# IAPWS-IF97 STEAM TABLES

## Contents

Symbols and units

Notes on derivation of table values and their use

Table 1: Saturated Water and Steam - Temperature (triple point to 100ºC)

Table 2: Saturated Water and Steam - Pressure (triple point to critical point)

Table 3: Subcooled Water and Superheated Steam (Triple Point to 220 bar)

Table 4: Supercritical Steam (250 bar to 1000 bar)

## Symbols and Units

h specific enthalpy, kJ/kg

P absolute pressure, bar (1 bar = $10^5$Pa = $10^5$N/$m^2$)

s specific entropy, kJ/kgK

T temperature, ºC

u specific internal energy, kJ/kg

v specific volume, $m^3$/kg

### Subscripts

f saturated liquid state

fg change between saturated liquid state and saturated vapour states at constant pressure ($h_{fg} = h_g - h_f$)

g saturated vapour state

sat saturation state

## Notes on derivation of table values and their use

Values in these tables are calculated using the 1997 IAPWS Industrial Formulation for steam and water properties[1]. These equations have been implemented in Mathcad[2] and used to calculate results in a table structure developed by Dr R.I. Crane. Values were formatted for printing in Microsoft Excel.

**These tables are intended for use solely by students at the University of Edinburgh.**

[1] The International Association for the Properties of Water and Steam Release on the IAPWS Industrial Formulation 1997 for the Thermodynamic Properties of Water and Steam (Erlangen, Germany, Sep. 1997). [see http://www.iapws.org/relguide/IF97-Rev.pdf]

[2] Gibbins, J., 'Implementing the IAPWS Industrial Formulation 1997 for Thermodynamic Properties of Water and Steam in Mathcad', Proc. I.Mech.E, Vol. 217, Part A, J. Power and Energy (2003), 653-657.

**Table 1: Saturated Water and Steam - Temperature (triple point to 100°C)**

| T | P | $v_f$ | $v_g$ | $u_f$ | $u_g$ | $h_f$ | $h_{fg}$ | $h_g$ | $s_f$ | $s_g$ |
|---|---|---|---|---|---|---|---|---|---|---|
| °C | bar (abs) | $m^3$/kg | $m^3$/kg | kJ/kg | kJ/kg | kJ/kg | kJ/kg | kJ/kg | kJ/kgK | kJ/kgK |
| 0.01 | 0.006117 | 0.001000 | 206.0 | **0** | 2374.9 | 0.0006118 | 2500.9 | 2500.9 | **0** | 9.155 |
| 1 | 0.006571 | 0.001000 | 192.4 | 4.18 | 2376.3 | 4.177 | 2498.6 | 2502.7 | 0.0153 | 9.129 |
| 2 | 0.007060 | 0.001000 | 179.8 | 8.39 | 2377.7 | 8.392 | 2496.2 | 2504.6 | 0.0306 | 9.103 |
| 3 | 0.007581 | 0.001000 | 168.0 | 12.60 | 2379.0 | 12.60 | 2493.8 | 2506.4 | 0.0459 | 9.076 |
| 4 | 0.008135 | 0.001000 | 157.1 | 16.81 | 2380.4 | 16.81 | 2491.4 | 2508.2 | 0.0611 | 9.051 |
| 5 | 0.008726 | 0.001000 | 147.0 | 21.02 | 2381.8 | 21.02 | 2489.1 | 2510.1 | 0.0763 | 9.025 |
| 6 | 0.009354 | 0.001000 | 137.6 | 25.22 | 2383.2 | 25.22 | 2486.7 | 2511.9 | 0.0913 | 8.999 |
| 7 | 0.01002 | 0.001000 | 128.9 | 29.42 | 2384.5 | 29.43 | 2484.3 | 2513.7 | 0.1064 | 8.974 |
| 8 | 0.01073 | 0.001000 | 120.8 | 33.62 | 2385.9 | 33.63 | 2481.9 | 2515.6 | 0.1213 | 8.949 |
| 9 | 0.01148 | 0.001000 | 113.3 | 37.82 | 2387.3 | 37.82 | 2479.6 | 2517.4 | 0.1362 | 8.924 |
| 10 | 0.01228 | 0.001000 | 106.3 | 42.02 | 2388.7 | 42.02 | 2477.2 | 2519.2 | 0.1511 | 8.900 |
| 11 | 0.01313 | 0.001000 | 99.79 | 46.21 | 2390.0 | 46.22 | 2474.8 | 2521.1 | 0.1659 | 8.876 |
| 12 | 0.01403 | 0.001001 | 93.72 | 50.41 | 2391.4 | 50.41 | 2472.5 | 2522.9 | 0.1806 | 8.851 |
| 13 | 0.01498 | 0.001001 | 88.07 | 54.60 | 2392.8 | 54.60 | 2470.1 | 2524.7 | 0.1953 | 8.828 |
| 14 | 0.01599 | 0.001001 | 82.80 | 58.79 | 2394.1 | 58.79 | 2467.7 | 2526.5 | 0.2099 | 8.804 |
| 15 | 0.01706 | 0.001001 | 77.88 | 62.98 | 2395.5 | 62.98 | 2465.4 | 2528.4 | 0.2245 | 8.780 |
| 16 | 0.01819 | 0.001001 | 73.29 | 67.17 | 2396.9 | 67.17 | 2463.0 | 2530.2 | 0.2390 | 8.757 |
| 17 | 0.01938 | 0.001001 | 69.01 | 71.36 | 2398.3 | 71.36 | 2460.6 | 2532.0 | 0.2534 | 8.734 |
| 18 | 0.02065 | 0.001001 | 65.00 | 75.55 | 2399.6 | 75.55 | 2458.3 | 2533.8 | 0.2678 | 8.711 |
| 19 | 0.02198 | 0.001002 | 61.26 | 79.73 | 2401.0 | 79.73 | 2455.9 | 2535.7 | 0.2822 | 8.689 |
| 20 | 0.02339 | 0.001002 | 57.76 | 83.92 | 2402.4 | 83.92 | 2453.5 | 2537.5 | 0.2965 | 8.666 |
| 21 | 0.02488 | 0.001002 | 54.49 | 88.10 | 2403.7 | 88.10 | 2451.2 | 2539.3 | 0.3108 | 8.644 |
| 22 | 0.02645 | 0.001002 | 51.42 | 92.29 | 2405.1 | 92.29 | 2448.8 | 2541.1 | 0.3250 | 8.622 |
| 23 | 0.02811 | 0.001003 | 48.55 | 96.47 | 2406.4 | 96.47 | 2446.4 | 2542.9 | 0.3391 | 8.600 |
| 24 | 0.02986 | 0.001003 | 45.86 | 100.7 | 2407.8 | 100.66 | 2444.1 | 2544.7 | 0.3532 | 8.578 |
| 25 | 0.03170 | 0.001003 | 43.34 | 104.8 | 2409.2 | 104.84 | 2441.7 | 2546.5 | 0.3673 | 8.557 |
| 26 | 0.03364 | 0.001003 | 40.98 | 109.0 | 2410.5 | 109.02 | 2439.3 | 2548.4 | 0.3813 | 8.535 |
| 27 | 0.03568 | 0.001004 | 38.76 | 113.2 | 2411.9 | 113.20 | 2437.0 | 2550.2 | 0.3952 | 8.514 |
| 28 | 0.03783 | 0.001004 | 36.68 | 117.4 | 2413.2 | 117.38 | 2434.6 | 2552.0 | 0.4091 | 8.493 |
| 29 | 0.04009 | 0.001004 | 34.72 | 121.6 | 2414.6 | 121.56 | 2432.2 | 2553.8 | 0.4230 | 8.473 |
| 30 | 0.04247 | 0.001004 | 32.88 | 125.7 | 2415.9 | 125.75 | 2429.8 | 2555.6 | 0.4368 | 8.452 |
| 32 | 0.04759 | 0.001005 | 29.53 | 134.1 | 2418.7 | 134.11 | 2425.1 | 2559.2 | 0.4643 | 8.411 |
| 34 | 0.05325 | 0.001006 | 26.56 | 142.5 | 2421.4 | 142.47 | 2420.3 | 2562.8 | 0.4916 | 8.372 |
| 36 | 0.05947 | 0.001006 | 23.93 | 150.8 | 2424.0 | 150.82 | 2415.6 | 2566.4 | 0.5187 | 8.332 |
| 38 | 0.06632 | 0.001007 | 21.60 | 159.2 | 2426.7 | 159.18 | 2410.8 | 2570.0 | 0.5457 | 8.294 |
| 40 | 0.07384 | 0.001008 | 19.52 | 167.5 | 2429.4 | 167.54 | 2406.0 | 2573.5 | 0.5724 | 8.256 |
| 42 | 0.08209 | 0.001009 | 17.67 | 175.9 | 2432.1 | 175.9 | 2401.2 | 2577.1 | 0.5990 | 8.218 |
| 44 | 0.09112 | 0.001009 | 16.01 | 184.2 | 2434.8 | 184.3 | 2396.4 | 2580.7 | 0.6255 | 8.182 |
| 46 | 0.1010 | 0.001010 | 14.54 | 192.6 | 2437.4 | 192.6 | 2391.6 | 2584.2 | 0.6517 | 8.145 |
| 48 | 0.1118 | 0.001011 | 13.21 | 201.0 | 2440.1 | 201.0 | 2386.8 | 2587.8 | 0.6778 | 8.110 |
| 50 | 0.1235 | 0.001012 | 12.03 | 209.3 | 2442.8 | 209.3 | 2382.0 | 2591.3 | 0.7038 | 8.075 |
| 52 | 0.1363 | 0.001013 | 10.96 | 217.7 | 2445.4 | 217.7 | 2377.1 | 2594.8 | 0.7296 | 8.040 |
| 54 | 0.1502 | 0.001014 | 10.01 | 226.0 | 2448.0 | 226.1 | 2372.3 | 2598.4 | 0.7552 | 8.007 |
| 56 | 0.1653 | 0.001015 | 9.145 | 234.4 | 2450.7 | 234.4 | 2367.4 | 2601.9 | 0.7807 | 7.973 |
| 58 | 0.1817 | 0.001016 | 8.369 | 242.8 | 2453.3 | 242.8 | 2362.6 | 2605.4 | 0.8060 | 7.940 |
| 60 | 0.1995 | 0.001017 | 7.668 | 251.1 | 2455.9 | 251.2 | 2357.7 | 2608.8 | 0.8312 | 7.908 |
| 62 | 0.2187 | 0.001018 | 7.034 | 259.5 | 2458.5 | 259.5 | 2352.8 | 2612.3 | 0.8563 | 7.876 |
| 64 | 0.2394 | 0.001019 | 6.460 | 267.9 | 2461.1 | 267.9 | 2347.9 | 2615.8 | 0.8811 | 7.845 |
| 66 | 0.2618 | 0.001020 | 5.940 | 276.2 | 2463.7 | 276.3 | 2343.0 | 2619.2 | 0.9059 | 7.814 |
| 68 | 0.2860 | 0.001022 | 5.468 | 284.6 | 2466.3 | 284.6 | 2338.0 | 2622.7 | 0.9305 | 7.784 |
| 70 | 0.3120 | 0.001023 | 5.040 | 293.0 | 2468.9 | 293.0 | 2333.1 | 2626.1 | 0.9550 | 7.754 |
| 72 | 0.3400 | 0.001024 | 4.650 | 301.4 | 2471.4 | 301.4 | 2328.1 | 2629.5 | 0.9793 | 7.725 |
| 74 | 0.3701 | 0.001025 | 4.295 | 309.7 | 2474.0 | 309.8 | 2323.1 | 2632.9 | 1.004 | 7.696 |
| 76 | 0.4024 | 0.001026 | 3.971 | 318.1 | 2476.5 | 318.2 | 2318.1 | 2636.3 | 1.028 | 7.667 |
| 78 | 0.4370 | 0.001028 | 3.675 | 326.5 | 2479.0 | 326.6 | 2313.1 | 2639.7 | 1.052 | 7.639 |
| 80 | 0.4741 | 0.001029 | 3.405 | 334.9 | 2481.6 | 334.9 | 2308.1 | 2643.0 | 1.075 | 7.611 |
| 82 | 0.5139 | 0.001030 | 3.158 | 343.3 | 2484.1 | 343.3 | 2303.0 | 2646.4 | 1.099 | 7.584 |
| 84 | 0.5564 | 0.001032 | 2.932 | 351.7 | 2486.6 | 351.7 | 2297.9 | 2649.7 | 1.123 | 7.557 |
| 86 | 0.6017 | 0.001033 | 2.724 | 360.1 | 2489.0 | 360.1 | 2292.8 | 2653.0 | 1.146 | 7.530 |
| 88 | 0.6502 | 0.001035 | 2.534 | 368.5 | 2491.5 | 368.6 | 2287.7 | 2656.3 | 1.169 | 7.504 |
| 90 | 0.7018 | 0.001036 | 2.359 | 376.9 | 2494.0 | 377.0 | 2282.6 | 2659.5 | 1.193 | 7.478 |
| 92 | 0.7568 | 0.001037 | 2.198 | 385.3 | 2496.4 | 385.4 | 2277.4 | 2662.8 | 1.216 | 7.453 |
| 94 | 0.8154 | 0.001039 | 2.050 | 393.7 | 2498.8 | 393.8 | 2272.2 | 2666.0 | 1.239 | 7.427 |
| 96 | 0.8777 | 0.001040 | 1.914 | 402.1 | 2501.2 | 402.2 | 2267.0 | 2669.2 | 1.262 | 7.403 |
| 98 | 0.9439 | 0.001042 | 1.788 | 410.6 | 2503.6 | 410.7 | 2261.7 | 2672.4 | 1.284 | 7.378 |
| 100 | 1.0142 | 0.001043 | 1.672 | 419.0 | 2506.0 | 419.1 | 2256.5 | 2675.6 | 1.307 | 7.354 |

