751.37	529.1	1280.5
115	8313.3	0.002452	0.00933	0.01178	786.82	476.2	1263.1
120	9107.2	0.002589	0.00744	0.01003	825.77	414.5	1240.3
125	9963.5	0.002783	0.00554	0.00833	870.69	337.7	1208.4
130	10891.6	0.003122	0.00337	0.00649	929.29	226.9	1156.2
132.3	11333.2	0.004255	0	0.00426	1037.62	0	1037.6

TABLO-B16 (Devam)

Doymuş Amonyak

Sıcaklık (°C)	Basınç (kPa)	Entalpi, kJ/kg			Entropi, kJ/kg		
		Doymuş Sıvı h_f	Buharlaştırma h_{fg}	Doymuş Buhar h_g	Doymuş Sıvı s_f	Buharlaştırma s_{fg}	Doymuş Buhar s_g
-50	40.9	-43.76	1416.3	1372.6	-0.1916	6.3470	6.1554
-45	54.5	-21.94	1402.8	1380.8	-0.0950	6.1484	6.0534
-40	71.7	0	1388.8	1388.8	0	5.9567	5.9567
-35	93.2	22.06	1374.5	1396.5	0.0935	5.7715	5.8650
-30	119.5	44.26	1359.8	1404.0	0.1856	5.5922	5.7778
-25	151.6	66.58	1344.6	1411.2	0.2763	5.4185	5.6947
-20	190.2	89.05	1329.0	1418.0	0.3657	5.2498	5.6155
-15	236.3	111.66	1312.9	1424.6	0.4538	5.0859	5.5397
-10	290.9	134.41	1296.4	1430.8	0.5408	4.9265	5.4673
-5	354.9	157.31	1279.4	1436.7	0.6266	4.7711	5.3977
0	429.6	180.36	1261.8	1442.2	0.7114	4.6195	5.3309
5	515.9	203.58	1243.7	1447.3	0.7951	4.4715	5.2666
10	615.2	226.97	1225.1	1452.0	0.8779	4.3266	5.2045
15	728.6	250.54	1205.8	1456.3	0.9598	4.1846	5.1444
20	857.5	274.30	1185.9	1460.2	1.0408	4.0452	5.0860
25	1003.2	298.25	1165.2	1463.5	1.1210	3.9083	5.0293
30	1167.0	322.42	1143.9	1466.3	1.2005	3.7734	4.9738
35	1350.4	346.80	1121.8	1468.6	1.2792	3.6403	4.9196
40	1554.9	371.43	1098.8	1470.2	1.3574	3.5088	4.8662
45	1782.0	396.31	1074.9	1471.2	1.4350	3.3786	4.8136
50	2033.1	421.48	1050.0	1471.5	1.5121	3.2493	4.7614
55	2310.1	446.96	1024.1	1471.0	1.5888	3.1208	4.7095
60	2614.4	472.79	997.0	1469.7	1.6652	2.9925	4.6577
65	2947.8	499.01	968.5	1467.5	1.7415	2.8642	4.6057
70	3312.0	525.69	938.7	1464.4	1.8178	2.7354	4.5533
75	3709.0	552.88	907.2	1460.1	1.8943	2.6058	4.5001
80	4140.5	580.69	873.9	1454.6	1.9712	2.4746	4.4458
85	4608.6	609.21	838.6	1447.8	2.0488	2.3413	4.3901
90	5115.3	638.59	800.8	1439.4	2.1273	2.2051	4.3325
95	5662.9	668.99	760.2	1429.2	2.2073	2.0650	4.2723
100	6253.7	700.64	716.2	1416.9	2.2893	1.9195	4.2088
105	6890.4	733.87	668.1	1402.0	2.3740	1.7667	4.1407
110	7575.7	769.15	614.6	1383.7	2.4625	1.6040	4.0665
115	8313.3	807.21	553.8	1361.0	2.5566	1.4267	3.9833
120	9107.2	849.36	482.3	1331.7	2.6593	1.2268	3.8861
125	9963.5	898.42	393.0	1291.4	2.7775	0.9870	3.7645
130	10892	963.29	263.7	1227.0	2.9326	0.6540	3.5866
132.3	11333	1085.85	0	1085.9	3.2316	0	3.2316

TABLO-B17

Kızgın Amonyak Buharı

Sıcaklık (°C)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)
	50 kPa (−46.53 °C)				100 kPa (−33.60 °C)			
Doymuş	2.1752	1269.6	1378.3	6.0839	1.1381	1284.9	1398.7	5.8401
−30	2.3448	1296.2	1413.4	6.2333	1.1573	1291.0	1406.7	5.8734
−20	2.4463	1312.3	1434.6	6.3187	1.2101	1307.8	1428.8	5.9626
−10	2.5471	1328.4	1455.7	6.4006	1.2621	1324.6	1450.8	6.0477
0	2.6474	1344.5	1476.9	6.4795	1.3136	1341.3	1472.6	6.1291
10	2.7472	1360.7	1498.1	6.5556	1.3647	1357.9	1494.4	6.2073
20	2.8466	1377.0	1519.3	6.6293	1.4153	1374.5	1516.1	6.2826
30	2.9458	1393.3	1540.6	6.7008	1.4657	1391.2	1537.7	6.3553
40	3.0447	1409.8	1562.0	6.7703	1.5158	1407.9	1559.5	6.4258
50	3.1435	1426.3	1583.5	6.8379	1.5658	1424.7	1581.2	6.4943
60	3.2421	1443.0	1605.1	6.9038	1.6156	1441.5	1603.1	6.5609
70	3.3406	1459.9	1626.9	6.9682	1.6653	1458.5	1625.1	6.6258
80	3.4390	1476.9	1648.8	7.0312	1.7148	1475.6	1647.1	6.6892
100	3.6355	1511.4	1693.2	7.1533	1.8137	1510.3	1691.7	6.8120
120	3.8318	1546.6	1738.2	7.2708	1.9124	1545.7	1736.9	6.9300
140	4.0280	1582.5	1783.9	7.3842	2.0109	1581.7	1782.8	7.0439
160	4.2240	1619.2	1830.4	7.4941	2.1093	1618.5	1829.4	7.1540
180	4.4199	1656.7	1877.7	7.6008	2.2075	1656.0	1876.8	7.2609
200	4.6157	1694.9	1925.7	7.7045	2.3057	1694.3	1924.9	7.3648
	150 kPa (−25.22 °C)				200 kPa (−18.86 °C)			
Doymuş	0.7787	1294.1	1410.9	5.6983	0.5946	1300.6	1419.6	5.5979
−20	0.7977	1303.3	1422.9	5.7465	—	—	—	—
−10	0.8336	1320.7	1445.7	5.8349	0.6193	1316.7	1440.6	5.6791
0	0.8689	1337.9	1468.3	5.9189	0.6465	1334.5	1463.8	5.7659
10	0.9037	1355.0	1490.6	5.9992	0.6732	1352.1	1486.8	5.8484
20	0.9382	1372.0	1512.8	6.0761	0.6995	1369.5	1509.4	5.9270
30	0.9723	1389.0	1534.9	6.1502	0.7255	1386.8	1531.9	6.0025
40	1.0062	1406.0	1556.9	6.2217	0.7513	1404.0	1554.3	6.0751
50	1.0398	1423.0	1578.9	6.2910	0.7769	1421.3	1576.6	6.1453
60	1.0734	1440.0	1601.0	6.3583	0.8023	1438.5	1598.9	6.2133
70	1.1068	1457.2	1623.2	6.4238	0.8275	1455.8	1621.3	6.2794
80	1.1401	1474.4	1645.4	6.4877	0.8527	1473.1	1643.7	6.3437
100	1.2065	1509.3	1690.2	6.6112	0.9028	1508.2	1688.8	6.4679
120	1.2726	1544.8	1735.6	6.7297	0.9527	1543.8	1734.4	6.5869
140	1.3386	1580.9	1781.7	6.8439	1.0024	1580.1	1780.6	6.7015
160	1.4044	1617.8	1828.4	6.9544	1.0519	1617.0	1827.4	6.8123
180	1.4701	1655.4	1875.9	7.0615	1.1014	1654.7	1875.0	6.9196
200	1.5357	1693.7	1924.1	7.1656	1.1507	1693.2	1923.3	7.0239
220	1.6013	1732.9	1973.1	7.2670	1.2000	1732.4	1972.4	7.1255

TABLO-B17 (Devam)

Kızgın Amonyak Buharı

Sıcaklık (°C)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)
	300 kPa (−9.24 °C)				400 kPa (−1.89 °C)			
Doymuş	0.40607	1309.9	1431.7	5.4565	0.30942	1316.4	1440.2	5.3559
0	0.42382	1327.5	1454.7	5.5420	0.31227	1320.2	1445.1	5.3741
10	0.44251	1346.1	1478.9	5.6290	0.32701	1339.9	1470.7	5.4663
20	0.46077	1364.4	1502.6	5.7113	0.34129	1359.1	1495.6	5.5525
30	0.47870	1382.3	1526.0	5.7896	0.35520	1377.7	1519.8	5.6338
40	0.49636	1400.1	1549.0	5.8645	0.36884	1396.1	1543.6	5.7111
50	0.51382	1417.8	1571.9	5.9365	0.38226	1414.2	1567.1	5.7850
60	0.53111	1435.4	1594.7	6.0060	0.39550	1432.2	1590.4	5.8560
70	0.54827	1453.0	1617.5	6.0732	0.40860	1450.1	1613.6	5.9244
80	0.56532	1470.6	1640.2	6.1385	0.42160	1468.0	1636.7	5.9907
100	0.59916	1506.1	1685.8	6.2642	0.44732	1503.9	1682.8	6.1179
120	0.63276	1542.0	1731.8	6.3842	0.47279	1540.1	1729.2	6.2390
140	0.66618	1578.5	1778.3	6.4996	0.49808	1576.8	1776.0	6.3552
160	0.69946	1615.6	1825.4	6.6109	0.52323	1614.1	1823.4	6.4671
180	0.73263	1653.4	1873.2	6.7188	0.54827	1652.1	1871.4	6.5755
200	0.76572	1692.0	1921.7	6.8235	0.57321	1690.8	1920.1	6.6806
220	0.79872	1731.3	1970.9	6.9254	0.59809	1730.3	1969.5	6.7828
240	0.83167	1771.4	2020.9	7.0247	0.62289	1770.5	2019.6	6.8825
260	0.86455	1812.2	2071.6	7.1217	0.64764	1811.4	2070.5	6.9797
	500 kPa (4.13 °C)				600 kPa (9.28 °C)			
Doymuş	0.25035	1321.3	1446.5	5.2776	0.21038	1325.2	1451.4	5.2133
10	0.25757	1333.5	1462.3	5.3340	0.21115	1326.7	1453.4	5.2205
20	0.26949	1353.6	1488.3	5.4244	0.22154	1347.9	1480.8	5.3156
30	0.28103	1373.0	1513.5	5.5090	0.23152	1368.2	1507.1	5.4037
40	0.29227	1392.0	1538.1	5.5889	0.24118	1387.8	1532.5	5.4862
50	0.30328	1410.6	1562.2	5.6647	0.25059	1406.9	1557.3	5.5641
60	0.31410	1429.0	1586.1	5.7373	0.25981	1425.7	1581.6	5.6383
70	0.32478	1447.3	1609.6	5.8070	0.26888	1444.3	1605.7	5.7094
80	0.33535	1465.4	1633.1	5.8744	0.27783	1462.8	1629.5	5.7778
100	0.35621	1501.7	1679.8	6.0031	0.29545	1499.5	1676.8	5.9081
120	0.37681	1538.2	1726.6	6.1253	0.31281	1536.3	1724.0	6.0314
140	0.39722	1575.2	1773.8	6.2422	0.32997	1573.5	1771.5	6.1491
160	0.41748	1612.7	1821.4	6.3548	0.34699	1611.2	1819.4	6.2623
180	0.43764	1650.8	1869.6	6.4636	0.36389	1649.5	1867.8	6.3717
200	0.45771	1689.6	1918.5	6.5691	0.38071	1688.5	1916.9	6.4776
220	0.47770	1729.2	1968.1	6.6717	0.39745	1728.2	1966.6	6.5806
240	0.49763	1769.5	2018.3	6.7717	0.41412	1768.6	2017.0	6.6808
260	0.51749	1810.6	2069.3	6.8692	0.43073	1809.8	2068.2	6.7786

