

# LINOVECTOR II

LV3-E / LV4-E  
Copper/Aluminum and  
Steel Element Ratings

## Submittal

### Specification

#### LV3 Slip Jointed Enclosure

##### ENCLOSURE:

STYLE: Flat Top, Top Outlet  
OUTLET: Stamped Louvers  
Pencil Proof

LENGTHS: 2'0" thru 8'0" in 6" Increments

MAT'L: ☐ 18 Ga. CRS (Std)  
☐ 16 Ga. CRS (Opt'l)  
☐ 14 Ga. CRS (Opt'l)  
☐ 18 Ga. Stainless Steel (Opt'l)  
☐ 16 Ga. Stainless Steel (Opt'l)  
☐ 14 Ga. Stainless Steel (Opt'l)  
☐ 16 Ga. Aluminum (Opt'l)  
☐ 14 Ga. Aluminum (Opt'l)  
☐ 12 Ga. Aluminum (Opt'l)

HEIGHT: ☐ 5 3/4" (LV3 only)  
☐ 6 1/8" (LV4 only)  
☐ 11 3/4" (LV3 only)  
☐ 12 1/8" (LV4 only)

FINISH: ☐ Baked Powder (Std)  
☐ Baked Metallic (Opt'l)

##### ELEMENT:

TYPE: ☐ Cu/AL (Mechanically Expanded)  
LENGTHS: 2'0" thru 12'6" in 1" Increments  
for 1" & 1-1/4" Cu.  
2'0" thru 8'0" in 1" Increments  
for 3/4" Cu.

One End Flared (Std)

TYPE: ☐ IPS Steel (Mechanically Expanded)  
LENGTHS: 2'0" thru 12'6" in 1" Increments  
☐ NPT Thread both Ends (Std)  
☐ Beveled Ends for Field Weld (Opt'l)

See Catalog for Working Pressures

#### LV4 Slip Jointed Enclosure

##### BACKPLATE:

TYPE: ☐ Partial B/P  
LENGTHS: 8'0" Only  
MAT'L: ☐ 20 Ga. Prepainted (Std)  
☐ 18 Ga. Galvannealed (Opt'l)

##### AIRSEAL:

☐ 1/8" x 3/8" Closed Cell (Opt'l)

##### BRACKETS:

☐ Water Brkt w/B.B.

##### DAMPER: Not Available

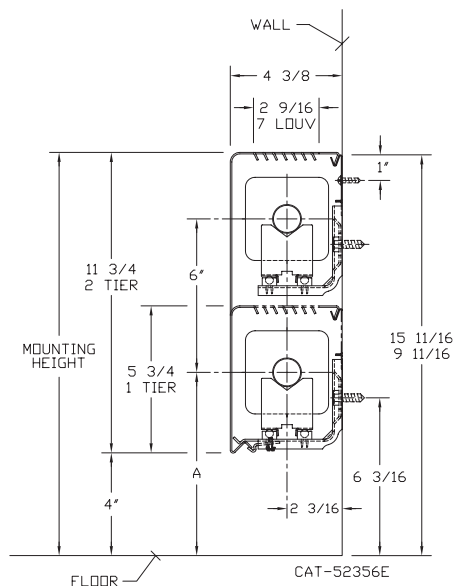
Not recommended for steam applications.  
Consult factory

##### ACCESSORIES:

☐ LV Overlapping Type  
All accessories return to the wall at the bottom  
and have pre-punched holes for fastening to  
the wall.

