

## 10.7 CAPILLARY TUBES SIZE

During the initial steps of the design of a new cabinet, tables of Chapter **10.7.1 (a-g)** can provide guidance for starting with the selection of the appropriate capillary tube dimensions.

They represent capillaries adopted in practical on systems performing properly and requiring a cooling capacity indicated on the below tables, corresponding to the Embraco compressor rated cooling capacity, for the various refrigerants and applications.



The exact size of the capillary must however be determined according to the results of laboratory tests performed on prototype cabinets. For this reason the capillary here indicated are classified as "suggested capillary for preliminary selection".

The capillary sizing indicated on **Tables 10.7.1 (a-g)** refers to cabinets adopting a suction line heat exchanger of minimum length 0.9 m and with 0°C sub-cooling, working within the indicated range of evaporating temperature.

### 10.7.1 SUGGESTED CAPILLARY FOR PRELIMINARY SELECTION

**Table 10.7.1a R600a LBP applications**

| Compressor<br>Rated cooling capacity<br>(W) |            |                       | Dimension I.D. (mm) x length (m)             |                                             |
|---------------------------------------------|------------|-----------------------|----------------------------------------------|---------------------------------------------|
| CECOMAF                                     | ASHRAE (*) | ARI 540<br>(2004) (*) | Evaporating<br>temperature<br>-30°C to -20°C | Evaporating<br>temperature<br>-20°C to -5°C |
| 40 - 60                                     | 60 - 80    | 50 - 70               | 0.66 x 4.00                                  | 0.66 x 3.45                                 |
| 60 - 75                                     | 80 - 105   | 70 - 90               | 0.78 x 3.50                                  | 0.78 x 3.10                                 |
| 75 - 100                                    | 105 - 140  | 90 - 120              | 0.78 x 3.20                                  | 0.91 x 3.20                                 |
| 100 - 125                                   | 140 - 175  | 120 - 150             | 0.78 x 3.00                                  | 0.91 x 3.00                                 |
| 125 - 150                                   | 175 - 210  | 150 - 180             | 0.78 x 2.70                                  | 0.91 x 2.60                                 |
| 150 - 180                                   | 210 - 250  | 180 - 215             | 0.91 x 3.60                                  | 1.06 x 3.60                                 |

(\*): Approximate equivalent cooling capacity to the Cecomaf.

**Table 10.7.1b R600a HBP applications**

| Compressor<br>Rated cooling capacity<br>(W) |            |                       | Dimension I.D. (mm) x length (m)            |                                             |
|---------------------------------------------|------------|-----------------------|---------------------------------------------|---------------------------------------------|
| EN12900 (*)                                 | ASHRAE     | ARI 540<br>(2004) (*) | Evaporating<br>temperature<br>-15°C to -5°C | Evaporating<br>temperature<br>-5°C to +10°C |
| 250 - 300                                   | 275 - 350  | 250 - 320             | 0.78 x 2.50                                 | 0.91 x 2.40                                 |
|                                             |            |                       | 0.78 x 2.10                                 | 0.91 x 2.00                                 |
| 300 - 400                                   | 350 - 450  | 320 - 400             | 0.78 x 2.40                                 | 0.91 x 2.30                                 |
| 400 - 500                                   | 450 - 570  | 400 - 520             | 0.78 x 2.30                                 | 0.91 x 2.20                                 |
| 500 - 650                                   | 570 - 750  | 520 - 675             | 0.91 x 2.90                                 | 1.06 x 2.70                                 |
| 650 - 750                                   | 750 - 850  | 675 - 775             | 0.91 x 2.40                                 | 1.06 x 2.50                                 |
| 750 - 900                                   | 850 - 1000 | 775 - 900             | 1.06 x 3.20                                 | 1.27 x 3.30                                 |