TABLO-B17 (Devam)

Kızgın Amonyak Buharı

Sıcaklık (°C)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)
800 kPa (17.85 °C)					1000 kPa (24.90 °C)			
Doymuş	0.15958	1330.9	1458.6	5.1110	0.12852	1334.9	1463.4	5.0304
20	0.16138	1335.8	1464.9	5.1328	—	—	—	—
30	0.16947	1358.0	1493.5	5.2287	0.13206	1347.1	1479.1	5.0826
40	0.17720	1379.0	1520.8	5.3171	0.13868	1369.8	1508.5	5.1778
50	0.18465	1399.3	1547.0	5.3996	0.14499	1391.3	1536.3	5.2654
60	0.19189	1419.0	1572.5	5.4774	0.15106	1412.1	1563.1	5.3471
70	0.19896	1438.3	1597.5	5.5513	0.15695	1432.2	1589.1	5.4240
80	0.20590	1457.4	1622.1	5.6219	0.16270	1451.9	1614.6	5.4971
100	0.21949	1495.0	1670.6	5.7555	0.17389	1490.5	1664.3	5.6342
120	0.23280	1532.5	1718.7	5.8811	0.18477	1528.6	1713.4	5.7622
140	0.24590	1570.1	1766.9	6.0006	0.19545	1566.8	1762.2	5.8834
160	0.25886	1608.2	1815.3	6.1150	0.20597	1605.2	1811.2	5.9992
180	0.27170	1646.8	1864.2	6.2254	0.21638	1644.2	1860.5	6.1105
200	0.28445	1686.1	1913.6	6.3322	0.22669	1683.7	1910.4	6.2182
220	0.29712	1726.0	1963.7	6.4358	0.23693	1723.9	1960.8	6.3226
240	0.30973	1766.7	2014.5	6.5367	0.24710	1764.8	2011.9	6.4241
260	0.32228	1808.1	2065.9	6.6350	0.25720	1806.4	2063.6	6.5229
280	0.33477	1850.2	2118.0	6.7310	0.26726	1848.8	2116.0	6.6194
300	0.34722	1893.1	2170.9	6.8248	0.27726	1891.8	2169.1	6.7137
1200 kPa (30.94 °C)					1400 kPa (36.26 °C)			
Doymuş	0.10751	1337.8	1466.8	4.9635	0.09231	1339.8	1469.0	4.9060
40	0.11287	1360.0	1495.4	5.0564	0.09432	1349.5	1481.6	4.9463
50	0.11846	1383.0	1525.1	5.1497	0.09942	1374.2	1513.4	5.0462
60	0.12378	1404.8	1553.3	5.2357	0.10423	1397.2	1543.1	5.1370
70	0.12890	1425.8	1580.5	5.3159	0.10882	1419.2	1571.5	5.2209
80	0.13387	1446.2	1606.8	5.3916	0.11324	1440.3	1598.8	5.2994
100	0.14347	1485.8	1658.0	5.5325	0.12172	1481.0	1651.4	5.4443
120	0.15275	1524.7	1708.0	5.6631	0.12986	1520.7	1702.5	5.5775
140	0.16181	1563.3	1757.5	5.7860	0.13777	1559.9	1752.8	5.7023
160	0.17071	1602.2	1807.1	5.9031	0.14552	1599.2	1802.9	5.8208
180	0.17950	1641.5	1856.9	6.0156	0.15315	1638.8	1853.2	5.9343
200	0.18819	1681.3	1907.1	6.1241	0.16068	1678.9	1903.8	6.0437
220	0.19680	1721.8	1957.9	6.2292	0.16813	1719.6	1955.0	6.1495
240	0.20534	1762.9	2009.3	6.3313	0.17551	1761.0	2006.7	6.2523
260	0.21382	1804.7	2061.3	6.4308	0.18283	1803.0	2059.0	6.3523
280	0.22225	1847.3	2114.0	6.5278	0.19010	1845.8	2111.9	6.4498
300	0.23063	1890.6	2167.3	6.6225	0.19732	1889.3	2165.5	6.5450
320	0.23897	1934.6	2221.3	6.7151	0.20450	1933.5	2219.8	6.6380

TABLO-B17 (Devam)

Kızgın Amonyak Buharı

Temp. (°C)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)
1600 kPa (41.03 °C)					2000 kPa (49.37 °C)			
Sat.	0.08079	1341.2	1470.5	4.8553	0.06444	1342.6	1471.5	4.7680
50	0.08506	1364.9	1501.0	4.9510	0.06471	1344.5	1473.9	4.7754
60	0.08951	1389.3	1532.5	5.0472	0.06875	1372.3	1509.8	4.8848
70	0.09372	1412.3	1562.3	5.1351	0.07246	1397.8	1542.7	4.9821
80	0.09774	1434.3	1590.6	5.2167	0.07595	1421.6	1573.5	5.0707
100	0.10539	1476.2	1644.8	5.3659	0.08248	1466.1	1631.1	5.2294
120	0.11268	1516.6	1696.9	5.5018	0.08861	1508.3	1685.5	5.3714
140	0.11974	1556.4	1748.0	5.6286	0.09447	1549.3	1738.2	5.5022
160	0.12662	1596.1	1798.7	5.7485	0.10016	1589.9	1790.2	5.6251
180	0.13339	1636.1	1849.5	5.8631	0.10571	1630.6	1842.0	5.7420
200	0.14005	1676.5	1900.5	5.9734	0.11116	1671.6	1893.9	5.8540
220	0.14663	1717.4	1952.0	6.0800	0.11652	1713.1	1946.1	5.9621
240	0.15314	1759.0	2004.1	6.1834	0.12182	1755.2	1998.8	6.0668
260	0.15959	1801.3	2056.7	6.2839	0.12705	1797.9	2052.0	6.1685
280	0.16599	1844.3	2109.9	6.3819	0.13224	1841.3	2105.8	6.2675
300	0.17234	1888.0	2163.7	6.4775	0.13737	1885.4	2160.1	6.3641
320	0.17865	1932.4	2218.2	6.5710	0.14246	1930.2	2215.1	6.4583
340	0.18492	1977.5	2273.4	6.6624	0.14751	1975.6	2270.7	6.5505
360	0.19115	2023.3	2329.1	6.7519	0.15253	2021.8	2326.8	6.6406
5000 kPa (88.90 °C)					10000 kPa (125.20 °C)			
Sat.	0.02365	1323.2	1441.4	4.3454	0.00826	1206.8	1289.4	3.7587
100	0.02636	1369.7	1501.5	4.5091	—	—	—	—
120	0.03024	1435.1	1586.3	4.7306	—	—	—	—
140	0.03350	1489.8	1657.3	4.9068	0.01195	1341.8	1461.3	4.1839
160	0.03643	1539.5	1721.7	5.0591	0.01461	1432.2	1578.3	4.4610
180	0.03916	1586.9	1782.7	5.1968	0.01666	1500.6	1667.2	4.6617
200	0.04174	1633.1	1841.8	5.3245	0.01842	1560.3	1744.5	4.8287
220	0.04422	1678.9	1900.0	5.4450	0.02001	1615.8	1816.0	4.9767
240	0.04662	1724.8	1957.9	5.5600	0.02150	1669.2	1884.2	5.1123
260	0.04895	1770.9	2015.6	5.6704	0.02290	1721.6	1950.6	5.2392
280	0.05123	1817.4	2073.6	5.7771	0.02424	1773.6	2015.9	5.3596
300	0.05346	1864.5	2131.8	5.8805	0.02552	1825.5	2080.7	5.4746
320	0.05565	1912.1	2190.3	5.9809	0.02676	1877.6	2145.2	5.5852
340	0.05779	1960.3	2249.2	6.0786	0.02796	1930.0	2209.6	5.6921
360	0.05990	2009.1	2308.6	6.1738	0.02913	1982.8	2274.1	5.7955
380	0.06198	2058.5	2368.4	6.2668	0.03026	2036.1	2338.7	5.8960
400	0.06403	2108.4	2428.6	6.3576	0.03137	2089.8	2403.5	5.9937
420	0.06606	2159.0	2489.3	6.4464	0.03245	2143.9	2468.5	6.0888
440	0.06806	2210.1	2550.4	6.5334	0.03351	2198.5	2533.7	6.1815

TABLO-B18

Termodinamik Özellikleri, Karbon Dioksit

Doymuş Karbon Dioksit

Sıcaklık (°C)	Basınç (kPa)	Özgül Hacim, m ³ /kg			İç Enerji, kJ/kg		
		Doymuş Sıvı v_f	Buharlaştırma v_{fg}	Doymuş Buhar v_g	Doymuş Sıvı u_f	Buharlaştırma u_{fg}	Doymuş Buhar u_g
-50.0	682.3	0.000866	0.05492	0.05579	-20.55	302.26	281.71
-48	739.5	0.000872	0.05075	0.05162	-16.64	298.86	282.21
-46	800.2	0.000878	0.04694	0.04782	-12.72	295.42	282.69
-44	864.4	0.000883	0.04347	0.04435	-8.80	291.94	283.15
-42	932.5	0.000889	0.04029	0.04118	-4.85	288.42	283.57
-40	1004.5	0.000896	0.03739	0.03828	-0.90	284.86	283.96
-38	1080.5	0.000902	0.03472	0.03562	3.07	281.26	284.33
-36	1160.7	0.000909	0.03227	0.03318	7.05	277.60	284.66
-34	1245.2	0.000915	0.03002	0.03093	11.05	273.90	284.95
-32	1334.2	0.000922	0.02794	0.02886	15.07	270.14	285.21
-30	1427.8	0.000930	0.02603	0.02696	19.11	266.32	285.43
-28	1526.1	0.000937	0.02425	0.02519	23.17	262.45	285.61
-26	1629.3	0.000945	0.02261	0.02356	27.25	258.51	285.75
-24	1737.5	0.000953	0.02110	0.02205	31.35	254.50	285.85
-22	1850.9	0.000961	0.01968	0.02065	35.48	250.41	285.89
-20	1969.6	0.000969	0.01837	0.01934	39.64	246.25	285.89
-18	2093.8	0.000978	0.01715	0.01813	43.82	242.01	285.84
-16	2223.7	0.000987	0.01601	0.01700	48.04	237.68	285.73
-14	2359.3	0.000997	0.01495	0.01595	52.30	233.26	285.56
-12	2501.0	0.001007	0.01396	0.01497	56.59	228.73	285.32
-10	2648.7	0.001017	0.01303	0.01405	60.92	224.10	285.02
-8	2802.7	0.001028	0.01216	0.01319	65.30	219.35	284.65
-6	2963.2	0.001040	0.01134	0.01238	69.73	214.47	284.20
-4	3130.3	0.001052	0.01057	0.01162	74.20	209.46	283.66
-2	3304.2	0.001065	0.00985	0.01091	78.74	204.29	283.03
0	3485.1	0.001078	0.00916	0.01024	83.34	198.96	282.30
2	3673.3	0.001093	0.00852	0.00961	88.01	193.44	281.46
4	3868.8	0.001108	0.00790	0.00901	92.76	187.73	280.49
6	4072.0	0.001124	0.00732	0.00845	97.60	181.78	279.38
8	4283.1	0.001142	0.00677	0.00791	102.54	175.57	278.11
10	4502.2	0.001161	0.00624	0.00740	107.60	169.07	276.67
12	4729.7	0.001182	0.00573	0.00691	112.79	162.23	275.02
14	4965.8	0.001205	0.00524	0.00645	118.14	154.99	273.13
16	5210.8	0.001231	0.00477	0.00600	123.69	147.26	270.95
18	5465.1	0.001260	0.00431	0.00557	129.48	138.95	268.43
20	5729.1	0.001293	0.00386	0.00515	135.56	129.90	265.46
22	6003.1	0.001332	0.00341	0.00474	142.03	119.89	261.92
24	6287.7	0.001379	0.00295	0.00433	149.04	108.55	257.59
26	6583.7	0.001440	0.00247	0.00391	156.88	95.20	252.07
28	6891.8	0.001526	0.00193	0.00346	166.20	78.26	244.46
30	7213.7	0.001685	0.00121	0.00290	179.49	51.83	231.32
31.0	7377.3	0.002139	0.0	0.00214	203.56	0.0	203.56

TABLO-B18 (Devam)