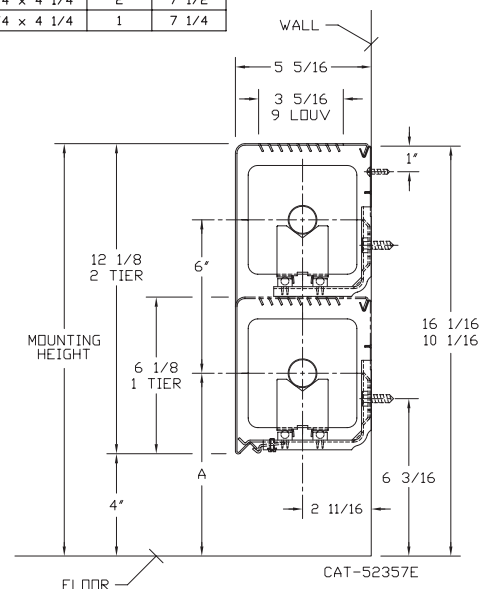
#### LV3-E5 11

| ELEMENT<br>TUBE SIZE | FIN SIZE<br>HEIGHT x WIDTH | CRADLE<br>NUMBER | A       |
|----------------------|----------------------------|------------------|---------|
| 3/4" COPPER          | 3 1/4 x 3 1/4              | 2                | 7"      |
| 1" COPPER            | 3 1/4 x 3 1/4              | 2                | 7 3/16  |
| 1 1/4" COPPER        | 3 1/4 x 3 1/4              | 1                | 6 5/8   |
| 1" STEEL             | 3 1/4 x 3 1/4              | 2                | 7 5/16  |
| 1 1/4" STEEL         | 3 1/4 x 3 1/4              | 1                | 6 13/16 |



#### LV4-E6 12

| ELEMENT<br>TUBE SIZE | FIN SIZE<br>HEIGHT x WIDTH | CRADLE<br>NUMBER | A      |
|----------------------|----------------------------|------------------|--------|
| 3/4" COPPER          | 3 5/8 x 4 1/4              | 2                | 7"     |
| 3/4" COPPER          | 4 1/4 x 4 1/4              | 3A               | 7 3/8  |
| 1" COPPER            | 3 5/8 x 4 1/4              | 2                | 7 3/16 |
| 1" COPPER            | 4 1/4 x 4 1/4              | 2                | 7 3/16 |
| 1 1/4" COPPER        | 3 5/8 x 4 1/4              | 2                | 7 5/16 |
| 1 1/4" COPPER        | 4 1/4 x 4 1/4              | 2                | 7 5/16 |
| 1" STEEL             | 4 1/4 x 4 1/4              | 2                | 7 5/16 |
| 1 1/4" STEEL         | 4 1/4 x 4 1/4              | 2                | 7 1/2  |
| 2" STEEL             | 4 1/4 x 4 1/4              | 1                | 7 1/4  |



**Vulcan**  
RADIATOR

260 North Elm St., Westfield, MA 01085  
(413) 568-9571 Fax: (413) 564-5661  
www.vulcanrad.com

PROJECT: \_\_\_\_\_ DATE: \_\_\_\_\_  
LOCATION: \_\_\_\_\_  
ARCHITECT: \_\_\_\_\_  
ENGINEER: \_\_\_\_\_  
CONTRACTOR: \_\_\_\_\_  
PO NUMBER: \_\_\_\_\_

