

Table B.7 Properties of Superheated Steam^a

P (bar) (T_{sat} , °C)	Sat'd Water	Sat'd Steam	Temperature (°C)→								
			50	75	100	150	200	250	300	350	
0.0 (—)	\hat{H} \hat{U} \hat{V}	— — —	— — —	2595 2446 —	2642 2481 —	2689 2517 —	2784 2589 —	2880 2662 —	2978 2736 —	3077 2812 —	3177 2890 —
0.1 (45.8)	\hat{H} \hat{U} \hat{V}	191.8 191.8 0.00101	2584.8 2438.0 14.7	2593 2444 14.8	2640 2480 16.0	2688 2516 17.2	2783 2588 19.5	2880 2661 21.8	2977 2736 24.2	3077 2812 26.5	3177 2890 28.7
0.5 (81.3)	\hat{H} \hat{U} \hat{V}	340.6 340.6 0.00103	2646.0 2484.0 3.24	209.3 209.2 0.00101	313.9 313.9 0.00103	2683 2512 3.41	2780 2586 3.89	2878 2660 4.35	2979 2735 4.83	3076 2811 5.29	3177 2889 5.75
1.0 (99.6)	\hat{H} \hat{U} \hat{V}	417.5 417.5 0.00104	2675.4 2506.1 1.69	209.3 209.2 0.00101	314.0 313.9 0.00103	2676 2507 1.69	2776 2583 1.94	2875 2658 2.17	2975 2734 2.40	3074 2811 2.64	3176 2889 2.87
5.0 (151.8)	\hat{H} \hat{U} \hat{V}	640.1 639.6 0.00109	2747.5 2560.2 0.375	209.7 209.2 0.00101	314.3 313.8 0.00103	419.4 418.8 0.00104	632.2 631.6 0.00109	2855 2643 0.425	2961 2724 0.474	3065 2803 0.522	3168 2883 0.571
10 (179.9)	\hat{H} \hat{U} \hat{V}	762.6 761.5 0.00113	2776.2 2582 0.194	210.1 209.1 0.00101	314.7 313.7 0.00103	419.7 418.7 0.00104	632.5 631.4 0.00109	2827 2621 0.206	2943 2710 0.233	3052 2794 0.258	3159 2876 0.282
20 (212.4)	\hat{H} \hat{U} \hat{V}	908.6 906.2 0.00118	2797.2 2598.2 0.09950	211.0 209.0 0.00101	315.5 313.5 0.00102	420.5 418.4 0.00104	633.1 603.9 0.00109	852.6 850.2 0.00116	2902 2679 0.111	3025 2774 0.125	3139 2862 0.139
40 (250.3)	\hat{H} \hat{U} \hat{V}	1087.4 1082.4 0.00125	2800.3 2601.3 0.04975	212.7 208.6 0.00101	317.1 313.0 0.00102	422.0 417.8 0.00104	634.3 630.0 0.00109	853.4 848.8 0.00115	1085.8 1080.8 0.00125	2962 2727 0.0588	3095 2829 0.0665

$P(\text{bar})$ ($T_{\text{sat.}} \text{ } ^\circ\text{C}$)	Sat'd Water	Sat'd Steam	Temperature ($^\circ\text{C}$) \rightarrow								
			50	75	100	150	200	250	300	350	
60 (275.6)	\hat{H}	1213.7	2785.0	214.4	318.7	423.5	635.6	854.2	1085.8	2885	3046
	\hat{U}	1205.8	2590.4	208.3	312.6	417.3	629.1	847.3	1078.3	2668	2792
	\hat{V}	0.00132	0.0325	0.00101	0.00103	0.00104	0.00109	0.00115	0.00125	0.0361	0.0422
80 (295.0)	\hat{H}	1317.1	2759.9	216.1	320.3	425.0	636.8	855.1	1085.8	2787	2990
	\hat{U}	1306.0	2571.7	208.1	312.3	416.7	628.2	845.9	1075.8	2593	2750
	\hat{V}	0.00139	0.0235	0.00101	0.00102	0.00104	0.00109	0.00115	0.00124	0.0243	0.0299
100 (311.0)	\hat{H}	1408.0	2727.7	217.8	322.9	426.5	638.1	855.9	1085.8	1343.4	2926
	\hat{U}	1393.5	2547.3	207.8	311.7	416.1	627.3	844.4	1073.4	1329.4	2702
	\hat{V}	0.00145	0.0181	0.00101	0.00102	0.00104	0.00109	0.00115	0.00124	0.00140	0.0224
150 (342.1)	\hat{H}	1611.0	2615.0	222.1	326.0	430.3	641.3	858.1	1086.2	1338.2	2695
	\hat{U}	1586.1	2459.9	207.0	310.7	414.7	625.0	841.0	1067.7	1317.6	2523
	\hat{V}	0.00166	0.0103	0.00101	0.00102	0.00104	0.00108	0.00114	0.00123	0.00138	0.0115
200 (365.7)	\hat{H}	1826.5	2418.4	226.4	330.0	434.0	644.5	860.4	1086.7	1334.3	1647.1
	\hat{U}	1785.7	2300.8	206.3	309.7	413.2	622.9	837.7	1062.2	1307.1	1613.7
	\hat{V}	0.00204	0.005875	0.00100	0.00102	0.00103	0.00108	0.00114	0.00122	0.00136	0.00167
221.2(P_c) (374.15)(T_c)	\hat{H}	2108	2108	228.2	331.7	435.7	645.8	861.4	1087.0	1332.8	1635.5
	\hat{U}	2037.8	2037.8	206.0	309.2	412.8	622.0	836.3	1060.0	1302.9	1600.3
	\hat{V}	0.00317	0.00317	0.00100	0.00102	0.00103	0.00108	0.00114	0.00122	0.00135	0.00163
250 (—)	\hat{H}	—	—	230.7	334.0	437.8	647.7	862.8	1087.5	1331.1	1625.0
	\hat{U}	—	—	205.7	308.7	412.1	620.8	834.4	1057.0	1297.5	1585.0
	\hat{V}	—	—	0.00100	0.00101	0.00103	0.00108	0.00113	0.00122	0.00135	0.00160
300 (—)	\hat{H}	—	—	235.0	338.1	441.6	650.9	865.2	1088.4	1328.7	1609.9
	\hat{U}	—	—	205.0	307.7	410.8	618.7	831.3	1052.1	1288.7	1563.3
	\hat{V}	—	—	0.0009990	0.00101	0.00103	0.00107	0.00113	0.00121	0.00133	0.00155

