## Table 2 .... Refrigerant Line Capacities in Tons for Refrigerant 12 (Single or High Stage Applications)

*(Tons of Refrigeration Resulting in a Line Friction Drop per 100 Ft Equivalent Pipe Length Corresponding to 2F(ΔT) Change in Saturation Temp.)*

| Line Size Type L Copper, OD | Suction Lines* Suction Temp F | | | | | Discharge Lines* ΔP = 3.66 | | | Liquid Lines | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | −40 ΔP = 0.49 | −20 ΔP = 0.72 | 0 ΔP = 1.01 | 20 ΔP = 1.38 | 40 ΔP = 1.82 | Saturated −40 | Suction 0 | Temp F 40 | Line Size Type L Copper, OD | Condenser to Receiver Velocity = 100 fpm | Receiver* to System ΔT = 1 F ΔP = 1.8 psi |
| ⅛ | | | | | | | | | ⅛ | 1.16 | 2.03 |
| ¼ | | 0.17 | 0.26 | 0.21 | 0.31 | 0.46 | 0.54 | 0.67 | ¼ | 2.65 | 3.81 |
| ⅜ | 0.25 | 0.42 | 0.68 | 0.40 | 0.58 | 0.85 | 0.98 | 1.23 | ⅜ | 6.94 | 10.10 |
| ½ | 0.51 | 0.87 | 1.39 | 1.04 | 1.50 | 2.23 | 2.58 | 3.22 | ½ | 11.85 | 20.5 |
| ⅝ | 0.87 | 1.52 | 2.40 | 2.10 | 3.10 | 4.60 | 5.30 | 6.65 | ⅝ | 18.10 | 35.1 |
| ⅞ | 1.41 | 2.44 | 3.86 | 3.70 | 5.36 | 7.8 | 9.0 | 11.3 | ⅞ | 25.5 | 57.5 |
| 1⅛ | 2.94 | 5.03 | 8.00 | 5.82 | 8.50 | 12.4 | 14.4 | 18.0 | 1⅛ | 44.4 | 117.8 |
| 1⅜ | | | | 12.1 | 17.6 | 25.8 | 30.0 | 37.4 | 1⅜ | | |
| 1⅝ | 5.20 | 8.94 | 14.2 | 21.3 | 31.4 | 45.5 | 52.5 | 66.0 | 1⅝ | 68.4 | 207.8 |
| 2⅛ | 8.35 | 14.3 | 22.7 | 34.0 | 49.5 | 73.0 | 85.0 | 106.0 | 2⅛ | 97.5 | 344.0 |
| 2⅝ | 12.4 | 21.2 | 33.8 | 50.6 | 73.5 | 107.0 | 124.0 | 155.0 | 2⅝ | 132.0 | 508.0 |
| 3⅛ | 17.4 | 29.9 | 47.7 | 71.0 | 103.0 | 152.0 | 176.0 | 220.0 | 3⅛ | 173.0 | 704.0 |
| 3⅝ | 31.7 | 54.0 | 85.3 | 128.0 | 187.0 | 270.0 | 314.0 | 392.0 | | | |
| 4⅛ | 50.8 | 86.0 | 137.0 | 206.0 | 299.0 | 428.0 | 494.0 | 620.0 | | | |
| 5⅛ | | | | | | | | | | | |
| 6⅛ | | | | | | | | | | | |
| **Steel** | | | | | | | | | **Steel** | | |
| IPS | SCH | | | | | | | | IPS | SCH | | |
| ⅛ | 40 | | | | | | | | ⅛ | 80 | 3.43 | 3.23 |
| ¼ | 40 | 0.24 | 0.41 | 0.30 | 0.45 | 0.64 | 0.92 | 1.07 | 1.34 | ¼ | 80 | 6.25 | 7.27 |
| ⅜ | 40 | 0.46 | 0.78 | 1.22 | 1.82 | 2.68 | 3.75 | 4.35 | 5.42 | ⅜ | 80 | 10.4 | 14.3 |
| ½ | 40 | 0.97 | 1.60 | 2.52 | 3.78 | 5.41 | 7.8 | 9.0 | 11.3 | ½ | 80 | 18.6 | 30.1 |
| ¾ | 40 | 1.50 | 2.41 | 3.76 | 5.62 | 8.12 | 11.4 | 13.2 | 16.5 | ¾ | 80 | 25.5 | 47.3 |
| 1 | 40 | 2.81 | 4.69 | 7.40 | 10.9 | 15.7 | 21.6 | 25.1 | 31.4 | 1 | 40 | 48.0 | 111.9 |
| 1¼ | 40 | 4.44 | 7.42 | 11.6 | 17.3 | 24.7 | 34.7 | 40.2 | 50.2 | 1¼ | 40 | 68.3 | 173.0 |
| 1½ | 40 | 8.04 | 13.2 | 20.6 | 30.6 | 43.8 | 61.0 | 70.8 | 88.4 | 1½ | 40 | 104.0 | 311.8 |
| 2 | 40 | 16.03 | 27.0 | 42.8 | 62.9 | 90.2 | 125.0 | 146.0 | 182.0 | 2 | 40 | 179.0 | 634.0 |
| 2½ | 40 | 30.0 | 49.1 | 78.7 | 114.0 | 165.0 | 228.0 | 264.0 | 330.0 | | | | |
| 3 | 40 | 48.2 | 78.6 | 124.0 | 182.0 | 268.0 | 365.0 | 421.0 | 528.0 | | | | |
| 4 | 40 | 98.4 | 161.0 | 254.0 | 376.0 | 541.0 | 745.0 | 865.0 | 1080.0 | | | | |
| 5 | 40 | 180.0 | 297.0 | 458.0 | 678.0 | 972.0 | 1350.0 | 1570.0 | 1960.0 | | | | |
| 6 | 40 | 286.0 | 475.0 | 729.0 | 1080.0 | 1520.0 | 2130.0 | 2460.0 | 3090.0 | | | | |
| 8 | 40 | | | | | | | | | | | | |
| 10 | 40 | | | | | | | | | | | | |
| 12 | ID | | | | | | | | | | | | |