# STYLE "LV3-E / LV4-E" LINOVECTOR II

## COPPER/ALUMINUM ELEMENTS

ALL RATINGS ARE IN BTU/HR/LIN FT AND BASED ON 3 FPS VELOCITY, 65° EAT

| TUBE<br>SIZE | CATALOG<br>DESIGNATION | FIN SIZE<br>HEIGHT X WIDTH | FINS<br>PER<br>FT. | FIN<br>THICKNESS<br>IN INCHES | ENCL<br>HEIGHT<br>IN INCHES | TIERS<br>AND<br>CENTERS<br>IN INCHES | MOUNTING<br>HEIGHT<br>IN INCHES | STEAM<br>215°<br>FACTOR                           | HOT WATER (AVG.) |              |             |             |             |            |            |            |            |
|--------------|------------------------|----------------------------|--------------------|-------------------------------|-----------------------------|--------------------------------------|---------------------------------|---------------------------------------------------|------------------|--------------|-------------|-------------|-------------|------------|------------|------------|------------|
|              |                        |                            |                    |                               |                             |                                      |                                 |                                                   | 200°             | 190°         | 180°        | 170°        | 160°        | 150°       | 140°       | 130°       | 120°       |
|              |                        |                            |                    |                               |                             |                                      |                                 | CORRECTION FACTORS FOR AVERAGE WATER TEMPERATURES |                  |              |             |             |             |            |            |            | 0.86       |
| 3/4"         | VC3/4-33               | 3-1/4" SQ.                 | 32                 | .020                          | 5<br>11                     | 1<br>2-6 CL                          | 9-3/4<br>15-3/4                 | 840<br>1380                                       | 720<br>1190      | 660<br>1080  | 580<br>950  | 510<br>840  | 450<br>730  | 380<br>620 | 340<br>550 | 280<br>460 | 220<br>360 |
| 3/4"         | VC3/4-34               | 3-1/4" SQ.                 | 40                 | .020                          | 5<br>11                     | 1<br>2-6 CL                          | 9-3/4<br>15-3/4                 | 970<br>1490                                       | 830<br>1280      | 760<br>1160  | 670<br>1030 | 590<br>910  | 510<br>790  | 440<br>670 | 390<br>600 | 320<br>490 | 250<br>390 |
| 3/4"         | VC3/4-35               | 3-1/4" SQ.                 | 50                 | .020                          | 5<br>11                     | 1<br>2-6 CL                          | 9-3/4<br>15-3/4                 | 980<br>1440                                       | 840<br>1240      | 760<br>1120  | 680<br>990  | 600<br>880  | 520<br>760  | 440<br>650 | 390<br>580 | 320<br>480 | 250<br>370 |
| 1"           | VC33                   | 3-1/4" SQ.                 | 32                 | .020                          | 5<br>11                     | 1<br>2-6 CL                          | 9-3/4<br>15-3/4                 | 820<br>1360                                       | 710<br>1170      | 640<br>1060  | 570<br>940  | 500<br>830  | 430<br>720  | 370<br>610 | 330<br>540 | 270<br>450 | 210<br>350 |
| 1"           | VC34                   | 3-1/4" SQ.                 | 40                 | .020                          | 5<br>11                     | 1<br>2-6 CL                          | 9-3/4<br>15-3/4                 | 950<br>1470                                       | 820<br>1260      | 740<br>1150  | 660<br>1010 | 580<br>900  | 500<br>780  | 430<br>660 | 380<br>590 | 310<br>490 | 250<br>380 |
| 1"           | VC35                   | 3-1/4" SQ.                 | 50                 | .020                          | 5<br>11                     | 1<br>2-6 CL                          | 9-3/4<br>15-3/4                 | 960<br>1470                                       | 830<br>1260      | 750<br>1150  | 660<br>1010 | 590<br>900  | 510<br>780  | 430<br>660 | 380<br>590 | 320<br>490 | 250<br>380 |