**Table 2: Saturated Water and Steam - Pressure (triple point to 2 bar)**

| P | T | $v_f$ | $v_g$ | $u_f$ | $u_g$ | $h_f$ | $h_{fg}$ | $h_g$ | $s_f$ | $s_g$ |
|---|---|---|---|---|---|---|---|---|---|---|
| bar (abs) | °C | $m^3/kg$ | $m^3/kg$ | kJ/kg | kJ/kg | kJ/kg | kJ/kg | kJ/kg | kJ/kgK | kJ/kgK |
| 0.006117 | 0.01 | 0.001000 | 206.0 | **0** | 2374.9 | 0.0006118 | 2500.9 | 2500.9 | **0** | 9.155 |
| 0.008 | 3.76 | 0.001000 | 159.6 | 15.81 | 2380.1 | 15.809 | 2492.0 | 2507.8 | 0.0575 | 9.057 |
| 0.010 | 6.97 | 0.001000 | 129.2 | 29.30 | 2384.5 | 29.298 | 2484.4 | 2513.7 | 0.1059 | 8.975 |
| 0.012 | 9.65 | 0.001000 | 108.7 | 40.57 | 2388.2 | 40.57 | 2478.0 | 2518.6 | 0.1460 | 8.908 |
| 0.014 | 11.97 | 0.001001 | 93.90 | 50.28 | 2391.4 | 50.28 | 2472.5 | 2522.8 | 0.1802 | 8.852 |
| 0.016 | 14.01 | 0.001001 | 82.75 | 58.83 | 2394.2 | 58.84 | 2467.7 | 2526.6 | 0.2101 | 8.804 |
| 0.018 | 15.84 | 0.001001 | 74.01 | 66.49 | 2396.7 | 66.49 | 2463.4 | 2529.9 | 0.2366 | 8.761 |
| 0.020 | 17.50 | 0.001001 | 66.99 | 73.43 | 2398.9 | 73.43 | 2459.5 | 2532.9 | 0.2606 | 8.723 |
| 0.022 | 19.01 | 0.001002 | 61.21 | 79.79 | 2401.0 | 79.79 | 2455.9 | 2535.7 | 0.2824 | 8.688 |
| 0.024 | 20.41 | 0.001002 | 56.38 | 85.65 | 2402.9 | 85.66 | 2452.6 | 2538.2 | 0.3024 | 8.657 |
| 0.026 | 21.72 | 0.001002 | 52.27 | 91.11 | 2404.7 | 91.11 | 2449.5 | 2540.6 | 0.3210 | 8.628 |
| 0.028 | 22.94 | 0.001002 | 48.73 | 96.20 | 2406.4 | 96.20 | 2446.6 | 2542.8 | 0.3382 | 8.601 |
| 0.030 | 24.08 | 0.001003 | 45.66 | 100.99 | 2407.9 | 100.99 | 2443.9 | 2544.9 | 0.3543 | 8.577 |
| 0.035 | 26.67 | 0.001003 | 39.47 | 111.83 | 2411.4 | 111.84 | 2437.7 | 2549.6 | 0.3907 | 8.521 |
| 0.040 | 28.96 | 0.001004 | 34.79 | 121.40 | 2414.5 | 121.40 | 2432.3 | 2553.7 | 0.4224 | 8.473 |
| 0.045 | 31.01 | 0.001005 | 31.13 | 129.98 | 2417.3 | 129.98 | 2427.4 | 2557.4 | 0.4507 | 8.431 |
| 0.050 | 32.88 | 0.001005 | 28.19 | 137.76 | 2419.8 | 137.77 | 2423.0 | 2560.8 | 0.4763 | 8.394 |
| 0.060 | 36.16 | 0.001006 | 23.73 | 151.49 | 2424.3 | 151.49 | 2415.2 | 2566.7 | 0.5209 | 8.329 |
| 0.070 | 39.00 | 0.001007 | 20.53 | 163.36 | 2428.1 | 163.37 | 2408.4 | 2571.8 | 0.5591 | 8.275 |
| 0.080 | 41.51 | 0.001008 | 18.10 | 173.84 | 2431.4 | 173.85 | 2402.4 | 2576.2 | 0.5925 | 8.227 |
| 0.090 | 43.76 | 0.001009 | 16.20 | 183.25 | 2434.5 | 183.26 | 2397.0 | 2580.3 | 0.6223 | 8.186 |
| 0.100 | 45.81 | 0.001010 | 14.67 | 191.80 | 2437.2 | 191.81 | 2392.1 | 2583.9 | 0.6492 | 8.149 |
| 0.11 | 47.68 | 0.001011 | 13.41 | 199.65 | 2439.7 | 199.66 | 2387.6 | 2587.2 | 0.6737 | 8.115 |
| 0.12 | 49.42 | 0.001012 | 12.36 | 206.90 | 2442.0 | 206.91 | 2383.4 | 2590.3 | 0.6963 | 8.085 |
| 0.13 | 51.04 | 0.001013 | 11.46 | 213.7 | 2444.1 | 213.66 | 2379.5 | 2593.1 | 0.7172 | 8.057 |
| 0.14 | 52.55 | 0.001013 | 10.69 | 220.0 | 2446.1 | 219.99 | 2375.8 | 2595.8 | 0.7366 | 8.031 |
| 0.15 | 53.97 | 0.001014 | 10.02 | 225.9 | 2448.0 | 225.94 | 2372.4 | 2598.3 | 0.7548 | 8.007 |
| 0.16 | 55.31 | 0.001015 | 9.431 | 231.5 | 2449.8 | 231.55 | 2369.1 | 2600.7 | 0.7720 | 7.985 |
| 0.17 | 56.59 | 0.001015 | 8.909 | 236.9 | 2451.4 | 236.88 | 2366.0 | 2602.9 | 0.7882 | 7.964 |
| 0.18 | 57.80 | 0.001016 | 8.443 | 241.9 | 2453.0 | 241.95 | 2363.1 | 2605.0 | 0.8035 | 7.944 |
| 0.19 | 58.95 | 0.001017 | 8.025 | 246.8 | 2454.5 | 246.78 | 2360.2 | 2607.0 | 0.8181 | 7.925 |
| 0.20 | 60.06 | 0.001017 | 7.648 | 251.4 | 2456.0 | 251.40 | 2357.5 | 2608.9 | 0.8320 | 7.907 |
| 0.22 | 62.13 | 0.001018 | 6.994 | 260.1 | 2458.7 | 260.08 | 2352.5 | 2612.6 | 0.8579 | 7.874 |
| 0.24 | 64.05 | 0.001019 | 6.446 | 268.1 | 2461.2 | 268.12 | 2347.8 | 2615.9 | 0.8818 | 7.844 |
| 0.26 | 65.84 | 0.001020 | 5.979 | 275.6 | 2463.5 | 275.61 | 2343.4 | 2619.0 | 0.9040 | 7.817 |
| 0.28 | 67.52 | 0.001021 | 5.578 | 282.6 | 2465.7 | 282.62 | 2339.2 | 2621.8 | 0.9246 | 7.791 |
| 0.30 | 69.10 | 0.001022 | 5.229 | 289.2 | 2467.7 | 289.23 | 2335.3 | 2624.6 | 0.9439 | 7.767 |
| 0.35 | 72.68 | 0.001024 | 4.525 | 304.2 | 2472.3 | 304.25 | 2326.4 | 2630.7 | 0.9876 | 7.715 |
| 0.40 | 75.86 | 0.001026 | 3.993 | 317.5 | 2476.3 | 317.57 | 2318.5 | 2636.1 | 1.0259 | 7.669 |
| 0.45 | 78.71 | 0.001028 | 3.576 | 329.5 | 2479.9 | 329.55 | 2311.3 | 2640.9 | 1.0601 | 7.629 |
| 0.50 | 81.32 | 0.001030 | 3.240 | 340.4 | 2483.2 | 340.48 | 2304.7 | 2645.2 | 1.0910 | 7.593 |
| 0.55 | 83.71 | 0.001032 | 2.964 | 350.5 | 2486.2 | 350.52 | 2298.7 | 2649.2 | 1.1192 | 7.561 |
| 0.60 | 85.93 | 0.001033 | 2.732 | 359.8 | 2488.9 | 359.84 | 2293.0 | 2652.9 | 1.1452 | 7.531 |
| 0.65 | 87.99 | 0.001035 | 2.535 | 368.5 | 2491.5 | 368.53 | 2287.7 | 2656.2 | 1.1694 | 7.504 |
| 0.70 | 89.93 | 0.001036 | 2.365 | 376.6 | 2493.9 | 376.68 | 2282.7 | 2659.4 | 1.1919 | 7.479 |
| 0.75 | 91.76 | 0.001037 | 2.217 | 384.3 | 2496.1 | 384.37 | 2278.0 | 2662.4 | 1.2130 | 7.456 |
| 0.80 | 93.49 | 0.001038 | 2.087 | 391.6 | 2498.2 | 391.64 | 2273.5 | 2665.2 | 1.2328 | 7.434 |
| 0.85 | 95.13 | 0.001040 | 1.972 | 398.5 | 2500.2 | 398.55 | 2269.3 | 2667.8 | 1.2516 | 7.413 |
| 0.90 | 96.69 | 0.001041 | 1.869 | 405.0 | 2502.1 | 405.13 | 2265.2 | 2670.3 | 1.2694 | 7.394 |
| 0.95 | 98.18 | 0.001042 | 1.777 | 411.3 | 2503.8 | 411.42 | 2261.3 | 2672.7 | 1.2864 | 7.376 |
| 1.00 | 99.61 | 0.001043 | 1.694 | 417.3 | 2505.5 | 417.44 | 2257.5 | 2674.9 | 1.3026 | 7.359 |
| 1.0132 | 99.97 | 0.001043 | 1.673 | 418.9 | 2506.0 | 418.98 | 2256.5 | 2675.5 | 1.3067 | 7.354 |
| 1.10 | 102.3 | 0.001045 | 1.550 | 428.7 | 2508.7 | 428.77 | 2250.4 | 2679.2 | 1.333 | 7.327 |
| 1.20 | 104.8 | 0.001047 | 1.428 | 439.2 | 2511.6 | 439.30 | 2243.8 | 2683.1 | 1.361 | 7.298 |
| 1.30 | 107.1 | 0.001049 | 1.325 | 449.0 | 2514.3 | 449.13 | 2237.5 | 2686.6 | 1.387 | 7.271 |
| 1.40 | 109.3 | 0.001051 | 1.237 | 458.2 | 2516.9 | 458.37 | 2231.6 | 2690.0 | 1.411 | 7.246 |
| 1.50 | 111.4 | 0.001053 | 1.159 | 466.9 | 2519.2 | 467.08 | 2226.0 | 2693.1 | 1.434 | 7.223 |
| 1.60 | 113.3 | 0.001054 | 1.091 | 475.2 | 2521.4 | 475.34 | 2220.7 | 2696.0 | 1.455 | 7.201 |
| 1.70 | 115.1 | 0.001056 | 1.031 | 483.0 | 2523.5 | 483.18 | 2215.6 | 2698.8 | 1.475 | 7.181 |
| 1.80 | 116.9 | 0.001058 | 0.9775 | 490.5 | 2525.5 | 490.67 | 2210.7 | 2701.4 | 1.494 | 7.162 |
| 1.90 | 118.6 | 0.001059 | 0.9293 | 497.6 | 2527.3 | 497.82 | 2206.1 | 2703.9 | 1.513 | 7.144 |
| 2.00 | 120.2 | 0.001061 | 0.8857 | 504.5 | 2529.1 | 504.68 | 2201.6 | 2706.2 | 1.530 | 7.127 |

**Table 2: Saturated Water and Steam - Pressure (2 bar to 45 bar)**

| P | T | $v_f$ | $v_g$ | $u_f$ | $u_g$ | $h_f$ | $h_{fg}$ | $h_g$ | $s_f$ | $s_g$ |
|---|---|---|---|---|---|---|---|---|---|---|
| bar (abs) | $^oC$ | $m^3/kg$ | $m^3/kg$ | kJ/kg | kJ/kg | kJ/kg | kJ/kg | kJ/kg | kJ/kgK | kJ/kgK |
| 2.0 | 120.2 | 0.001061 | 0.8857 | 504.5 | 2529.1 | 504.68 | 2201.6 | 2706.2 | 1.530 | 7.127 |
| 2.2 | 123.3 | 0.001063 | 0.8101 | 517.4 | 2532.4 | 517.62 | 2193.0 | 2710.6 | 1.563 | 7.095 |
| 2.4 | 126.1 | 0.001066 | 0.7467 | 529.4 | 2535.4 | 529.64 | 2185.0 | 2714.6 | 1.593 | 7.066 |
| 2.6 | 128.7 | 0.001068 | 0.6928 | 540.6 | 2538.2 | 540.88 | 2177.4 | 2718.3 | 1.621 | 7.039 |
| 2.8 | 131.2 | 0.001071 | 0.6463 | 551.2 | 2540.8 | 551.46 | 2170.3 | 2721.7 | 1.647 | 7.015 |
| 3.0 | 133.5 | 0.001073 | 0.6058 | 561.1 | 2543.2 | 561.46 | 2163.4 | 2724.9 | 1.672 | 6.992 |
| 3.2 | 135.7 | 0.001075 | 0.5702 | 570.6 | 2545.4 | 570.93 | 2156.9 | 2727.9 | 1.695 | 6.970 |
| 3.4 | 137.8 | 0.001078 | 0.5387 | 579.6 | 2547.5 | 579.96 | 2150.7 | 2730.6 | 1.717 | 6.950 |
| 3.6 | 139.9 | 0.001080 | 0.5105 | 588.2 | 2549.5 | 588.57 | 2144.7 | 2733.3 | 1.738 | 6.931 |
| 3.8 | 141.8 | 0.001082 | 0.4852 | 596.4 | 2551.3 | 596.81 | 2138.9 | 2735.7 | 1.758 | 6.913 |
| 4.0 | 143.6 | 0.001084 | 0.4624 | 604.3 | 2553.1 | 604.72 | 2133.3 | 2738.1 | 1.777 | 6.895 |
| 4.2 | 145.4 | 0.001085 | 0.4417 | 611.9 | 2554.8 | 612.33 | 2127.9 | 2740.3 | 1.795 | 6.879 |
| 4.4 | 147.1 | 0.001087 | 0.4227 | 619.2 | 2556.4 | 619.66 | 2122.7 | 2742.4 | 1.812 | 6.863 |
| 4.6 | 148.7 | 0.001089 | 0.4054 | 626.2 | 2557.9 | 626.73 | 2117.6 | 2744.4 | 1.829 | 6.849 |
| 4.8 | 150.3 | 0.001091 | 0.3895 | 633.0 | 2559.3 | 633.57 | 2112.7 | 2746.3 | 1.845 | 6.834 |
| 5.0 | 151.8 | 0.001093 | 0.3748 | 639.6 | 2560.7 | 640.19 | 2107.9 | 2748.1 | 1.861 | 6.821 |
| 5.5 | 155.5 | 0.001097 | 0.3426 | 655.3 | 2563.9 | 655.88 | 2096.5 | 2752.3 | 1.897 | 6.789 |
| 6.0 | 158.8 | 0.001101 | 0.3156 | 669.8 | 2566.8 | 670.50 | 2085.6 | 2756.1 | 1.931 | 6.759 |
| 6.5 | 162.0 | 0.001104 | 0.2926 | 683.5 | 2569.4 | 684.22 | 2075.4 | 2759.6 | 1.963 | 6.732 |
| 7.0 | 165.0 | 0.001108 | 0.2728 | 696.4 | 2571.8 | 697.14 | 2065.6 | 2762.7 | 1.992 | 6.707 |
| 7.5 | 167.8 | 0.001111 | 0.2555 | 708.6 | 2574.0 | 709.38 | 2056.3 | 2765.6 | 2.020 | 6.684 |
| 8.0 | 170.4 | 0.001115 | 0.2403 | 720.1 | 2576.0 | 721.02 | 2047.3 | 2768.3 | 2.046 | 6.662 |
| 8.5 | 172.9 | 0.001118 | 0.2269 | 731.2 | 2577.9 | 732.11 | 2038.6 | 2770.8 | 2.071 | 6.641 |
| 9.0 | 175.4 | 0.001121 | 0.2149 | 741.7 | 2579.7 | 742.72 | 2030.3 | 2773.0 | 2.094 | 6.621 |
| 9.5 | 177.7 | 0.001124 | 0.2041 | 751.8 | 2581.3 | 752.90 | 2022.3 | 2775.2 | 2.117 | 6.603 |
| 10.0 | 179.9 | 0.001127 | 0.1943 | 761.6 | 2582.8 | 762.68 | 2014.4 | 2777.1 | 2.138 | 6.585 |
| 11 | 184.1 | 0.001133 | 0.1774 | 780.0 | 2585.5 | 781.20 | 1999.5 | 2780.7 | 2.179 | 6.552 |
| 12 | 188.0 | 0.001139 | 0.1632 | 797.1 | 2587.9 | 798.50 | 1985.3 | 2783.8 | 2.216 | 6.522 |
| 13 | 191.6 | 0.001144 | 0.1512 | 813.3 | 2590.0 | 814.76 | 1971.7 | 2786.5 | 2.251 | 6.494 |
| 14 | 195.0 | 0.001149 | 0.1408 | 828.5 | 2591.8 | 830.13 | 1958.8 | 2788.9 | 2.284 | 6.468 |
| 15 | 198.3 | 0.001154 | 0.1317 | 843.0 | 2593.5 | 844.72 | 1946.3 | 2791.0 | 2.315 | 6.443 |
| 16 | 201.4 | 0.001159 | 0.1237 | 856.8 | 2594.9 | 858.61 | 1934.3 | 2792.9 | 2.344 | 6.420 |
| 17 | 204.3 | 0.001163 | 0.1167 | 869.9 | 2596.2 | 871.89 | 1922.6 | 2794.5 | 2.371 | 6.398 |
| 18 | 207.1 | 0.001168 | 0.1104 | 882.5 | 2597.3 | 884.61 | 1911.4 | 2796.0 | 2.398 | 6.378 |
| 19 | 209.8 | 0.001172 | 0.1047 | 894.6 | 2598.3 | 896.84 | 1900.4 | 2797.3 | 2.423 | 6.358 |
| 20 | 212.4 | 0.001177 | 0.0996 | 906.3 | 2599.2 | 908.62 | 1889.8 | 2798.4 | 2.447 | 6.339 |
| 21 | 214.9 | 0.001181 | 0.0949 | 917.5 | 2600.0 | 919.99 | 1879.4 | 2799.4 | 2.470 | 6.321 |
| 22 | 217.3 | 0.001185 | 0.0907 | 928.4 | 2600.7 | 930.98 | 1869.2 | 2800.2 | 2.492 | 6.304 |
| 23 | 219.6 | 0.001189 | 0.0868 | 938.9 | 2601.3 | 941.63 | 1859.3 | 2800.9 | 2.514 | 6.287 |
| 24 | 221.8 | 0.001193 | 0.0832 | 949.1 | 2601.8 | 951.95 | 1849.6 | 2801.5 | 2.534 | 6.271 |
| 25 | 224.0 | 0.001197 | 0.0799 | 959.0 | 2602.2 | 961.98 | 1840.1 | 2802.0 | 2.554 | 6.256 |
| 26 | 226.1 | 0.001201 | 0.0769 | 968.6 | 2602.5 | 971.74 | 1830.7 | 2802.5 | 2.574 | 6.241 |
| 27 | 228.1 | 0.001205 | 0.0741 | 978.0 | 2602.8 | 981.24 | 1821.5 | 2802.8 | 2.593 | 6.227 |
| 28 | 230.1 | 0.001209 | 0.0714 | 987.1 | 2603.0 | 990.50 | 1812.5 | 2803.0 | 2.611 | 6.213 |
| 29 | 232.0 | 0.001213 | 0.0690 | 996.0 | 2603.2 | 999.54 | 1803.6 | 2803.2 | 2.628 | 6.199 |
| 30 | 233.9 | 0.001217 | 0.0667 | 1004.7 | 2603.3 | 1008.37 | 1794.9 | 2803.3 | 2.646 | 6.186 |
| 31 | 235.7 | 0.001220 | 0.0645 | 1013.2 | 2603.3 | 1017.00 | 1786.3 | 2803.3 | 2.662 | 6.173 |
| 32 | 237.5 | 0.001224 | 0.0625 | 1021.5 | 2603.3 | 1025.45 | 1777.8 | 2803.2 | 2.679 | 6.160 |
| 33 | 239.2 | 0.001228 | 0.0606 | 1029.7 | 2603.3 | 1033.72 | 1769.4 | 2803.1 | 2.695 | 6.148 |
| 34 | 240.9 | 0.001231 | 0.0588 | 1037.6 | 2603.2 | 1041.83 | 1761.1 | 2803.0 | 2.710 | 6.136 |
| 35 | 242.6 | 0.001235 | 0.0571 | 1045.5 | 2603.0 | 1049.78 | 1753.0 | 2802.7 | 2.725 | 6.125 |
| 36 | 244.2 | 0.001239 | 0.0554 | 1053.1 | 2602.9 | 1057.57 | 1744.9 | 2802.5 | 2.740 | 6.113 |
| 37 | 245.8 | 0.001242 | 0.0539 | 1060.6 | 2602.6 | 1065.23 | 1736.9 | 2802.1 | 2.755 | 6.102 |
| 38 | 247.3 | 0.001246 | 0.0525 | 1068.0 | 2602.4 | 1072.76 | 1729.0 | 2801.8 | 2.769 | 6.091 |
| 39 | 248.9 | 0.001249 | 0.0511 | 1075.3 | 2602.1 | 1080.15 | 1721.2 | 2801.4 | 2.783 | 6.080 |
| 40 | 250.4 | 0.001253 | 0.0498 | 1082.4 | 2601.8 | 1087.43 | 1713.5 | 2800.9 | 2.797 | 6.070 |
| 41 | 251.8 | 0.001256 | 0.0485 | 1089.4 | 2601.4 | 1094.58 | 1705.8 | 2800.4 | 2.810 | 6.059 |
| 42 | 253.3 | 0.001259 | 0.0473 | 1096.3 | 2601.1 | 1101.63 | 1698.2 | 2799.9 | 2.823 | 6.049 |
| 43 | 254.7 | 0.001263 | 0.0462 | 1103.1 | 2600.6 | 1108.57 | 1690.7 | 2799.3 | 2.836 | 6.039 |
| 44 | 256.1 | 0.001266 | 0.0451 | 1109.8 | 2600.2 | 1115.40 | 1683.2 | 2798.7 | 2.849 | 6.029 |
| 45 | 257.4 | 0.001270 | 0.0441 | 1116.4 | 2599.7 | 1122.14 | 1675.9 | 2798.0 | 2.861 | 6.020 |

