

# HEATING VENTILATING AIR CONDITIONING GUIDE 1940

TABLE 1. PROPERTIES OF DRY AIR<sup>a</sup>

Barometric Pressure 29.921 In. of Hg.

| TEMPERATURE<br>DEG F | WEIGHT POUNDS<br>PER CU FT | RATIO OF<br>VOLUME TO<br>VOLUME AT 70 F | BTU ABSORBED BY<br>ONE CU FT DRY<br>AIR PER DEG F | CU FT DRY<br>AIR WARMED<br>ONE DEG<br>PER BTU |
|----------------------|----------------------------|-----------------------------------------|---------------------------------------------------|-----------------------------------------------|
| 0                    | 0.08633                    | 0.8678                                  | 0.02077                                           | 48.15                                         |
| 10                   | 0.08449                    | 0.8867                                  | 0.02030                                           | 49.26                                         |
| 20                   | 0.08273                    | 0.9056                                  | 0.01986                                           | 50.35                                         |
| 30                   | 0.08104                    | 0.9245                                  | 0.01944                                           | 51.44                                         |
| 40                   | 0.07942                    | 0.9433                                  | 0.01905                                           | 52.49                                         |
| 50                   | 0.07785                    | 0.9624                                  | 0.01868                                           | 53.36                                         |
| 60                   | 0.07636                    | 0.9811                                  | 0.01832                                           | 54.44                                         |
| 70                   | 0.07492                    | 1.0000                                  | 0.01798                                           | 55.62                                         |
| 80                   | 0.07353                    | 1.0189                                  | 0.01765                                           | 56.66                                         |
| 90                   | 0.07219                    | 1.0378                                  | 0.01733                                           | 57.70                                         |
| 100                  | 0.07090                    | 1.0567                                  | 0.01702                                           | 58.75                                         |
| 110                  | 0.06966                    | 1.0755                                  | 0.01672                                           | 59.81                                         |
| 120                  | 0.06845                    | 1.0946                                  | 0.01643                                           | 60.86                                         |
| 130                  | 0.06729                    | 1.1133                                  | 0.01616                                           | 61.88                                         |
| 140                  | 0.06617                    | 1.1322                                  | 0.01589                                           | 62.93                                         |
| 150                  | 0.06509                    | 1.1510                                  | 0.01563                                           | 63.98                                         |
| 160                  | 0.06403                    | 1.1701                                  | 0.01538                                           | 65.02                                         |
| 180                  | 0.06203                    | 1.2078                                  | 0.01490                                           | 67.11                                         |
| 200                  | 0.06015                    | 1.2456                                  | 0.01446                                           | 69.24                                         |
| 220                  | 0.05838                    | 1.2832                                  | 0.01403                                           | 71.27                                         |
| 240                  | 0.05671                    | 1.3211                                  | 0.01364                                           | 73.31                                         |
| 260                  | 0.05514                    | 1.3587                                  | 0.01326                                           | 75.41                                         |
| 280                  | 0.05365                    | 1.3965                                  | 0.01291                                           | 77.46                                         |
| 300                  | 0.05223                    | 1.4344                                  | 0.01257                                           | 79.55                                         |
| 350                  | 0.04901                    | 1.5287                                  | 0.01181                                           | 84.67                                         |
| 400                  | 0.04615                    | 1.6234                                  | 0.01114                                           | 89.67                                         |
| 450                  | 0.04362                    | 1.7176                                  | 0.01054                                           | 94.87                                         |
| 500                  | 0.04135                    | 1.8119                                  | 0.01001                                           | 99.01                                         |
| 550                  | 0.03930                    | 1.9064                                  | 0.00953                                           | 104.93                                        |
| 600                  | 0.03744                    | 2.0011                                  | 0.00908                                           | 110.13                                        |
| 700                  | 0.03422                    | 2.1893                                  | 0.00833                                           | 120.05                                        |
| 800                  | 0.03150                    | 2.3784                                  | 0.00769                                           | 130.04                                        |
| 900                  | 0.02911                    | 2.5737                                  | 0.00713                                           | 140.25                                        |
| 1000                 | 0.02718                    | 2.7564                                  | 0.00668                                           | 149.70                                        |

<sup>a</sup>Compiled by W. H. Severns, based on the instantaneous specific heats of air. The values for the heats and for the cubic feet warmed one degree are for the temperatures stated and are not true over a temperature range of more than one degree above or below the temperatures stated.