Doymuş Karbon Dioksit

Sıcaklık (°C)	Basınç (kPa)	Entalpi, kJ/kg			Entropi, kJ/kg·K		
		Doymuş Sıvı h_f	Buharlaştırma h_{fg}	Doymuş Buhar h_g	Doymuş Sıvı s_f	Buharlaştırma s_{fg}	Doymuş Buhar s_g
-50.0	682.3	-19.96	339.73	319.77	-0.0863	1.5224	1.4362
-48	739.5	-16.00	336.38	320.38	-0.0688	1.4940	1.4252
-46	800.2	-12.02	332.98	320.96	-0.0515	1.4659	1.4144
-44	864.4	-8.03	329.52	321.49	-0.0342	1.4380	1.4038
-42	932.5	-4.02	326.00	321.97	-0.0171	1.4103	1.3933
-40	1004.5	0	322.42	322.42	0	1.3829	1.3829
-38	1080.5	4.04	318.78	322.82	0.0170	1.3556	1.3726
-36	1160.7	8.11	315.06	323.17	0.0339	1.3285	1.3624
-34	1245.2	12.19	311.28	323.47	0.0507	1.3016	1.3523
-32	1334.2	16.30	307.42	323.72	0.0675	1.2748	1.3423
-30	1427.8	20.43	303.48	323.92	0.0842	1.2481	1.3323
-28	1526.1	24.60	299.46	324.06	0.1009	1.2215	1.3224
-26	1629.3	28.78	295.35	324.14	0.1175	1.1950	1.3125
-24	1737.5	33.00	291.15	324.15	0.1341	1.1686	1.3026
-22	1850.9	37.26	286.85	324.11	0.1506	1.1421	1.2928
-20	1969.6	41.55	282.44	323.99	0.1672	1.1157	1.2829
-18	2093.8	45.87	277.93	323.80	0.1837	1.0893	1.2730
-16	2223.7	50.24	273.30	323.53	0.2003	1.0628	1.2631
-14	2359.3	54.65	268.54	323.19	0.2169	1.0362	1.2531
-12	2501.0	59.11	263.65	322.76	0.2334	1.0096	1.2430
-10	2648.7	63.62	258.61	322.23	0.2501	0.9828	1.2328
-8	2802.7	68.18	253.43	321.61	0.2668	0.9558	1.2226
-6	2963.2	72.81	248.08	320.89	0.2835	0.9286	1.2121
-4	3130.3	77.50	242.55	320.05	0.3003	0.9012	1.2015
-2	3304.2	82.26	236.83	319.09	0.3173	0.8734	1.1907
0	3485.1	87.10	230.89	317.99	0.3344	0.8453	1.1797
2	3673.3	92.02	224.73	316.75	0.3516	0.8167	1.1683
4	3868.8	97.05	218.30	315.35	0.3690	0.7877	1.1567
6	4072.0	102.18	211.59	313.77	0.3866	0.7580	1.1446
8	4283.1	107.43	204.56	311.99	0.4045	0.7276	1.1321
10	4502.2	112.83	197.15	309.98	0.4228	0.6963	1.1190
12	4729.7	118.38	189.33	307.72	0.4414	0.6640	1.1053
14	4965.8	124.13	181.02	305.15	0.4605	0.6304	1.0909
16	5210.8	130.11	172.12	302.22	0.4802	0.5952	1.0754
18	5465.1	136.36	162.50	298.86	0.5006	0.5581	1.0588
20	5729.1	142.97	152.00	294.96	0.5221	0.5185	1.0406
22	6003.1	150.02	140.34	290.36	0.5449	0.4755	1.0203
24	6287.7	157.71	127.09	284.80	0.5695	0.4277	0.9972
26	6583.7	166.36	111.45	277.80	0.5971	0.3726	0.9697
28	6891.8	176.72	91.58	268.30	0.6301	0.3041	0.9342
30	7213.7	191.65	60.58	252.23	0.6778	0.1998	0.8776
31.0	7377.3	219.34	0.0	219.34	0.7680	0.0	0.7680

TABLO-B19

Kızgın Karbon Dioksit

Sıcaklık (°C)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)
400 kPa (NA)					800 kPa (−46.00 °C)			
Doymuş	—	—	—	—	0.04783	282.69	320.95	1.4145
−40	0.10499	292.46	334.46	1.5947	0.04966	287.05	326.78	1.4398
−20	0.11538	305.30	351.46	1.6646	0.05546	301.13	345.49	1.5168
0	0.12552	318.31	368.51	1.7295	0.06094	314.92	363.67	1.5859
20	0.13551	331.57	385.77	1.7904	0.06623	328.73	381.72	1.6497
40	0.14538	345.14	403.29	1.8482	0.07140	342.70	399.82	1.7094
60	0.15518	359.03	421.10	1.9033	0.07648	356.90	418.09	1.7660
80	0.16491	373.25	439.21	1.9561	0.08150	371.37	436.57	1.8199
100	0.17460	387.80	457.64	2.0069	0.08647	386.11	455.29	1.8714
120	0.18425	402.67	476.37	2.0558	0.09141	401.15	474.27	1.9210
140	0.19388	417.86	495.41	2.1030	0.09631	416.47	493.52	1.9687
160	0.20348	433.35	514.74	2.1487	0.10119	432.07	513.03	2.0148
180	0.21307	449.13	534.36	2.1930	0.10606	447.95	532.80	2.0594
200	0.22264	465.20	554.26	2.2359	0.11090	464.11	552.83	2.1027
220	0.23219	481.55	574.42	2.2777	0.11573	480.52	573.11	2.1447
240	0.24173	498.16	594.85	2.3183	0.12056	497.20	593.64	2.1855
260	0.25127	515.02	615.53	2.3578	0.12537	514.12	614.41	2.2252
1000 kPa (−40.12 °C)					1400 kPa (−30.58 °C)			
Doymuş	0.03845	283.94	322.39	1.3835	0.02750	285.37	323.87	1.3352
−20	0.04342	298.89	342.31	1.4655	0.02957	294.04	335.44	1.3819
0	0.04799	313.15	361.14	1.5371	0.03315	309.42	355.83	1.4595
20	0.05236	327.27	379.63	1.6025	0.03648	324.23	375.30	1.5283
40	0.05660	341.46	398.05	1.6633	0.03966	338.90	394.42	1.5914
60	0.06074	355.82	416.56	1.7206	0.04274	353.62	413.45	1.6503
80	0.06482	370.42	435.23	1.7750	0.04575	368.48	432.52	1.7059
100	0.06885	385.26	454.11	1.8270	0.04870	383.54	451.72	1.7588
120	0.07284	400.38	473.22	1.8768	0.05161	398.83	471.09	1.8093
140	0.07680	415.77	492.57	1.9249	0.05450	414.36	490.66	1.8579
160	0.08074	431.43	512.17	1.9712	0.05736	430.14	510.44	1.9046
180	0.08465	447.36	532.02	2.0160	0.06020	446.17	530.45	1.9498
200	0.08856	463.56	552.11	2.0594	0.06302	462.45	550.68	1.9935
220	0.09244	480.01	572.46	2.1015	0.06583	478.98	571.14	2.0358
240	0.09632	496.72	593.04	2.1424	0.06863	495.76	591.83	2.0770
260	0.10019	513.67	613.86	2.1822	0.07141	512.77	612.74	2.1169
280	0.10405	530.86	634.90	2.2209	0.07419	530.01	633.88	2.1558

TABLO-B19 (Devam)

Kızgın Karbon Dioksit

Sıcaklık (°C)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)
	2000 kPa (-19.50 °C)				3000 kPa (-5.55 °C)			
Doymuş	0.01903	285.88	323.95	1.2804	0.01221	284.09	320.71	1.2098
0	0.02193	303.24	347.09	1.3684	0.01293	290.52	329.32	1.2416
20	0.02453	319.37	368.42	1.4438	0.01512	310.21	355.56	1.3344
40	0.02693	334.88	388.75	1.5109	0.01698	327.61	378.55	1.4104
60	0.02922	350.19	408.64	1.5725	0.01868	344.14	400.19	1.4773
80	0.03143	365.49	428.36	1.6300	0.02029	360.30	421.16	1.5385
100	0.03359	380.90	448.07	1.6843	0.02182	376.35	441.82	1.5954
120	0.03570	396.46	467.85	1.7359	0.02331	392.42	462.35	1.6490
140	0.03777	412.22	487.76	1.7853	0.02477	408.57	482.87	1.6999
160	0.03982	428.18	507.83	1.8327	0.02619	424.87	503.44	1.7485
180	0.04186	444.37	528.08	1.8784	0.02759	441.34	524.12	1.7952
200	0.04387	460.79	548.53	1.9226	0.02898	457.99	544.92	1.8401
220	0.04587	477.43	569.17	1.9653	0.03035	474.83	565.88	1.8835
240	0.04786	494.31	590.02	2.0068	0.03171	491.88	587.01	1.9255
260	0.04983	511.41	611.08	2.0470	0.03306	509.13	608.30	1.9662
280	0.05180	528.73	632.34	2.0862	0.03440	526.59	629.78	2.0057
300	0.05377	546.26	653.80	2.1243	0.03573	544.25	651.43	2.0442
	6000 kPa (21.98 °C)				10 000 kPa			
Doymuş	0.00474	261.97	290.42	1.0206	—	—	—	—
20	—	—	—	—	0.00117	118.12	129.80	0.4594
40	0.00670	298.62	338.82	1.1806	0.00159	184.23	200.14	0.6906
60	0.00801	322.51	370.54	1.2789	0.00345	277.63	312.11	1.0389
80	0.00908	342.74	397.21	1.3567	0.00451	312.82	357.95	1.1728
100	0.01004	361.47	421.69	1.4241	0.00530	338.20	391.24	1.2646
120	0.01092	379.47	445.02	1.4850	0.00598	360.19	419.96	1.3396
140	0.01176	397.10	467.68	1.5413	0.00658	380.54	446.38	1.4051
160	0.01257	414.56	489.97	1.5939	0.00715	399.99	471.46	1.4644
180	0.01335	431.97	512.06	1.6438	0.00768	418.94	495.73	1.5192
200	0.01411	449.40	534.04	1.6913	0.00819	437.61	519.49	1.5705
220	0.01485	466.91	556.01	1.7367	0.00868	456.12	542.91	1.6190
240	0.01558	484.52	578.00	1.7804	0.00916	474.58	566.14	1.6652
260	0.01630	502.27	600.05	1.8226	0.00962	493.03	589.26	1.7094
280	0.01701	520.15	622.19	1.8634	0.01008	511.53	612.32	1.7518
300	0.01771	538.18	644.44	1.9029	0.01053	530.11	635.37	1.7928
320	0.01840	556.37	666.80	1.9412	0.01097	548.77	658.46	1.8324

TABLO-B20

Termodinamik Özellikleri, R-410A

Doymuş R-410A

Sıcaklık (°C)	Basınç (kPa)	Özgül Hacim, m ³ /kg			İç Enerji, kJ/kg		
		Doymuş Sıvı v_f	Buharlaştırma v_{fg}	Doymuş Buhar v_g	Doymuş Sıvı u_f	Buharlaştırma u_{fg}	Doymuş Buhar u_g
-60	64.1	0.000727	0.36772	0.36845	-27.50	256.41	228.91
-55	84.0	0.000735	0.28484	0.28558	-20.70	251.89	231.19
-51.4	101.3	0.000741	0.23875	0.23949	-15.78	248.59	232.81
-50	108.7	0.000743	0.22344	0.22418	-13.88	247.31	233.43
-45	138.8	0.000752	0.17729	0.17804	-7.02	242.67	235.64
-40	175.0	0.000762	0.14215	0.14291	-0.13	237.95	237.81
-35	218.4	0.000771	0.11505	0.11582	6.80	233.14	239.94
-30	269.6	0.000781	0.09392	0.09470	13.78	228.23	242.01
-25	329.7	0.000792	0.07726	0.07805	20.82	223.21	244.03
-20	399.6	0.000803	0.06400	0.06480	27.92	218.07	245.99
-15	480.4	0.000815	0.05334	0.05416	35.08	212.79	247.88
-10	573.1	0.000827	0.04470	0.04553	42.32	207.36	249.69
-5	678.9	0.000841	0.03764	0.03848	49.65	201.75	251.41
0	798.7	0.000855	0.03182	0.03267	57.07	195.95	253.02
5	933.9	0.000870	0.02699	0.02786	64.60	189.93	254.53
10	1085.7	0.000886	0.02295	0.02383	72.24	183.66	255.90
15	1255.4	0.000904	0.01955	0.02045	80.02	177.10	257.12
20	1444.2	0.000923	0.01666	0.01758	87.94	170.21	258.16
25	1653.6	0.000944	0.01420	0.01514	96.03	162.95	258.98
30	1885.1	0.000968	0.01208	0.01305	104.32	155.24	259.56
35	2140.2	0.000995	0.01025	0.01124	112.83	147.00	259.83
40	2420.7	0.001025	0.00865	0.00967	121.61	138.11	259.72
45	2728.3	0.001060	0.00723	0.00829	130.72	128.41	259.13
50	3065.2	0.001103	0.00597	0.00707	140.27	117.63	257.90
55	3433.7	0.001156	0.00482	0.00598	150.44	105.34	255.78
60	3836.9	0.001227	0.00374	0.00497	161.57	90.70	252.27
65	4278.3	0.001338	0.00265	0.00399	174.59	71.59	246.19
70	4763.1	0.001619	0.00124	0.00286	194.53	37.47	232.01
71.3	4901.2	0.00218	0	0.00218	215.78	0	215.78