**Table 2: Saturated Water and Steam - Pressure (45 bar to critical point)**

| P | T | $v_f$ | $v_g$ | $u_f$ | $u_g$ | $h_f$ | $h_{fg}$ | $h_g$ | $s_f$ | $s_g$ |
|---|---|---|---|---|---|---|---|---|---|---|
| bar (abs) | °C | $m^3$/kg | $m^3$/kg | kJ/kg | kJ/kg | kJ/kg | kJ/kg | kJ/kg | kJ/kgK | kJ/kgK |
| 45 | 257.4 | 0.001270 | 0.0441 | 1116.4 | 2599.7 | 1122.14 | 1675.9 | 2798.0 | 2.861 | 6.020 |
| 46 | 258.8 | 0.001273 | 0.0431 | 1122.9 | 2599.2 | 1128.79 | 1668.5 | 2797.3 | 2.874 | 6.010 |
| 47 | 260.1 | 0.001276 | 0.0421 | 1129.3 | 2598.7 | 1135.34 | 1661.2 | 2796.6 | 2.886 | 6.001 |
| 48 | 261.4 | 0.001280 | 0.0412 | 1135.7 | 2598.2 | 1141.81 | 1654.0 | 2795.8 | 2.898 | 5.992 |
| 49 | 262.7 | 0.001283 | 0.0403 | 1141.9 | 2597.6 | 1148.20 | 1646.8 | 2795.0 | 2.909 | 5.983 |
| 50 | 263.9 | 0.001286 | 0.0394 | 1148.1 | 2597.0 | 1154.50 | 1639.7 | 2794.2 | 2.921 | 5.974 |
| 51 | 265.2 | 0.001290 | 0.0386 | 1154.2 | 2596.4 | 1160.73 | 1632.7 | 2793.4 | 2.932 | 5.965 |
| 52 | 266.4 | 0.001293 | 0.0378 | 1160.2 | 2595.7 | 1166.88 | 1625.6 | 2792.5 | 2.943 | 5.956 |
| 53 | 267.6 | 0.001296 | 0.0371 | 1166.1 | 2595.1 | 1172.97 | 1618.6 | 2791.6 | 2.954 | 5.948 |
| 54 | 268.8 | 0.001300 | 0.0363 | 1172.0 | 2594.4 | 1178.98 | 1611.7 | 2790.7 | 2.965 | 5.939 |
| 55 | 270.0 | 0.001303 | 0.0356 | 1177.8 | 2593.7 | 1184.92 | 1604.8 | 2789.7 | 2.976 | 5.931 |
| 56 | 271.1 | 0.001306 | 0.0350 | 1183.5 | 2593.0 | 1190.81 | 1597.9 | 2788.7 | 2.986 | 5.922 |
| 57 | 272.3 | 0.001309 | 0.0343 | 1189.2 | 2592.2 | 1196.63 | 1591.1 | 2787.7 | 2.997 | 5.914 |
| 58 | 273.4 | 0.001313 | 0.0337 | 1194.8 | 2591.5 | 1202.39 | 1584.3 | 2786.7 | 3.007 | 5.906 |
| 59 | 274.5 | 0.001316 | 0.0330 | 1200.3 | 2590.7 | 1208.09 | 1577.6 | 2785.6 | 3.017 | 5.898 |
| 60 | 275.6 | 0.001319 | 0.0324 | 1205.8 | 2589.9 | 1213.73 | 1570.8 | 2784.6 | 3.027 | 5.890 |
| 62 | 277.7 | 0.001326 | 0.0313 | 1216.6 | 2588.2 | 1224.86 | 1557.5 | 2782.3 | 3.047 | 5.874 |
| 64 | 279.8 | 0.001332 | 0.0302 | 1227.3 | 2586.5 | 1235.78 | 1544.2 | 2780.0 | 3.067 | 5.859 |
| 66 | 281.9 | 0.001339 | 0.0292 | 1237.7 | 2584.7 | 1246.51 | 1531.1 | 2777.6 | 3.085 | 5.844 |
| 68 | 283.9 | 0.001345 | 0.0283 | 1247.9 | 2582.8 | 1257.06 | 1518.1 | 2775.1 | 3.104 | 5.829 |
| 70 | 285.8 | 0.001352 | 0.0274 | 1258.0 | 2580.9 | 1267.44 | 1505.1 | 2772.6 | 3.122 | 5.815 |
| 72 | 287.7 | 0.001358 | 0.0265 | 1267.9 | 2578.9 | 1277.65 | 1492.3 | 2769.9 | 3.140 | 5.800 |
| 74 | 289.6 | 0.001365 | 0.0257 | 1277.6 | 2576.9 | 1287.72 | 1479.5 | 2767.2 | 3.157 | 5.786 |
| 76 | 291.4 | 0.001371 | 0.0250 | 1287.2 | 2574.8 | 1297.64 | 1466.8 | 2764.4 | 3.174 | 5.772 |
| 78 | 293.2 | 0.001378 | 0.0242 | 1296.7 | 2572.6 | 1307.42 | 1454.1 | 2761.5 | 3.191 | 5.758 |
| 80 | 295.0 | 0.001385 | 0.0235 | 1306.0 | 2570.4 | 1317.08 | 1441.5 | 2758.6 | 3.208 | 5.745 |
| 82 | 296.7 | 0.001391 | 0.0229 | 1315.2 | 2568.1 | 1326.61 | 1429.0 | 2755.6 | 3.224 | 5.731 |
| 84 | 298.4 | 0.001398 | 0.0222 | 1324.3 | 2565.8 | 1336.03 | 1416.5 | 2752.5 | 3.240 | 5.718 |
| 86 | 300.1 | 0.001405 | 0.0216 | 1333.3 | 2563.4 | 1345.34 | 1404.0 | 2749.4 | 3.256 | 5.705 |
| 88 | 301.7 | 0.001411 | 0.0210 | 1342.1 | 2560.9 | 1354.54 | 1391.6 | 2746.2 | 3.271 | 5.692 |
| 90 | 303.3 | 0.001418 | 0.0205 | 1350.9 | 2558.4 | 1363.65 | 1379.2 | 2742.9 | 3.287 | 5.679 |
| 92 | 304.9 | 0.001425 | 0.0200 | 1359.6 | 2555.9 | 1372.66 | 1366.9 | 2739.5 | 3.302 | 5.666 |
| 94 | 306.5 | 0.001432 | 0.0195 | 1368.1 | 2553.3 | 1381.59 | 1354.5 | 2736.1 | 3.317 | 5.653 |
| 96 | 308.0 | 0.001439 | 0.0190 | 1376.6 | 2550.6 | 1390.43 | 1342.2 | 2732.6 | 3.331 | 5.641 |
| 98 | 309.5 | 0.001446 | 0.0185 | 1385.0 | 2547.9 | 1399.18 | 1329.9 | 2729.1 | 3.346 | 5.628 |
| 100 | 311.0 | 0.001453 | 0.0180 | 1393.3 | 2545.1 | 1407.87 | 1317.6 | 2725.5 | 3.360 | 5.616 |
| 105 | 314.6 | 0.001470 | 0.0170 | 1413.8 | 2538.0 | 1429.27 | 1286.9 | 2716.1 | 3.396 | 5.585 |
| 110 | 318.1 | 0.001489 | 0.0160 | 1433.9 | 2530.5 | 1450.28 | 1256.1 | 2706.4 | 3.430 | 5.555 |
| 115 | 321.4 | 0.001507 | 0.0151 | 1453.6 | 2522.6 | 1470.95 | 1225.3 | 2696.2 | 3.464 | 5.524 |
| 120 | 324.7 | 0.001526 | 0.0143 | 1473.0 | 2514.4 | 1491.33 | 1194.3 | 2685.6 | 3.496 | 5.494 |
| 125 | 327.8 | 0.001546 | 0.0135 | 1492.1 | 2505.7 | 1511.46 | 1163.0 | 2674.5 | 3.529 | 5.464 |
| 130 | 330.9 | 0.001566 | 0.0128 | 1511.0 | 2496.7 | 1531.40 | 1131.5 | 2662.9 | 3.561 | 5.434 |
| 135 | 333.8 | 0.001588 | 0.0121 | 1529.8 | 2487.2 | 1551.19 | 1099.6 | 2650.8 | 3.592 | 5.404 |
| 140 | 336.7 | 0.001610 | 0.0115 | 1548.3 | 2477.2 | 1570.88 | 1067.2 | 2638.1 | 3.623 | 5.373 |
| 145 | 339.5 | 0.001633 | 0.0109 | 1566.8 | 2466.8 | 1590.51 | 1034.3 | 2624.8 | 3.654 | 5.342 |
| 150 | 342.2 | 0.001657 | 0.0103 | 1585.3 | 2455.8 | 1610.15 | 1000.7 | 2610.9 | 3.684 | 5.311 |
| 155 | 344.8 | 0.001682 | 0.0098 | 1603.8 | 2444.1 | 1629.85 | 966.4 | 2596.2 | 3.715 | 5.279 |
| 160 | 347.4 | 0.001710 | 0.0093 | 1622.3 | 2431.9 | 1649.67 | 931.1 | 2580.8 | 3.746 | 5.246 |
| 165 | 349.9 | 0.001738 | 0.0088 | 1641.0 | 2418.9 | 1669.68 | 894.9 | 2564.6 | 3.776 | 5.213 |
| 170 | 352.3 | 0.001769 | 0.0084 | 1660.0 | 2405.1 | 1690.04 | 857.4 | 2547.4 | 3.808 | 5.179 |
| 175 | 354.7 | 0.001803 | 0.0079 | 1679.2 | 2390.4 | 1710.76 | 818.4 | 2529.1 | 3.839 | 5.143 |
| 180 | 357.0 | 0.001839 | 0.0075 | 1698.9 | 2374.6 | 1732.02 | 777.5 | 2509.5 | 3.872 | 5.106 |
| 185 | 359.3 | 0.001880 | 0.0071 | 1719.2 | 2357.4 | 1753.99 | 734.4 | 2488.4 | 3.905 | 5.066 |
| 190 | 361.5 | 0.001925 | 0.0067 | 1740.3 | 2338.6 | 1776.89 | 688.5 | 2465.4 | 3.940 | 5.025 |
| 195 | 363.6 | 0.001977 | 0.0063 | 1762.5 | 2317.8 | 1801.08 | 638.9 | 2440.0 | 3.976 | 4.980 |
| 200 | 365.7 | 0.002039 | 0.0059 | 1786.3 | 2294.2 | 1827.10 | 584.3 | 2411.4 | 4.015 | 4.930 |
| 205 | 367.8 | 0.002114 | 0.0054 | 1812.6 | 2266.7 | 1855.90 | 522.3 | 2378.2 | 4.059 | 4.874 |
| 210 | 369.8 | 0.002212 | 0.0050 | 1842.9 | 2232.8 | 1889.40 | 448.1 | 2337.5 | 4.109 | 4.806 |
| 215 | 371.8 | 0.002360 | 0.0045 | 1882.1 | 2186.2 | 1932.81 | 349.4 | 2282.2 | 4.175 | 4.717 |
| 220 | 373.7 | 0.002750 | 0.0036 | 1961.4 | 2085.5 | 2021.92 | 142.3 | 2164.2 | 4.311 | 4.531 |
| **220.640** | **373.95** | 0.003106 | 0.0031 | 2019.0 | 2019.0 | 2087.55 | 0.0 | 2087.5 | 4.412 | 4.412 |

**Table 3: Subcooled Water and Superheated Steam (Triple Point to 0.1 bar)**

| | **0.006117 bar** | | ($T_{sat}$ = 0.01°C) | | **0.01 bar** | | ($T_{sat}$ = 7.0°C) | | **0.05 bar** | | ($T_{sat}$ = 32.9°C) | | **0.1 bar** | | ($T_{sat}$ = 45.8°C) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **T** | **v** | **u** | **h** | **s** | **v** | **u** | **h** | **s** | **v** | **u** | **h** | **s** | **v** | **u** | **h** | **s** | **T** |
| (°C) | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | (°C) |
| 0.01 | 206.0 | 2374.9 | 2500.9 | 9.155 | 0.001000 | 0.000007 | 0.001007 | 0.0000 | 0.001000 | 0.000081 | 0.005082 | 0.0000 | 0.001000 | 0.000174 | 0.010176 | 0.0000 | 0.01 |
| 20 | 221.1 | 2403.1 | 2538.4 | 9.288 | 135.2 | 2403.0 | 2538.2 | 9.060 | 0.001002 | 83.92 | 83.92 | 0.2965 | 0.001002 | 83.92 | 83.93 | 0.2965 | 20 |
| 40 | 236.2 | 2431.3 | 2575.8 | 9.411 | 144.5 | 2431.2 | 2575.7 | 9.184 | 28.9 | 2430.1 | 2574.4 | 8.438 | 0.001008 | 167.5 | 167.5 | 0.5724 | 40 |
| 60 | 251.3 | 2459.5 | 2613.3 | 9.527 | 153.7 | 2459.5 | 2613.2 | 9.300 | 30.7 | 2458.7 | 2612.3 | 8.555 | 15.3 | 2457.8 | 2611.2 | 8.233 | 60 |
| 80 | 266.4 | 2487.9 | 2650.8 | 9.637 | 163.0 | 2487.8 | 2650.8 | 9.410 | 32.6 | 2487.3 | 2650.1 | 8.666 | 16.3 | 2486.7 | 2649.3 | 8.344 | 80 |
| 100 | 281.5 | 2516.4 | 2688.6 | 9.741 | 172.2 | 2516.3 | 2688.5 | 9.514 | 34.4 | 2516.0 | 2688.0 | 8.770 | 17.2 | 2515.5 | 2687.4 | 8.449 | 100 |
| 120 | 296.6 | 2545.0 | 2726.5 | 9.840 | 181.4 | 2545.0 | 2726.4 | 9.613 | 36.3 | 2544.7 | 2726.1 | 8.869 | 18.1 | 2544.3 | 2725.6 | 8.548 | 120 |
| 140 | 311.7 | 2573.9 | 2764.6 | 9.934 | 190.7 | 2573.9 | 2764.5 | 9.707 | 38.1 | 2573.6 | 2764.2 | 8.964 | 19.1 | 2573.3 | 2763.8 | 8.643 | 140 |
| 160 | 326.8 | 2602.9 | 2802.8 | 10.025 | 199.9 | 2602.9 | 2802.8 | 9.798 | 40.0 | 2602.7 | 2802.6 | 9.055 | 20.0 | 2602.5 | 2802.2 | 8.734 | 160 |
| 180 | 341.9 | 2632.2 | 2841.3 | 10.112 | 209.1 | 2632.2 | 2841.3 | 9.885 | 41.8 | 2632.0 | 2841.1 | 9.141 | 20.9 | 2631.8 | 2840.8 | 8.821 | 180 |
| 200 | 357.0 | 2661.6 | 2880.0 | 10.195 | 218.4 | 2661.6 | 2880.0 | 9.968 | 43.7 | 2661.5 | 2879.8 | 9.225 | 21.8 | 2661.3 | 2879.6 | 8.905 | 200 |
| 220 | 372.1 | 2691.3 | 2918.9 | 10.276 | 227.6 | 2691.3 | 2918.9 | 10.049 | 45.5 | 2691.2 | 2918.8 | 9.306 | 22.8 | 2691.1 | 2918.6 | 8.986 | 220 |
| 240 | 387.2 | 2721.3 | 2958.1 | 10.353 | 236.8 | 2721.2 | 2958.1 | 10.127 | 47.4 | 2721.1 | 2957.9 | 9.384 | 23.7 | 2721.0 | 2957.8 | 9.063 | 240 |
| 260 | 402.3 | 2751.4 | 2997.5 | 10.429 | 246.1 | 2751.4 | 2997.5 | 10.202 | 49.2 | 2751.3 | 2997.3 | 9.459 | 24.6 | 2751.2 | 2997.2 | 9.139 | 260 |
| 280 | 417.4 | 2781.8 | 3037.1 | 10.502 | 255.3 | 2781.8 | 3037.1 | 10.275 | 51.1 | 2781.7 | 3037.0 | 9.532 | 25.5 | 2781.6 | 3036.8 | 9.212 | 280 |
| 300 | 432.5 | 2812.4 | 3077.0 | 10.573 | 264.5 | 2812.4 | 3077.0 | 10.346 | 52.9 | 2812.4 | 3076.9 | 9.603 | 26.4 | 2812.3 | 3076.7 | 9.283 | 300 |
| 320 | 447.6 | 2843.3 | 3117.1 | 10.641 | 273.7 | 2843.3 | 3117.1 | 10.414 | 54.7 | 2843.3 | 3117.0 | 9.672 | 27.4 | 2843.2 | 3116.9 | 9.351 | 320 |
| 340 | 462.6 | 2874.5 | 3157.4 | 10.708 | 283.0 | 2874.5 | 3157.4 | 10.481 | 56.6 | 2874.4 | 3157.4 | 9.738 | 28.3 | 2874.3 | 3157.3 | 9.418 | 340 |
| 360 | 477.7 | 2905.9 | 3198.1 | 10.773 | 292.2 | 2905.8 | 3198.1 | 10.547 | 58.4 | 2905.8 | 3198.0 | 9.804 | 29.2 | 2905.7 | 3197.9 | 9.484 | 360 |
| 380 | 492.8 | 2937.5 | 3238.9 | 10.837 | 301.4 | 2937.5 | 3238.9 | 10.610 | 60.3 | 2937.4 | 3238.9 | 9.867 | 30.1 | 2937.4 | 3238.8 | 9.547 | 380 |
| 400 | 507.9 | 2969.4 | 3280.1 | 10.899 | 310.7 | 2969.4 | 3280.1 | 10.672 | 62.1 | 2969.4 | 3280.0 | 9.929 | 31.1 | 2969.3 | 3279.9 | 9.609 | 400 |
| 420 | 523.0 | 3001.6 | 3321.5 | 10.960 | 319.9 | 3001.6 | 3321.5 | 10.733 | 64.0 | 3001.5 | 3321.4 | 9.990 | 32.0 | 3001.5 | 3321.3 | 9.670 | 420 |
| 440 | 538.1 | 3034.0 | 3363.2 | 11.019 | 329.1 | 3034.0 | 3363.1 | 10.792 | 65.8 | 3034.0 | 3363.1 | 10.049 | 32.9 | 3033.9 | 3363.0 | 9.729 | 440 |
| 460 | 553.2 | 3066.7 | 3405.1 | 11.077 | 338.4 | 3066.7 | 3405.1 | 10.850 | 67.7 | 3066.7 | 3405.0 | 10.107 | 33.8 | 3066.6 | 3405.0 | 9.787 | 460 |
| 480 | 568.3 | 3099.7 | 3447.3 | 11.134 | 347.6 | 3099.7 | 3447.3 | 10.907 | 69.5 | 3099.7 | 3447.2 | 10.164 | 34.8 | 3099.6 | 3447.2 | 9.844 | 480 |
| 500 | 583.4 | 3132.9 | 3489.8 | 11.189 | 356.8 | 3132.9 | 3489.8 | 10.962 | 71.4 | 3132.9 | 3489.7 | 10.220 | 35.7 | 3132.9 | 3489.7 | 9.900 | 500 |
| 520 | 598.5 | 3166.5 | 3532.5 | 11.244 | 366.1 | 3166.5 | 3532.5 | 11.017 | 73.2 | 3166.4 | 3532.5 | 10.274 | 36.6 | 3166.4 | 3532.4 | 9.954 | 520 |
| 540 | 613.6 | 3200.3 | 3575.6 | 11.298 | 375.3 | 3200.3 | 3575.6 | 11.071 | 75.1 | 3200.2 | 3575.5 | 10.328 | 37.5 | 3200.2 | 3575.5 | 10.008 | 540 |
| 560 | 628.7 | 3234.4 | 3618.9 | 11.350 | 384.5 | 3234.4 | 3618.9 | 11.123 | 76.9 | 3234.3 | 3618.8 | 10.380 | 38.4 | 3234.3 | 3618.8 | 10.061 | 560 |
| 580 | 643.7 | 3268.7 | 3662.5 | 11.402 | 393.7 | 3268.7 | 3662.5 | 11.175 | 78.7 | 3268.7 | 3662.4 | 10.432 | 39.4 | 3268.7 | 3662.4 | 10.112 | 580 |
| 600 | 658.8 | 3303.4 | 3706.3 | 11.453 | 403.0 | 3303.4 | 3706.3 | 11.226 | 80.6 | 3303.3 | 3706.3 | 10.483 | 40.3 | 3303.3 | 3706.3 | 10.163 | 600 |
| 640 | 689.0 | 3373.5 | 3794.9 | 11.552 | 421.4 | 3373.5 | 3794.9 | 11.325 | 84.3 | 3373.5 | 3794.9 | 10.582 | 42.1 | 3373.4 | 3794.9 | 10.262 | 640 |
| 680 | 719.2 | 3444.8 | 3884.7 | 11.648 | 439.9 | 3444.8 | 3884.7 | 11.421 | 88.0 | 3444.7 | 3884.6 | 10.678 | 44.0 | 3444.7 | 3884.6 | 10.358 | 680 |
| 720 | 749.4 | 3517.2 | 3975.5 | 11.741 | 458.4 | 3517.2 | 3975.5 | 11.515 | 91.7 | 3517.2 | 3975.5 | 10.772 | 45.8 | 3517.1 | 3975.5 | 10.452 | 720 |
| 760 | 779.6 | 3590.7 | 4067.5 | 11.832 | 476.8 | 3590.7 | 4067.5 | 11.605 | 95.4 | 3590.7 | 4067.5 | 10.863 | 47.7 | 3590.7 | 4067.5 | 10.543 | 760 |
| 800 | 809.7 | 3665.4 | 4160.7 | 11.921 | 495.3 | 3665.4 | 4160.7 | 11.694 | 99.1 | 3665.4 | 4160.6 | 10.951 | 49.5 | 3665.3 | 4160.6 | 10.631 | 800 |