NOTES:

* (1) Basis of Table: 100 F Condensing Temp, 2 F $\Delta T$ per 100 ft Equivalent Length (except liquid lines).

(2) For other $\Delta T$'s and Equivalent Lengths, $L_e$
Line Capacity (Tons)

$$= \text{Table Tons} \times \left(\frac{100}{L_e} \times \frac{\text{Actual } \Delta T \text{ Loss Desired}}{\text{Table } \Delta T \text{ Loss}}\right)^{0.55}$$

(3) For other Tons and Equivalent Lengths for a given pipe size

$$\Delta T = \text{Table } \Delta T \times \frac{L_e}{100} \times \left(\frac{\text{Actual Tons}}{\text{Table Tons}}\right)^{1.8}$$

(4) Values based on 100 F Condensing Temp. For capacities at other condensing temp. multiply table value by line capacity multiplier below:

| Line | Condensing Temp, F | | | | | |
|---|---|---|---|---|---|---|
| | 80 | 90 | 100 | 105 | 110 | 120 |
| Suction Lines | 1.11 | 1.06 | 1.00 | 0.97 | 0.94 | 0.88 |
| Discharge Lines | 0.88 | 0.94 | 1.00 | 1.04 | 1.07 | 1.16 |

(5) Tabulated data developed from data prepared by ARI.[1]

(6) For the Equivalent Change in saturation temp for various line pressure drops in psi refer to Fig. 1.