TABLO-B20 (Devam)

Doymuş R-410A

Sıcaklık (°C)	Basınç (kPa)	Entalpi, kJ/kg			Entropi, kJ/kg·K		
		Doymuş Sıvı h_f	Buharlaştırma h_{fg}	Doymuş Buhar h_g	Doymuş Sıvı s_f	Buharlaştırma s_{fg}	Doymuş Buhar s_g
-60	64.1	-27.45	279.96	252.51	-0.1227	1.3135	1.1907
-55	84.0	-20.64	275.83	255.19	-0.0912	1.2644	1.1732
-51.4	101.3	-15.70	272.78	257.08	-0.0688	1.2301	1.1613
-50	108.7	-13.80	271.60	257.80	-0.0603	1.2171	1.1568
-45	138.8	-6.92	267.27	260.35	-0.0299	1.1715	1.1416
-40	175.0	0	262.83	262.83	0	1.1273	1.1273
-35	218.4	6.97	258.26	265.23	0.0294	1.0844	1.1139
-30	269.6	13.99	253.55	267.54	0.0585	1.0428	1.1012
-25	329.7	21.08	248.69	269.77	0.0871	1.0022	1.0893
-20	399.6	28.24	243.65	271.89	0.1154	0.9625	1.0779
-15	480.4	35.47	238.42	273.90	0.1435	0.9236	1.0671
-10	573.1	42.80	232.98	275.78	0.1713	0.8854	1.0567
-5	678.9	50.22	227.31	277.53	0.1989	0.8477	1.0466
0	798.7	57.76	221.37	279.12	0.2264	0.8104	1.0368
5	933.9	65.41	215.13	280.55	0.2537	0.7734	1.0272
10	1085.7	73.21	208.57	281.78	0.2810	0.7366	1.0176
15	1255.4	81.15	201.64	282.79	0.3083	0.6998	1.0081
20	1444.2	89.27	194.28	283.55	0.3357	0.6627	0.9984
25	1653.6	97.59	186.43	284.02	0.3631	0.6253	0.9884
30	1885.1	106.14	178.02	284.16	0.3908	0.5872	0.9781
35	2140.2	114.95	168.94	283.89	0.4189	0.5482	0.9671
40	2420.7	124.09	159.04	283.13	0.4473	0.5079	0.9552
45	2728.3	133.61	148.14	281.76	0.4765	0.4656	0.9421
50	3065.2	143.65	135.93	279.58	0.5067	0.4206	0.9273
55	3433.7	154.41	121.89	276.30	0.5384	0.3715	0.9099
60	3836.9	166.28	105.04	271.33	0.5729	0.3153	0.8882
65	4278.3	180.32	82.95	263.26	0.6130	0.2453	0.8583
70	4763.1	202.24	43.40	245.64	0.6752	0.1265	0.8017
71.3	4901.2	226.46	0	226.46	0.7449	0	0.7449

TABLO-B21

Kızgın Buhar R-410A

Sıcaklık (°C)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)
50 kPa (−64.34 °C)					100 kPa (−51.65 °C)			
Doymuş	0.46484	226.90	250.15	1.2070	0.24247	232.70	256.94	1.1621
−60	0.47585	229.60	253.40	1.2225	—	—	—	—
−40	0.52508	241.94	268.20	1.2888	0.25778	240.40	266.18	1.2027
−20	0.57295	254.51	283.16	1.3504	0.28289	253.44	281.73	1.2667
0	0.62016	267.52	298.53	1.4088	0.30723	266.72	297.44	1.3265
20	0.66698	281.05	314.40	1.4649	0.33116	280.42	313.54	1.3833
40	0.71355	295.15	330.83	1.5191	0.35483	294.64	330.12	1.4380
60	0.75995	309.84	347.83	1.5717	0.37833	309.40	347.24	1.4910
80	0.80623	325.11	365.43	1.6230	0.40171	324.75	364.92	1.5425
100	0.85243	340.99	383.61	1.6731	0.42500	340.67	383.17	1.5928
120	0.89857	357.46	402.38	1.7221	0.44822	357.17	401.99	1.6419
140	0.94465	374.50	421.74	1.7701	0.47140	374.25	421.39	1.6901
160	0.99070	392.12	441.65	1.8171	0.49453	391.89	441.34	1.7372
180	1.03671	410.28	462.12	1.8633	0.51764	410.07	461.84	1.7835
200	1.08270	428.98	483.11	1.9087	0.54072	428.79	482.86	1.8289
220	1.12867	448.19	504.63	1.9532	0.56378	448.02	504.40	1.8734
240	1.17462	467.90	526.63	1.9969	0.58682	467.74	526.42	1.9172
150 kPa (−43.35 °C)					200 kPa (−37.01 °C)			
Doymuş	0.16540	236.36	261.17	1.1368	0.12591	239.09	264.27	1.1192
−40	0.16851	238.72	263.99	1.1489	—	—	—	—
−20	0.18613	252.34	280.26	1.2159	0.13771	251.18	278.72	1.1783
0	0.20289	265.90	296.33	1.2770	0.15070	265.06	295.20	1.2410
20	0.21921	279.78	312.66	1.3347	0.16322	279.13	311.78	1.2995
40	0.23525	294.12	329.40	1.3899	0.17545	293.59	328.68	1.3553
60	0.25112	308.97	346.64	1.4433	0.18750	308.53	346.03	1.4090
80	0.26686	324.37	364.40	1.4950	0.19943	324.00	363.89	1.4610
100	0.28251	340.35	382.72	1.5455	0.21127	340.02	382.28	1.5117
120	0.29810	356.89	401.60	1.5948	0.22305	356.60	401.21	1.5611
140	0.31364	374.00	421.04	1.6430	0.23477	373.74	420.70	1.6094
160	0.32915	391.66	441.03	1.6902	0.24645	391.43	440.72	1.6568
180	0.34462	409.87	461.56	1.7366	0.25810	409.66	461.28	1.7032
200	0.36006	428.60	482.61	1.7820	0.26973	428.41	482.35	1.7487
220	0.37548	447.84	504.16	1.8266	0.28134	447.67	503.93	1.7933
240	0.39089	467.58	526.21	1.8705	0.29293	467.41	526.00	1.8372
260	0.40628	487.78	548.73	1.9135	0.30450	487.63	548.53	1.8803

TABLO-B21 (Devam)

Kızgın Buhar R-410A

Sıcaklık (°C)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)
	300 kPa (−27.37 °C)				400 kPa (−19.98 °C)			
Doymuş	0.08548	243.08	268.72	1.0949	0.06475	246.00	271.90	1.0779
−20	0.08916	248.71	275.46	1.1219	—	—	—	—
0	0.09845	263.33	292.87	1.1881	0.07227	261.51	290.42	1.1483
20	0.10720	277.81	309.96	1.2485	0.07916	276.44	308.10	1.2108
40	0.11564	292.53	327.22	1.3054	0.08571	291.44	325.72	1.2689
60	0.12388	307.65	344.81	1.3599	0.09207	306.75	343.58	1.3242
80	0.13200	323.25	362.85	1.4125	0.09828	322.49	361.80	1.3773
100	0.14003	339.37	381.38	1.4635	0.10440	338.72	380.48	1.4288
120	0.14798	356.03	400.43	1.5132	0.11045	355.45	399.64	1.4788
140	0.15589	373.23	420.00	1.5617	0.11645	372.72	419.30	1.5276
160	0.16376	390.97	440.10	1.6093	0.12241	390.51	439.47	1.5752
180	0.17159	409.24	460.72	1.6558	0.12834	408.82	460.16	1.6219
200	0.17940	428.03	481.85	1.7014	0.13424	427.64	481.34	1.6676
220	0.18719	447.31	503.47	1.7462	0.14012	446.96	503.01	1.7125
240	0.19496	467.09	525.58	1.7901	0.14598	466.76	525.15	1.7565
260	0.20272	487.33	548.15	1.8332	0.15182	487.03	547.76	1.7997
280	0.21046	508.02	571.16	1.8756	0.15766	507.74	570.81	1.8422
	500 kPa (−13.89 °C)				600 kPa (−8.67 °C)			
Doymuş	0.05208	248.29	274.33	1.0647	0.04351	250.15	276.26	1.0540
0	0.05651	259.59	287.84	1.1155	0.04595	257.54	285.12	1.0869
20	0.06231	275.02	306.18	1.1803	0.05106	273.56	304.20	1.1543
40	0.06775	290.32	324.20	1.2398	0.05576	289.19	322.64	1.2152
60	0.07297	305.84	342.32	1.2959	0.06023	304.91	341.05	1.2722
80	0.07804	321.72	360.74	1.3496	0.06455	320.94	359.67	1.3265
100	0.08302	338.05	379.56	1.4014	0.06877	337.38	378.65	1.3787
120	0.08793	354.87	398.84	1.4517	0.07292	354.29	398.04	1.4294
140	0.09279	372.20	418.60	1.5007	0.07701	371.68	417.89	1.4786
160	0.09760	390.05	438.85	1.5486	0.08106	389.58	438.22	1.5266
180	0.10238	408.40	459.59	1.5954	0.08508	407.98	459.03	1.5736
200	0.10714	427.26	480.83	1.6413	0.08907	426.88	480.32	1.6196
220	0.11187	446.61	502.55	1.6862	0.09304	446.26	502.08	1.6646
240	0.11659	466.44	524.73	1.7303	0.09700	466.11	524.31	1.7088
260	0.12129	486.73	547.37	1.7736	0.10093	486.42	546.98	1.7521
280	0.12598	507.46	570.45	1.8161	0.10486	507.18	570.09	1.7947
300	0.13066	528.62	593.95	1.8578	0.10877	528.36	593.62	1.8365

TABLO-B21 (Devam)