**Table 3: Subcooled Water and Superheated Steam (0.2 bar to 1 atmosphere)**

| | **0.2 bar** | | ($T_{sat}$ = 60.1°C) | | **0.5 bar** | | ($T_{sat}$ = 81.3°C) | | **1 bar** | | ($T_{sat}$ = 99.6°C) | | **1.01325 bar** | | ($T_{sat}$ = 100.0°C) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **T** | **v** | **u** | **h** | **s** | **v** | **u** | **h** | **s** | **v** | **u** | **h** | **s** | **v** | **u** | **h** | **s** | **T** |
| (°C) | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | (°C) |
| 0.01 | 0.001000 | 0.000360 | 0.020363 | 0.0000 | 0.001000 | 0.000915 | 0.050924 | 0.0000 | 0.001000 | 0.001841 | 0.101856 | 0.0000 | 0.001000 | 0.001865 | 0.103206 | 0.0000 | 0.01 |
| 20 | 0.001002 | 83.92 | 83.94 | 0.2965 | 0.001002 | 83.91 | 83.96 | 0.2965 | 0.001002 | 83.91 | 84.01 | 0.2965 | 0.001002 | 83.91 | 84.01 | 0.2965 | 20 |
| 40 | 0.001008 | 167.5 | 167.6 | 0.5724 | 0.001008 | 167.5 | 167.6 | 0.5724 | 0.001008 | 167.5 | 167.6 | 0.5724 | 0.001008 | 167.5 | 167.6 | 0.5724 | 40 |
| 60 | 0.001017 | 251.1 | 251.2 | 0.8312 | 0.001017 | 251.1 | 251.2 | 0.8312 | 0.001017 | 251.1 | 251.2 | 0.8312 | 0.001017 | 251.1 | 251.2 | 0.8312 | 60 |
| 80 | 8.118 | 2485.3 | 2647.7 | 8.020 | 0.001029 | 334.9 | 335.0 | 1.0754 | 0.001029 | 334.9 | 335.0 | 1.0754 | 0.001029 | 334.9 | 335.0 | 1.0754 | 80 |
| 100 | 8.586 | 2514.5 | 2686.2 | 8.126 | 3.419 | 2511.5 | 2682.4 | 7.695 | 1.696 | 2506.2 | 2675.8 | 7.361 | 1.673 | 2506.0 | 2675.6 | 7.355 | 100 |
| 120 | 9.052 | 2543.6 | 2724.6 | 8.227 | 3.608 | 2541.3 | 2721.7 | 7.798 | 1.793 | 2537.3 | 2716.6 | 7.468 | 1.770 | 2537.2 | 2716.5 | 7.461 | 120 |
| 140 | 9.517 | 2572.7 | 2763.1 | 8.322 | 3.796 | 2570.9 | 2760.7 | 7.895 | 1.889 | 2567.8 | 2756.7 | 7.567 | 1.864 | 2567.7 | 2756.6 | 7.561 | 140 |
| 160 | 9.981 | 2602.0 | 2801.6 | 8.413 | 3.983 | 2600.5 | 2799.7 | 7.987 | 1.984 | 2598.0 | 2796.4 | 7.661 | 1.958 | 2597.9 | 2796.3 | 7.655 | 160 |
| 180 | 10.44 | 2631.4 | 2840.3 | 8.500 | 4.170 | 2630.2 | 2838.7 | 8.075 | 2.079 | 2628.1 | 2836.0 | 7.750 | 2.051 | 2628.1 | 2835.9 | 7.744 | 180 |
| 200 | 10.91 | 2661.0 | 2879.1 | 8.584 | 4.356 | 2660.0 | 2877.8 | 8.159 | 2.172 | 2658.2 | 2875.5 | 7.836 | 2.144 | 2658.2 | 2875.4 | 7.829 | 200 |
| 220 | 11.37 | 2690.8 | 2918.2 | 8.665 | 4.542 | 2689.9 | 2917.0 | 8.240 | 2.266 | 2688.4 | 2915.0 | 7.917 | 2.236 | 2688.4 | 2915.0 | 7.911 | 220 |
| 240 | 11.83 | 2720.8 | 2957.4 | 8.743 | 4.728 | 2720.0 | 2956.4 | 8.319 | 2.360 | 2718.7 | 2954.7 | 7.996 | 2.329 | 2718.7 | 2954.6 | 7.990 | 240 |
| 260 | 12.30 | 2751.0 | 2996.9 | 8.818 | 4.913 | 2750.3 | 2996.0 | 8.394 | 2.453 | 2749.2 | 2994.4 | 8.072 | 2.421 | 2749.1 | 2994.4 | 8.066 | 260 |
| 280 | 12.76 | 2781.4 | 3036.6 | 8.892 | 5.099 | 2780.8 | 3035.8 | 8.468 | 2.546 | 2779.8 | 3034.4 | 8.146 | 2.512 | 2779.8 | 3034.4 | 8.140 | 280 |
| 300 | 13.22 | 2812.1 | 3076.5 | 8.962 | 5.284 | 2811.6 | 3075.8 | 8.539 | 2.639 | 2810.7 | 3074.5 | 8.217 | 2.604 | 2810.6 | 3074.5 | 8.211 | 300 |
| 320 | 13.68 | 2843.0 | 3116.7 | 9.031 | 5.469 | 2842.5 | 3116.0 | 8.608 | 2.732 | 2841.7 | 3114.9 | 8.286 | 2.696 | 2841.7 | 3114.9 | 8.280 | 320 |
| 340 | 14.14 | 2874.2 | 3157.1 | 9.098 | 5.654 | 2873.7 | 3156.5 | 8.675 | 2.825 | 2873.0 | 3155.5 | 8.354 | 2.788 | 2873.0 | 3155.4 | 8.347 | 340 |
| 360 | 14.61 | 2905.6 | 3197.7 | 9.164 | 5.840 | 2905.2 | 3197.2 | 8.740 | 2.917 | 2904.5 | 3196.2 | 8.419 | 2.879 | 2904.5 | 3196.2 | 8.413 | 360 |
| 380 | 15.07 | 2937.3 | 3238.6 | 9.227 | 6.025 | 2936.9 | 3238.1 | 8.804 | 3.010 | 2936.3 | 3237.3 | 8.483 | 2.971 | 2936.2 | 3237.2 | 8.477 | 380 |
| 400 | 15.53 | 2969.2 | 3279.8 | 9.289 | 6.209 | 2968.8 | 3279.3 | 8.866 | 3.103 | 2968.3 | 3278.5 | 8.545 | 3.062 | 2968.3 | 3278.5 | 8.539 | 400 |
| 420 | 15.99 | 3001.4 | 3321.2 | 9.350 | 6.394 | 3001.1 | 3320.8 | 8.927 | 3.195 | 3000.5 | 3320.1 | 8.606 | 3.154 | 3000.5 | 3320.0 | 8.600 | 420 |
| 440 | 16.45 | 3033.8 | 3362.9 | 9.409 | 6.579 | 3033.5 | 3362.5 | 8.986 | 3.288 | 3033.0 | 3361.8 | 8.665 | 3.245 | 3033.0 | 3361.8 | 8.659 | 440 |
| 460 | 16.92 | 3066.5 | 3404.8 | 9.467 | 6.764 | 3066.3 | 3404.5 | 9.044 | 3.381 | 3065.8 | 3403.9 | 8.723 | 3.336 | 3065.8 | 3403.8 | 8.717 | 460 |
| 480 | 17.38 | 3099.5 | 3447.1 | 9.524 | 6.949 | 3099.3 | 3446.7 | 9.101 | 3.473 | 3098.8 | 3446.2 | 8.780 | 3.428 | 3098.8 | 3446.1 | 8.774 | 480 |
| 500 | 17.84 | 3132.8 | 3489.6 | 9.580 | 7.134 | 3132.6 | 3489.2 | 9.156 | 3.566 | 3132.2 | 3488.7 | 8.836 | 3.519 | 3132.1 | 3488.7 | 8.830 | 500 |
| 520 | 18.30 | 3166.3 | 3532.3 | 9.634 | 7.319 | 3166.1 | 3532.0 | 9.211 | 3.658 | 3165.7 | 3531.5 | 8.891 | 3.610 | 3165.7 | 3531.5 | 8.885 | 520 |
| 540 | 18.76 | 3200.1 | 3575.4 | 9.688 | 7.503 | 3199.9 | 3575.1 | 9.265 | 3.751 | 3199.6 | 3574.6 | 8.944 | 3.701 | 3199.6 | 3574.6 | 8.938 | 540 |
| 560 | 19.22 | 3234.2 | 3618.7 | 9.741 | 7.688 | 3234.0 | 3618.4 | 9.317 | 3.843 | 3233.7 | 3618.0 | 8.997 | 3.793 | 3233.7 | 3618.0 | 8.991 | 560 |
| 580 | 19.69 | 3268.6 | 3662.3 | 9.792 | 7.873 | 3268.4 | 3662.1 | 9.369 | 3.936 | 3268.1 | 3661.6 | 9.049 | 3.884 | 3268.1 | 3661.6 | 9.043 | 580 |
| 600 | 20.15 | 3303.2 | 3706.2 | 9.843 | 8.058 | 3303.1 | 3706.0 | 9.420 | 4.028 | 3302.8 | 3705.6 | 9.100 | 3.975 | 3302.8 | 3705.6 | 9.094 | 600 |
| 640 | 21.07 | 3373.4 | 3794.8 | 9.942 | 8.427 | 3373.2 | 3794.6 | 9.519 | 4.213 | 3373.0 | 3794.3 | 9.199 | 4.158 | 3373.0 | 3794.2 | 9.193 | 640 |
| 680 | 21.99 | 3444.7 | 3884.6 | 10.039 | 8.797 | 3444.5 | 3884.4 | 9.615 | 4.398 | 3444.3 | 3884.1 | 9.295 | 4.340 | 3444.3 | 3884.1 | 9.289 | 680 |
| 720 | 22.92 | 3517.1 | 3975.4 | 10.132 | 9.166 | 3517.0 | 3975.3 | 9.709 | 4.582 | 3516.7 | 3975.0 | 9.389 | 4.522 | 3516.7 | 3975.0 | 9.383 | 720 |
| 760 | 23.84 | 3590.6 | 4067.4 | 10.223 | 9.535 | 3590.5 | 4067.3 | 9.800 | 4.767 | 3590.3 | 4067.0 | 9.480 | 4.705 | 3590.3 | 4067.0 | 9.474 | 760 |
| 800 | 24.76 | 3665.3 | 4160.6 | 10.311 | 9.905 | 3665.2 | 4160.4 | 9.888 | 4.952 | 3665.0 | 4160.2 | 9.568 | 4.887 | 3665.0 | 4160.2 | 9.562 | 800 |