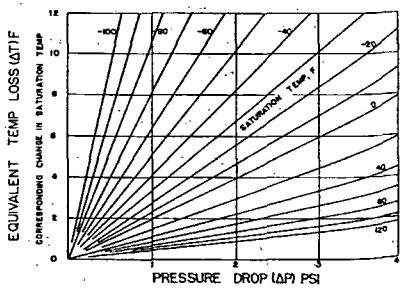



Fig. 1 .... Temperature Equivalent ($\Delta T$) of Pressure Drop (Refrigerant 12)



## Table 3 .... Refrigerant Line Capacities for Refrigerant 22 (Single or High Stage Applications)

*(Tons of Refrigeration Resulting in a Line Friction Drop per 100 Ft Equivalent Pipe Length Corresponding to 2F(ΔT) Change in Saturation Temp.)*

| Line Size Type L Copper, OD | Suction Lines* Suction Temp, F | | | | | Discharge Lines* ΔP = 6.1 | | | Liquid Lines | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | −40 ΔP = 0.79 | −20 ΔP = 1.15 | 0 ΔP = 1.6 | 20 ΔP = 2.22 | 40 ΔP = 2.93 | Saturated −40 | Suction 0 | Temp 40 | Line Size Type L Copper, OD | Condenser to Receiver Velocity = 100 fpm | Receiver to System ΔT = 1 F |
| ⅛ | | | | 0.40 | 0.59 | 1.0 | 1.1 | 1.2 | ⅛ | 2.24 | 3.5 |
| ¼ | | 0.32 | 0.49 | 0.75 | 1.10 | 2.1 | 2.3 | 2.5 | ¼ | 3.57 | 6.4 |
| ⅜ | 0.35 | 0.57 | 1.31 | 2.00 | 1.89 | 4.9 | 5.4 | 5.2 | ⅜ | 7.41 | 17.0 |
| ½ | 1.08 | 1.74 | 2.65 | 4.03 | 5.82 | 9.8 | 10.7 | 11.8 | ½ | 12.7 | 34.4 |
| ⅝ | 1.88 | 3.01 | 4.61 | 7.03 | 9.98 | 17.0 | 18.6 | 20.5 | ⅝ | 19.2 | 60.0 |
| ⅞ | 2.90 | 4.78 | 7.23 | 10.26 | 15.95 | 26.4 | 29.0 | 31.9 | ⅞ | 27.2 | 95.0 |
| 1⅛ | 6.21 | 9.97 | 15.2 | 23.2 | 33.2 | 55.0 | 60.3 | 66.3 | 1⅛ | 47.3 | 200.0 |
| 1⅜ | 10.8 | 17.5 | 26.5 | 40.3 | 58.1 | 96.0 | 105.0 | 115.6 | 1⅜ | 73.2 | 354.0 |
| 1⅝ | 17.3 | 27.1 | 43.3 | 64.5 | 23.1 | 155.0 | 170.0 | 187.3 | 1⅝ | 104.1 | 572.0 |
| 2⅛ | 25.9 | 41.9 | 63.9 | 96.8 | 139.5 | 233.0 | 255.0 | 281.0 | 2⅛ | 141.1 | 860.0 |
| 2⅝ | 36.9 | 59.2 | 89.7 | 136.0 | 196.0 | 327.0 | 358.0 | 394.0 | 2⅝ | 183.0 | 1200.0 |
| 3⅛ | 66.1 | 106.7 | 162.0 | 245.0 | 355.0 | 588.0 | 644.0 | 709.0 | | | |
| **Steel** | | | | | | | | | **Steel** | | |
| IPS | SCH | | | | | | | | IPS | SCH | | |
| ⅛ | 40 | | | | | | | | ⅛ | 80 | 4.66 | 5.5 |
| ¼ | 40 | 0.49 | 0.78 | 1.18 | 1.77 | 2.52 | 4.1 | 4.5 | 5.0 | ¾ | 80 | 6.17 | 12.2 |
| ⅜ | 40 | 0.94 | 1.49 | 2.24 | 3.24 | 4.72 | 7.8 | 8.5 | 9.4 | 1 | 80 | 13.2 | 24.4 |
| ½ | 40 | 1.95 | 3.01 | 4.67 | 6.83 | 9.73 | 16.1 | 17.6 | 19.4 | 1¼ | 80 | 22.9 | 51.5 |
| ¾ | 40 | 2.89 | 4.63 | 7.04 | 10.4 | 14.7 | 24.1 | 26.5 | 29.1 | 1½ | 80 | 37.1 | 78.0 |
| 1 | 40 | 5.60 | 8.90 | 13.0 | 19.9 | 28.2 | 46.6 | 51.0 | 56.2 | 2 | 40 | 51.5 | 185.0 |
| 1¼ | 40 | 8.90 | 14.2 | 21.5 | 31.9 | 45.9 | 74.7 | 82.0 | 90.0 | 2½ | 40 | 73.3 | 297.0 |
| 1½ | 40 | 15.9 | 25.2 | 38.0 | 56.5 | 80.1 | 132.0 | 144.0 | 159.0 | 3 | 40 | 113.0 | 510.0 |
| 2 | 40 | 23.1 | 36.1 | 55.1 | 81.0 | 116.0 | 189.0 | 207.0 | 228.0 | 3½ | 40 | 151.5 | 704.0 |
| 2½ | 40 | 32.1 | 50.8 | 76.7 | 112.7 | 159.5 | 260.0 | 285.0 | 314.0 | 4 | 40 | 195.0 | 1060.0 |
| 3 | 40 | 57.8 | 91.0 | 138.6 | 204.0 | 292.0 | 477.0 | 520.0 | 575.0 | | | | |
| 4 | 40 | 94.1 | 148.6 | 224.0 | 329.0 | 472.0 | 775.0 | 850.0 | 937.0 | | | | |
| 5 | 40 | 199.0 | 316.0 | 474.0 | 704.0 | 996.0 | 1650.0 | 1810.0 | 1992.0 | | | | |
| 6 | 40 | 294.2 | 550.0 | 840.0 | 1226.0 | 1760.0 | 2880.0 | 3150.0 | 3470.0 | | | | |
| 8 | 40 | 555.0 | 877.0 | 1340.0 | 1935.0 | 2795.0 | 4640.0 | 5080.0 | 5590.0 | | | | |
| 10 | 40 | | | | | | | | | | | | |
| 12 | ID | | | | | | | | | | | | |