Kızgın Buhar R-410A

Sıcaklık (°C)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)
800 kPa (0.05 °C)					1000 kPa (7.25 °C)			
Doymuş	0.03262	253.04	279.14	1.0367	0.02596	255.16	281.12	1.0229
20	0.03693	270.47	300.02	1.1105	0.02838	267.11	295.49	1.0730
40	0.04074	286.83	319.42	1.1746	0.03170	284.35	316.05	1.1409
60	0.04429	303.01	338.44	1.2334	0.03470	301.04	335.75	1.2019
80	0.04767	319.36	357.49	1.2890	0.03753	317.73	355.27	1.2588
100	0.05095	336.03	376.79	1.3421	0.04025	334.65	374.89	1.3128
120	0.05415	353.11	396.42	1.3934	0.04288	351.91	394.79	1.3648
140	0.05729	370.64	416.47	1.4431	0.04545	369.58	415.04	1.4150
160	0.06039	388.65	436.96	1.4915	0.04798	387.70	435.68	1.4638
180	0.06345	407.13	457.90	1.5388	0.05048	406.28	456.76	1.5113
200	0.06649	426.10	479.30	1.5850	0.05294	425.33	478.27	1.5578
220	0.06951	445.55	501.15	1.6302	0.05539	444.84	500.23	1.6032
240	0.07251	465.46	523.46	1.6746	0.05781	464.80	522.62	1.6477
260	0.07549	485.82	546.21	1.7181	0.06023	485.21	545.43	1.6914
280	0.07846	506.61	569.38	1.7607	0.06262	506.05	568.67	1.7341
300	0.08142	527.83	592.97	1.8026	0.06501	527.30	592.31	1.7761
1200 kPa (13.43 °C)					1400 kPa (18.88 °C)			
Doymuş	0.02145	256.75	282.50	1.0111	0.01819	257.94	283.40	1.0006
20	0.02260	263.39	290.51	1.0388	0.01838	259.18	284.90	1.0057
40	0.02563	281.72	312.48	1.1113	0.02127	278.93	308.71	1.0843
60	0.02830	299.00	332.96	1.1747	0.02371	296.88	330.07	1.1505
80	0.03077	316.06	352.98	1.2331	0.02593	314.35	350.64	1.2105
100	0.03311	333.24	372.97	1.2881	0.02801	331.80	371.01	1.2666
120	0.03537	350.69	393.13	1.3408	0.03000	349.46	391.46	1.3199
140	0.03756	368.51	413.59	1.3915	0.03192	367.43	412.13	1.3712
160	0.03971	386.75	434.40	1.4407	0.03380	385.79	433.12	1.4208
180	0.04183	405.43	455.62	1.4886	0.03565	404.56	454.47	1.4690
200	0.04391	424.55	477.24	1.5353	0.03746	423.77	476.21	1.5160
220	0.04597	444.12	499.29	1.5809	0.03925	443.41	498.36	1.5618
240	0.04802	464.14	521.77	1.6256	0.04102	463.49	520.92	1.6066
260	0.05005	484.60	544.66	1.6693	0.04278	483.99	543.88	1.6505
280	0.05207	505.48	567.96	1.7122	0.04452	504.91	567.25	1.6936
300	0.05407	526.77	591.66	1.7543	0.04626	526.25	591.01	1.7358
320	0.05607	548.47	615.75	1.7956	0.04798	547.97	615.14	1.7772

TABLO-B21 (Devam)

Kızgın Buhar R-410A

Sıcaklık (°C)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)
	1800 kPa (28.22 °C)				2000 kPa (32.31 °C)			
Doymuş	0.01376	259.38	284.15	0.9818	0.01218	259.72	284.09	0.9731
40	0.01534	272.67	300.29	1.0344	0.01321	269.07	295.49	1.0099
60	0.01754	292.34	323.92	1.1076	0.01536	289.90	320.62	1.0878
80	0.01945	310.76	345.77	1.1713	0.01717	308.88	343.22	1.1537
100	0.02119	328.84	366.98	1.2297	0.01880	327.30	364.91	1.2134
120	0.02283	346.93	388.03	1.2847	0.02032	345.64	386.29	1.2693
140	0.02441	365.24	409.17	1.3371	0.02177	364.12	407.66	1.3223
160	0.02593	383.85	430.51	1.3875	0.02317	382.86	429.20	1.3732
180	0.02741	402.82	452.16	1.4364	0.02452	401.94	450.99	1.4224
200	0.02886	422.19	474.14	1.4839	0.02585	421.40	473.10	1.4701
220	0.03029	441.97	496.49	1.5301	0.02715	441.25	495.55	1.5166
240	0.03170	462.16	519.22	1.5753	0.02844	461.50	518.37	1.5619
260	0.03309	482.77	542.34	1.6195	0.02970	482.16	541.56	1.6063
280	0.03447	503.78	565.83	1.6627	0.03095	503.21	565.12	1.6497
300	0.03584	525.19	589.70	1.7051	0.03220	524.66	589.05	1.6922
320	0.03720	546.98	613.94	1.7467	0.03343	546.49	613.35	1.7338
340	0.03855	569.15	638.54	1.7875	0.03465	568.69	637.99	1.7747
	3000 kPa (49.07 °C)				4000 kPa (61.90 °C)			
Doymuş	0.00729	258.19	280.06	0.9303	0.00460	250.37	268.76	0.8782
60	0.00858	274.96	300.70	0.9933	—	—	—	—
80	0.01025	298.38	329.12	1.0762	0.00661	285.02	311.48	1.0028
100	0.01159	319.07	353.84	1.1443	0.00792	309.62	341.29	1.0850
120	0.01277	338.84	377.16	1.2052	0.00897	331.39	367.29	1.1529
140	0.01387	358.32	399.92	1.2617	0.00990	352.14	391.75	1.2136
160	0.01489	377.80	422.49	1.3150	0.01076	372.51	415.53	1.2698
180	0.01588	397.46	445.09	1.3661	0.01156	392.82	439.05	1.3229
200	0.01683	417.37	467.85	1.4152	0.01232	413.25	462.52	1.3736
220	0.01775	437.60	490.84	1.4628	0.01305	433.88	486.10	1.4224
240	0.01865	458.16	514.11	1.5091	0.01377	454.79	509.85	1.4696
260	0.01954	479.08	537.69	1.5541	0.01446	475.99	533.83	1.5155
280	0.02041	500.37	561.59	1.5981	0.01514	497.51	558.08	1.5601
300	0.02127	522.01	585.81	1.6411	0.01581	519.37	582.60	1.6037
320	0.02212	544.02	610.37	1.6833	0.01647	541.55	607.42	1.6462
340	0.02296	566.37	635.25	1.7245	0.01712	564.06	632.54	1.6879
360	0.02379	589.07	660.45	1.7650	0.01776	586.90	657.95	1.7286

TABLO-B24

Termodinamik Özellikleri, Azot

Doymuş Azot

Sıcaklık (K)	Basınç (kPa)	Özgül Hacim, m ³ /kg			İç Enerji, kJ/kg		
		Doymuş Sıvı v_f	Buharlaştırma v_{fg}	Doymuş Buhar v_g	Doymuş Sıvı u_f	Buharlaştırma u_{fg}	Doymuş Buhar u_g
63.1	12.5	0.001150	1.48074	1.48189	-150.92	196.86	45.94
65	17.4	0.001160	1.09231	1.09347	-147.19	194.37	47.17
70	38.6	0.001191	0.52513	0.52632	-137.13	187.54	50.40
75	76.1	0.001223	0.28052	0.28174	-127.04	180.47	53.43
77.3	101.3	0.001240	0.21515	0.21639	-122.27	177.04	54.76
80	137.0	0.001259	0.16249	0.16375	-116.86	173.06	56.20
85	229.1	0.001299	0.10018	0.10148	-106.55	165.20	58.65
90	360.8	0.001343	0.06477	0.06611	-96.06	156.76	60.70
95	541.1	0.001393	0.04337	0.04476	-85.35	147.60	62.25
100	779.2	0.001452	0.02975	0.03120	-74.33	137.50	63.17
105	1084.6	0.001522	0.02066	0.02218	-62.89	126.18	63.29
110	1467.6	0.001610	0.01434	0.01595	-50.81	113.11	62.31
115	1939.3	0.001729	0.00971	0.01144	-37.66	97.36	59.70
120	2513.0	0.001915	0.00608	0.00799	-22.42	76.63	54.21
125	3208.0	0.002355	0.00254	0.00490	-0.83	40.73	39.90
126.2	3397.8	0.003194	0	0.00319	18.94	0	18.94
Sıcaklık (K)	Basınç (kPa)	Entalpi, kJ/kg			Entropi, kJ/kg·K		
		Doymuş Sıvı h_f	Buharlaştırma h_{fg}	Doymuş Buhar h_g	Doymuş Sıvı s_f	Buharlaştırma s_{fg}	Doymuş Buhar s_g
63.1	12.5	-150.91	215.39	64.48	2.4234	3.4109	5.8343
65	17.4	-147.17	213.38	66.21	2.4816	3.2828	5.7645
70	38.6	-137.09	207.79	70.70	2.6307	2.9684	5.5991
75	76.1	-126.95	201.82	74.87	2.7700	2.6909	5.4609
77.3	101.3	-122.15	198.84	76.69	2.8326	2.5707	5.4033
80	137.0	-116.69	195.32	78.63	2.9014	2.4415	5.3429
85	229.1	-106.25	188.15	81.90	3.0266	2.2135	5.2401
90	360.8	-95.58	180.13	84.55	3.1466	2.0015	5.1480
95	541.1	-84.59	171.07	86.47	3.2627	1.8007	5.0634
100	779.2	-73.20	160.68	87.48	3.3761	1.6068	4.9829
105	1084.6	-61.24	148.59	87.35	3.4883	1.4151	4.9034
110	1467.6	-48.45	134.15	85.71	3.6017	1.2196	4.8213
115	1939.3	-34.31	116.19	81.88	3.7204	1.0104	4.7307
120	2513.0	-17.61	91.91	74.30	3.8536	0.7659	4.6195
125	3208.0	6.73	48.88	55.60	4.0399	0.3910	4.4309
126.2	3397.8	29.79	0	29.79	4.2193	0	4.2193

TABLO-B25

Kızgın Azot

Sıcaklık (K)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)				
					100 kPa (77.24 K)		200 kPa (83.62 K)	
Doymuş	0.21903	54.70	76.61	5.4059	0.11520	58.01	81.05	5.2673
100	0.29103	72.84	101.94	5.6944	0.14252	71.73	100.24	5.4775
120	0.35208	87.94	123.15	5.8878	0.17397	87.14	121.93	5.6753
140	0.41253	102.95	144.20	6.0501	0.20476	102.33	143.28	5.8399
160	0.47263	117.91	165.17	6.1901	0.23519	117.40	164.44	5.9812
180	0.53254	132.83	186.09	6.3132	0.26542	132.41	185.49	6.1052
200	0.59231	147.74	206.97	6.4232	0.29551	147.37	206.48	6.2157
220	0.65199	162.63	227.83	6.5227	0.32552	162.31	227.41	6.3155
240	0.71161	177.51	248.67	6.6133	0.35546	177.23	248.32	6.4064
260	0.77118	192.39	269.51	6.6967	0.38535	192.14	269.21	6.4900
280	0.83072	207.26	290.33	6.7739	0.41520	207.04	290.08	6.5674
300	0.89023	222.14	311.16	6.8457	0.44503	221.93	310.94	6.6393
350	1.03891	259.35	363.24	7.0063	0.51952	259.18	363.09	6.8001
400	1.18752	296.66	415.41	7.1456	0.59392	296.52	415.31	6.9396
450	1.33607	334.16	467.77	7.2690	0.66827	334.04	467.70	7.0630
500	1.48458	371.95	520.41	7.3799	0.74258	371.85	520.37	7.1740
600	1.78154	448.79	626.94	7.5741	0.89114	448.71	626.94	7.3682
700	2.07845	527.74	735.58	7.7415	1.03965	527.68	735.61	7.5357
800	2.37532	609.07	846.60	7.8897	1.18812	609.02	846.64	7.6839
900	2.67217	692.79	960.01	8.0232	1.33657	692.75	960.07	7.8175
1000	2.96900	778.78	1075.68	8.1451	1.48501	778.74	1075.75	7.9393

TABLO-B25 (Devam)