(\*): Approximate equivalent cooling capacity to the Ashrae HBP

**Table 10.7.1c R134a LBP applications**

| Compressor<br>Rated cooling capacity<br>(W) |           |                       | Dimension I.D. (mm) x length (m)             |                                             |
|---------------------------------------------|-----------|-----------------------|----------------------------------------------|---------------------------------------------|
| EN12900 (*)                                 | ASHRAE    | ARI 540<br>(2004) (*) | Evaporating<br>temperature<br>-35°C to -20°C | Evaporating<br>temperature<br>-20°C to -5°C |
| 35 - 45                                     | 70 - 90   | 60 - 75               | 0.61 x 4.00                                  | 0.61 x 3.50                                 |
| 45 - 55                                     | 90 - 120  | 75 - 95               | 0.78 x 4.00                                  | 0.91 x 4.00                                 |
| 55 - 65                                     | 110 - 130 | 95 - 110              | 0.78 x 3.70                                  | 0.91 x 3.70                                 |
| 65 - 80                                     | 130 - 160 | 110 - 135             | 0.78 x 3.50                                  | 0.91 x 3.50                                 |
| 80 - 95                                     | 160 - 190 | 135 - 160             | 0.78 x 3.30                                  | 0.91 x 3.30                                 |
| 95 - 110                                    | 190 - 220 | 160 - 190             | 0.91 x 4.00                                  | 1.06 x 4.00                                 |
| 110 - 150                                   | 220 - 300 | 190 - 255             | 0.91 x 3.30                                  | 1.06 x 3.30                                 |
| 150 - 200                                   | 300 - 400 | 255 - 350             | 0.91 x 2.90                                  | 1.06 x 3.00                                 |
| 200 - 250                                   | 400 - 500 | 350 - 425             | 1.06 x 3.25                                  | 1.06 x 2.50                                 |
| 250 - 345                                   | 500 - 680 | 425 - 610             | 1.06 x 3.00                                  | 1.20 x 3.50                                 |

(\*): Approximate equivalent cooling capacity to the EN12900

Table 10.7.1d R134a HBP Applications

| Compressor<br>Rated cooling capacity<br>(W) |             |                       | Dimension I.D. (mm) x length (m)            |                                             |
|---------------------------------------------|-------------|-----------------------|---------------------------------------------|---------------------------------------------|
| EN12900 (*)                                 | ASHRAE      | ARI 540<br>(2004) (*) | Evaporating<br>temperature<br>-15°C to -5°C | Evaporating<br>temperature<br>-5°C to +10°C |
| 250 - 300                                   | 275 - 350   | 250 - 320             | 0.78 x 2.50                                 | 0.91 x 2.40                                 |
|                                             |             |                       | 0.78 x 2.10                                 | 0.91 x 2.00                                 |
| 300 - 400                                   | 350 - 450   | 320 - 400             | 0.78 x 2.40                                 | 0.91 x 2.30                                 |
| 400 - 500                                   | 450 - 570   | 400 - 520             | 0.78 x 2.30                                 | 0.91 x 2.20                                 |
| 500 - 650                                   | 570 - 750   | 520 - 675             | 0.91 x 2.90                                 | 1.06 x 2.70                                 |
| 650 - 750                                   | 750 - 850   | 675 - 775             | 0.91 x 2.40                                 | 1.06 x 2.50                                 |
| 750 - 900                                   | 850 - 1000  | 775 - 900             | 1.06 x 3.20                                 | 1.27 x 3.30                                 |
| 900 - 1200                                  | 1000 - 1350 | 900 - 1250            | 1.24 x 4.00                                 | 1.37 x 3.30                                 |
| 1200 - 1500                                 | 1350 - 1700 | 1250 - 1550           | 1.37 x 3.50                                 | 1.50 x 3.30                                 |
| 1500 - 2000                                 | 1700 - 2300 | 1550 - 2100           | 1.37 x 3.10                                 | 1.50 x 2.90                                 |
| 2000 - 2500                                 | 2300 - 2850 | 2100 - 2600           | 1.63 x 3.60                                 | 1.78 x 3.30                                 |
| 2500 - 3000                                 | 2850 - 3500 | 2600 - 3200           | 2x1.50 x 4.00                               | 2x1.63 x 3.00                               |