# CHAPTER 1. AIR, WATER AND STEAM

TABLE 2. PROPERTIES OF SATURATED AIR<sup>a</sup>

Weights of Air, Vapor and Saturated Mixture of Air and Vapor at 29.921 In. of Hg.

| TEMP<br>DEG F | WEIGHT IN A CUBIC FOOT OF MIXTURE |                              |                                      | BTU<br>ABSORBED<br>BY ONE<br>CUBIC<br>FOOT<br>SAT. AIR<br>PER DEG F | CUBIC<br>FEET<br>SAT. AIR<br>WARMED<br>ONE DEG<br>PER BTU | SPECIFIC<br>HEAT BTU<br>PER POUND<br>OF<br>MIXTURE |
|---------------|-----------------------------------|------------------------------|--------------------------------------|---------------------------------------------------------------------|-----------------------------------------------------------|----------------------------------------------------|
|               | Weight of<br>Dry Air<br>Pounds    | Weight of<br>Vapor<br>Pounds | Total Weight<br>of Mixture<br>Pounds |                                                                     |                                                           |                                                    |
| 0             | 0.08622                           | 0.000068                     | 0.08629                              | 0.02078                                                             | 48.12                                                     | 0.2408                                             |
| 10            | 0.08431                           | 0.000111                     | 0.08442                              | 0.02031                                                             | 49.24                                                     | 0.2406                                             |
| 20            | 0.08244                           | 0.000177                     | 0.08262                              | 0.01987                                                             | 50.33                                                     | 0.2405                                             |
| 30            | 0.08060                           | 0.000278                     | 0.08088                              | 0.01946                                                             | 51.39                                                     | 0.2406                                             |
| 40            | 0.07876                           | 0.000409                     | 0.07917                              | 0.01908                                                             | 52.41                                                     | 0.2410                                             |
| 50            | 0.07692                           | 0.000587                     | 0.07751                              | 0.01872                                                             | 53.42                                                     | 0.2415                                             |
| 60            | 0.07503                           | 0.000828                     | 0.07586                              | 0.01838                                                             | 54.41                                                     | 0.2423                                             |
| 70            | 0.07307                           | 0.001151                     | 0.07422                              | 0.01805                                                             | 55.40                                                     | 0.2432                                             |
| 80            | 0.07099                           | 0.001578                     | 0.07257                              | 0.01775                                                             | 56.34                                                     | 0.2446                                             |
| 90            | 0.06877                           | 0.002134                     | 0.07090                              | 0.01747                                                             | 57.24                                                     | 0.2464                                             |
| 100           | 0.06634                           | 0.002851                     | 0.06919                              | 0.01721                                                             | 58.11                                                     | 0.2487                                             |
| 110           | 0.06361                           | 0.003762                     | 0.06737                              | 0.01696                                                             | 58.96                                                     | 0.2517                                             |
| 120           | 0.06057                           | 0.004912                     | 0.06548                              | 0.01675                                                             | 59.70                                                     | 0.2558                                             |
| 130           | 0.05712                           | 0.006344                     | 0.06346                              | 0.01657                                                             | 60.35                                                     | 0.2611                                             |
| 140           | 0.05317                           | 0.008116                     | 0.06129                              | 0.01642                                                             | 60.91                                                     | 0.2679                                             |
| 150           | 0.04863                           | 0.010284                     | 0.05891                              | 0.01630                                                             | 61.35                                                     | 0.2767                                             |
| 160           | 0.04339                           | 0.012919                     | 0.05631                              | 0.01624                                                             | 61.58                                                     | 0.2884                                             |
| 170           | 0.03733                           | 0.016092                     | 0.05342                              | 0.01621                                                             | 61.69                                                     | 0.3034                                             |
| 180           | 0.03033                           | 0.019888                     | 0.05022                              | 0.01624                                                             | 61.58                                                     | 0.3234                                             |
| 190           | 0.02228                           | 0.024384                     | 0.04666                              | 0.01633                                                             | 61.24                                                     | 0.3500                                             |
| 200           | 0.01298                           | 0.029700                     | 0.04268                              | 0.01649                                                             | 60.64                                                     | 0.3864                                             |
| 210           | 0.00230                           | 0.035932                     | 0.03616                              | 0.01672                                                             | 59.81                                                     | 0.4624                                             |
| 212           | 0.00000                           | 0.037286                     | 0.03729                              | 0.01818                                                             | 55.01                                                     | 0.4875                                             |

<sup>a</sup>Compiled by W. H. Severns, based on the instantaneous specific heats of air.

TABLE 3. SPECIFIC HEATS OF DRY AIR<sup>a</sup>

Constant Barometric Pressure of 29.921 In. of Hg.

| TEMPERATURE<br>DEG F | INSTANTANEOUS<br>OR TRUE<br>SPECIFIC HEAT | TEMPERATURE<br>RANGE<br>DEG F | MEAN<br>SPECIFIC<br>HEAT |
|----------------------|-------------------------------------------|-------------------------------|--------------------------|
| -301.0               | 0.2520                                    | 32 to 212                     | 0.2401                   |
| -108.4               | 0.2430                                    | 32 to 392                     | 0.2411                   |
| 32.0                 | 0.2399                                    | 32 to 752                     | 0.2420                   |
| 212.0                | 0.2403                                    | 32 to 1112                    | 0.2430                   |
| 392.0                | 0.2413                                    | -----                         | -----                    |
| 752.0                | 0.2430                                    | -----                         | -----                    |
| 1112.0               | 0.2470                                    | -----                         | -----                    |

<sup>a</sup>Compiled by W. H. Severns, based on data given in the *International Critical Tables*.