**Table 3: Subcooled Water and Superheated Steam (2 bar to 8 bar)**

| | **2 bar** | | ($T_{sat}$ = 120.2°C) | | **4 bar** | | ($T_{sat}$ = 143.6°C) | | **6 bar** | | ($T_{sat}$ = 158.8°C) | | **8 bar** | | ($T_{sat}$ = 170.4°C) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **T** | **v** | **u** | **h** | **s** | **v** | **u** | **h** | **s** | **v** | **u** | **h** | **s** | **v** | **u** | **h** | **s** | **T** |
| (°C) | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | (°C) |
| 0.01 | 0.001000 | 0.003688 | 0.203709 | 0.0000 | 0.001000 | 0.007365 | 0.407366 | 0.0000 | 0.001000 | 0.011021 | 0.610962 | 0.0000 | 0.001000 | 0.014655 | 0.814495 | 0.0001 | 0.01 |
| 20 | 0.001002 | 83.91 | 84.11 | 0.2965 | 0.001002 | 83.89 | 84.29 | 0.2964 | 0.001002 | 83.88 | 84.48 | 0.2964 | 0.001001 | 83.87 | 84.67 | 0.2963 | 20 |
| 40 | 0.001008 | 167.5 | 167.7 | 0.5724 | 0.001008 | 167.49 | 167.89 | 0.5723 | 0.001008 | 167.46 | 168.07 | 0.5722 | 0.001008 | 167.44 | 168.24 | 0.5721 | 40 |
| 60 | 0.001017 | 251.1 | 251.3 | 0.8311 | 0.001017 | 251.07 | 251.47 | 0.8310 | 0.001017 | 251.03 | 251.64 | 0.8309 | 0.001017 | 251.00 | 251.81 | 0.8308 | 60 |
| 80 | 0.001029 | 334.9 | 335.1 | 1.075 | 0.001029 | 334.82 | 335.23 | 1.075 | 0.001029 | 334.77 | 335.39 | 1.075 | 0.001029 | 334.72 | 335.55 | 1.075 | 80 |
| 100 | 0.001043 | 418.96 | 419.17 | 1.307 | 0.001043 | 418.91 | 419.32 | 1.307 | 0.001043 | 418.85 | 419.47 | 1.307 | 0.001043 | 418.79 | 419.62 | 1.306 | 100 |
| 120 | 0.001060 | 503.57 | 503.79 | 1.528 | 0.001060 | 503.50 | 503.93 | 1.528 | 0.001060 | 503.43 | 504.07 | 1.527 | 0.001060 | 503.36 | 504.21 | 1.527 | 120 |
| 140 | 0.9353 | 2561.3 | 2748.3 | 7.231 | 0.001080 | 588.79 | 589.23 | 1.739 | 0.001080 | 588.71 | 589.35 | 1.739 | 0.001079 | 588.62 | 589.48 | 1.739 | 140 |
| 160 | 0.984 | 2592.8 | 2789.7 | 7.329 | 0.4839 | 2581.6 | 2775.2 | 6.983 | 0.3167 | 2569.0 | 2759.0 | 6.766 | 0.001102 | 674.80 | 675.68 | 1.943 | 160 |
| 180 | 1.033 | 2623.9 | 2830.4 | 7.421 | 0.5094 | 2614.9 | 2818.6 | 7.081 | 0.3347 | 2605.2 | 2806.0 | 6.872 | 0.2472 | 2594.7 | 2792.4 | 6.715 | 180 |
| 200 | 1.081 | 2654.7 | 2870.8 | 7.508 | 0.5343 | 2647.3 | 2861.0 | 7.172 | 0.3521 | 2639.4 | 2850.7 | 6.968 | 0.2609 | 2631.1 | 2839.8 | 6.818 | 200 |
| 220 | 1.128 | 2685.4 | 2911.0 | 7.591 | 0.5589 | 2679.1 | 2902.7 | 7.259 | 0.3690 | 2672.6 | 2894.0 | 7.058 | 0.2740 | 2665.7 | 2885.0 | 6.911 | 220 |
| 240 | 1.175 | 2716.1 | 2951.2 | 7.671 | 0.5831 | 2710.7 | 2944.0 | 7.341 | 0.3857 | 2705.2 | 2936.6 | 7.143 | 0.2869 | 2699.4 | 2928.9 | 6.999 | 240 |
| 260 | 1.222 | 2746.9 | 2991.4 | 7.748 | 0.6072 | 2742.2 | 2985.1 | 7.419 | 0.4021 | 2737.4 | 2978.6 | 7.223 | 0.2995 | 2732.4 | 2972.0 | 7.081 | 260 |
| 280 | 1.269 | 2777.8 | 3031.7 | 7.822 | 0.6311 | 2773.7 | 3026.1 | 7.495 | 0.4183 | 2769.4 | 3020.4 | 7.300 | 0.3119 | 2765.1 | 3014.6 | 7.159 | 280 |
| 300 | 1.316 | 2808.8 | 3072.1 | 7.894 | 0.6549 | 2805.2 | 3067.1 | 7.568 | 0.4344 | 2801.4 | 3062.1 | 7.374 | 0.3242 | 2797.6 | 3056.9 | 7.235 | 300 |
| 320 | 1.363 | 2840.1 | 3112.7 | 7.964 | 0.6786 | 2836.8 | 3108.2 | 7.638 | 0.4504 | 2833.4 | 3103.7 | 7.445 | 0.3363 | 2830.0 | 3099.1 | 7.307 | 320 |
| 340 | 1.410 | 2871.5 | 3153.4 | 8.031 | 0.7022 | 2868.5 | 3149.4 | 7.706 | 0.4663 | 2865.5 | 3145.3 | 7.514 | 0.3484 | 2862.4 | 3141.1 | 7.377 | 340 |
| 360 | 1.456 | 2903.1 | 3194.4 | 8.097 | 0.7257 | 2900.4 | 3190.7 | 7.773 | 0.4822 | 2897.6 | 3187.0 | 7.581 | 0.3604 | 2894.9 | 3183.2 | 7.444 | 360 |
| 380 | 1.503 | 2935.0 | 3235.6 | 8.161 | 0.7492 | 2932.5 | 3232.2 | 7.837 | 0.4980 | 2930.0 | 3228.8 | 7.646 | 0.3724 | 2927.4 | 3225.3 | 7.510 | 380 |
| 400 | 1.549 | 2967.1 | 3277.0 | 8.223 | 0.7726 | 2964.8 | 3273.9 | 7.900 | 0.5137 | 2962.5 | 3270.7 | 7.710 | 0.3843 | 2960.1 | 3267.6 | 7.573 | 400 |
| 420 | 1.596 | 2999.5 | 3318.6 | 8.284 | 0.7960 | 2997.3 | 3315.7 | 7.961 | 0.5294 | 2995.2 | 3312.8 | 7.771 | 0.3961 | 2993.0 | 3309.9 | 7.635 | 420 |
| 440 | 1.642 | 3032.0 | 3360.5 | 8.344 | 0.8194 | 3030.1 | 3357.8 | 8.021 | 0.5451 | 3028.1 | 3355.1 | 7.831 | 0.4080 | 3026.1 | 3352.5 | 7.696 | 440 |
| 460 | 1.689 | 3064.9 | 3402.6 | 8.402 | 0.8428 | 3063.0 | 3400.1 | 8.080 | 0.5608 | 3061.2 | 3397.7 | 7.890 | 0.4198 | 3059.3 | 3395.2 | 7.755 | 460 |
| 480 | 1.735 | 3098.0 | 3445.0 | 8.459 | 0.8661 | 3096.3 | 3442.7 | 8.137 | 0.5764 | 3094.5 | 3440.4 | 7.948 | 0.4316 | 3092.8 | 3438.1 | 7.813 | 480 |
| 500 | 1.781 | 3131.3 | 3487.6 | 8.515 | 0.8894 | 3129.7 | 3485.5 | 8.193 | 0.5920 | 3128.1 | 3483.3 | 8.004 | 0.4433 | 3126.5 | 3481.2 | 7.869 | 500 |
| 520 | 1.828 | 3165.0 | 3530.5 | 8.570 | 0.9126 | 3163.5 | 3528.5 | 8.248 | 0.6076 | 3162.0 | 3526.5 | 8.059 | 0.4551 | 3160.4 | 3524.5 | 7.924 | 520 |
| 540 | 1.874 | 3198.9 | 3573.7 | 8.624 | 0.9359 | 3197.5 | 3571.8 | 8.302 | 0.6232 | 3196.0 | 3569.9 | 8.113 | 0.4668 | 3194.6 | 3568.0 | 7.979 | 540 |
| 560 | 1.920 | 3233.0 | 3617.1 | 8.676 | 0.959 | 3231.7 | 3615.4 | 8.355 | 0.6387 | 3230.4 | 3613.6 | 8.166 | 0.4785 | 3229.0 | 3611.8 | 8.032 | 560 |
| 580 | 1.967 | 3267.5 | 3660.8 | 8.728 | 0.982 | 3266.2 | 3659.2 | 8.407 | 0.6542 | 3265.0 | 3657.5 | 8.218 | 0.4902 | 3263.7 | 3655.8 | 8.084 | 580 |
| 600 | 2.013 | 3302.2 | 3704.8 | 8.779 | 1.006 | 3301.0 | 3703.2 | 8.458 | 0.6698 | 3299.8 | 3701.7 | 8.269 | 0.5019 | 3298.6 | 3700.1 | 8.135 | 600 |
| 640 | 2.106 | 3372.4 | 3793.6 | 8.879 | 1.052 | 3371.4 | 3792.2 | 8.558 | 0.7008 | 3370.3 | 3790.8 | 8.369 | 0.5252 | 3369.3 | 3789.4 | 8.235 | 640 |
| 680 | 2.198 | 3443.8 | 3883.4 | 8.975 | 1.098 | 3442.9 | 3882.2 | 8.654 | 0.7318 | 3441.9 | 3881.0 | 8.466 | 0.5485 | 3441.0 | 3879.7 | 8.332 | 680 |
| 720 | 2.291 | 3516.3 | 3974.4 | 9.068 | 1.145 | 3515.4 | 3973.3 | 8.748 | 0.7627 | 3514.6 | 3972.2 | 8.560 | 0.5717 | 3513.7 | 3971.1 | 8.426 | 720 |
| 760 | 2.383 | 3589.9 | 4066.5 | 9.159 | 1.191 | 3589.1 | 4065.5 | 8.839 | 0.7937 | 3588.3 | 4064.5 | 8.651 | 0.5950 | 3587.6 | 4063.5 | 8.517 | 760 |
| 800 | 2.476 | 3664.7 | 4159.8 | 9.248 | 1.237 | 3663.9 | 4158.9 | 8.927 | 0.8246 | 3663.2 | 4157.9 | 8.739 | 0.6182 | 3662.5 | 4157.0 | 8.606 | 800 |

**Table 3: Subcooled Water and Superheated Steam (10 bar to 40 bar)**

| | **10 bar** | | ($T_{sat}$ = 179.9°C) | | **20 bar** | | ($T_{sat}$ = 212.4°C) | | **30 bar** | | ($T_{sat}$ = 233.9°C) | | **40 bar** | | ($T_{sat}$ = 250.4°C) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **T** | **v** | **u** | **h** | **s** | **v** | **u** | **h** | **s** | **v** | **u** | **h** | **s** | **v** | **u** | **h** | **s** | **T** |
| (°C) | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | (°C) |
| 0.01 | 0.001000 | 0.01827 | 1.018 | 0.00007 | 0.000999 | 0.03601 | 2.034 | 0.00013 | 0.000999 | 0.05321 | 3.049 | 0.00019 | 0.000998 | 0.06989 | 4.063 | 0.0002 | 0.01 |
| 20 | 0.001001 | 83.86 | 84.86 | 0.2963 | 0.001001 | 83.80 | 85.80 | 0.2961 | 0.001000 | 83.74 | 86.74 | 0.2959 | 0.001000 | 83.68 | 87.68 | 0.2957 | 20 |
| 40 | 0.001007 | 167.41 | 168.42 | 0.5720 | 0.001007 | 167.29 | 169.31 | 0.5717 | 0.001007 | 167.17 | 170.19 | 0.5713 | 0.001006 | 167.05 | 171.08 | 0.5709 | 40 |
| 60 | 0.001017 | 250.96 | 251.98 | 0.8307 | 0.001016 | 250.78 | 252.82 | 0.8302 | 0.001016 | 250.61 | 253.66 | 0.8296 | 0.001015 | 250.43 | 254.50 | 0.8291 | 60 |
| 80 | 0.001029 | 334.68 | 335.71 | 1.075 | 0.001028 | 334.45 | 336.50 | 1.074 | 0.001028 | 334.22 | 337.30 | 1.073 | 0.001027 | 333.99 | 338.09 | 1.073 | 80 |
| 100 | 0.001043 | 418.73 | 419.77 | 1.306 | 0.001042 | 418.44 | 420.53 | 1.306 | 0.001042 | 418.15 | 421.28 | 1.305 | 0.001041 | 417.86 | 422.03 | 1.304 | 100 |
| 120 | 0.001060 | 503.29 | 504.35 | 1.527 | 0.001059 | 502.93 | 505.05 | 1.526 | 0.001059 | 502.58 | 505.76 | 1.525 | 0.001058 | 502.23 | 506.46 | 1.524 | 120 |
| 140 | 0.001079 | 588.53 | 589.61 | 1.739 | 0.001079 | 588.11 | 590.26 | 1.738 | 0.001078 | 587.68 | 590.91 | 1.737 | 0.001077 | 587.25 | 591.56 | 1.736 | 140 |
| 160 | 0.001102 | 674.70 | 675.80 | 1.942 | 0.001101 | 674.18 | 676.38 | 1.941 | 0.001100 | 673.67 | 676.97 | 1.940 | 0.001100 | 673.16 | 677.56 | 1.939 | 160 |
| 180 | 0.1944 | 2583.0 | 2777.4 | 6.586 | 0.001127 | 761.44 | 763.69 | 2.138 | 0.001126 | 760.82 | 764.20 | 2.137 | 0.001125 | 760.21 | 764.71 | 2.135 | 180 |
| 200 | 0.2060 | 2622.3 | 2828.3 | 6.695 | 0.001156 | 850.26 | 852.57 | 2.330 | 0.001155 | 849.51 | 852.98 | 2.329 | 0.001154 | 848.77 | 853.39 | 2.327 | 200 |
| 220 | 0.2170 | 2658.6 | 2875.6 | 6.793 | 0.1022 | 2617.3 | 2821.7 | 6.387 | 0.001189 | 940.26 | 943.83 | 2.517 | 0.001188 | 939.35 | 944.10 | 2.515 | 220 |
| 240 | 0.2276 | 2693.4 | 2921.0 | 6.884 | 0.1085 | 2660.2 | 2877.2 | 6.497 | 0.06823 | 2619.9 | 2824.6 | 6.228 | 0.001228 | 1032.7 | 1037.6 | 2.700 | 240 |
| 260 | 0.2379 | 2727.4 | 2965.2 | 6.968 | 0.1144 | 2699.7 | 2928.5 | 6.595 | 0.07289 | 2667.8 | 2886.4 | 6.346 | 0.05178 | 2630.1 | 2837.2 | 6.138 | 260 |
| 280 | 0.2480 | 2760.7 | 3008.7 | 7.048 | 0.1200 | 2737.1 | 2977.2 | 6.685 | 0.07716 | 2710.7 | 2942.2 | 6.449 | 0.05549 | 2680.9 | 2902.9 | 6.259 | 280 |
| 300 | 0.2580 | 2793.7 | 3051.7 | 7.125 | 0.1255 | 2773.2 | 3024.3 | 6.769 | 0.08118 | 2750.8 | 2994.3 | 6.541 | 0.05887 | 2726.2 | 2961.7 | 6.364 | 300 |
| 320 | 0.2678 | 2826.5 | 3094.4 | 7.198 | 0.1308 | 2808.5 | 3070.2 | 6.847 | 0.08502 | 2789.1 | 3044.2 | 6.627 | 0.06202 | 2768.2 | 3016.3 | 6.458 | 320 |
| 340 | 0.2776 | 2859.3 | 3136.9 | 7.268 | 0.1360 | 2843.2 | 3115.3 | 6.922 | 0.08874 | 2826.2 | 3092.4 | 6.707 | 0.06502 | 2808.1 | 3068.1 | 6.544 | 340 |
| 360 | 0.2873 | 2892.1 | 3179.4 | 7.337 | 0.1411 | 2877.6 | 3159.9 | 6.994 | 0.09235 | 2862.4 | 3139.5 | 6.782 | 0.06790 | 2846.5 | 3118.1 | 6.624 | 360 |
| 380 | 0.2970 | 2924.9 | 3221.9 | 7.403 | 0.1462 | 2911.8 | 3204.2 | 7.063 | 0.09590 | 2898.1 | 3185.8 | 6.854 | 0.07070 | 2883.9 | 3166.7 | 6.699 | 380 |
| 400 | 0.3066 | 2957.8 | 3264.4 | 7.467 | 0.1512 | 2945.8 | 3248.2 | 7.129 | 0.09938 | 2933.4 | 3231.6 | 6.923 | 0.07343 | 2920.6 | 3214.4 | 6.771 | 400 |
| 420 | 0.3162 | 2990.8 | 3307.0 | 7.529 | 0.1562 | 2979.8 | 3292.2 | 7.193 | 0.1028 | 2968.5 | 3277.0 | 6.990 | 0.07611 | 2956.9 | 3261.4 | 6.840 | 420 |
| 440 | 0.3257 | 3024.1 | 3349.8 | 7.590 | 0.1611 | 3013.9 | 3336.1 | 7.256 | 0.1062 | 3003.5 | 3322.1 | 7.054 | 0.07874 | 2992.9 | 3307.9 | 6.906 | 440 |
| 460 | 0.3352 | 3057.5 | 3392.7 | 7.649 | 0.1660 | 3048.1 | 3380.0 | 7.317 | 0.1096 | 3038.5 | 3367.2 | 7.116 | 0.08134 | 3028.7 | 3354.0 | 6.970 | 460 |
| 480 | 0.3447 | 3091.1 | 3435.7 | 7.707 | 0.1708 | 3082.3 | 3424.0 | 7.376 | 0.1129 | 3073.4 | 3412.1 | 7.177 | 0.08390 | 3064.4 | 3400.0 | 7.032 | 480 |
| 500 | 0.3541 | 3124.9 | 3479.0 | 7.764 | 0.1757 | 3116.7 | 3468.1 | 7.433 | 0.1162 | 3108.5 | 3457.0 | 7.236 | 0.08644 | 3100.1 | 3445.8 | 7.092 | 500 |
| 520 | 0.3635 | 3158.9 | 3522.5 | 7.819 | 0.1805 | 3151.3 | 3512.3 | 7.490 | 0.1195 | 3143.6 | 3502.0 | 7.293 | 0.08896 | 3135.8 | 3491.6 | 7.150 | 520 |
| 540 | 0.3730 | 3193.2 | 3566.2 | 7.874 | 0.1853 | 3186.0 | 3556.6 | 7.545 | 0.1227 | 3178.8 | 3547.0 | 7.349 | 0.09146 | 3171.5 | 3537.3 | 7.207 | 540 |
| 560 | 0.3824 | 3227.7 | 3610.1 | 7.927 | 0.1901 | 3221.0 | 3601.2 | 7.599 | 0.1260 | 3214.2 | 3592.2 | 7.404 | 0.09394 | 3207.4 | 3583.1 | 7.263 | 560 |
| 580 | 0.3917 | 3262.4 | 3654.2 | 7.980 | 0.1949 | 3256.1 | 3645.8 | 7.652 | 0.1292 | 3249.7 | 3637.4 | 7.458 | 0.09640 | 3243.3 | 3628.9 | 7.317 | 580 |
| 600 | 0.4011 | 3297.4 | 3698.6 | 8.031 | 0.1996 | 3291.5 | 3690.7 | 7.704 | 0.1324 | 3285.5 | 3682.8 | 7.510 | 0.09886 | 3279.4 | 3674.8 | 7.370 | 600 |
| 640 | 0.4198 | 3368.2 | 3788.0 | 8.131 | 0.2091 | 3362.9 | 3781.1 | 7.805 | 0.1389 | 3357.5 | 3774.1 | 7.612 | 0.1037 | 3352.1 | 3767.0 | 7.474 | 640 |
| 680 | 0.4385 | 3440.0 | 3878.5 | 8.228 | 0.2185 | 3435.2 | 3872.3 | 7.903 | 0.1452 | 3430.4 | 3866.1 | 7.711 | 0.1086 | 3425.5 | 3859.8 | 7.573 | 680 |
| 720 | 0.4572 | 3512.8 | 3970.0 | 8.322 | 0.2280 | 3508.5 | 3964.4 | 7.998 | 0.1516 | 3504.1 | 3958.8 | 7.806 | 0.1134 | 3499.7 | 3953.2 | 7.669 | 720 |
| 760 | 0.4758 | 3586.8 | 4062.5 | 8.413 | 0.2374 | 3582.8 | 4057.5 | 8.090 | 0.1579 | 3578.8 | 4052.5 | 7.899 | 0.1182 | 3574.8 | 4047.4 | 7.762 | 760 |
| 800 | 0.4944 | 3661.8 | 4156.1 | 8.502 | 0.2467 | 3658.1 | 4151.6 | 8.179 | 0.1642 | 3654.5 | 4147.0 | 7.989 | 0.1229 | 3650.8 | 4142.5 | 7.852 | 800 |