$P(\text{bar})$ ($T_{\text{sat.}} \text{ } ^\circ\text{C}$)	Sat'd Water	Sat'd Steam	Temperature ($^\circ\text{C}$)→								
			50	75	100	150	200	250	300	350	
250	\hat{H}	—	—	230.7	334.0	437.8	647.7	862.8	1087.5	1331.1	1625.0
(—)	\hat{U}	—	—	205.7	308.7	412.1	620.8	834.4	1057.0	1297.5	1585.0
	\hat{V}	—	—	0.00100	0.00101	0.00103	0.00108	0.00113	0.00122	0.00135	0.00160
300	\hat{H}	—	—	235.0	338.1	441.6	650.9	865.2	1088.4	1328.7	1609.9
(—)	\hat{U}	—	—	205.0	307.7	410.8	618.7	831.3	1052.1	1288.7	1563.3
	\hat{V}	—	—	0.0009990	0.00101	0.00103	0.00107	0.00113	0.00121	0.00133	0.00155
500	\hat{H}	—	—	251.9	354.2	456.8	664.1	875.4	1093.6	1323.7	1576.3
(—)	\hat{U}	—	—	202.4	304.0	405.8	611.0	819.7	1034.3	1259.3	1504.1
	\hat{V}	—	—	0.0009911	0.00100	0.00102	0.00106	0.00111	0.00119	0.00129	0.00144
1000	\hat{H}	—	—	293.9	394.3	495.1	698.0	903.5	1113.0	1328.7	1550.5
(—)	\hat{U}	—	—	196.5	295.7	395.1	594.4	795.3	999.0	1207.1	1419.0
	\hat{V}	—	—	0.0009737	0.0009852	0.001000	0.00104	0.00108	0.00114	0.00122	0.00131

^a Adapted from R. W. Haywood, *Thermodynamic Tables in SI (Metric) Units*, Cambridge University Press, London, 1968. Water is a liquid in the enclosed region between 50 $^\circ\text{C}$ and 350 $^\circ\text{C}$. \hat{H} = specific enthalpy (kJ/kg), \hat{U} = specific internal energy (kJ/kg), \hat{V} = specific volume (m^3/kg). Note: $\text{kJ/kg} \times 0.4303 = \text{Btu/lb}_{\text{m}}$

(continued)

Table B.7 (Continued)

$P(\text{bar})$ ($T_{\text{sat.}} \text{ } ^\circ\text{C}$)		Temperature ($^\circ\text{C}$) \rightarrow							
		400	450	500	550	600	650	700	750
0.0 (—)	\hat{H}	3280	3384	3497	3597	3706	3816	3929	4043
	\hat{U}	2969	3050	3132	3217	3303	3390	3480	3591
	\hat{V}	—	—	—	—	—	—	—	—
0.1 (45.8)	\hat{H}	3280	3384	3489	3596	3706	3816	3929	4043
	\hat{U}	2969	3050	3132	3217	3303	3390	3480	3571
	\hat{V}	21.1	33.3	35.7	38.0	40.3	42.6	44.8	47.2
0.5 (81.3)	\hat{H}	3279	3383	3489	3596	3705	3816	3929	4043
	\hat{U}	2969	3049	3132	3216	3302	3390	3480	3571
	\hat{V}	6.21	6.67	7.14	7.58	8.06	8.55	9.01	9.43
1.0 (99.6)	\hat{H}	3278	3382	3488	3596	3705	3816	3928	4042
	\hat{U}	2968	3049	3132	3216	3302	3390	3479	3570
	\hat{V}	3.11	3.33	3.57	3.80	4.03	4.26	4.48	4.72
5.0 (151.8)	\hat{H}	3272	3379	3484	3592	3702	3813	3926	4040
	\hat{U}	2964	3045	3128	3213	3300	3388	3477	3569
	\hat{V}	0.617	0.664	0.711	0.758	0.804	0.850	0.897	0.943
10 (179.9)	\hat{H}	3264	3371	3478	3587	3697	3809	3923	4038
	\hat{U}	2958	3041	3124	3210	3296	3385	3475	3567
	\hat{V}	0.307	0.330	0.353	0.377	0.402	0.424	0.448	0.472

