

Table 39 .... Refrigerant 720 (Neon) Properties of Saturated Liquid and Saturated Vapor\*

| Temp   | Pressure | Volume (cm <sup>3</sup> /g) |           | Enthalpy (J/g) |           | Entropy (J/g·K) |           | Temp | Pressure | Volume (cm <sup>3</sup> /g) |           | Enthalpy (J/g) |           | Entropy (J/g·K) |           |
|--------|----------|-----------------------------|-----------|----------------|-----------|-----------------|-----------|------|----------|-----------------------------|-----------|----------------|-----------|-----------------|-----------|
| K      | atm      | Sat Liquid                  | Sat Vapor | Sat Liquid     | Sat Vapor | Sat Liquid      | Sat Vapor | K    | atm      | Sat Liquid                  | Sat Vapor | Sat Liquid     | Sat Vapor | Sat Liquid      | Sat Vapor |
| 24.54* | 4.973    | 8013                        | 227.0     | 0              | 89.3      | 0.000           | 3.623     | 25   | 6.277    | 9387                        | 18.22     | 21.9           | 93.6      | 718             | 2.766     |
| 25     | 5.637    | 8080                        | 196.1     | 0              | 89.6      | 0.003           | 3.581     | 26   | 7.097    | 9520                        | 15.15     | 24.5           | 96.2      | 758             | 2.897     |
| 26     | 7.090    | 8167                        | 143.6     | 2.7            | 90.3      | 0.103           | 3.475     | 27   | 8.044    | 1.008                       | 12.63     | 27.2           | 92.7      | 837             | 2.828     |
| 27     | 9.728    | 8228                        | 107.7     | 4.6            | 91.1      | 0.175           | 3.377     | 28   | 10.46    | 1.038                       | 10.53     | 30.0           | 91.9      | 929             | 2.536     |
| 28     | 1.304    | 8408                        | 82.35     | 6.5            | 91.7      | 0.245           | 3.287     | 29   | 12.43    | 1.072                       | 8.776     | 33.1           | 90.7      | 1.003           | 2.461     |
| 29     | 1.712    | 8543                        | 64.08     | 8.5            | 92.3      | 0.313           | 3.202     | 30   | 14.43    | 1.113                       | 7.293     | 36.4           | 89.3      | 1.080           | 2.402     |
| 30     | 2.209    | 8683                        | 50.62     | 10.6           | 92.8      | 0.381           | 3.122     | 31   | 16.46    | 1.162                       | 6.033     | 39.9           | 87.4      | 1.162           | 2.320     |
| 31     | 2.803    | 8838                        | 40.51     | 12.7           | 93.2      | 0.449           | 3.046     | 32   | 18.53    | 1.226                       | 4.960     | 43.5           | 85.1      | 1.249           | 2.223     |
| 32     | 3.506    | 9001                        | 32.77     | 14.9           | 93.5      | 0.516           | 2.973     | 33   | 20.72    | 1.318                       | 4.041     | 48.3           | 82.4      | 1.346           | 2.140     |
| 33     | 4.329    | 9181                        | 26.78     | 17.1           | 93.7      | 0.583           | 2.903     | 34   | 24.89    | 1.474                       | 3.238     | 54.7           | 79.1      | 1.481           | 2.038     |
| 34     | 5.382    | 9375                        | 22.02     | 19.4           | 93.7      | 0.650           | 2.834     | 35   | 26.19    | 2.07                        | 2.07      |                |           |                 |           |

\* Unpublished data from Cryogenic Data Center, National Bureau of Standards, Boulder, Colorado.

† Triple point.

‡ Critical point.