NOTES:

*(1) Basis of Table: 105 F Condensing Temperature, 2 F $\Delta T$ per 100 ft Equivalent Length (except liquid lines).

(2) For Other $\Delta T$'s and Equivalent Lengths, $L_e$
Line Capacity (Tons)

$$= \text{Table Tons} \times \left(\frac{100}{L_e} \times \frac{\text{Actual } \Delta T \text{ Loss Desired}}{\text{Table } \Delta T \text{ Loss}}\right)^{0.55}$$

(3) For other Tons and Equivalent Lengths in a given pipe size

$$\Delta T = \text{Table } \Delta T \times \frac{L_e}{100} \times \left(\frac{\text{Actual Tons}}{\text{Table Tons}}\right)^{1.8}$$

(4) For the equivalent change in saturation temperature for various line pressure drops in psi, refer to Fig. 2.

(5) Data developed from ARI information.[1]

(6) For other condensing temperatures, multiply table tons by the following factors:

| Condensing Temp F | Suction Lines | Hot Gas Lines |
|---|---|---|
| 80 | 1.13 | 0.77 |
| 90 | 1.08 | 0.86 |
| 100 | 1.03 | 0.95 |
| 110 | 0.97 | 1.04 |
| 120 | 0.91 | 1.13 |

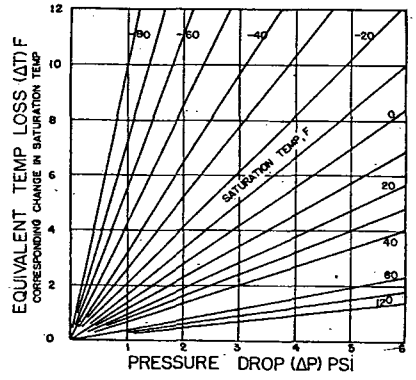



Fig. 2 .... Temperature Equivalent ($\Delta T$) of Pressure Drop (Refrigerant 22)