

TABLE 6. PROPERTIES OF SATURATED WATER VAPOR WITH AIR AT LOW TEMPERATURES<sup>a</sup> (PART I)

| TEMP.<br>F | PRESSURE OF SATURATED<br>VAPOR $\times 10^{-4}$ |               | WEIGHT OF SATURATED VAPOR  |          |                            |         | VOLUME IN CU FT<br>BAROMETER, 29.92 IN. HG |                                                    | HEAT CONTENT PER LB     |                        |                                            |
|------------|-------------------------------------------------|---------------|----------------------------|----------|----------------------------|---------|--------------------------------------------|----------------------------------------------------|-------------------------|------------------------|--------------------------------------------|
|            | In. of Hg                                       | Lb per Sq In. | per Cu Ft                  |          | per lb of Dry Air          |         | of 1 lb of<br>Dry Air                      | of 1 lb of<br>Dry Air +<br>Vapor to<br>Saturate it | Dry Air<br>0 F<br>Datum | Vapor<br>32 F<br>Datum | Dry Air<br>with Vapor<br>to Saturate<br>it |
|            |                                                 |               | Pounds<br>$\times 10^{-4}$ | Grains   | Pounds<br>$\times 10^{-4}$ | Grains  |                                            |                                                    |                         |                        |                                            |
| -130       | 0.276                                           | 0.1356        | 0.000893                   | 0.000049 | 0.005738                   | 0.00040 | 8.31                                       | 8.31                                               | -31.71                  | 1000.7                 | -31.71                                     |
| -129       | .306                                            | .1503         | .000766                    | .000054  | .006382                    | .00045  | 8.33                                       | 8.33                                               | -31.46                  | 1001.2                 | -31.46                                     |
| -128       | .338                                            | .1660         | .000643                    | .000059  | .007027                    | .00049  | 8.36                                       | 8.36                                               | -31.21                  | 1001.6                 | -31.21                                     |
| -127       | .373                                            | .1832         | .000528                    | .000065  | .007755                    | .00054  | 8.38                                       | 8.38                                               | -30.96                  | 1002.1                 | -30.96                                     |
| -126       | .411                                            | .2019         | .000419                    | .000071  | .008545                    | .00060  | 8.41                                       | 8.41                                               | -30.71                  | 1002.5                 | -30.71                                     |
| -125       | 0.455                                           | 0.2235        | 0.001125                   | 0.000079 | 0.009459                   | 0.00066 | 8.43                                       | 8.43                                               | -30.46                  | 1003.0                 | -30.46                                     |
| -124       | .499                                            | .2451         | .001230                    | .000086  | .01037                     | .00073  | 8.46                                       | 8.46                                               | -30.21                  | 1003.4                 | -30.21                                     |
| -123       | .542                                            | .2662         | .001332                    | .000093  | .01127                     | .00079  | 8.48                                       | 8.48                                               | -29.96                  | 1003.9                 | -29.96                                     |
| -122       | .604                                            | .2967         | .001480                    | .00010   | .01256                     | .00088  | 8.51                                       | 8.51                                               | -29.72                  | 1004.3                 | -29.72                                     |
| -121       | .669                                            | .3286         | .001635                    | .00012   | .01391                     | .00097  | 8.53                                       | 8.53                                               | -29.47                  | 1004.8                 | -29.47                                     |
| -120       | 0.735                                           | 0.3610        | 0.001791                   | 0.00013  | 0.01528                    | 0.00107 | 8.56                                       | 8.56                                               | -29.22                  | 1005.2                 | -29.22                                     |
| -119       | .805                                            | .3954         | .001956                    | .00014   | .01674                     | .00117  | 8.58                                       | 8.58                                               | -28.97                  | 1005.7                 | -28.97                                     |
| -118       | .892                                            | .4382         | .002161                    | .00015   | .01854                     | .00130  | 8.61                                       | 8.61                                               | -28.72                  | 1006.1                 | -28.72                                     |
| -117       | .989                                            | .4858         | .002388                    | .00017   | .02056                     | .00144  | 8.63                                       | 8.63                                               | -28.47                  | 1006.6                 | -28.47                                     |
| -116       | 1.098                                           | .5393         | .002644                    | .00019   | .02283                     | .00160  | 8.66                                       | 8.66                                               | -28.23                  | 1007.0                 | -28.23                                     |