**Table 3: Subcooled Water and Superheated Steam (50 bar to 80 bar)**

| | **50 bar** | | ($T_{sat}$ = 263.9°C) | | **60 bar** | | ($T_{sat}$ = 275.6°C) | | **70 bar** | | ($T_{sat}$ = 285.8°C) | | **80 bar** | | ($T_{sat}$ = 295.0°C) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **T** | **v** | **u** | **h** | **s** | **v** | **u** | **h** | **s** | **v** | **u** | **h** | **s** | **v** | **u** | **h** | **s** | **T** |
| (°C) | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | (°C) |
| 0.01 | 0.000998 | 0.08604 | 5.074 | 0.00029 | 0.000997 | 0.10167 | 6.085 | 0.00034 | 0.000997 | 0.11679 | 7.094 | 0.00038 | 0.000996 | 0.131386 | 8.100889 | 0.00042 | 0.01 |
| 20 | 0.001000 | 83.62 | 88.61 | 0.2955 | 0.000999 | 83.55 | 89.55 | 0.2952 | 0.000999 | 83.49 | 90.48 | 0.2950 | 0.000998 | 83.43 | 91.42 | 0.2948 | 20 |
| 40 | 0.001006 | 166.93 | 171.96 | 0.5705 | 0.001005 | 166.81 | 172.84 | 0.5701 | 0.001005 | 166.69 | 173.73 | 0.5697 | 0.001004 | 166.58 | 174.61 | 0.5693 | 40 |
| 60 | 0.001015 | 250.26 | 255.33 | 0.8286 | 0.001014 | 250.09 | 256.17 | 0.8280 | 0.001014 | 249.91 | 257.01 | 0.8275 | 0.001014 | 249.74 | 257.85 | 0.8270 | 60 |
| 80 | 0.001027 | 333.76 | 338.89 | 1.072 | 0.001026 | 333.53 | 339.69 | 1.071 | 0.001026 | 333.30 | 340.48 | 1.071 | 0.001025 | 333.08 | 341.28 | 1.070 | 80 |
| 100 | 0.001041 | 417.58 | 422.78 | 1.303 | 0.001040 | 417.29 | 423.53 | 1.302 | 0.001040 | 417.01 | 424.29 | 1.302 | 0.001039 | 416.72 | 425.04 | 1.301 | 100 |
| 120 | 0.001058 | 501.88 | 507.17 | 1.523 | 0.001057 | 501.53 | 507.87 | 1.523 | 0.001057 | 501.18 | 508.58 | 1.522 | 0.001056 | 500.84 | 509.28 | 1.521 | 120 |
| 140 | 0.001077 | 586.83 | 592.22 | 1.734 | 0.001076 | 586.41 | 592.87 | 1.733 | 0.001076 | 585.99 | 593.52 | 1.732 | 0.001075 | 585.58 | 594.18 | 1.731 | 140 |
| 160 | 0.001099 | 672.65 | 678.14 | 1.938 | 0.001098 | 672.15 | 678.73 | 1.936 | 0.001097 | 671.64 | 679.33 | 1.935 | 0.001097 | 671.15 | 679.92 | 1.934 | 160 |
| 180 | 0.001124 | 759.60 | 765.22 | 2.134 | 0.001123 | 758.99 | 765.73 | 2.133 | 0.001122 | 758.39 | 766.25 | 2.131 | 0.001122 | 757.80 | 766.77 | 2.130 | 180 |
| 200 | 0.001153 | 848.04 | 853.80 | 2.325 | 0.001152 | 847.30 | 854.22 | 2.324 | 0.001151 | 846.58 | 854.64 | 2.322 | 0.001150 | 845.86 | 855.06 | 2.321 | 200 |
| 220 | 0.001187 | 938.45 | 944.38 | 2.513 | 0.001186 | 937.56 | 944.67 | 2.511 | 0.001184 | 936.67 | 944.96 | 2.509 | 0.001183 | 935.80 | 945.26 | 2.507 | 220 |
| 240 | 0.001227 | 1031.5 | 1037.7 | 2.698 | 0.001225 | 1030.4 | 1037.8 | 2.696 | 0.001224 | 1029.3 | 1037.9 | 2.694 | 0.001222 | 1028.3 | 1038.0 | 2.692 | 240 |
| 260 | 0.001275 | 1128.4 | 1134.8 | 2.884 | 0.001273 | 1127.0 | 1134.6 | 2.881 | 0.001271 | 1125.6 | 1134.5 | 2.879 | 0.001269 | 1124.2 | 1134.3 | 2.876 | 260 |
| 280 | 0.04227 | 2646.7 | 2858.1 | 6.091 | 0.03320 | 2606.0 | 2805.2 | 5.928 | 0.001331 | 1227.0 | 1236.3 | 3.066 | 0.001328 | 1225.2 | 1235.8 | 3.063 | 280 |
| 300 | 0.04535 | 2698.9 | 2925.6 | 6.211 | 0.03619 | 2668.3 | 2885.5 | 6.070 | 0.02949 | 2633.4 | 2839.8 | 5.934 | 0.02428 | 2592.1 | 2786.4 | 5.794 | 300 |
| 320 | 0.04813 | 2745.5 | 2986.2 | 6.315 | 0.03878 | 2720.9 | 2953.5 | 6.187 | 0.03201 | 2693.8 | 2917.9 | 6.067 | 0.02684 | 2663.6 | 2878.4 | 5.951 | 320 |
| 340 | 0.05073 | 2788.7 | 3042.4 | 6.408 | 0.04114 | 2768.1 | 3014.9 | 6.289 | 0.03423 | 2745.9 | 2985.5 | 6.180 | 0.02899 | 2721.9 | 2953.9 | 6.077 | 340 |
| 360 | 0.05319 | 2829.7 | 3095.6 | 6.493 | 0.04334 | 2811.9 | 3072.0 | 6.380 | 0.03626 | 2793.2 | 3047.0 | 6.278 | 0.03092 | 2773.3 | 3020.6 | 6.184 | 360 |
| 380 | 0.05555 | 2869.1 | 3146.8 | 6.573 | 0.04542 | 2853.6 | 3126.1 | 6.465 | 0.03816 | 2837.3 | 3104.4 | 6.368 | 0.03268 | 2820.3 | 3081.8 | 6.279 | 380 |
| 400 | 0.05784 | 2907.4 | 3196.6 | 6.648 | 0.04742 | 2893.6 | 3178.2 | 6.543 | 0.03996 | 2879.4 | 3159.1 | 6.450 | 0.03435 | 2864.5 | 3139.3 | 6.366 | 400 |
| 420 | 0.06007 | 2945.0 | 3245.3 | 6.719 | 0.04936 | 2932.6 | 3228.8 | 6.617 | 0.04169 | 2919.9 | 3211.8 | 6.527 | 0.03593 | 2906.8 | 3194.2 | 6.446 | 420 |
| 440 | 0.06225 | 2982.0 | 3293.3 | 6.788 | 0.05124 | 2970.9 | 3278.3 | 6.688 | 0.04337 | 2959.4 | 3263.0 | 6.600 | 0.03745 | 2947.6 | 3247.3 | 6.522 | 440 |
| 460 | 0.06439 | 3018.7 | 3340.7 | 6.853 | 0.05308 | 3008.5 | 3327.0 | 6.755 | 0.04500 | 2998.1 | 3313.1 | 6.669 | 0.03893 | 2987.5 | 3298.9 | 6.593 | 460 |
| 480 | 0.06650 | 3055.2 | 3387.7 | 6.917 | 0.05489 | 3045.9 | 3375.2 | 6.820 | 0.04659 | 3036.3 | 3362.5 | 6.736 | 0.04036 | 3026.6 | 3349.5 | 6.661 | 480 |
| 500 | 0.06858 | 3091.6 | 3434.5 | 6.978 | 0.05667 | 3082.9 | 3422.9 | 6.882 | 0.04816 | 3074.1 | 3411.3 | 6.800 | 0.04177 | 3065.2 | 3399.4 | 6.726 | 500 |
| 520 | 0.07064 | 3127.8 | 3481.1 | 7.037 | 0.05843 | 3119.8 | 3470.4 | 6.943 | 0.04970 | 3111.7 | 3459.6 | 6.861 | 0.04315 | 3103.5 | 3448.6 | 6.789 | 520 |
| 540 | 0.07268 | 3164.1 | 3527.5 | 7.095 | 0.06016 | 3156.7 | 3517.6 | 7.002 | 0.05121 | 3149.1 | 3507.6 | 6.921 | 0.04450 | 3141.5 | 3497.5 | 6.850 | 540 |
| 560 | 0.07470 | 3200.4 | 3574.0 | 7.152 | 0.06188 | 3193.5 | 3564.7 | 7.059 | 0.05271 | 3186.4 | 3555.4 | 6.979 | 0.04584 | 3179.3 | 3546.0 | 6.909 | 560 |
| 580 | 0.07671 | 3236.8 | 3620.4 | 7.207 | 0.06358 | 3230.3 | 3611.8 | 7.115 | 0.05420 | 3223.7 | 3603.1 | 7.036 | 0.04716 | 3217.0 | 3594.3 | 6.966 | 580 |
| 600 | 0.07870 | 3273.3 | 3666.8 | 7.260 | 0.06526 | 3267.2 | 3658.8 | 7.169 | 0.05566 | 3261.0 | 3650.6 | 7.091 | 0.04846 | 3254.7 | 3642.4 | 7.022 | 600 |
| 640 | 0.08265 | 3346.7 | 3759.9 | 7.365 | 0.06860 | 3341.2 | 3752.8 | 7.275 | 0.05857 | 3335.7 | 3745.6 | 7.197 | 0.05104 | 3330.1 | 3738.4 | 7.130 | 640 |
| 680 | 0.08657 | 3420.6 | 3853.5 | 7.465 | 0.07190 | 3415.7 | 3847.1 | 7.376 | 0.06143 | 3410.8 | 3840.8 | 7.299 | 0.05357 | 3405.8 | 3834.4 | 7.232 | 680 |
| 720 | 0.09045 | 3495.3 | 3947.6 | 7.562 | 0.07517 | 3490.9 | 3941.9 | 7.473 | 0.06426 | 3486.4 | 3936.2 | 7.397 | 0.05607 | 3481.9 | 3930.5 | 7.331 | 720 |
| 760 | 0.09431 | 3570.8 | 4042.4 | 7.655 | 0.07842 | 3566.8 | 4037.3 | 7.567 | 0.06706 | 3562.7 | 4032.2 | 7.492 | 0.05855 | 3558.6 | 4027.0 | 7.427 | 760 |
| 800 | 0.09815 | 3647.1 | 4137.9 | 7.746 | 0.08164 | 3643.4 | 4133.3 | 7.658 | 0.06985 | 3639.7 | 4128.7 | 7.584 | 0.06101 | 3636.0 | 4124.0 | 7.519 | 800 |

**Table 3: Subcooled Water and Superheated Steam (90 bar to 140 bar)**

| | **90 bar** | | ($T_{sat}$ = 303.3°C) | | **100 bar** | | ($T_{sat}$ = 311.0°C) | | **120 bar** | | ($T_{sat}$ = 324.7°C) | | **140 bar** | | ($T_{sat}$ = 336.7°C) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **T** | **v** | **u** | **h** | **s** | **v** | **u** | **h** | **s** | **v** | **u** | **h** | **s** | **v** | **u** | **h** | **s** | **T** |
| (°C) | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | (°C) |
| 0.01 | 0.000996 | 0.1455 | 9.107 | 0.00046 | 0.000995 | 0.1591 | 10.11 | 0.00049 | 0.000994 | 0.1847 | 12.12 | 0.00055 | 0.000993 | 0.2084 | 14.11 | 0.00059 | 0.01 |
| 20 | 0.000998 | 83.37 | 92.35 | 0.2946 | 0.000997 | 83.31 | 93.29 | 0.2944 | 0.000996 | 83.19 | 95.15 | 0.2939 | 0.000996 | 83.07 | 97.01 | 0.2935 | 20 |
| 40 | 0.001004 | 166.46 | 175.49 | 0.5689 | 0.001003 | 166.34 | 176.37 | 0.5685 | 0.001003 | 166.10 | 178.14 | 0.5678 | 0.001002 | 165.87 | 179.90 | 0.5670 | 40 |
| 60 | 0.001013 | 249.57 | 258.69 | 0.8265 | 0.001013 | 249.40 | 259.53 | 0.8259 | 0.001012 | 249.06 | 261.20 | 0.8249 | 0.001011 | 248.72 | 262.88 | 0.8238 | 60 |
| 80 | 0.001025 | 332.85 | 342.08 | 1.070 | 0.001024 | 332.63 | 342.87 | 1.069 | 0.001023 | 332.18 | 344.46 | 1.068 | 0.001023 | 331.74 | 346.06 | 1.066 | 80 |
| 100 | 0.001039 | 416.44 | 425.79 | 1.300 | 0.001038 | 416.16 | 426.55 | 1.299 | 0.001038 | 415.61 | 428.06 | 1.298 | 0.001037 | 415.05 | 429.57 | 1.296 | 100 |
| 120 | 0.001055 | 500.49 | 509.99 | 1.520 | 0.001055 | 500.15 | 510.70 | 1.519 | 0.001054 | 499.47 | 512.12 | 1.517 | 0.001053 | 498.80 | 513.54 | 1.516 | 120 |
| 140 | 0.001074 | 585.16 | 594.83 | 1.730 | 0.001074 | 584.75 | 595.49 | 1.729 | 0.001073 | 583.94 | 596.81 | 1.727 | 0.001071 | 583.13 | 598.13 | 1.725 | 140 |
| 160 | 0.001096 | 670.65 | 680.52 | 1.933 | 0.001095 | 670.16 | 681.11 | 1.932 | 0.001094 | 669.18 | 682.31 | 1.929 | 0.001093 | 668.22 | 683.51 | 1.927 | 160 |
| 180 | 0.001121 | 757.20 | 767.29 | 2.129 | 0.001120 | 756.61 | 767.81 | 2.127 | 0.001118 | 755.44 | 768.86 | 2.125 | 0.001117 | 754.29 | 769.93 | 2.122 | 180 |
| 200 | 0.001149 | 845.15 | 855.49 | 2.319 | 0.001148 | 844.44 | 855.92 | 2.318 | 0.001146 | 843.03 | 856.79 | 2.315 | 0.001144 | 841.65 | 857.67 | 2.312 | 200 |
| 220 | 0.001182 | 934.93 | 945.57 | 2.506 | 0.001181 | 934.07 | 945.87 | 2.504 | 0.001179 | 932.36 | 946.51 | 2.500 | 0.001176 | 930.69 | 947.16 | 2.497 | 220 |
| 240 | 0.001221 | 1027.2 | 1038.2 | 2.690 | 0.001219 | 1026.1 | 1038.3 | 2.688 | 0.001216 | 1024.0 | 1038.6 | 2.683 | 0.001213 | 1022.0 | 1039.0 | 2.679 | 240 |
| 260 | 0.001267 | 1122.8 | 1134.2 | 2.873 | 0.001265 | 1121.5 | 1134.1 | 2.871 | 0.001262 | 1118.8 | 1134.0 | 2.866 | 0.001258 | 1116.3 | 1133.9 | 2.861 | 260 |
| 280 | 0.001325 | 1223.4 | 1235.3 | 3.059 | 0.001323 | 1221.6 | 1234.8 | 3.056 | 0.001317 | 1218.1 | 1233.9 | 3.050 | 0.001312 | 1214.8 | 1233.1 | 3.044 | 280 |
| 300 | 0.001402 | 1331.6 | 1344.3 | 3.253 | 0.001398 | 1329.1 | 1343.1 | 3.248 | 0.001390 | 1324.3 | 1340.9 | 3.240 | 0.001382 | 1319.6 | 1339.0 | 3.231 | 300 |
| 320 | 0.02271 | 2629.5 | 2833.9 | 5.835 | 0.01927 | 2589.9 | 2782.7 | 5.713 | 0.001494 | 1442.4 | 1460.3 | 3.444 | 0.001480 | 1435.2 | 1455.9 | 3.432 | 320 |
| 340 | 0.02486 | 2695.8 | 2919.6 | 5.977 | 0.02149 | 2667.2 | 2882.1 | 5.878 | 0.01621 | 2598.9 | 2793.5 | 5.672 | 0.01200 | 2504.4 | 2672.4 | 5.429 | 340 |
| 360 | 0.02672 | 2752.0 | 2992.5 | 6.094 | 0.02333 | 2729.3 | 2962.6 | 6.007 | 0.01812 | 2678.4 | 2895.9 | 5.837 | 0.01423 | 2617.2 | 2816.4 | 5.661 | 360 |
| 380 | 0.02840 | 2802.4 | 3058.0 | 6.196 | 0.02495 | 2783.6 | 3033.1 | 6.117 | 0.01971 | 2742.6 | 2979.1 | 5.966 | 0.01587 | 2696.1 | 2918.3 | 5.819 | 380 |
| 400 | 0.02996 | 2849.1 | 3118.8 | 6.287 | 0.02644 | 2833.0 | 3097.4 | 6.214 | 0.02111 | 2798.6 | 3051.9 | 6.076 | 0.01724 | 2760.9 | 3002.2 | 5.946 | 400 |
| 420 | 0.03144 | 2893.2 | 3176.1 | 6.371 | 0.02783 | 2879.2 | 3157.5 | 6.302 | 0.02239 | 2849.6 | 3118.2 | 6.173 | 0.01846 | 2817.7 | 3076.1 | 6.054 | 420 |
| 440 | 0.03284 | 2935.5 | 3231.1 | 6.450 | 0.02915 | 2923.1 | 3214.6 | 6.383 | 0.02358 | 2897.1 | 3180.1 | 6.261 | 0.01958 | 2869.5 | 3143.6 | 6.150 | 440 |
| 460 | 0.03420 | 2976.6 | 3284.4 | 6.523 | 0.03041 | 2965.4 | 3269.5 | 6.459 | 0.02471 | 2942.3 | 3238.8 | 6.343 | 0.02062 | 2918.0 | 3206.7 | 6.237 | 460 |
| 480 | 0.03551 | 3016.7 | 3336.3 | 6.593 | 0.03163 | 3006.6 | 3322.9 | 6.531 | 0.02579 | 2985.8 | 3295.2 | 6.418 | 0.02160 | 2964.1 | 3266.5 | 6.318 | 480 |
| 500 | 0.03680 | 3056.2 | 3387.3 | 6.660 | 0.03281 | 3046.9 | 3375.1 | 6.599 | 0.02683 | 3028.0 | 3350.0 | 6.490 | 0.02255 | 3008.4 | 3324.1 | 6.393 | 500 |
| 520 | 0.03805 | 3095.1 | 3437.6 | 6.724 | 0.03397 | 3086.6 | 3426.3 | 6.665 | 0.02784 | 3069.3 | 3403.4 | 6.558 | 0.02345 | 3051.5 | 3379.8 | 6.464 | 520 |
| 540 | 0.03928 | 3133.7 | 3487.2 | 6.786 | 0.03510 | 3125.9 | 3476.9 | 6.728 | 0.02882 | 3109.9 | 3455.8 | 6.624 | 0.02433 | 3093.5 | 3434.2 | 6.532 | 540 |
| 560 | 0.04049 | 3172.1 | 3536.5 | 6.846 | 0.03621 | 3164.8 | 3526.9 | 6.789 | 0.02978 | 3150.0 | 3507.4 | 6.686 | 0.02519 | 3134.9 | 3487.5 | 6.597 | 560 |
| 580 | 0.04168 | 3210.3 | 3585.4 | 6.904 | 0.03730 | 3203.5 | 3576.5 | 6.847 | 0.03072 | 3189.8 | 3558.4 | 6.747 | 0.02602 | 3175.7 | 3540.1 | 6.659 | 580 |
| 600 | 0.04286 | 3248.4 | 3634.2 | 6.960 | 0.03838 | 3242.1 | 3625.8 | 6.905 | 0.03165 | 3229.2 | 3609.0 | 6.806 | 0.02684 | 3216.1 | 3591.9 | 6.719 | 600 |
| 640 | 0.04518 | 3324.6 | 3731.2 | 7.069 | 0.04049 | 3319.0 | 3723.9 | 7.014 | 0.03346 | 3307.6 | 3709.2 | 6.918 | 0.02844 | 3296.1 | 3694.3 | 6.834 | 640 |
| 680 | 0.04746 | 3400.8 | 3828.0 | 7.173 | 0.04257 | 3395.8 | 3821.5 | 7.119 | 0.03523 | 3385.7 | 3808.5 | 7.024 | 0.03000 | 3375.5 | 3795.4 | 6.942 | 680 |
| 720 | 0.04971 | 3477.4 | 3924.8 | 7.272 | 0.04461 | 3472.9 | 3919.0 | 7.219 | 0.03697 | 3463.8 | 3907.5 | 7.126 | 0.03151 | 3454.6 | 3895.8 | 7.045 | 720 |
| 760 | 0.05193 | 3554.5 | 4021.9 | 7.368 | 0.04663 | 3550.4 | 4016.7 | 7.316 | 0.03868 | 3542.2 | 4006.4 | 7.223 | 0.03301 | 3533.9 | 3995.9 | 7.144 | 760 |
| 800 | 0.05413 | 3632.2 | 4119.4 | 7.461 | 0.04862 | 3628.5 | 4114.7 | 7.409 | 0.04037 | 3621.0 | 4105.4 | 7.318 | 0.03448 | 3613.4 | 4096.0 | 7.239 | 800 |