Table 40 .... Refrigerant 720 (Neon) Properties of Liquid and Vapor\*

| Temp K  | P = 0.1 atm          |       |       | P = 1 atm            |       |       | P = 2 atm            |       |       | P = 5 atm            |       |       | P = 10 atm           |       |       |
|---------|----------------------|-------|-------|----------------------|-------|-------|----------------------|-------|-------|----------------------|-------|-------|----------------------|-------|-------|
|         | (Sat temp = 27.09 K) |       |       | (Sat temp = 29.60 K) |       |       | (Sat temp = 33.72 K) |       |       | (Sat temp = 37.61 K) |       |       | (Sat temp = 37.61 K) |       |       |
| T       | v                    | h     | s     | v                    | h     | s     | v                    | h     | s     | v                    | h     | s     | v                    | h     | s     |
| Sat Liq | cm <sup>3</sup> /g   | J/g   | J/g·K | cm <sup>3</sup> /g   | J/g   | J/g·K | cm <sup>3</sup> /g   | J/g   | J/g·K | cm <sup>3</sup> /g   | J/g   | J/g·K | cm <sup>3</sup> /g   | J/g   | J/g·K |
| 25      | 1011                 | 90.1  | 4.261 | 105.0                | 4.8   | 182   | 8626                 | 9.8   | 254   | 9317                 | 18.8  | 631   | 1.026                | 28.9  | 0.004 |
| 30      | 1215                 | 95.3  | 4.450 | 117.6                | 94.3  | 3.470 | 56.42                | 93.0  | 3.168 | 8656                 | 10.7  | 877   | 8633                 | 10.9  | 0.370 |
| 40      | 1824                 | 106.7 | 4.747 | 150.0                | 105.0 | 3.788 | 78.42                | 104.2 | 3.490 | 29.94                | 101.7 | 3.071 | 12.63                | 96.3  | 2.889 |
| 50      | 2031                 | 116.0 | 4.978 | 201.5                | 115.5 | 4.022 | 99.86                | 115.0 | 3.731 | 28.84                | 113.4 | 3.333 | 18.44                | 110.4 | 2.594 |
| 60      | 2438                 | 126.3 | 5.166 | 242.7                | 126.0 | 4.214 | 120.7                | 125.0 | 3.924 | 47.53                | 124.5 | 3.534 | 23.14                | 122.5 | 2.226 |
| 80      | 3282                 | 146.9 | 5.482 | 324.6                | 146.7 | 4.612 | 161.9                | 145.6 | 4.224 | 64.37                | 145.8 | 3.841 | 31.87                | 146.6 | 3.545 |
| 90      | 3859                 | 167.2 | 5.634 | 385.9                | 167.2 | 4.834 | 182.4                | 156.8 | 4.348 | 72.98                | 166.3 | 3.964 | 36.12                | 155.3 | 3.671 |
| 100     | 4465                 | 187.5 | 5.822 | 406.2                | 187.4 | 4.742 | 202.9                | 187.2 | 4.456 | 80.35                | 186.7 | 4.074 | 40.32                | 165.9 | 3.782 |
| 110     | 4472                 | 177.8 | 5.795 | 407.0                | 177.7 | 4.841 | 223.4                | 177.5 | 4.554 | 89.20                | 177.1 | 4.174 | 44.50                | 176.4 | 3.883 |
| 120     | 4579                 | 188.1 | 5.820 | 407.0                | 188.0 | 4.931 | 243.9                | 187.9 | 4.644 | 97.42                | 187.5 | 4.264 | 48.65                | 186.9 | 3.974 |
| 140     | 5692                 | 208.7 | 6.039 | 569.2                | 208.6 | 5.090 | 364.6                | 208.5 | 4.803 | 118.8                | 208.3 | 4.424 | 56.93                | 207.6 | 4.135 |
| 160     | 6505                 | 229.3 | 6.176 | 650.0                | 229.3 | 5.227 | 325.4                | 229.2 | 4.941 | 130.2                | 229.0 | 4.562 | 65.17                | 228.6 | 4.274 |
| 180     | 7319                 | 249.9 | 6.298 | 732.0                | 249.9 | 5.349 | 366.1                | 249.8 | 5.063 | 146.6                | 249.7 | 4.684 | 73.38                | 249.4 | 4.396 |
| 200     | 8132                 | 270.5 | 6.408 | 813.4                | 270.5 | 5.457 | 406.8                | 270.4 | 5.171 | 162.9                | 270.3 | 4.793 | 81.58                | 270.1 | 4.506 |
| 220     | 8945                 | 291.1 | 6.504 | 894.8                | 291.1 | 5.555 | 447.5                | 291.0 | 5.270 | 179.2                | 291.0 | 4.891 | 89.77                | 290.8 | 4.604 |
| 240     | 9758                 | 311.7 | 6.594 | 976.1                | 311.7 | 5.645 | 488.3                | 311.7 | 5.359 | 195.5                | 311.6 | 4.981 | 97.95                | 311.5 | 4.694 |
| 260     | 10571                | 332.3 | 6.678 | 1058                 | 332.3 | 5.728 | 529.0                | 332.3 | 5.442 | 211.8                | 332.3 | 5.064 | 106.1                | 332.2 | 4.777 |
| 280     | 11385                | 352.9 | 6.763 | 1139                 | 352.9 | 5.804 | 569.6                | 352.9 | 5.518 | 228.1                | 352.9 | 5.140 | 114.3                | 352.9 | 4.854 |
| 300     | 12198                | 373.5 | 6.824 | 1220                 | 373.5 | 5.876 | 610.3                | 373.5 | 5.589 | 244.4                | 373.5 | 5.211 | 122.5                | 373.5 | 4.925 |