(\*): Approximate equivalent cooling capacity to the Ashrae HBP

Table 10.7.1e R290 (\*\*) - R404A - R507A LBP applications

| Compressor<br>Rated cooling capacity<br>(W) |             |                       | Dimension I.D. (mm) x length (m)             |                                              |
|---------------------------------------------|-------------|-----------------------|----------------------------------------------|----------------------------------------------|
| EN12900 (*)                                 | Ashrae      | ARI 540<br>(2004) (*) | Evaporating<br>temperature<br>-40°C to -20°C | Evaporating<br>temperature<br>-20°C to -10°C |
| 120 - 145                                   | 230 - 280   | 170 - 210             | 0.78 x 3.80                                  | 0.78 x 2.70                                  |
| 150 - 185                                   | 280 - 355   | 210 - 265             | 0.91 x 4.00                                  | 0.91 x 2.80                                  |
| 185 - 260                                   | 335 - 500   | 250 - 375             | 0.91 x 3.10                                  | 0.91 x 2.20                                  |
| 260 - 340                                   | 500 - 650   | 375 - 480             | 0.91 x 2.70                                  | 1.20 x 2.80                                  |
| 340 - 390                                   | 650 - 750   | 480 - 560             | 1.20 x 3.40                                  | 1.20 x 2.50                                  |
| 390 - 470                                   | 750 - 900   | 560 - 675             | 1.20 x 3.10                                  | 1.20 x 2.20                                  |
| 470 - 550                                   | 900 - 1050  | 675 - 800             | 1.20 x 2.90                                  | 1.40 x 3.00                                  |
| 550 - 640                                   | 1050 - 1400 | 800 - 1050            | 1.40 x 3.50                                  | 1.40 x 2.60                                  |
| 730 - 900                                   | 1400 - 1750 | 1050 - 1300           | 1.60 x 3.50                                  | 1.60 x 2.70                                  |

(\*): practical experience have demonstrated when changing from R404A to R290, is preferable a length increase of aprox 10 %

(\*\*): Approximate equivalent cooling capacity to the Ashrae LBP

Table 10.7.1f R290 (\*\*) - R404A - R507A - R407C M/HBP application

| Compressor<br>Rated cooling capacity<br>(W) |                    |                     | Dimension I.D. (mm) x length (m)            |                                             |
|---------------------------------------------|--------------------|---------------------|---------------------------------------------|---------------------------------------------|
| Ashrae                                      | EN12900MBP<br>(**) | ARI 540 MBP<br>(**) | Evaporating<br>temperature<br>-20°C to -5°C | Evaporating<br>temperature<br>-5°C to +10°C |
| 650 - 750                                   | 350 - 400          | 350 - 400           | 1.06 x 3.30                                 | 1.06 x 2.80                                 |
| 750 - 850                                   | 400 - 450          | 400 - 450           | 1.06 x 3.10                                 | 1.06 x 2.55                                 |
| 850 - 1000                                  | 450 - 550          | 450 - 550           | 1.06 x 2.80                                 | 1.20 x 3.30                                 |
| 1000 - 1200                                 | 550 - 650          | 550 - 650           | 1.20 x 3.00                                 | 1.20 x 2.35                                 |
| 1200 - 1600                                 | 650 - 850          | 650 - 850           | 1.20 x 2.75                                 | 1.27 x 2.45                                 |
| 1600 - 2000                                 | 850 - 1050         | 850 - 1050          | 1.27 x 2.55                                 | 1.27 x 1.80                                 |
| 2000 - 2400                                 | 1050 - 1250        | 1050 - 1250         | 1.27 x 2.15                                 | 1.27 x 1.50                                 |
| 2400 - 2800                                 | 1250 - 1500        | 1250 - 1500         | 1.37 x 1.90                                 | 1.37 x 1.50                                 |
| 2800 - 3300                                 | 1500 - 1750        | 1500 - 1750         | 1.63 x 2.75                                 | 1.63 x 1.60                                 |
| 3300 - 3800                                 | 1750 - 2000        | 1750 - 2000         | 1.90 x 2.65                                 | 2.16 x 2.05                                 |
| 3800 - 4500                                 | 2000 - 2400        | 2000 - 2400         | 2.16 x 2.45                                 | 2x1.63 x 1.70                               |
| 4500 - 5700                                 | 2400 - 4200        | 2400 - 4200         | 2.16 x 1.90                                 | 2x2.16 x 2.35                               |

(\*): practical experience have demonstrated when changing from R404A to R290, is preferable a length increase of aprox 10 %

(\*\*): Approximate equivalent cooling capacity to the Ashrae M/HBP

**Note:** Compressor test conditions see in Table 5.5