**Table 3: Subcooled Water and Superheated Steam (150 bar to 220 bar)**

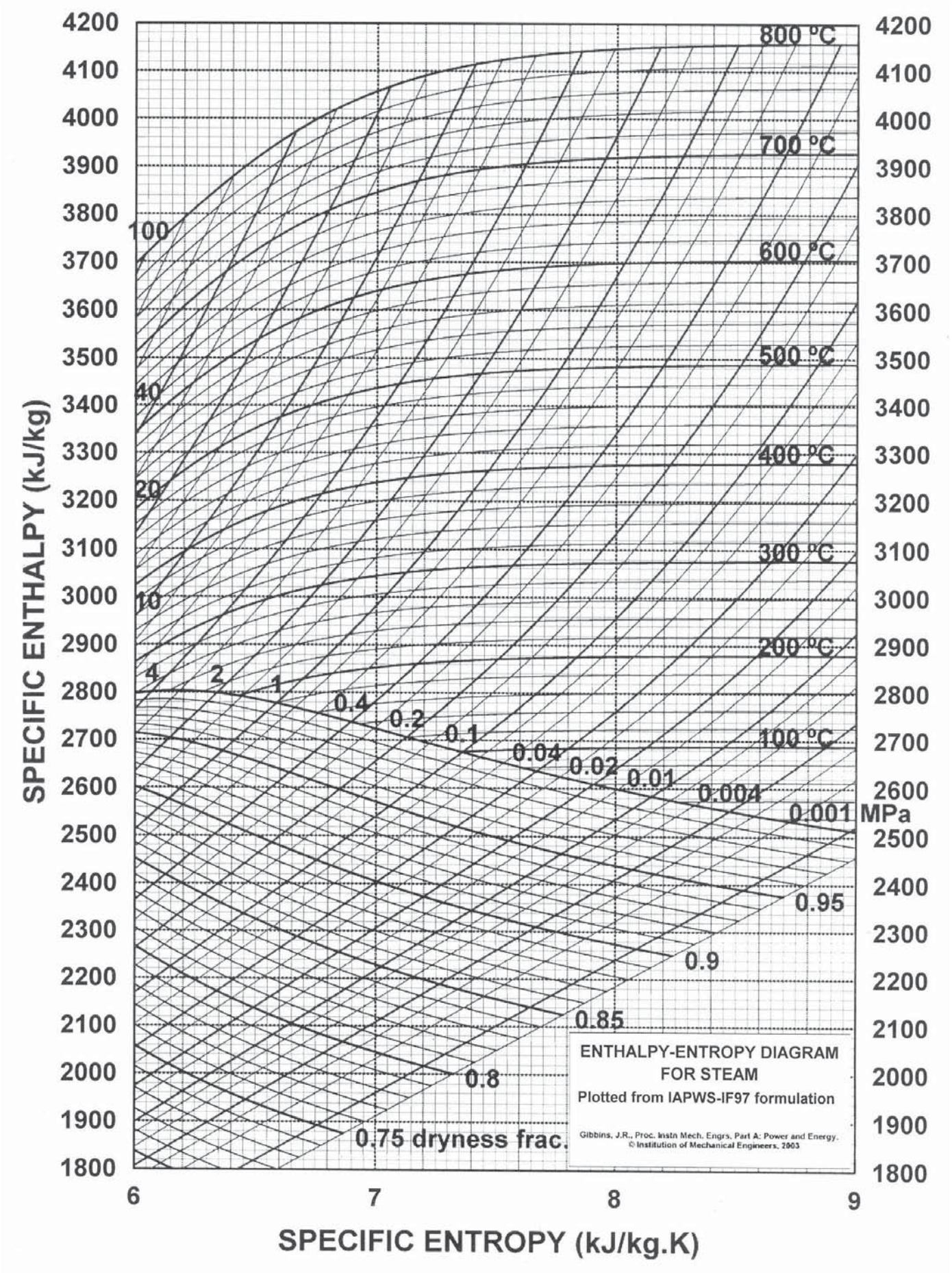
| | **150 bar** | | ($T_{sat}$ = 342.2°C) | | **180 bar** | | ($T_{sat}$ = 357.0°C) | | **200 bar** | | ($T_{sat}$ = 365.7°C) | | **220 bar** | | ($T_{sat}$ = 373.7°C) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **T** | **v** | **u** | **h** | **s** | **v** | **u** | **h** | **s** | **v** | **u** | **h** | **s** | **v** | **u** | **h** | **s** | **T** |
| (°C) | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | (°C) |
| 0.01 | 0.000993 | 0.2196 | 15.111 | 0.00060 | 0.000991 | 0.2501 | 18.09 | 0.00063 | 0.000990 | 0.2680 | 20.08 | 0.00062 | 0.000989 | 0.2842 | 22.05 | 0.00061 | 0.01 |
| 20 | 0.000995 | 83.01 | 97.94 | 0.2932 | 0.000994 | 82.83 | 100.72 | 0.2926 | 0.000993 | 82.71 | 102.57 | 0.2921 | 0.000992 | 82.59 | 104.42 | 0.2916 | 20 |
| 40 | 0.001001 | 165.76 | 180.78 | 0.5666 | 0.001000 | 165.41 | 183.41 | 0.5654 | 0.000999 | 165.18 | 185.17 | 0.5646 | 0.000998 | 164.95 | 186.92 | 0.5639 | 40 |
| 60 | 0.001011 | 248.55 | 263.71 | 0.8233 | 0.001009 | 248.06 | 266.22 | 0.8218 | 0.001008 | 247.73 | 267.89 | 0.8207 | 0.001008 | 247.40 | 269.56 | 0.8197 | 60 |
| 80 | 0.001022 | 331.52 | 346.85 | 1.066 | 0.001021 | 330.87 | 349.24 | 1.064 | 0.001020 | 330.44 | 350.83 | 1.062 | 0.001019 | 330.01 | 352.43 | 1.061 | 80 |
| 100 | 0.001036 | 414.78 | 430.32 | 1.296 | 0.001035 | 413.96 | 432.59 | 1.293 | 0.001034 | 413.43 | 434.10 | 1.292 | 0.001033 | 412.89 | 435.61 | 1.290 | 100 |
| 120 | 0.001052 | 498.47 | 514.25 | 1.515 | 0.001051 | 497.47 | 516.39 | 1.512 | 0.001050 | 496.82 | 517.81 | 1.510 | 0.001049 | 496.17 | 519.24 | 1.509 | 120 |
| 140 | 0.001071 | 582.73 | 598.79 | 1.724 | 0.001069 | 581.53 | 600.78 | 1.721 | 0.001068 | 580.75 | 602.11 | 1.719 | 0.001067 | 579.97 | 603.44 | 1.718 | 140 |
| 160 | 0.001092 | 667.74 | 684.12 | 1.926 | 0.001090 | 666.31 | 685.93 | 1.923 | 0.001089 | 665.38 | 687.15 | 1.920 | 0.001087 | 664.45 | 688.37 | 1.918 | 160 |
| 180 | 0.001116 | 753.72 | 770.46 | 2.121 | 0.001114 | 752.02 | 772.07 | 2.117 | 0.001112 | 750.91 | 773.16 | 2.115 | 0.001111 | 749.81 | 774.25 | 2.112 | 180 |
| 200 | 0.001143 | 840.96 | 858.12 | 2.310 | 0.001141 | 838.94 | 859.47 | 2.306 | 0.001139 | 837.61 | 860.39 | 2.303 | 0.001137 | 836.30 | 861.32 | 2.300 | 200 |
| 220 | 0.001175 | 929.86 | 947.49 | 2.495 | 0.001172 | 927.42 | 948.52 | 2.490 | 0.001170 | 925.83 | 949.22 | 2.487 | 0.001168 | 924.26 | 949.94 | 2.484 | 220 |
| 240 | 0.001212 | 1021.0 | 1039.1 | 2.677 | 0.001208 | 1018.0 | 1039.7 | 2.671 | 0.001205 | 1016.0 | 1040.1 | 2.668 | 0.001203 | 1014.1 | 1040.6 | 2.664 | 240 |
| 260 | 0.001256 | 1115.0 | 1133.8 | 2.858 | 0.001251 | 1111.3 | 1133.8 | 2.851 | 0.001247 | 1108.9 | 1133.8 | 2.847 | 0.001244 | 1106.5 | 1133.9 | 2.842 | 260 |
| 280 | 0.001310 | 1213.1 | 1232.8 | 3.041 | 0.001302 | 1208.4 | 1231.8 | 3.032 | 0.001298 | 1205.3 | 1231.3 | 3.026 | 0.001293 | 1202.4 | 1230.8 | 3.021 | 280 |
| 300 | 0.001378 | 1317.4 | 1338.1 | 3.227 | 0.001368 | 1311.0 | 1335.6 | 3.216 | 0.001361 | 1306.9 | 1334.1 | 3.209 | 0.001355 | 1303.0 | 1332.8 | 3.202 | 300 |
| 320 | 0.001473 | 1431.7 | 1453.8 | 3.426 | 0.001456 | 1422.2 | 1448.4 | 3.409 | 0.001445 | 1416.4 | 1445.3 | 3.399 | 0.001435 | 1410.9 | 1442.5 | 3.390 | 320 |
| 340 | 0.001631 | 1567.8 | 1592.3 | 3.655 | 0.001591 | 1550.1 | 1578.7 | 3.625 | 0.001569 | 1540.1 | 1571.5 | 3.608 | 0.001551 | 1531.2 | 1565.3 | 3.593 | 340 |
| 360 | 0.01258 | 2580.8 | 2769.6 | 5.565 | 0.00462 | 2145.8 | 2233.9 | 4.658 | 0.002365 | 1834.4 | 1876.1 | 4.101 | 0.002047 | 1768.2 | 1803.9 | 3.987 | 360 |
| 380 | 0.01429 | 2670.3 | 2884.6 | 5.744 | 0.01042 | 2577.4 | 2764.9 | 5.505 | 0.00826 | 2494.0 | 2659.2 | 5.314 | 0.00413 | 2183.2 | 2279.4 | 4.700 | 380 |
| 400 | 0.01567 | 2740.5 | 2975.5 | 5.882 | 0.01191 | 2671.8 | 2886.3 | 5.688 | 0.00995 | 2617.8 | 2816.8 | 5.552 | 0.00826 | 2554.2 | 2735.8 | 5.405 | 400 |
| 420 | 0.01688 | 2800.8 | 3053.9 | 5.996 | 0.01312 | 2745.7 | 2981.9 | 5.828 | 0.01120 | 2704.5 | 2928.5 | 5.716 | 0.00959 | 2659.0 | 2869.9 | 5.602 | 420 |
| 440 | 0.01796 | 2855.1 | 3124.6 | 6.097 | 0.01417 | 2808.9 | 3064.0 | 5.945 | 0.01225 | 2775.3 | 3020.3 | 5.847 | 0.01065 | 2739.3 | 2973.6 | 5.749 | 440 |
| 460 | 0.01897 | 2905.4 | 3190.0 | 6.187 | 0.01512 | 2865.6 | 3137.7 | 6.047 | 0.01317 | 2837.2 | 3100.6 | 5.958 | 0.01156 | 2807.2 | 3061.6 | 5.871 | 460 |
| 480 | 0.01992 | 2952.9 | 3251.8 | 6.271 | 0.01599 | 2917.9 | 3205.7 | 6.138 | 0.01401 | 2893.2 | 3173.4 | 6.056 | 0.01238 | 2867.5 | 3139.9 | 5.976 | 480 |
| 500 | 0.02083 | 2998.4 | 3310.8 | 6.348 | 0.01681 | 2967.1 | 3269.7 | 6.222 | 0.01479 | 2945.3 | 3241.2 | 6.145 | 0.01314 | 2922.8 | 3211.8 | 6.070 | 500 |
| 520 | 0.02170 | 3042.3 | 3367.8 | 6.421 | 0.01759 | 3014.1 | 3330.7 | 6.300 | 0.01553 | 2994.6 | 3305.2 | 6.226 | 0.01384 | 2974.5 | 3279.0 | 6.156 | 520 |
| 540 | 0.02254 | 3085.2 | 3423.2 | 6.490 | 0.01833 | 3059.5 | 3389.5 | 6.373 | 0.01623 | 3041.8 | 3366.4 | 6.303 | 0.01451 | 3023.7 | 3342.9 | 6.236 | 540 |
| 560 | 0.02335 | 3127.2 | 3477.5 | 6.556 | 0.01905 | 3103.6 | 3446.6 | 6.443 | 0.01690 | 3087.5 | 3425.6 | 6.374 | 0.01514 | 3071.0 | 3404.1 | 6.310 | 560 |
| 580 | 0.02414 | 3168.6 | 3530.8 | 6.619 | 0.01975 | 3146.8 | 3502.4 | 6.509 | 0.01755 | 3132.0 | 3483.0 | 6.443 | 0.01575 | 3116.8 | 3463.4 | 6.381 | 580 |
| 600 | 0.02492 | 3209.5 | 3583.3 | 6.680 | 0.02043 | 3189.3 | 3557.0 | 6.572 | 0.01818 | 3175.5 | 3539.2 | 6.508 | 0.01635 | 3161.6 | 3521.2 | 6.448 | 600 |
| 640 | 0.02643 | 3290.3 | 3686.8 | 6.796 | 0.02174 | 3272.7 | 3664.0 | 6.692 | 0.01940 | 3260.7 | 3648.7 | 6.630 | 0.01748 | 3248.6 | 3633.2 | 6.573 | 640 |
| 680 | 0.02790 | 3370.3 | 3788.8 | 6.905 | 0.02301 | 3354.7 | 3768.9 | 6.804 | 0.02056 | 3344.2 | 3755.5 | 6.745 | 0.01856 | 3333.5 | 3742.0 | 6.690 | 680 |
| 720 | 0.02933 | 3450.0 | 3890.0 | 7.009 | 0.02424 | 3436.0 | 3872.3 | 6.911 | 0.02169 | 3426.6 | 3860.5 | 6.853 | 0.01961 | 3417.2 | 3848.6 | 6.799 | 720 |
| 760 | 0.03074 | 3529.7 | 3990.7 | 7.108 | 0.02544 | 3517.1 | 3975.0 | 7.012 | 0.02279 | 3508.6 | 3964.4 | 6.955 | 0.02063 | 3500.1 | 3953.8 | 6.903 | 760 |
| 800 | 0.03212 | 3609.6 | 4091.3 | 7.204 | 0.02662 | 3598.1 | 4077.2 | 7.109 | 0.02387 | 3590.4 | 4067.7 | 7.053 | 0.02162 | 3582.6 | 4058.2 | 7.002 | 800 |