Kızgın Buhar Azot

Sıcaklık (K)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)
400 kPa (91.22 K)					600 kPa (96.37 K)			
Doymuş	0.05992	61.13	85.10	5.1268	0.04046	62.57	86.85	5.0411
100	0.06806	69.30	96.52	5.2466	0.04299	66.41	92.20	5.0957
120	0.08486	85.48	119.42	5.4556	0.05510	83.73	116.79	5.3204
140	0.10085	101.06	141.40	5.6250	0.06620	99.75	139.47	5.4953
160	0.11647	116.38	162.96	5.7690	0.07689	115.34	161.47	5.6422
180	0.13186	131.55	184.30	5.8947	0.08734	130.69	183.10	5.7696
200	0.14712	146.64	205.49	6.0063	0.09766	145.91	204.50	5.8823
220	0.16228	161.68	226.59	6.1069	0.10788	161.04	225.76	5.9837
240	0.17738	176.67	247.62	6.1984	0.11803	176.11	246.92	6.0757
260	0.19243	191.64	268.61	6.2824	0.12813	191.13	268.01	6.1601
280	0.20745	206.58	289.56	6.3600	0.13820	206.13	289.05	6.2381
300	0.22244	221.52	310.50	6.4322	0.14824	221.11	310.06	6.3105
350	0.25982	258.85	362.78	6.5934	0.17326	258.52	362.48	6.4722
400	0.29712	296.25	415.10	6.7331	0.19819	295.97	414.89	6.6121
450	0.33437	333.81	467.56	6.8567	0.22308	333.57	467.42	6.7359
500	0.37159	371.65	520.28	6.9678	0.24792	371.45	520.20	6.8471
600	0.44595	448.55	626.93	7.1622	0.29755	448.40	626.93	7.0416
700	0.52025	527.55	735.65	7.3298	0.34712	527.43	735.70	7.2093
800	0.59453	608.92	846.73	7.4781	0.39666	608.82	846.82	7.3576
900	0.66878	692.67	960.19	7.6117	0.44618	692.59	960.30	7.4912
1000	0.74302	778.68	1075.89	7.7335	0.49568	778.61	1076.02	7.6131
800 kPa (100.38 K)					1000 kPa (103.73 K)			
Doymuş	0.03038	63.21	87.52	4.9768	0.02416	63.35	87.51	4.9237
120	0.04017	81.88	114.02	5.2191	0.03117	79.91	111.08	5.1357
140	0.04886	98.41	137.50	5.4002	0.03845	97.02	135.47	5.3239
160	0.05710	114.28	159.95	5.5501	0.04522	113.20	158.42	5.4772
180	0.06509	129.82	181.89	5.6793	0.05173	128.94	180.67	5.6082
200	0.07293	145.17	203.51	5.7933	0.05809	144.43	202.52	5.7234
220	0.08067	160.40	224.94	5.8954	0.06436	159.76	224.11	5.8263
240	0.08835	175.54	246.23	5.9880	0.07055	174.98	245.53	5.9194
260	0.09599	190.63	267.42	6.0728	0.07670	190.13	266.83	6.0047
280	0.10358	205.68	288.54	6.1511	0.08281	205.23	288.04	6.0833
300	0.11115	220.70	309.62	6.2238	0.08889	220.29	309.18	6.1562
350	0.12998	258.19	362.17	6.3858	0.10401	257.86	361.87	6.3187
400	0.14873	295.69	414.68	6.5260	0.11905	295.42	414.47	6.4591
500	0.18609	371.25	520.12	6.7613	0.14899	371.04	520.04	6.6947
600	0.22335	448.24	626.93	6.9560	0.17883	448.09	626.92	6.8895
700	0.26056	527.31	735.76	7.1237	0.20862	527.19	735.81	7.0573
800	0.29773	608.73	846.91	7.2721	0.23837	608.63	847.00	7.2057
900	0.33488	692.52	960.42	7.4058	0.26810	692.44	960.54	7.3394
1000	0.37202	778.55	1076.16	7.5277	0.29782	778.49	1076.30	7.4614

TABLO-B25 (Devam)

Kızgın Buhar Azot

Sıcaklık (K)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)
1500 kPa (110.38 K)					2000 kPa (115.58 K)			
Doymuş	0.01555	62.17	85.51	4.8148	0.01100	59.25	81.25	4.7193
120	0.01899	74.26	102.75	4.9650	0.01260	66.90	92.10	4.8116
140	0.02452	93.36	130.15	5.1767	0.01752	89.37	124.40	5.0618
160	0.02937	110.44	154.50	5.3394	0.02144	107.55	150.43	5.2358
180	0.03393	126.71	177.60	5.4755	0.02503	124.42	174.48	5.3775
200	0.03832	142.56	200.03	5.5937	0.02844	140.66	197.53	5.4989
220	0.04260	158.14	222.05	5.6987	0.03174	156.52	219.99	5.6060
240	0.04682	173.57	243.80	5.7933	0.03496	172.15	242.08	5.7021
260	0.05099	188.87	265.36	5.8796	0.03814	187.62	263.90	5.7894
280	0.05512	204.10	286.78	5.9590	0.04128	202.97	285.53	5.8696
300	0.05922	219.27	308.10	6.0325	0.04440	218.24	307.03	5.9438
350	0.06940	257.03	361.13	6.1960	0.05209	256.21	360.39	6.1083
400	0.07949	294.73	413.96	6.3371	0.05971	294.05	413.47	6.2500
450	0.08953	332.53	466.82	6.4616	0.06727	331.95	466.49	6.3750
500	0.09953	370.54	519.84	6.5733	0.07480	370.05	519.65	6.4870
600	0.11948	447.71	626.92	6.7685	0.08980	447.33	626.93	6.6825
700	0.13937	526.89	735.94	6.9365	0.10474	526.59	736.07	6.8507
800	0.15923	608.39	847.22	7.0851	0.11965	608.14	847.45	6.9994
900	0.17906	692.24	960.83	7.2189	0.13454	692.04	961.13	7.1333
1000	0.19889	778.32	1076.65	7.3409	0.14942	778.16	1077.01	7.2553
3000 kPa (123.61 K)					10000 kPa			
Doymuş	0.00582	46.03	63.47	4.5032	—	—	—	—
140	0.01038	79.98	111.13	4.8706	0.00200	0.84	20.87	4.0373
160	0.01350	101.35	141.85	5.0763	0.00291	47.44	76.52	4.4088
180	0.01614	119.68	168.09	5.2310	0.00402	82.44	122.65	4.6813
200	0.01857	136.78	192.49	5.3596	0.00501	108.21	158.35	4.8697
220	0.02088	153.24	215.88	5.4711	0.00590	129.86	188.88	5.0153
240	0.02312	169.30	238.66	5.5702	0.00672	149.42	216.64	5.1362
260	0.02531	185.10	261.02	5.6597	0.00749	167.77	242.72	5.2406
280	0.02746	200.72	283.09	5.7414	0.00824	185.34	267.69	5.3331
300	0.02958	216.21	304.94	5.8168	0.00895	202.38	291.90	5.4167
350	0.03480	254.57	358.96	5.9834	0.01067	243.57	350.26	5.5967
400	0.03993	292.70	412.50	6.1264	0.01232	283.59	406.79	5.7477
500	0.05008	369.06	519.29	6.3647	0.01551	362.42	517.48	5.9948
600	0.06013	446.57	626.95	6.5609	0.01861	441.47	627.58	6.1955
700	0.07012	525.99	736.35	6.7295	0.02167	521.96	738.65	6.3667
800	0.08008	607.67	847.92	6.8785	0.02470	604.42	851.43	6.5172
900	0.09003	691.65	961.73	7.0125	0.02771	689.02	966.15	6.6523
1000	0.09996	777.85	1077.72	7.1347	0.03072	775.68	1082.84	6.7753

TABLO-B26

Metanın Termodinamik Özellikleri

Doymuş Metan

Sıcaklık (K)	P (kPa)	Özgül Hacim, m ³ /kg			İç Enerji, kJ/kg		
		v_f	v_{fg}	v_g	u_f	u_{fg}	u_g
90.7	11.7	0.002215	3.97941	3.98163	-358.10	496.59	138.49
95	19.8	0.002243	2.44845	2.45069	-343.79	488.62	144.83
100	34.4	0.002278	1.47657	1.47885	-326.90	478.96	152.06
105	56.4	0.002315	0.93780	0.94012	-309.79	468.89	159.11
110	88.2	0.002353	0.62208	0.62443	-292.50	458.41	165.91
111.7	101.3	0.002367	0.54760	0.54997	-286.74	454.85	168.10
115	132.3	0.002395	0.42800	0.43040	-275.05	447.48	172.42
120	191.6	0.002439	0.30367	0.30610	-257.45	436.02	178.57
125	269.0	0.002486	0.22108	0.22357	-239.66	423.97	184.32
130	367.6	0.002537	0.16448	0.16701	-221.65	411.25	189.60
135	490.7	0.002592	0.12458	0.12717	-203.40	397.77	194.37
140	641.6	0.002653	0.09575	0.09841	-184.86	383.42	198.56
145	823.7	0.002719	0.07445	0.07717	-165.97	368.06	202.09
150	1040.5	0.002794	0.05839	0.06118	-146.65	351.53	204.88
155	1295.6	0.002877	0.04605	0.04892	-126.82	333.61	206.79
160	1592.8	0.002974	0.03638	0.03936	-106.35	314.01	207.66
165	1935.9	0.003086	0.02868	0.03177	-85.06	292.30	207.24
170	2329.3	0.003222	0.02241	0.02563	-62.67	267.81	205.14
175	2777.6	0.003393	0.01718	0.02058	-38.75	239.47	200.72
180	3286.4	0.003623	0.01266	0.01629	-12.43	205.16	192.73
185	3863.2	0.003977	0.00846	0.01243	18.47	159.49	177.96
190	4520.5	0.004968	0.00300	0.00797	69.10	67.01	136.11
190.6	4599.2	0.006148	0	0.00615	101.46	0	101.46

TABLO-B26 (Devam)

Doymuş Metan

Sıcaklık (K)	P (kPa)	Entalpi, kJ/kg			Entropi, kJ/kg·K		
		h_f	h_{fg}	h_g	s_f	s_{fg}	s_g
90.7	11.7	-358.07	543.12	185.05	4.2264	5.9891	10.2155
95	19.8	-343.75	537.18	193.43	4.3805	5.6545	10.0350
100	34.4	-326.83	529.77	202.94	4.5538	5.2977	9.8514
105	56.4	-309.66	521.82	212.16	4.7208	4.9697	9.6905
110	88.2	-292.29	513.29	221.00	4.8817	4.6663	9.5480
111.7	101.3	-286.50	510.33	223.83	4.9336	4.5706	9.5042
115	132.3	-274.74	504.12	229.38	5.0368	4.3836	9.4205
120	191.6	-256.98	494.20	237.23	5.1867	4.1184	9.3051
125	269.0	-238.99	483.44	244.45	5.3321	3.8675	9.1996
130	367.6	-220.72	471.72	251.00	5.4734	3.6286	9.1020
135	490.7	-202.13	458.90	256.77	5.6113	3.3993	9.0106
140	641.6	-183.16	444.85	261.69	5.7464	3.1775	8.9239
145	823.7	-163.73	429.38	265.66	5.8794	2.9613	8.8406
150	1040.5	-143.74	412.29	268.54	6.0108	2.7486	8.7594
155	1295.6	-123.09	393.27	270.18	6.1415	2.5372	8.6787
160	1592.8	-101.61	371.96	270.35	6.2724	2.3248	8.5971
165	1935.9	-79.08	347.82	268.74	6.4046	2.1080	8.5126
170	2329.3	-55.17	320.02	264.85	6.5399	1.8824	8.4224
175	2777.6	-29.33	287.20	257.87	6.6811	1.6411	8.3223
180	3286.4	-0.53	246.77	246.25	6.8333	1.3710	8.2043
185	3863.2	33.83	192.16	226.00	7.0095	1.0387	8.0483
190	4520.5	91.56	80.58	172.14	7.3015	0.4241	7.7256
190.6	4599.2	129.74	0	129.74	7.4999	0	7.4999

TABLO-B27

Kızgın buhar, Metan

Sıcaklık (K)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)
	100 kPa (111.50K)				200 kPa (120.61 K)			
Doymuş	0.55665	167.90	223.56	9.5084	0.29422	179.30	238.14	9.2918
125	0.63126	190.21	253.33	9.7606	0.30695	186.80	248.19	9.3736
150	0.76586	230.18	306.77	10.1504	0.37700	227.91	303.31	9.7759
175	0.89840	269.72	359.56	10.4759	0.44486	268.05	357.02	10.1071
200	1.02994	309.20	412.19	10.7570	0.51165	307.88	410.21	10.3912
225	1.16092	348.90	464.99	11.0058	0.57786	347.81	463.38	10.6417
250	1.29154	389.12	518.27	11.2303	0.64370	388.19	516.93	10.8674
275	1.42193	430.17	572.36	11.4365	0.70931	429.36	571.22	11.0743
300	1.55215	472.36	627.58	11.6286	0.77475	471.65	626.60	11.2670
325	1.68225	516.00	684.23	11.8100	0.84008	515.37	683.38	11.4488
350	1.81226	561.34	742.57	11.9829	0.90530	560.77	741.83	11.6220
375	1.94220	608.58	802.80	12.1491	0.97046	608.07	802.16	11.7885
400	2.07209	657.89	865.10	12.3099	1.03557	657.41	864.53	11.9495
425	2.20193	709.36	929.55	12.4661	1.10062	708.92	929.05	12.1059

TABLO-B27 (Devam)