| Temp, K   | P = 20 atm           |       |       | P = 40 atm           |       |       | P = 60 atm           |       |       | P = 80 atm           |       |       | P = 100 atm          |       |       |
|-----------|----------------------|-------|-------|----------------------|-------|-------|----------------------|-------|-------|----------------------|-------|-------|----------------------|-------|-------|
|           | (Sat temp = 42.33 K) |       |       | (Sat temp = 42.33 K) |       |       | (Sat temp = 42.33 K) |       |       | (Sat temp = 42.33 K) |       |       | (Sat temp = 42.33 K) |       |       |
| Sat Liq   | 1.232                | 45.2  | 1.270 |                      |       |       |                      |       |       |                      |       |       |                      |       |       |
| Sat Vapor | 4.643                | 56.3  | 2.303 |                      |       |       |                      |       |       |                      |       |       |                      |       |       |
| 25        | 7990                 | 2.0   | 0.13  |                      |       |       |                      |       |       |                      |       |       |                      |       |       |
| 30        | 8576                 | 11.3  | 0.35  |                      |       |       |                      |       |       |                      |       |       |                      |       |       |
| 40        | 1.090                | 25.9  | 1.032 | 1.033                | 35.1  | 3.79  | 0.901                | 13.0  | 0.26  | 0.967                | 14.3  | 0.384 | 8340                 | 35.8  | 491   |
| 50        | 8.071                | 102.9 | 2.811 | 2.560                | 70.4  | 1.951 | 1.853                | 64.1  | 1.958 | 1.800                | 58.3  | 1.935 | 1.139                | 56.1  | 1.999 |
| 60        | 10.45                | 118.2 | 3.890 | 3.839                | 107.4 | 2.472 | 2.847                | 96.1  | 2.158 | 2.105                | 88.6  | 1.947 | 1.788                | 83.6  | 1.980 |
| 80        | 15.67                | 142.3 | 5.238 | 5.839                | 157.9 | 2.911 | 5.009                | 133.6 | 2.701 | 3.708                | 129.1 | 2.527 | 2.966                | 125.2 | 2.405 |
| 90        | 17.58                | 159.1 | 6.029 | 6.829                | 174.0 | 3.058 | 5.836                | 149.3 | 2.756 | 4.305                | 141.5 | 2.711 | 3.252                | 140.5 | 2.505 |
| 100       | 20.94                | 184.4 | 6.485 | 6.939                | 187.6 | 3.177 | 6.857                | 159.2 | 2.989 | 5.022                | 160.9 | 2.949 | 3.504                | 154.8 | 2.736 |
| 110       | 22.18                | 175.1 | 6.587 | 6.858                | 175.0 | 3.100 | 7.028                | 170.9 | 3.100 | 5.010                | 189.1 | 2.965 | 3.547                | 187.5 | 2.838 |
| 120       | 24.30                | 185.6 | 6.680 | 6.718                | 185.9 | 3.280 | 8.126                | 185.8 | 3.199 | 6.197                | 189.7 | 3.067 | 3.685                | 172.0 | 2.944 |
| 140       | 28.30                | 207.0 | 6.844 | 14.13                | 205.6 | 3.547 | 9.942                | 204.4 | 3.370 | 7.217                | 203.7 | 3.265 | 3.843                | 203.3 | 3.153 |
| 160       | 32.67                | 228.0 | 6.984 | 16.46                | 227.0 | 3.690 | 11.08                | 226.1 | 3.515 | 8.481                | 225.5 | 3.389 | 4.189                | 225.1 | 3.291 |
| 180       | 36.81                | 248.9 | 7.107 | 18.56                | 242.2 | 3.815 | 12.80                | 242.0 | 3.619 | 9.488                | 247.2 | 3.517 | 4.589                | 247.0 | 3.420 |
| 200       | 40.55                | 269.8 | 7.217 | 20.83                | 333.0 | 4.073 | 15.71                | 302.9 | 3.753 | 10.78                | 302.9 | 3.654 | 5.068                | 302.9 | 3.555 |
| 220       | 45.07                | 290.6 | 7.316 | 22.74                | 290.3 | 4.028 | 15.31                | 290.1 | 3.854 | 11.61                | 291.0 | 3.723 | 5.401                | 290.1 | 3.635 |
| 240       | 49.18                | 311.4 | 7.407 | 24.61                | 311.2 | 4.117 | 16.71                | 311.2 | 3.946 | 12.67                | 310.1 | 3.824 | 5.925                | 310.5 | 3.729 |
| 260       | 53.28                | 332.2 | 7.490 | 26.85                | 323.1 | 4.201 | 18.10                | 323.2 | 4.030 | 13.71                | 323.2 | 3.909 | 6.111                | 323.2 | 3.814 |
| 280       | 57.28                | 352.9 | 7.567 | 29.45                | 333.0 | 4.273 | 19.43                | 333.0 | 4.103 | 14.85                | 333.0 | 4.000 | 6.365                | 333.0 | 3.905 |
| 300       | 61.48                | 373.5 | 7.638 | 31.01                | 373.8 | 4.280 | 20.96                | 374.1 | 4.180 | 15.80                | 374.6 | 4.059 | 6.718                | 375.0 | 3.965 |