| -115       | 1.208                                           | 0.5934        | 0.002900                   | 0.00020  | 0.02511                    | 0.00176 | 8.68                                       | 8.68                                               | -27.98                  | 1007.5                 | -27.98                                     |
| -114       | 1.317                                           | .6469         | .003153                    | .00022   | .02738                     | .00192  | 8.71                                       | 8.71                                               | -27.73                  | 1007.9                 | -27.73                                     |
| -113       | 1.444                                           | .7093         | .003447                    | .00024   | .03002                     | .00210  | 8.73                                       | 8.73                                               | -27.48                  | 1008.4                 | -27.48                                     |
| -112       | 1.575                                           | .7736         | .003749                    | .00026   | .03274                     | .00229  | 8.76                                       | 8.76                                               | -27.23                  | 1008.8                 | -27.23                                     |
| -111       | 1.728                                           | .8488         | .004101                    | .00029   | .03593                     | .00252  | 8.78                                       | 8.78                                               | -26.99                  | 1009.3                 | -26.99                                     |
| -110       | 1.889                                           | 0.9279        | 0.004471                   | 0.00031  | 0.03927                    | 0.00275 | 8.81                                       | 8.81                                               | -26.74                  | 1009.7                 | -26.74                                     |
| -109       | 2.087                                           | 1.0251        | .004925                    | .00035   | .04339                     | .00304  | 8.83                                       | 8.83                                               | -26.49                  | 1010.2                 | -26.49                                     |
| -108       | 2.292                                           | 1.1268        | .005393                    | .00038   | .04765                     | .00334  | 8.86                                       | 8.86                                               | -26.24                  | 1010.6                 | -26.24                                     |
| -107       | 2.511                                           | 1.2334        | .005892                    | .00041   | .05220                     | .00365  | 8.89                                       | 8.89                                               | -26.00                  | 1011.1                 | -26.00                                     |
| -106       | 2.742                                           | 1.3469        | .006415                    | .00045   | .05701                     | .00399  | 8.91                                       | 8.91                                               | -25.75                  | 1011.5                 | -25.75                                     |
| -105       | 2.983                                           | 1.4652        | 0.006960                   | 0.00049  | 0.06202                    | 0.00434 | 8.94                                       | 8.94                                               | -25.50                  | 1012.0                 | -25.50                                     |
| -104       | 3.258                                           | 1.6003        | .007580                    | .00053   | .06773                     | .00474  | 8.96                                       | 8.96                                               | -25.26                  | 1012.4                 | -25.26                                     |
| -103       | 3.543                                           | 1.7403        | .008219                    | .00058   | .07366                     | .00516  | 8.99                                       | 8.99                                               | -25.01                  | 1012.9                 | -25.01                                     |
| -102       | 3.872                                           | 1.9019        | .008958                    | .00063   | .08050                     | .00564  | 9.01                                       | 9.01                                               | -24.76                  | 1013.3                 | -24.76                                     |
| -101       | 4.213                                           | 2.0694        | .009719                    | .00068   | .08759                     | .00613  | 9.04                                       | 9.04                                               | -24.51                  | 1013.8                 | -24.51                                     |
| -100       | 4.607                                           | 2.2630        | 0.010599                   | 0.00074  | 0.09578                    | 0.00705 | 9.06                                       | 9.06                                               | -24.27                  | 1014.2                 | -24.27                                     |
| -99        | 5.018                                           | 2.4637        | .011512                    | .00081   | .1043                      | .00730  | 9.09                                       | 9.09                                               | -24.02                  | 1014.7                 | -24.02                                     |
| -98        | 5.455                                           | 2.6784        | .012480                    | .00087   | .1134                      | .00794  | 9.11                                       | 9.11                                               | -23.78                  | 1015.1                 | -23.78                                     |
| -97        | 5.946                                           | 2.9196        | .013566                    | .00095   | .1236                      | .00865  | 9.14                                       | 9.14                                               | -23.53                  | 1015.6                 | -23.53                                     |
| -96        | 6.470                                           | 3.1781        | .014721                    | .00103   | .1345                      | .00942  | 9.16                                       | 9.16                                               | -23.28                  | 1016.0                 | -23.28                                     |