| 1-1/4"       | VC133                  | 3-1/4" SQ.                 | 32                 | .020                          | 5<br>11                     | 1<br>2-6 CL                          | 9-3/4<br>15-3/4                 | 780<br>1320                                       | 670<br>1140      | 610<br>1030  | 540<br>910  | 480<br>810  | 410<br>700  | 350<br>590 | 310<br>530 | 260<br>440 | 200<br>340 |
| 1-1/4"       | VC134                  | 3-1/4" SQ.                 | 40                 | .020                          | 5<br>11                     | 1<br>2-6 CL                          | 9-3/4<br>15-3/4                 | 910<br>1400                                       | 780<br>1200      | 710<br>1090  | 630<br>970  | 560<br>850  | 480<br>740  | 410<br>630 | 360<br>560 | 300<br>460 | 240<br>360 |
| 1-1/4"       | VC135                  | 3-1/4" SQ.                 | 50                 | .020                          | 5<br>11                     | 1<br>2-6 CL                          | 9-3/4<br>15-3/4                 | 920<br>1380                                       | 790<br>1190      | 720<br>1080  | 630<br>950  | 560<br>840  | 490<br>730  | 410<br>620 | 370<br>550 | 300<br>460 | 240<br>360 |
| 3/4"         | VC3/4-433              | 3-5/8" x 4-1/4"            | 32                 | .020                          | 6<br>12                     | 1<br>2-6 CL                          | 10-1/8<br>16-1/8                | 1080<br>1900                                      | 930<br>1630      | 840<br>1480  | 750<br>1310 | 660<br>1160 | 570<br>1010 | 490<br>860 | 430<br>760 | 360<br>630 | 280<br>490 |
| 3/4"         | VC3/4-434              | 3-5/8" x 4-1/4"            | 40                 | .020                          | 6<br>12                     | 1<br>2-6 CL                          | 10-1/8<br>16-1/8                | 1190<br>2040                                      | 1020<br>1750     | 930<br>1590  | 820<br>1410 | 730<br>1240 | 630<br>1080 | 540<br>920 | 480<br>820 | 390<br>670 | 310<br>530 |
| 3/4"         | VC3/4-435              | 3-5/8" x 4-1/4"            | 50                 | .020                          | 6<br>12                     | 1<br>2-6 CL                          | 10-1/8<br>16-1/8                | 1270<br>2060                                      | 1090<br>1770     | 990<br>1610  | 880<br>1420 | 770<br>1260 | 670<br>1090 | 570<br>930 | 510<br>820 | 420<br>680 | 330<br>540 |
| 1"           | VC433                  | 3-5/8" x 4-1/4"            | 32                 | .020                          | 6<br>12                     | 1<br>2-6 CL                          | 10-1/8<br>16-1/8                | 1110<br>1690                                      | 950<br>1450      | 870<br>1320  | 770<br>1170 | 680<br>1030 | 590<br>900  | 500<br>760 | 440<br>680 | 370<br>560 | 290<br>440 |
| 1"           | VC434                  | 3-5/8" x 4-1/4"            | 40                 | .020                          | 6<br>12                     | 1<br>2-6 CL                          | 10-1/8<br>16-1/8                | 1230<br>1960                                      | 1060<br>1690     | 960<br>1530  | 850<br>1350 | 750<br>1200 | 650<br>1040 | 550<br>880 | 490<br>780 | 410<br>650 | 320<br>510 |
| 1"           | VC435                  | 3-5/8" x 4-1/4"            | 50                 | .020                          | 6<br>12                     | 1<br>2-6 CL                          | 10-1/8<br>16-1/8                | 1320<br>1930                                      | 1140<br>1660     | 1030<br>1510 | 910<br>1330 | 810<br>1180 | 700<br>1020 | 590<br>870 | 530<br>770 | 440<br>640 | 340<br>500 |
| 1-1/4"       | VC1433                 | 3-5/8" x 4-1/4"            | 32                 | .020                          | 6<br>12                     | 1<br>2-6 CL                          | 10-1/8<br>16-1/8                | 1090<br>1660                                      | 940<br>1430      | 850<br>1290  | 750<br>1150 | 660<br>1010 | 580<br>880  | 490<br>750 | 440<br>660 | 360<br>550 | 280<br>430 |
| 1-1/4"       | VC1434                 | 3-5/8" x 4-1/4"            | 40                 | .020                          | 6<br>12                     | 1<br>2-6 CL                          | 10-1/8<br>16-1/8                | 1210<br>1920                                      | 1040<br>1650     | 940<br>1500  | 830<br>1320 | 740<br>1170 | 640<br>1020 | 540<br>860 | 480<br>770 | 400<br>630 | 310<br>500 |