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Bold horizontal line indicates phase change (liquid above, vapor below the line).

Conversions for Units, to Equivalent in British System of Units:

To convert temperature in degrees Kelvin (°K) to degrees Rankine (°R), multiply (°K) by 1.8

To convert pressure in atmospheres (atm) to (psia), multiply (atm) by 14.696

To convert volume (v) in cubic centimeters per gram (cm<sup>3</sup>/g) to (ft<sup>3</sup>/lb), multiply (cm<sup>3</sup>/g) by 0.16018

To convert enthalpy (h) in joules per gram (J/g) to (Btu/lb), multiply (J/g) by 0.4299

To convert entropy (s) in joules per gram·K (J/g·K) to (Btu/lb·R), multiply (J/g·K) by 0.23885

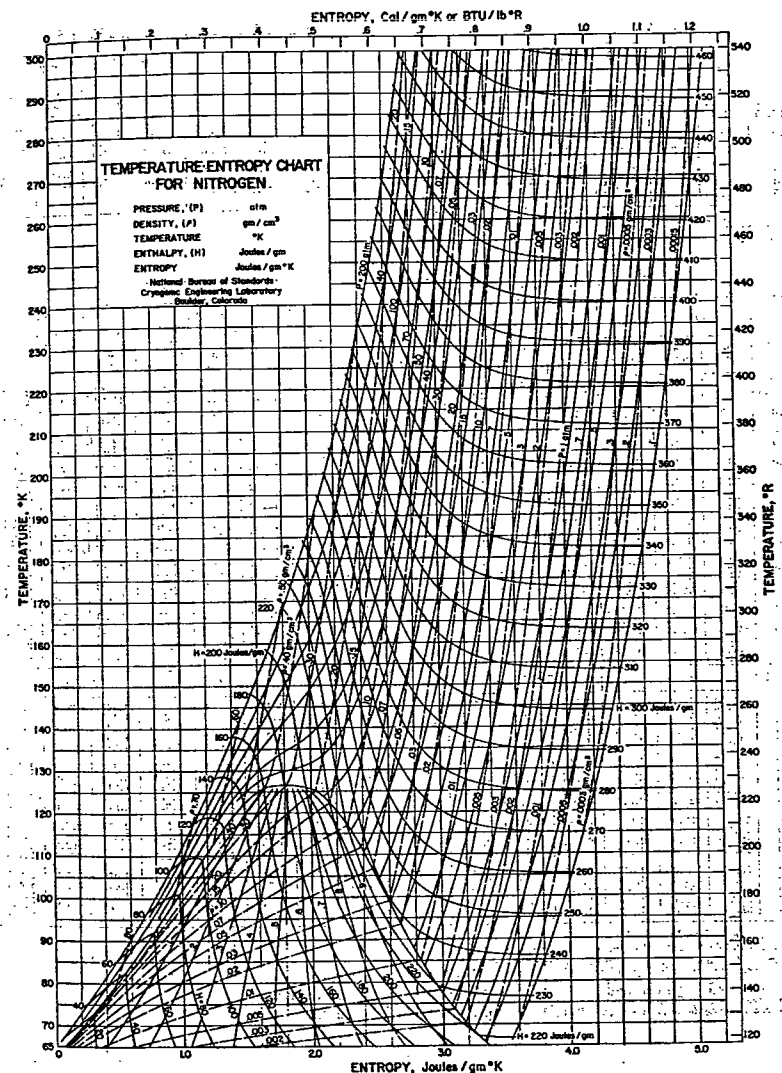


Fig. 32 .... Temperature-Entropy Diagram for Refrigerant 728