<sup>a</sup>Compiled by W. M. Sawdon, vapor pressures converted from *International Critical Tables*.TABLE 6. PROPERTIES OF SATURATED WATER VAPOR WITH AIR AT LOW TEMPERATURES<sup>a</sup> (PART I, CONTINUED)

| TEMP.<br>F | PRESSURE OF SATURATED<br>VAPOR $\times 10^{-4}$ |               | WEIGHT OF SATURATED VAPOR  |         |                            |         | VOLUME IN CU FT<br>BAROMETER, 29.92 IN. HG |                                                    | HEAT CONTENT PER LB     |                        |                                            |
|------------|-------------------------------------------------|---------------|----------------------------|---------|----------------------------|---------|--------------------------------------------|----------------------------------------------------|-------------------------|------------------------|--------------------------------------------|
|            | In. of Hg                                       | Lb per Sq In. | per Cu Ft                  |         | per lb of Dry Air          |         | of 1 lb of<br>Dry Air                      | of 1 lb of<br>Dry Air +<br>Vapor to<br>Saturate it | Dry Air<br>0 F<br>Datum | Vapor<br>32 F<br>Datum | Dry Air<br>with Vapor<br>to Saturate<br>it |
|            |                                                 |               | Pounds<br>$\times 10^{-4}$ | Grains  | Pounds<br>$\times 10^{-4}$ | Grains  |                                            |                                                    |                         |                        |                                            |
| -95        | 7.047                                           | 3.4604        | 0.015990                   | 0.00112 | 0.1465                     | 0.01026 | 9.19                                       | 9.19                                               | -23.04                  | 1016.5                 | -23.04                                     |
| -94        | 7.638                                           | 3.7507        | .017284                    | .00121  | .1588                      | .01112  | 9.21                                       | 9.21                                               | -22.79                  | 1016.9                 | -22.79                                     |
| -93        | 8.316                                           | 4.0837        | .018767                    | .00131  | .1729                      | .01210  | 9.23                                       | 9.23                                               | -22.55                  | 1017.4                 | -22.55                                     |
| -92        | 9.017                                           | 4.4281        | .020292                    | .00142  | .1875                      | .01312  | 9.26                                       | 9.26                                               | -22.30                  | 1017.8                 | -22.30                                     |
| -91        | 9.806                                           | 4.8156        | .022009                    | .00154  | .2039                      | .01427  | 9.29                                       | 9.29                                               | -22.05                  | 1018.3                 | -22.05                                     |
| -90        | 10.64                                           | 5.2264        | 0.023817                   | 0.00167 | 0.2212                     | 0.01548 | 9.31                                       | 9.31                                               | -21.81                  | 1018.7                 | -21.81                                     |
| -89        | 11.53                                           | 5.6635        | .025738                    | .00180  | .2397                      | .01678  | 9.34                                       | 9.34                                               | -21.56                  | 1019.2                 | -21.56                                     |
| -88        | 12.51                                           | 6.1449        | .027851                    | .00195  | .2601                      | .01821  | 9.36                                       | 9.36                                               | -21.32                  | 1019.6                 | -21.32                                     |
| -87        | 13.53                                           | 6.6459        | .030041                    | .00210  | .2813                      | .01969  | 9.39                                       | 9.39                                               | -21.07                  | 1020.1                 | -21.07                                     |
| -86        | 14.69                                           | 7.2157        | .032530                    | .00228  | .3054                      | .02138  | 9.41                                       | 9.41                                               | -20.83                  | 1020.5                 | -20.83                                     |
| -85        | 15.87                                           | 7.7953        | 0.035049                   | 0.00245 | 0.3299                     | 0.02309 | 9.44                                       | 9.44                                               | -20.58                  | 1021.0                 | -20.58                                     |
| -84        | 17.20                                           | 8.4486        | .037885                    | .00265  | .3576                      | .02503  | 9.46                                       | 9.46                                               | -20.34                  | 1021.4                 | -20.34                                     |
| -83        | 18.58                                           | 9.1265        | .040817                    | .00286  | .3863                      | .02704  | 9.49                                       | 9.49                                               | -20.09                  | 1021.9                 | -20.09                                     |
| -82        | 20.10                                           | 9.8731        | .044037                    | .00308  | .4179                      | .02925  | 9.51                                       | 9.51                                               | -19.84                  | 1022.3                 | -19.84                                     |
| -81        | 21.72                                           | 10.669        | .047463                    | .00332  | .4516                      | .03161  | 9.54                                       | 9.54                                               | -19.60                  | 1022.8                 | -19.60                                     |