| 1-1/4"       | VC1435                 | 3-5/8" x 4-1/4"            | 50                 | .020                          | 6<br>12                     | 1<br>2-6 CL                          | 10-1/8<br>16-1/8                | 1300<br>1890                                      | 1120<br>1630     | 1010<br>1470 | 900<br>1300 | 790<br>1150 | 690<br>1000 | 590<br>850 | 520<br>760 | 430<br>620 | 340<br>490 |
| 3/4"         | VC3/4-43               | 4-1/4" SQ.                 | 32                 | .020                          | 6<br>12                     | 1<br>2-6 CL                          | 10-1/8<br>16-1/8                | 1200<br>2090                                      | 1030<br>1800     | 940<br>1630  | 830<br>1440 | 730<br>1270 | 640<br>1110 | 540<br>940 | 480<br>840 | 400<br>690 | 310<br>540 |
| 3/4"         | VC3/4-44               | 4-1/4" SQ.                 | 40                 | .020                          | 6<br>12                     | 1<br>2-6 CL                          | 10-1/8<br>16-1/8                | 1310<br>2100                                      | 1130<br>1810     | 1020<br>1640 | 900<br>1450 | 800<br>1280 | 690<br>1110 | 590<br>950 | 520<br>840 | 430<br>690 | 340<br>550 |
| 3/4"         | VC3/4-45               | 4-1/4" SQ.                 | 50                 | .020                          | 6<br>12                     | 1<br>2-6 CL                          | 10-1/8<br>16-1/8                | 1330<br>2110                                      | 1140<br>1810     | 1040<br>1650 | 920<br>1460 | 810<br>1290 | 700<br>1120 | 600<br>950 | 530<br>840 | 440<br>700 | 350<br>550 |
| 1"           | VC43                   | 4-1/4" SQ.                 | 32                 | .020                          | 6<br>12                     | 1<br>2-6 CL                          | 10-1/8<br>16-1/8                | 1220<br>1920                                      | 1050<br>1650     | 950<br>1500  | 840<br>1320 | 740<br>1170 | 650<br>1020 | 550<br>860 | 490<br>770 | 400<br>630 | 320<br>500 |
| 1"           | VC44                   | 4-1/4" SQ.                 | 40                 | .020                          | 6<br>12                     | 1<br>2-6 CL                          | 10-1/8<br>16-1/8                | 1220<br>2040                                      | 1050<br>1750     | 950<br>1590  | 840<br>1410 | 740<br>1240 | 650<br>1080 | 550<br>920 | 490<br>820 | 400<br>670 | 320<br>530 |
| 1"           | VC45                   | 4-1/4" SQ.                 | 50                 | .020                          | 6<br>12                     | 1<br>2-6 CL                          | 10-1/8<br>16-1/8                | 1370<br>1930                                      | 1180<br>1660     | 1070<br>1510 | 950<br>1330 | 840<br>1180 | 730<br>1020 | 620<br>870 | 550<br>770 | 450<br>640 | 360<br>500 |
| 1-1/4"       | VC143                  | 4-1/4" SQ.                 | 32                 | .020                          | 6<br>12                     | 1<br>2-6 CL                          | 10-1/8<br>16-1/8                | 1200<br>1880                                      | 1030<br>1620     | 940<br>1470  | 830<br>1300 | 730<br>1150 | 640<br>1000 | 540<br>850 | 480<br>750 | 400<br>620 | 310<br>490 |
| 1-1/4"       | VC144                  | 4-1/4" SQ.                 | 40                 | .020                          | 6<br>12                     | 1<br>2-6 CL                          | 10-1/8<br>16-1/8                | 1330<br>1970                                      | 1140<br>1690     | 1040<br>1540 | 920<br>1360 | 810<br>1200 | 700<br>1040 | 600<br>890 | 530<br>790 | 440<br>650 | 350<br>510 |
| 1-1/4"       | VC145                  | 4-1/4" SQ.                 | 50                 | .020                          | 6<br>12                     | 1<br>2-6 CL                          | 10-1/8<br>16-1/8                | 1350<br>1890                                      | 1160<br>1630     | 1050<br>1470 | 930<br>1300 | 820<br>1150 | 720<br>1000 | 610<br>850 | 540<br>760 | 450<br>620 | 350<br>490 |