Kızgın buhar, Metan

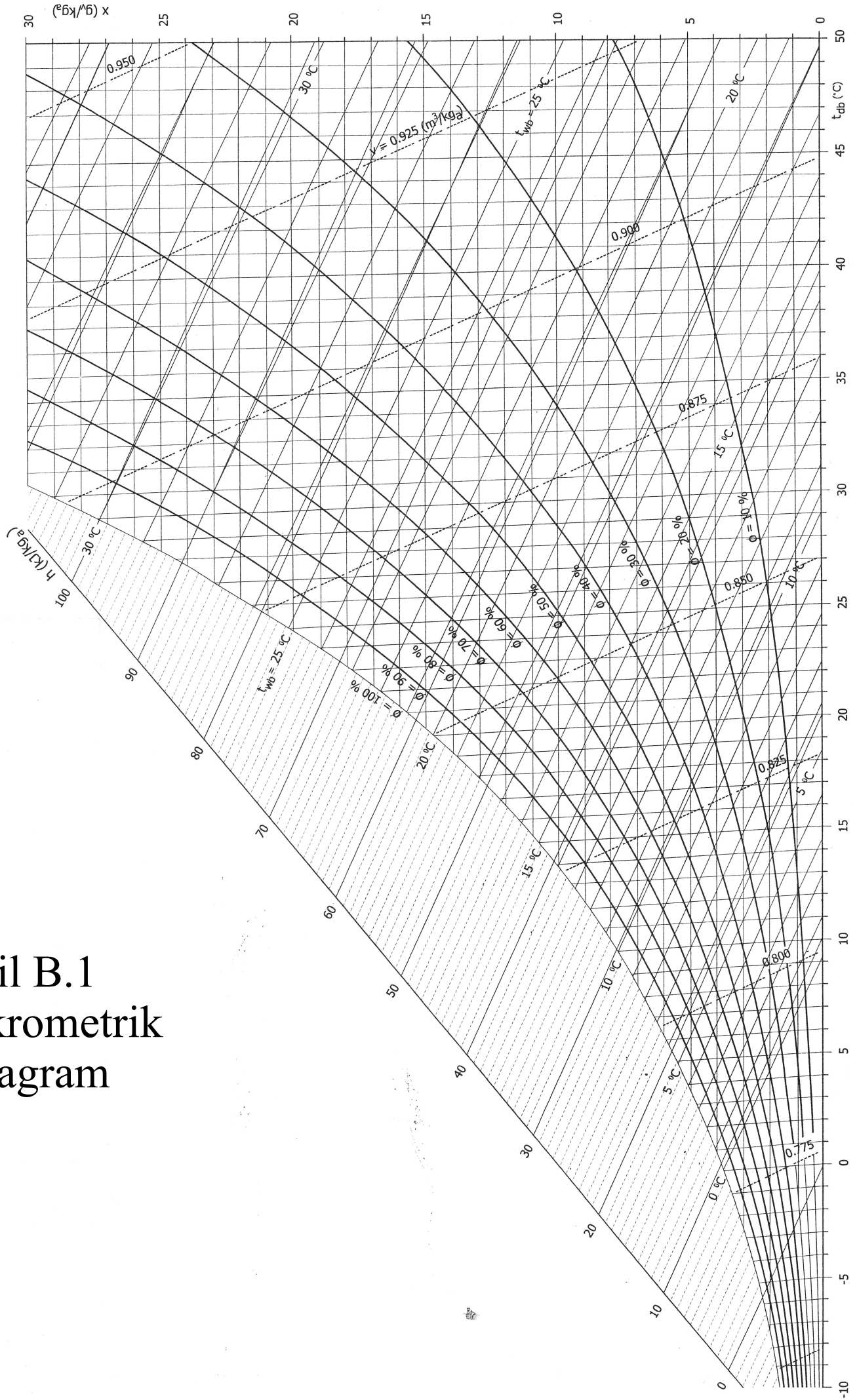
Sıcaklık (K)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)
400 kPa (131.42 K)					600 kPa (138.72 K)			
Doymuş	0.15427	191.01	252.72	9.0754	0.10496	197.54	260.51	8.9458
150	0.18233	223.16	296.09	9.3843	0.11717	218.08	288.38	9.1390
175	0.21799	264.61	351.81	9.7280	0.14227	261.03	346.39	9.4970
200	0.25246	305.19	406.18	10.0185	0.16603	302.44	402.06	9.7944
225	0.28631	345.61	460.13	10.2726	0.18911	343.37	456.84	10.0525
250	0.31978	386.32	514.23	10.5007	0.21180	384.44	511.52	10.2830
275	0.35301	427.74	568.94	10.7092	0.23424	426.11	566.66	10.4931
300	0.38606	470.23	624.65	10.9031	0.25650	468.80	622.69	10.6882
325	0.41899	514.10	681.69	11.0857	0.27863	512.82	680.00	10.8716
350	0.45183	559.63	740.36	11.2595	0.30067	558.48	738.88	11.0461
375	0.48460	607.03	800.87	11.4265	0.32264	605.99	799.57	11.2136
400	0.51731	656.47	863.39	11.5879	0.34456	655.52	862.25	11.3754
425	0.54997	708.05	928.04	11.7446	0.36643	707.18	927.04	11.5324
450	0.58260	761.85	994.89	11.8974	0.38826	761.05	994.00	11.6855
475	0.61520	817.89	1063.97	12.0468	0.41006	817.15	1063.18	11.8351
500	0.64778	876.18	1135.29	12.1931	0.43184	875.48	1134.59	11.9816
525	0.68033	936.67	1208.81	12.3366	0.45360	936.03	1208.18	12.1252
800 kPa (144.40 K)					1000 kPa (149.13 K)			
Doymuş	0.07941	201.70	265.23	8.8505	0.06367	204.45	268.12	8.7735
150	0.08434	212.53	280.00	8.9509	0.06434	206.28	270.62	8.7902
175	0.10433	257.30	340.76	9.3260	0.08149	253.38	334.87	9.1871
200	0.12278	299.62	397.85	9.6310	0.09681	296.73	393.53	9.5006
225	0.14050	341.10	453.50	9.8932	0.11132	338.79	450.11	9.7672
250	0.15781	382.53	508.78	10.1262	0.12541	380.61	506.01	10.0028
275	0.17485	424.47	564.35	10.3381	0.13922	422.82	562.04	10.2164
300	0.19172	467.36	620.73	10.5343	0.15285	465.91	618.76	10.4138
325	0.20845	511.55	678.31	10.7186	0.16635	510.26	676.61	10.5990
350	0.22510	557.33	737.41	10.8938	0.17976	556.18	735.94	10.7748
375	0.24167	604.95	798.28	11.0617	0.19309	603.91	797.00	10.9433
400	0.25818	654.57	861.12	11.2239	0.20636	653.62	859.98	11.1059
425	0.27465	706.31	926.03	11.3813	0.21959	705.44	925.03	11.2636
450	0.29109	760.24	993.11	11.5346	0.23279	759.44	992.23	11.4172
475	0.30749	816.40	1062.40	11.6845	0.24595	815.66	1061.61	11.5672
500	0.32387	874.79	1133.89	11.8311	0.25909	874.10	1133.19	11.7141
525	0.34023	935.38	1207.56	11.9749	0.27221	934.73	1206.95	11.8580
550	0.35657	998.14	1283.45	12.1161	0.28531	997.53	1282.84	11.9992

TABLO-B27 (Devam)

Kızgın buhar, Metan

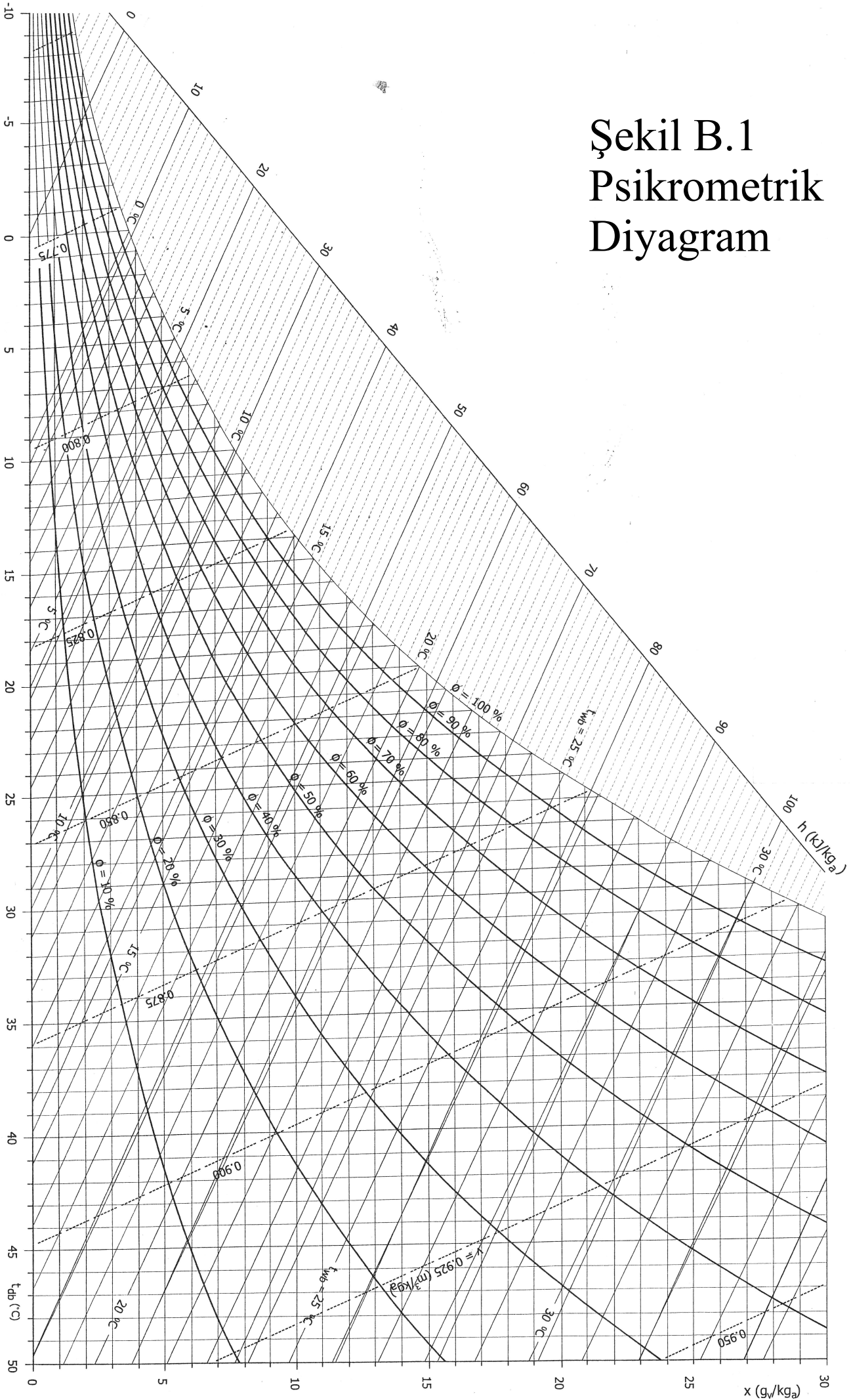
Sıcaklık (K)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)	v (m ³ /kg)	u (kJ/kg)	h (kJ/kg)	s (kJ/kg·K)
1500 kPa (158.52 K)					2000 kPa (165.86 K)			
Doymuş	0.04196	207.53	270.47	8.6215	0.03062	207.01	268.25	8.4975
175	0.05078	242.64	318.81	8.9121	0.03504	229.90	299.97	8.6839
200	0.06209	289.13	382.26	9.2514	0.04463	280.91	370.17	9.0596
225	0.07239	332.85	441.44	9.5303	0.05289	326.64	432.43	9.3532
250	0.08220	375.70	499.00	9.7730	0.06059	370.67	491.84	9.6036
275	0.09171	418.65	556.21	9.9911	0.06796	414.40	550.31	9.8266
300	0.10103	462.27	613.82	10.1916	0.07513	458.59	608.85	10.0303
325	0.11022	507.04	672.37	10.3790	0.08216	503.80	668.12	10.2200
350	0.11931	553.30	732.26	10.5565	0.08909	550.40	728.58	10.3992
375	0.12832	601.30	793.78	10.7263	0.09594	598.69	790.57	10.5703
400	0.13728	651.24	857.16	10.8899	0.10274	648.87	854.34	10.7349
425	0.14619	703.26	922.54	11.0484	0.10949	701.08	920.06	10.8942
450	0.15506	757.43	990.02	11.2027	0.11620	755.43	987.84	11.0491
475	0.16391	813.80	1059.66	11.3532	0.12289	811.94	1057.72	11.2003
500	0.17273	872.37	1131.46	11.5005	0.12955	870.64	1129.74	11.3480
525	0.18152	933.12	1205.41	11.6448	0.13619	931.51	1203.88	11.4927
550	0.19031	996.02	1281.48	11.7864	0.14281	994.51	1280.13	11.6346
4000 kPa (186.10 K)					8000 kPa			
Doymuş	0.01160	172.96	219.34	8.0035	—	—	—	—
200	0.01763	237.70	308.23	8.4675	0.00412	55.58	88.54	7.2069
225	0.02347	298.52	392.39	8.8653	0.00846	217.30	284.98	8.1344
250	0.02814	349.08	461.63	9.1574	0.01198	298.05	393.92	8.5954
275	0.03235	396.67	526.07	9.4031	0.01469	357.88	475.39	8.9064
300	0.03631	443.48	588.73	9.6212	0.01705	411.71	548.15	9.1598
325	0.04011	490.62	651.07	9.8208	0.01924	463.52	617.40	9.3815
350	0.04381	538.70	713.93	10.0071	0.02130	515.02	685.39	9.5831
375	0.04742	588.18	777.86	10.1835	0.02328	567.12	753.34	9.7706
400	0.05097	639.34	843.24	10.3523	0.02520	620.38	821.95	9.9477
425	0.05448	692.38	910.31	10.5149	0.02707	675.14	891.71	10.1169
450	0.05795	747.43	979.23	10.6725	0.02891	731.63	962.92	10.2796
475	0.06139	804.55	1050.12	10.8258	0.03072	789.99	1035.75	10.4372
500	0.06481	863.78	1123.01	10.9753	0.03251	850.28	1110.34	10.5902
525	0.06820	925.11	1197.93	11.1215	0.03428	912.54	1186.74	10.7393
550	0.07158	988.53	1274.86	11.2646	0.03603	976.77	1264.99	10.8849
575	0.07495	1053.98	1353.77	11.4049	0.03776	1042.96	1345.07	11.0272