| -80        | 23.47                                           | 11.517        | 0.051151                   | 0.00358 | 0.4879                     | 0.03415 | 9.56                                       | 9.56                                               | -19.36                  | 1023.2                 | -19.36                                     |
| -79        | 25.34                                           | 12.436        | .055082                    | .00386  | .5268                      | .03688  | 9.59                                       | 9.59                                               | -19.11                  | 1023.7                 | -19.11                                     |
| -78        | 27.29                                           | 13.394        | .059165                    | .00414  | .5674                      | .03972  | 9.61                                       | 9.61                                               | -18.87                  | 1024.1                 | -18.87                                     |
| -77        | 29.52                                           | 14.489        | .063831                    | .00447  | .6137                      | .04296  | 9.64                                       | 9.64                                               | -18.62                  | 1024.6                 | -18.62                                     |
| -76        | 31.81                                           | 15.614        | .068605                    | .00480  | .6613                      | .04629  | 9.66                                       | 9.66                                               | -18.38                  | 1025.0                 | -18.37                                     |
| -75        | 34.37                                           | 16.883        | 0.073933                   | 0.00518 | 0.7146                     | 0.05002 | 9.69                                       | 9.69                                               | -18.13                  | 1025.5                 | -18.12                                     |
| -74        | 37.01                                           | 18.179        | .079405                    | .00556  | .7694                      | .05386  | 9.72                                       | 9.72                                               | -17.89                  | 1025.9                 | -17.88                                     |
| -73        | 39.96                                           | 19.628        | .085510                    | .00599  | .8308                      | .05816  | 9.74                                       | 9.74                                               | -17.64                  | 1026.4                 | -17.63                                     |
| -72        | 43.04                                           | 21.141        | .091865                    | .00643  | .8948                      | .06264  | 9.77                                       | 9.77                                               | -17.40                  | 1026.8                 | -17.39                                     |
| -71        | 46.33                                           | 22.757        | .098632                    | .00690  | .9632                      | .06742  | 9.79                                       | 9.79                                               | -17.16                  | 1027.3                 | -17.15                                     |
| -70        | 49.87                                           | 24.496        | 0.10590                    | 0.00741 | 1.037                      | 0.07259 | 9.82                                       | 9.82                                               | -16.91                  | 1027.7                 | -16.90                                     |
| -69        | 53.59                                           | 26.323        | .11350                     | .00795  | 1.114                      | .07798  | 9.84                                       | 9.84                                               | -16.67                  | 1028.2                 | -16.66                                     |
| -68        | 57.65                                           | 28.318        | .12179                     | .00853  | 1.199                      | .08393  | 9.87                                       | 9.87                                               | -16.42                  | 1028.6                 | -16.41                                     |
| -67        | 61.81                                           | 30.361        | .13024                     | .00911  | 1.285                      | .08995  | 9.89                                       | 9.89                                               | -16.18                  | 1029.1                 | -16.17                                     |
| -66        | 66.41                                           | 32.621        | .13959                     | .00977  | 1.381                      | .09667  | 9.92                                       | 9.92                                               | -15.94                  | 1029.5                 | -15.93                                     |
| -65        | 71.17                                           | 34.959        | 0.14922                    | 0.01044 | 1.480                      | 0.10360 | 9.94                                       | 9.94                                               | -15.69                  | 1030.0                 | -15.67                                     |
| -64        | 76.64                                           | 37.646        | .16028                     | .01122  | 1.593                      | .11151  | 9.97                                       | 9.97                                               | -15.45                  | 1030.4                 | -15.43                                     |
| -63        | 82.28                                           | 40.416        | .17164                     | .01201  | 1.711                      | .11977  | 9.99                                       | 9.99                                               | -15.21                  | 1030.9                 | -15.19                                     |
| -62        | 88.19                                           | 43.319        | .18350                     | .01285  | 1.833                      | .12831  | 10.02                                      | 10.02                                              | -14.96                  | 1031.3                 | -14.94                                     |
| -61        | 94.62                                           | 46.477        | .19638                     | .01375  | 1.967                      | .13769  | 10.04                                      | 10.04                                              | -14.72                  | 1031.8                 | -14.70                                     |

<sup>a</sup>Compiled by W. M. Sawdon, vapor pressures converted from *International Critical Tables*.