**Table 4: Supercritical Steam (250 bar to 500 bar)**

| | 250 bar | | | | 300 bar | | | | 400 bar | | | | 500 bar | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T | v | u | h | s | v | u | h | s | v | u | h | s | v | u | h | s | T |
| (°C) | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | (°C) |
| 0.01 | 0.000988 | 0.3049 | 25.00 | 0.00056 | 0.000986 | 0.3308 | 29.90 | 0.00043 | 0.000981 | 0.3511 | 39.60 | -0.00008 | 0.000977 | 0.3323 | 49.17 | -0.00087 | 0.01 |
| 20 | 0.000991 | 82.41 | 107.2 | 0.291 | 0.000989 | 82.12 | 111.8 | 0.290 | 0.000985 | 81.52 | 120.9 | 0.287 | 0.000980 | 80.93 | 130.0 | 0.285 | 20 |
| 40 | 0.000997 | 164.6 | 189.5 | 0.563 | 0.000995 | 164.1 | 193.9 | 0.561 | 0.000991 | 163.0 | 202.6 | 0.557 | 0.000987 | 161.9 | 211.3 | 0.553 | 40 |
| 60 | 0.001006 | 246.9 | 272.1 | 0.818 | 0.001004 | 246.1 | 276.2 | 0.816 | 0.001000 | 244.6 | 284.6 | 0.810 | 0.000996 | 243.1 | 292.9 | 0.805 | 60 |
| 80 | 0.001018 | 329.4 | 354.8 | 1.059 | 0.001016 | 328.3 | 358.8 | 1.056 | 0.001011 | 326.3 | 366.8 | 1.050 | 0.001007 | 324.4 | 374.7 | 1.044 | 80 |
| 100 | 0.001031 | 412.1 | 437.9 | 1.288 | 0.001029 | 410.8 | 441.7 | 1.284 | 0.001024 | 408.3 | 449.3 | 1.277 | 0.001020 | 405.9 | 456.9 | 1.270 | 100 |
| 120 | 0.001047 | 495.2 | 521.4 | 1.506 | 0.001045 | 493.6 | 525.0 | 1.502 | 0.001040 | 490.6 | 532.2 | 1.494 | 0.001035 | 487.7 | 539.4 | 1.486 | 120 |
| 140 | 0.001065 | 578.8 | 605.4 | 1.715 | 0.001062 | 576.9 | 608.8 | 1.710 | 0.001057 | 573.3 | 615.6 | 1.701 | 0.001052 | 569.8 | 622.4 | 1.692 | 140 |
| 160 | 0.001085 | 663.1 | 690.2 | 1.915 | 0.001082 | 660.8 | 693.3 | 1.910 | 0.001076 | 656.5 | 699.6 | 1.899 | 0.001070 | 652.4 | 706.0 | 1.889 | 160 |
| 180 | 0.001108 | 748.2 | 775.9 | 2.108 | 0.001105 | 745.5 | 778.7 | 2.102 | 0.001098 | 740.5 | 784.4 | 2.091 | 0.001091 | 735.6 | 790.2 | 2.079 | 180 |
| 200 | 0.001135 | 834.4 | 862.7 | 2.296 | 0.001130 | 831.2 | 865.1 | 2.289 | 0.001122 | 825.2 | 870.1 | 2.276 | 0.001115 | 819.6 | 875.3 | 2.263 | 200 |
| 220 | 0.001164 | 921.9 | 951.1 | 2.479 | 0.001159 | 918.2 | 953.0 | 2.471 | 0.001150 | 911.1 | 957.1 | 2.456 | 0.001141 | 904.4 | 961.5 | 2.441 | 220 |
| 240 | 0.001199 | 1011.3 | 1041.3 | 2.658 | 0.001193 | 1006.8 | 1042.6 | 2.649 | 0.001181 | 998.4 | 1045.6 | 2.632 | 0.001171 | 990.5 | 1049.0 | 2.615 | 240 |
| 260 | 0.001239 | 1103.1 | 1134.1 | 2.835 | 0.001231 | 1097.6 | 1134.6 | 2.825 | 0.001217 | 1087.4 | 1136.1 | 2.805 | 0.001204 | 1078.1 | 1138.3 | 2.786 | 260 |
| 280 | 0.001287 | 1198.1 | 1230.2 | 3.012 | 0.001277 | 1191.3 | 1229.6 | 3.000 | 0.001259 | 1178.8 | 1229.1 | 2.976 | 0.001243 | 1167.5 | 1229.7 | 2.954 | 280 |
| 300 | 0.001346 | 1297.4 | 1331.1 | 3.192 | 0.001332 | 1288.7 | 1328.7 | 3.176 | 0.001308 | 1273.1 | 1325.4 | 3.147 | 0.001288 | 1259.3 | 1323.7 | 3.121 | 300 |
| 320 | 0.001421 | 1403.2 | 1438.7 | 3.376 | 0.001401 | 1391.5 | 1433.5 | 3.355 | 0.001368 | 1371.3 | 1426.0 | 3.319 | 0.001341 | 1354.2 | 1421.2 | 3.289 | 320 |
| 340 | 0.001526 | 1519.3 | 1557.5 | 3.573 | 0.001493 | 1502.3 | 1547.1 | 3.544 | 0.001443 | 1474.8 | 1532.5 | 3.496 | 0.001405 | 1452.8 | 1523.1 | 3.457 | 340 |
| 360 | 0.001858 | 1714.6 | 1750.4 | 3.897 | 0.001715 | 1663.3 | 1704.5 | 3.811 | 0.001581 | 1605.1 | 1660.1 | 3.713 | 0.001507 | 1568.4 | 1637.2 | 3.651 | 360 |
| 380 | 0.002749 | 1987.1 | 2052.8 | 4.350 | 0.002165 | 1867.2 | 1922.0 | 4.145 | 0.001805 | 1757.9 | 1816.6 | 3.962 | 0.001656 | 1698.3 | 1768.3 | 3.863 | 380 |
| 400 | 0.005284 | 2372.9 | 2510.3 | 5.030 | 0.002937 | 2093.3 | 2180.3 | 4.518 | 0.002102 | 1913.8 | 1987.5 | 4.213 | 0.001838 | 1829.3 | 1908.6 | 4.072 | 400 |
| 420 | 0.007579 | 2580.0 | 2769.4 | 5.420 | 0.004566 | 2371.7 | 2512.3 | 4.999 | 0.002518 | 2077.6 | 2174.1 | 4.475 | 0.002065 | 1962.6 | 2056.8 | 4.282 | 420 |
| 440 | 0.008697 | 2679.6 | 2897.1 | 5.601 | 0.006228 | 2562.0 | 2748.9 | 5.342 | 0.003138 | 2254.3 | 2381.2 | 4.761 | 0.002355 | 2099.8 | 2213.5 | 4.496 | 440 |
| 460 | 0.009617 | 2758.8 | 2999.2 | 5.743 | 0.007193 | 2668.0 | 2883.8 | 5.528 | 0.004149 | 2447.4 | 2613.3 | 5.084 | 0.002741 | 2242.4 | 2379.6 | 4.720 | 460 |
| 480 | 0.010418 | 2826.6 | 3087.1 | 5.861 | 0.007992 | 2752.2 | 2992.0 | 5.674 | 0.004950 | 2579.2 | 2777.2 | 5.305 | 0.003277 | 2391.7 | 2556.8 | 4.957 | 480 |
| 500 | 0.011142 | 2887.4 | 3165.9 | 5.964 | 0.008690 | 2824.1 | 3084.8 | 5.796 | 0.005625 | 2681.7 | 2906.7 | 5.475 | 0.003889 | 2528.0 | 2722.5 | 5.176 | 500 |
| 520 | 0.011810 | 2943.2 | 3238.5 | 6.057 | 0.009320 | 2888.1 | 3167.7 | 5.901 | 0.006213 | 2766.9 | 3015.4 | 5.613 | 0.004417 | 2636.5 | 2857.4 | 5.348 | 520 |
| 540 | 0.012435 | 2995.7 | 3306.6 | 6.142 | 0.009899 | 2946.7 | 3243.7 | 5.996 | 0.006740 | 2841.1 | 3110.7 | 5.732 | 0.004896 | 2728.4 | 2973.2 | 5.492 | 540 |
| 560 | 0.013028 | 3045.6 | 3371.3 | 6.220 | 0.010442 | 3001.6 | 3314.8 | 6.083 | 0.007221 | 2907.8 | 3196.7 | 5.837 | 0.005332 | 2808.8 | 3075.4 | 5.617 | 560 |
| 580 | 0.013595 | 3093.6 | 3433.5 | 6.294 | 0.010955 | 3053.6 | 3382.3 | 6.163 | 0.007669 | 2969.3 | 3276.0 | 5.931 | 0.005734 | 2881.0 | 3167.7 | 5.726 | 580 |
| 600 | 0.014140 | 3140.2 | 3493.7 | 6.364 | 0.011444 | 3103.5 | 3446.9 | 6.237 | 0.008089 | 3026.9 | 3350.4 | 6.017 | 0.006109 | 2947.2 | 3252.6 | 5.825 | 600 |
| 640 | 0.015179 | 3230.2 | 3609.7 | 6.494 | 0.012368 | 3198.9 | 3569.9 | 6.375 | 0.008869 | 3134.1 | 3488.8 | 6.172 | 0.006796 | 3067.4 | 3407.2 | 5.998 | 640 |
| 680 | 0.016165 | 3317.4 | 3721.5 | 6.614 | 0.013236 | 3290.1 | 3687.2 | 6.501 | 0.009589 | 3234.0 | 3617.6 | 6.310 | 0.007422 | 3176.9 | 3548.0 | 6.149 | 680 |
| 720 | 0.017113 | 3402.8 | 3830.6 | 6.726 | 0.014063 | 3378.6 | 3800.5 | 6.617 | 0.010264 | 3329.4 | 3740.0 | 6.436 | 0.008004 | 3279.5 | 3679.6 | 6.284 | 720 |
| 760 | 0.018030 | 3487.2 | 3937.9 | 6.832 | 0.014858 | 3465.5 | 3911.3 | 6.727 | 0.010906 | 3421.7 | 3857.9 | 6.552 | 0.008552 | 3377.4 | 3805.0 | 6.408 | 760 |
| 800 | 0.018922 | 3570.9 | 4044.0 | 6.932 | 0.015629 | 3551.4 | 4020.2 | 6.830 | 0.011523 | 3511.9 | 3972.8 | 6.661 | 0.009074 | 3472.3 | 3926.0 | 6.523 | 800 |

**Table 4: Supercritical Steam (250 bar to 500 bar)**

| | 600 bar | | | | 700 bar | | | | 800 bar | | | | 1000 bar | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T | v | u | h | s | v | u | h | s | v | u | h | s | v | u | h | s | T |
| (°C) | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | $m^3$/kg | kJ/kg | kJ/kg | kJ/kgK | (°C) |
| 0.01 | 0.000972 | 0.2777 | 58.63 | -0.00193 | 0.000968 | 0.1902 | 67.97 | -0.00323 | 0.000964 | 0.0725 | 77.22 | -0.00476 | 0.000957 | -0.2439 | 95.43 | -0.00844 | 0.01 |
| 20 | 0.000977 | 80.35 | 138.9 | 0.282 | 0.000973 | 79.76 | 147.9 | 0.279 | 0.000969 | 79.19 | 156.7 | 0.276 | 0.000962 | 78.04 | 174.2 | 0.270 | 20 |
| 40 | 0.000983 | 160.9 | 219.9 | 0.549 | 0.000980 | 159.9 | 228.4 | 0.545 | 0.000976 | 158.9 | 237.0 | 0.541 | 0.000969 | 157.0 | 253.9 | 0.533 | 40 |
| 60 | 0.000992 | 241.6 | 301.1 | 0.800 | 0.000989 | 240.2 | 309.4 | 0.795 | 0.000985 | 238.8 | 317.6 | 0.791 | 0.000978 | 236.2 | 334.0 | 0.781 | 60 |
| 80 | 0.001003 | 322.5 | 382.7 | 1.038 | 0.000999 | 320.7 | 390.6 | 1.032 | 0.000996 | 318.9 | 398.5 | 1.026 | 0.000988 | 315.5 | 414.4 | 1.015 | 80 |
| 100 | 0.001016 | 403.5 | 464.5 | 1.263 | 0.001012 | 401.3 | 472.1 | 1.257 | 0.001008 | 399.1 | 479.8 | 1.250 | 0.001000 | 395.0 | 495.0 | 1.237 | 100 |
| 120 | 0.001030 | 484.8 | 546.7 | 1.478 | 0.001026 | 482.1 | 554.0 | 1.470 | 0.001022 | 479.5 | 561.3 | 1.463 | 0.001014 | 474.6 | 576.0 | 1.449 | 120 |
| 140 | 0.001047 | 566.5 | 629.3 | 1.683 | 0.001042 | 563.3 | 636.2 | 1.674 | 0.001037 | 560.2 | 643.2 | 1.666 | 0.001028 | 554.4 | 657.2 | 1.650 | 140 |
| 160 | 0.001065 | 648.5 | 712.4 | 1.879 | 0.001060 | 644.8 | 718.9 | 1.870 | 0.001054 | 641.2 | 725.5 | 1.861 | 0.001045 | 634.4 | 738.9 | 1.843 | 160 |
| 180 | 0.001085 | 731.0 | 796.2 | 2.068 | 0.001079 | 726.7 | 802.2 | 2.058 | 0.001074 | 722.5 | 808.4 | 2.048 | 0.001063 | 714.7 | 820.9 | 2.028 | 180 |
| 200 | 0.001108 | 814.2 | 880.7 | 2.251 | 0.001101 | 809.1 | 886.2 | 2.239 | 0.001095 | 804.3 | 891.8 | 2.228 | 0.001083 | 795.3 | 903.5 | 2.207 | 200 |
| 220 | 0.001133 | 898.2 | 966.2 | 2.428 | 0.001125 | 892.3 | 971.0 | 2.415 | 0.001118 | 886.7 | 976.1 | 2.402 | 0.001104 | 876.3 | 986.7 | 2.379 | 220 |
| 240 | 0.001161 | 983.2 | 1052.8 | 2.600 | 0.001152 | 976.3 | 1056.9 | 2.586 | 0.001143 | 969.8 | 1061.3 | 2.572 | 0.001128 | 957.9 | 1070.7 | 2.546 | 240 |
| 260 | 0.001193 | 1069.4 | 1141.0 | 2.769 | 0.001182 | 1061.4 | 1144.1 | 2.752 | 0.001172 | 1053.9 | 1147.7 | 2.737 | 0.001154 | 1040.2 | 1155.6 | 2.708 | 260 |
| 280 | 0.001229 | 1157.3 | 1231.0 | 2.934 | 0.001216 | 1147.8 | 1232.9 | 2.916 | 0.001204 | 1139.1 | 1235.4 | 2.898 | 0.001183 | 1123.3 | 1241.6 | 2.866 | 280 |
| 300 | 0.001270 | 1247.0 | 1323.3 | 3.098 | 0.001254 | 1235.9 | 1323.7 | 3.077 | 0.001240 | 1225.7 | 1324.9 | 3.057 | 0.001215 | 1207.4 | 1328.9 | 3.022 | 300 |
| 320 | 0.001318 | 1339.2 | 1418.3 | 3.261 | 0.001298 | 1325.9 | 1416.7 | 3.237 | 0.001280 | 1313.8 | 1416.3 | 3.214 | 0.001250 | 1292.7 | 1417.7 | 3.174 | 320 |
| 340 | 0.001374 | 1434.2 | 1516.7 | 3.424 | 0.001349 | 1418.1 | 1512.5 | 3.395 | 0.001327 | 1403.8 | 1509.9 | 3.369 | 0.001290 | 1379.1 | 1508.1 | 3.324 | 340 |
| 360 | 0.001457 | 1541.1 | 1623.1 | 3.604 | 0.001419 | 1519.1 | 1613.7 | 3.565 | 0.001388 | 1500.4 | 1607.4 | 3.532 | 0.001339 | 1469.6 | 1600.6 | 3.477 | 360 |
| 380 | 0.001569 | 1657.8 | 1740.6 | 3.794 | 0.001509 | 1627.2 | 1722.8 | 3.742 | 0.001464 | 1602.5 | 1710.7 | 3.700 | 0.001398 | 1563.5 | 1696.5 | 3.632 | 380 |
| 400 | 0.001701 | 1775.1 | 1864.6 | 3.982 | 0.001613 | 1735.6 | 1836.8 | 3.916 | 0.001549 | 1704.7 | 1818.0 | 3.863 | 0.001462 | 1657.5 | 1795.2 | 3.782 | 400 |
| 420 | 0.001856 | 1893.4 | 1994.1 | 4.167 | 0.001731 | 1844.5 | 1955.0 | 4.086 | 0.001645 | 1807.1 | 1928.5 | 4.023 | 0.001532 | 1751.3 | 1896.0 | 3.929 | 420 |
| 440 | 0.002042 | 2013.3 | 2128.8 | 4.352 | 0.001868 | 1954.2 | 2076.9 | 4.255 | 0.001754 | 1909.9 | 2041.9 | 4.181 | 0.001609 | 1845.1 | 1998.7 | 4.073 | 440 |
| 460 | 0.002270 | 2135.4 | 2268.6 | 4.539 | 0.002028 | 2065.0 | 2202.2 | 4.422 | 0.001877 | 2013.2 | 2158.0 | 4.337 | 0.001694 | 1939.1 | 2103.3 | 4.214 | 460 |
| 480 | 0.002555 | 2260.1 | 2413.7 | 4.730 | 0.002219 | 2177.0 | 2330.9 | 4.591 | 0.002020 | 2117.2 | 2276.4 | 4.492 | 0.001789 | 2033.2 | 2209.4 | 4.354 | 480 |
| 500 | 0.002922 | 2388.0 | 2564.6 | 4.926 | 0.002449 | 2290.5 | 2462.9 | 4.761 | 0.002186 | 2222.0 | 2397.1 | 4.647 | 0.001895 | 2127.6 | 2316.8 | 4.491 | 500 |
| 520 | 0.003361 | 2512.3 | 2713.9 | 5.119 | 0.002732 | 2405.5 | 2598.3 | 4.933 | 0.002382 | 2327.5 | 2519.8 | 4.801 | 0.002015 | 2222.1 | 2425.3 | 4.627 | 520 |
| 540 | 0.003762 | 2617.2 | 2842.9 | 5.280 | 0.003067 | 2518.7 | 2733.4 | 5.103 | 0.002616 | 2433.9 | 2644.8 | 4.957 | 0.002150 | 2316.8 | 2534.8 | 4.762 | 540 |
| 560 | 0.004142 | 2709.6 | 2958.1 | 5.420 | 0.003378 | 2617.6 | 2854.1 | 5.250 | 0.002885 | 2538.2 | 2769.0 | 5.110 | 0.002305 | 2411.7 | 2645.3 | 4.896 | 560 |
| 580 | 0.004499 | 2792.1 | 3062.0 | 5.543 | 0.003683 | 2707.3 | 2965.1 | 5.382 | 0.003135 | 2631.2 | 2882.0 | 5.244 | 0.002484 | 2506.8 | 2756.8 | 5.031 | 580 |
| 600 | 0.004834 | 2866.9 | 3157.0 | 5.653 | 0.003975 | 2789.3 | 3067.5 | 5.500 | 0.003384 | 2717.4 | 2988.1 | 5.367 | 0.002672 | 2597.8 | 2865.1 | 5.158 | 600 |
| 640 | 0.005447 | 3000.4 | 3327.3 | 5.844 | 0.004520 | 2934.8 | 3251.2 | 5.706 | 0.003861 | 2872.1 | 3181.0 | 5.583 | 0.003026 | 2761.2 | 3063.8 | 5.381 | 640 |
| 680 | 0.006003 | 3119.6 | 3479.8 | 6.007 | 0.005018 | 3063.1 | 3414.4 | 5.881 | 0.004306 | 3008.5 | 3352.9 | 5.768 | 0.003376 | 2907.7 | 3245.3 | 5.575 | 680 |
| 720 | 0.006518 | 3229.5 | 3620.6 | 6.152 | 0.005478 | 3180.2 | 3563.6 | 6.034 | 0.004720 | 3132.1 | 3509.7 | 5.929 | 0.003712 | 3041.7 | 3413.0 | 5.748 | 720 |
| 760 | 0.007000 | 3333.2 | 3753.2 | 6.283 | 0.005909 | 3289.5 | 3703.1 | 6.172 | 0.005108 | 3246.7 | 3655.3 | 6.073 | 0.004031 | 3165.5 | 3568.6 | 5.901 | 760 |
| 800 | 0.007457 | 3432.7 | 3880.2 | 6.403 | 0.006317 | 3393.6 | 3835.8 | 6.298 | 0.005476 | 3355.2 | 3793.3 | 6.204 | 0.004336 | 3281.6 | 3715.2 | 6.040 | 800 |


SPECIFIC ENTHALPY (kJ/kg)
SPECIFIC ENTROPY (kJ/kg.K)
4200
4100
4000
3900
3800
3700
3600
3500
3400
3300
3200
3100
3000
2900
2800
2700
2600
2500
2400
2300
2200
2100
2000
1900
1800
6
7
8
9
800 °C
700 °C
600 °C
500 °C
400 °C
300 °C
200 °C
100 °C
100
40
20
10
4
2
1
0.4
0.2
0.1
0.04
0.02
0.01
0.004
0.001 MPa
0.95
0.9
0.85
0.8
0.75 dryness frac.
ENTHALPY-ENTROPY DIAGRAM
FOR STEAM
Plotted from IAPWS-IF97 formulation
Gibbins, J.R., Proc. Instn Mech. Engrs, Part A: Power and Energy.
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