Note: Copper tube furnished flared one end standard.

# STYLE "LV3-E / LV4-E" LINOVECTOR II

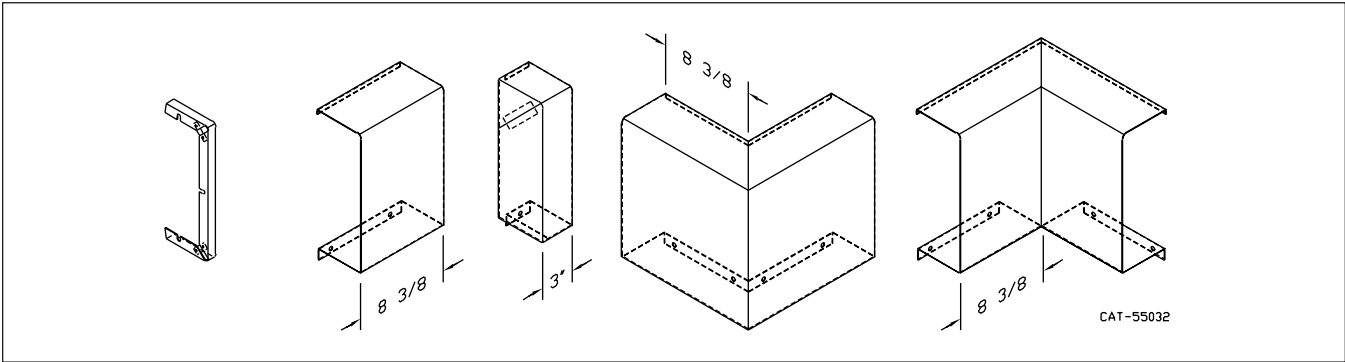
## STEEL ELEMENTS

ALL RATINGS ARE IN BTU/HR/LIN FT AND BASED ON 3 FPS VELOCITY, 65° EAT

| TUBE SIZE | CATALOG DESIGNATION | FIN SIZE HEIGHT X WIDTH | FINS PER FT. | FIN THICKNESS IN INCHES | ENCL HEIGHT IN INCHES | TIERS AND CENTERS IN INCHES | MOUNTING HEIGHT IN INCHES | STEAM 215° FACTOR | HOT WATER (AVG.)                                  |              |             |             |             |            |            |            |            |
|-----------|---------------------|-------------------------|--------------|-------------------------|-----------------------|-----------------------------|---------------------------|-------------------|---------------------------------------------------|--------------|-------------|-------------|-------------|------------|------------|------------|------------|
|           |                     |                         |              |                         |                       |                             |                           |                   | 200°                                              | 190°         | 180°        | 170°        | 160°        | 150°       | 140°       | 130°       | 120°       |
|           |                     |                         |              |                         |                       |                             |                           |                   | CORRECTION FACTORS FOR AVERAGE WATER TEMPERATURES |              |             |             |             |            |            |            |            |
|           |                     |                         |              |                         |                       |                             |                           | 1.00              | 0.86                                              | 0.78         | 0.69        | 0.61        | 0.53        | 0.45       | .40        | .33        | .26        |
| 1"        | VS33                | 3-1/4" SQ.              | 32           | .032                    | 5<br>11               | 1<br>2-6 CL                 | 9-3/4<br>15-3/4           | 780<br>1330       | 670<br>1140                                       | 610<br>1040  | 540<br>920  | 480<br>810  | 410<br>700  | 350<br>600 | 310<br>530 | 260<br>440 | 200<br>350 |
| 1"        | VS34                | 3-1/4" SQ.              | 40           | .032                    | 5<br>11               | 1<br>2-6 CL                 | 9-3/4<br>15-3/4           | 860<br>1475       | 740<br>1270                                       | 670<br>1150  | 590<br>1020 | 520<br>900  | 460<br>780  | 390<br>660 | 340<br>590 | 280<br>490 | 220<br>380 |
| 1"        | VS35                | 3-1/4" SQ.              | 50           | .032                    | 5<br>11               | 1<br>2-6 CL                 | 9-3/4<br>15-3/4           | 910<br>1550       | 780<br>1330                                       | 710<br>1210  | 630<br>1070 | 560<br>950  | 480<br>820  | 410<br>700 | 360<br>620 | 300<br>510 | 240<br>400 |
| 1-1/4"    | VS133               | 3-1/4" SQ.              | 32           | .032                    | 5<br>11               | 1<br>2-6 CL                 | 9-3/4<br>15-3/4           | 770<br>1320       | 660<br>1140                                       | 600<br>1030  | 530<br>910  | 470<br>810  | 410<br>700  | 350<br>590 | 310<br>530 | 250<br>440 | 200<br>340 |
| 1-1/4"    | VS134               | 3-1/4" SQ.              | 40           | .032                    | 5<br>11               | 1<br>2-6 CL                 | 9-3/4<br>15-3/4           | 870<br>1490       | 750<br>1280                                       | 680<br>1160  | 600<br>1030 | 530<br>910  | 460<br>790  | 390<br>670 | 350<br>600 | 290<br>490 | 230<br>390 |