$P(\text{bar})$ ($T_{\text{sat.}} \text{ } ^\circ\text{C}$)	Sat'd Water	Sat'd Steam	Temperature ($^\circ\text{C}$) \rightarrow						
			50	75	100	150	200	250	300
20 (212.4)	\hat{H}	3249	3358	3467	3578	3689	3802	3916	4032
	\hat{U}	2946	3031	3115	3202	3290	3379	3470	3562
	\hat{V}	0.151	0.163	0.175	0.188	0.200	0.211	0.223	0.235
40 (250.3)	\hat{H}	3216	3331	3445	3559	3673	3788	3904	4021
	\hat{U}	2922	3011	3100	3188	3278	3368	3460	3554
	\hat{V}	0.0734	0.0799	0.0864	0.0926	0.0987	0.105	0.111	0.117
60 (275.6)	\hat{H}	3180	3303	3422	3539	3657	3774	3892	4011
	\hat{U}	2896	2991	3083	3174	3265	3357	3451	3545
	\hat{V}	0.0474	0.0521	0.0566	0.0609	0.0652	0.0693	0.0735	0.0776
80 (295.0)	\hat{H}	3142	3274	3399	3520	3640	3759	3879	4000
	\hat{U}	2867	2969	3065	3159	3252	3346	3441	3537
	\hat{V}	0.0344	0.0382	0.0417	0.0450	0.0483	0.0515	0.0547	0.0578
100 (311.0)	\hat{H}	3100	3244	3375	3500	3623	3745	3867	3989
	\hat{U}	2836	2946	3047	3144	3240	3335	3431	3528
	\hat{V}	0.0264	0.0298	0.0328	0.0356	0.0383	0.0410	0.0435	0.0461

$P(\text{bar})$ ($T_{\text{sat.}} \text{ } ^\circ\text{C}$)	Sat'd Water	Sat'd Steam	Temperature ($^\circ\text{C}$)→						
			50	75	100	150	200	250	300
150 (342.1)	\hat{H}	2975	3160	3311	3448	3580	3708	3835	3962
	\hat{U}	2744	2883	2999	3105	3207	3307	3407	3507
	\hat{V}	0.0157	0.0185	0.0208	0.0229	0.0249	0.0267	0.0286	0.0304
200 (365.7)	\hat{H}	2820	3064	3241	3394	3536	3671	3804	3935
	\hat{U}	2622	2810	2946	3063	3172	3278	3382	3485
	\hat{V}	0.009950	0.0127	0.0148	0.0166	0.0182	0.197	0.211	0.0225
221.2(P_c) (374.15)(T_c)	\hat{H}	2733	3020	3210	3370	3516	3655	3790	3923
	\hat{U}	2553	2776	2922	3045	3157	3265	3371	3476
	\hat{V}	0.008157	0.0110	0.0130	0.0147	0.0162	0.0176	0.0190	0.0202
250 (—)	\hat{H}	2582	2954	3166	3337	3490	3633	3772	3908
	\hat{U}	2432	2725	2888	3019	3137	3248	3356	3463
	\hat{V}	0.006013	0.009174	0.0111	0.0127	0.0141	0.0143	0.0166	0.0178
300 (—)	\hat{H}	2162	2826	3085	3277	3443	3595	3740	3880
	\hat{U}	2077	2623	2825	2972	3100	3218	3330	3441
	\hat{V}	0.002830	0.006734	0.008680	0.0102	0.0114	0.0126	0.0136	0.0147
500 (—)	\hat{H}	1878	2293	2723	3021	3248	3439	3610	3771
	\hat{U}	1791	2169	2529	2765	2946	3091	3224	3350
	\hat{V}	0.001726	0.002491	0.003882	0.005112	0.006112	0.007000	0.007722	0.008418
1000 (—)	\hat{H}	1798	2051	2316	2594	2857	3105	3324	3526
	\hat{U}	1653	1888	2127	2369	2591	2795	2971	3131
	\hat{V}	0.001446	0.001628	0.001893	0.002246	0.002668	0.003106	0.003536	0.003953