YÜKSEKLİK : Deniz seviyesinden 0 metre
BASINÇ : 101 325 Pa



Şekil B.1
Psikrometrik
Diyagram

Şekil B.1 Psikrometrik Diyagram



YÜKSEKLİK : Deniz seviyesinden 0 metre
BASINÇ : 101 325 Pa

Properties of saturated water

Temp. T, °C	Saturation Pressure P _{sat} , kPa	Density ρ, kg/m ³		Enthalpy of Vaporization h _{fg} , kJ/kg	Specific Heat C _p , J/kg·K		Thermal Conductivity k, W/m·K		Dynamic Viscosity μ, kg/m·s		Prandtl Number Pr		Volume Expansion Coefficient β, 1/K Liquid	Surface Tension, N/m Liquid
		Liquid	Vapor		Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor		
0.01	0.6113	999.8	0.0048	2501	4217	1854	0.561	0.0171	1.792 × 10 ⁻³	0.922 × 10 ⁻⁵	13.5	1.00	-0.068 × 10 ⁻³	0.0756
5	0.8721	999.9	0.0068	2490	4205	1857	0.571	0.0173	1.519 × 10 ⁻³	0.934 × 10 ⁻⁵	11.2	1.00	0.015 × 10 ⁻³	0.0749
10	1.2276	999.7	0.0094	2478	4194	1862	0.580	0.0176	1.307 × 10 ⁻³	0.946 × 10 ⁻⁵	9.45	1.00	0.733 × 10 ⁻³	0.0742
15	1.7051	999.1	0.0128	2466	4186	1863	0.589	0.0179	1.138 × 10 ⁻³	0.959 × 10 ⁻⁵	8.09	1.00	0.138 × 10 ⁻³	0.0735
20	2.339	998.0	0.0173	2454	4182	1867	0.598	0.0182	1.002 × 10 ⁻³	0.973 × 10 ⁻⁵	7.01	1.00	0.195 × 10 ⁻³	0.0727
25	3.169	997.0	0.0231	2442	4180	1870	0.607	0.0186	0.891 × 10 ⁻³	0.987 × 10 ⁻⁵	6.14	1.00	0.247 × 10 ⁻³	0.0720
30	4.246	996.0	0.0304	2431	4178	1875	0.615	0.0189	0.798 × 10 ⁻³	1.001 × 10 ⁻⁵	5.42	1.00	0.294 × 10 ⁻³	0.0712
35	5.628	994.0	0.0397	2419	4178	1880	0.623	0.0192	0.720 × 10 ⁻³	1.016 × 10 ⁻⁵	4.83	1.00	0.337 × 10 ⁻³	0.0704
40	7.384	992.1	0.0512	2407	4179	1885	0.631	0.0196	0.653 × 10 ⁻³	1.031 × 10 ⁻⁵	4.32	1.00	0.377 × 10 ⁻³	0.0696
45	9.593	990.1	0.0655	2395	4180	1892	0.637	0.0200	0.596 × 10 ⁻³	1.046 × 10 ⁻⁵	3.91	1.00	0.415 × 10 ⁻³	0.0688
50	12.35	988.1	0.0831	2383	4181	1900	0.644	0.0204	0.547 × 10 ⁻³	1.062 × 10 ⁻⁵	3.55	1.00	0.451 × 10 ⁻³	0.0679
55	15.76	985.2	0.1045	2371	4183	1908	0.649	0.0208	0.504 × 10 ⁻³	1.077 × 10 ⁻⁵	3.25	1.00	0.484 × 10 ⁻³	0.0671
60	19.94	983.3	0.1304	2359	4185	1916	0.654	0.0212	0.467 × 10 ⁻³	1.093 × 10 ⁻⁵	2.99	1.00	0.517 × 10 ⁻³	0.0662
65	25.03	980.4	0.1614	2346	4187	1926	0.659	0.0216	0.433 × 10 ⁻³	1.110 × 10 ⁻⁵	2.75	1.00	0.548 × 10 ⁻³	0.0654
70	31.19	977.5	0.1983	2334	4190	1936	0.663	0.0221	0.404 × 10 ⁻³	1.126 × 10 ⁻⁵	2.55	1.00	0.578 × 10 ⁻³	0.0645
75	38.58	974.7	0.2421	2321	4193	1948	0.667	0.0225	0.378 × 10 ⁻³	1.142 × 10 ⁻⁵	2.38	1.00	0.607 × 10 ⁻³	0.0636
80	47.39	971.8	0.2935	2309	4197	1962	0.670	0.0230	0.355 × 10 ⁻³	1.159 × 10 ⁻⁵	2.22	1.00	0.653 × 10 ⁻³	0.0627
85	57.83	968.1	0.3536	2296	4201	1977	0.673	0.0235	0.333 × 10 ⁻³	1.176 × 10 ⁻⁵	2.08	1.00	0.670 × 10 ⁻³	0.0617
90	70.14	965.3	0.4235	2283	4206	1993	0.675	0.0240	0.315 × 10 ⁻³	1.193 × 10 ⁻⁵	1.96	1.00	0.702 × 10 ⁻³	0.0608
95	84.55	961.5	0.5045	2270	4212	2010	0.677	0.0246	0.297 × 10 ⁻³	1.210 × 10 ⁻⁵	1.85	1.00	0.716 × 10 ⁻³	0.0599
100	101.33	957.9	0.5978	2257	4217	2029	0.679	0.0251	0.282 × 10 ⁻³	1.227 × 10 ⁻⁵	1.75	1.00	0.750 × 10 ⁻³	0.0589
110	143.27	950.6	0.8263	2230	4229	2071	0.682	0.0262	0.255 × 10 ⁻³	1.261 × 10 ⁻⁵	1.58	1.00	0.798 × 10 ⁻³	0.0570
120	198.53	943.4	1.121	2203	4244	2120	0.683	0.0275	0.232 × 10 ⁻³	1.296 × 10 ⁻⁵	1.44	1.00	0.858 × 10 ⁻³	0.0550
130	270.1	934.6	1.496	2174	4263	2177	0.684	0.0288	0.213 × 10 ⁻³	1.330 × 10 ⁻⁵	1.33	1.01	0.913 × 10 ⁻³	0.0529
140	361.3	921.7	1.965	2145	4286	2244	0.683	0.0301	0.197 × 10 ⁻³	1.365 × 10 ⁻⁵	1.24	1.02	0.970 × 10 ⁻³	0.0509
150	475.8	916.6	2.546	2114	4311	2314	0.682	0.0316	0.183 × 10 ⁻³	1.399 × 10 ⁻⁵	1.16	1.02	1.025 × 10 ⁻³	0.0487
160	617.8	907.4	3.256	2083	4340	2420	0.680	0.0331	0.170 × 10 ⁻³	1.434 × 10 ⁻⁵	1.09	1.05	1.145 × 10 ⁻³	0.0466
170	791.7	897.7	4.119	2050	4370	2490	0.677	0.0347	0.160 × 10 ⁻³	1.468 × 10 ⁻⁵	1.03	1.05	1.178 × 10 ⁻³	0.0444
180	1,002.1	887.3	5.153	2015	4410	2590	0.673	0.0364	0.150 × 10 ⁻³	1.502 × 10 ⁻⁵	0.983	1.07	1.210 × 10 ⁻³	0.0422
190	1,254.4	876.4	6.388	1979	4460	2710	0.669	0.0382	0.142 × 10 ⁻³	1.537 × 10 ⁻⁵	0.947	1.09	1.280 × 10 ⁻³	0.0399
200	1,553.8	864.3	7.852	1941	4500	2840	0.663	0.0401	0.134 × 10 ⁻³	1.571 × 10 ⁻⁵	0.910	1.11	1.350 × 10 ⁻³	0.0377
220	2,318	840.3	11.60	1859	4610	3110	0.650	0.0442	0.122 × 10 ⁻³	1.641 × 10 ⁻⁵	0.865	1.15	1.520 × 10 ⁻³	0.0331
240	3,344	813.7	16.73	1767	4760	3520	0.632	0.0487	0.111 × 10 ⁻³	1.712 × 10 ⁻⁵	0.836	1.24	1.720 × 10 ⁻³	0.0284
260	4,688	783.7	23.69	1663	4970	4070	0.609	0.0540	0.102 × 10 ⁻³	1.788 × 10 ⁻⁵	0.832	1.35	2.000 × 10 ⁻³	0.0237
280	6,412	750.8	33.15	1544	5280	4835	0.581	0.0605	0.094 × 10 ⁻³	1.870 × 10 ⁻⁵	0.854	1.49	2.380 × 10 ⁻³	0.0190
300	8,581	713.8	46.15	1405	5750	5980	0.548	0.0695	0.086 × 10 ⁻³	1.965 × 10 ⁻⁵	0.902	1.69	2.950 × 10 ⁻³	0.0144
320	11,274	667.1	64.57	1239	6540	7900	0.509	0.0836	0.078 × 10 ⁻³	2.084 × 10 ⁻⁵	1.00	1.97	—	0.0099
340	14,586	610.5	92.62	1028	8240	11,870	0.469	0.110	0.070 × 10 ⁻³	2.255 × 10 ⁻⁵	1.23	2.43	—	0.0056
360	18,651	528.3	144.0	720	14,690	25,800	0.427	0.178	0.060 × 10 ⁻³	2.571 × 10 ⁻⁵	2.06	3.73	—	0.0019
374.14	22,090	317.0	317.0	0	—	—	—	—	0.043 × 10 ⁻³	4.313 × 10 ⁻⁵	—	—	—	0

Note 1: Kinematic viscosity ν and thermal diffusivity α can be calculated from their definitions, $\nu = \mu/\rho$ and $\alpha = k/\rho C_p = \nu/Pr$. The temperatures 0.01°C, 100°C, and 374.14°C are the triple-, boiling-, and critical-point temperatures of water, respectively. The properties listed above (except the vapor density) can be used at any pressure with negligible error except at temperatures near the critical-point value.

Note 2: The unit kJ/kg·°C for specific heat is equivalent to kJ/kg·K, and the unit W/m·°C for thermal conductivity is equivalent to W/m·K.

Source: Viscosity and thermal conductivity data are from J. V. Sengers and J. T. R. Watson, *Journal of Physical and Chemical Reference Data* 15 (1986), pp. 1291–1322. Other data are obtained from various sources or calculated.

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