| 1-1/4"    | VS135               | 3-1/4" SQ.              | 50           | .032                    | 5<br>11               | 1<br>2-6 CL                 | 9-3/4<br>15-3/4           | 880<br>1510       | 760<br>1300                                       | 690<br>1180  | 610<br>1040 | 540<br>920  | 470<br>800  | 400<br>680 | 350<br>600 | 290<br>500 | 230<br>390 |
| 1"        | VS43                | 4-1/4" SQ.              | 32           | .032                    | 6<br>12               | 1<br>2-6 CL                 | 10-1/8<br>16-1/8          | 1095<br>1850      | 940<br>1590                                       | 850<br>1440  | 760<br>1280 | 670<br>1130 | 580<br>980  | 490<br>830 | 440<br>740 | 360<br>610 | 280<br>480 |
| 1"        | VS44                | 4-1/4" SQ.              | 40           | .032                    | 6<br>12               | 1<br>2-6 CL                 | 10-1/8<br>16-1/8          | 1215<br>1910      | 1040<br>1640                                      | 950<br>1490  | 840<br>1320 | 740<br>1170 | 640<br>1010 | 550<br>860 | 490<br>760 | 400<br>630 | 320<br>500 |
| 1"        | VS45                | 4-1/4" SQ.              | 50           | .032                    | 6<br>12               | 1<br>2-6 CL                 | 10-1/8<br>16-1/8          | 1300<br>2150      | 1120<br>1850                                      | 1010<br>1680 | 900<br>1480 | 790<br>1310 | 690<br>1140 | 590<br>970 | 520<br>860 | 430<br>710 | 340<br>560 |
| 1-1/4"    | VS143               | 4-1/4" SQ.              | 32           | .032                    | 6<br>12               | 1<br>2-6 CL                 | 10-1/8<br>16-1/8          | 1010<br>1700      | 870<br>1460                                       | 790<br>1330  | 700<br>1170 | 620<br>1040 | 540<br>900  | 450<br>770 | 400<br>680 | 330<br>560 | 260<br>440 |
| 1-1/4"    | VS144               | 4-1/4" SQ.              | 40           | .032                    | 6<br>12               | 1<br>2-6 CL                 | 10-1/8<br>16-1/8          | 1210<br>1900      | 1040<br>1630                                      | 940<br>1480  | 830<br>1310 | 740<br>1160 | 640<br>1010 | 540<br>860 | 480<br>760 | 400<br>630 | 310<br>490 |
| 1-1/4"    | VS145               | 4-1/4" SQ.              | 50           | .032                    | 6<br>12               | 1<br>2-6 CL                 | 10-1/8<br>16-1/8          | 1280<br>2135      | 1100<br>1840                                      | 1000<br>1670 | 880<br>1470 | 780<br>1300 | 680<br>1130 | 580<br>960 | 510<br>850 | 420<br>700 | 330<br>560 |
| 2"        | VS242               | 4-1/4" SQ.              | 25           | .032                    | 6<br>12               | 1<br>2-6 CL                 | 10-1/8<br>16-1/8          | 950<br>1620       | 820<br>1390                                       | 740<br>1260  | 660<br>1120 | 580<br>990  | 500<br>860  | 430<br>730 | 380<br>650 | 310<br>530 | 250<br>420 |
| 2"        | VS243               | 4-1/4" SQ.              | 32           | .032                    | 6<br>12               | 1<br>2-6 CL                 | 10-1/8<br>16-1/8          | 1130<br>1770      | 970<br>1520                                       | 880<br>1380  | 780<br>1220 | 690<br>1080 | 600<br>940  | 510<br>800 | 450<br>710 | 370<br>580 | 290<br>460 |

- Notes: 1) Steel fins furnished as .032 thick, painted black.  
2) NPT threads furnished on steel elements. Please use domestic fittings for proper installation.  
3) The ends can be provided chamfered for field welded fittings when specified.

## STYLE LVE ACCESSORIES



# Design Data

## COMMERCIAL FINNED TUBE CHARTS FOR RATING CORRECTIONS

For assistance with ratings and selection, please use our online Specifier.

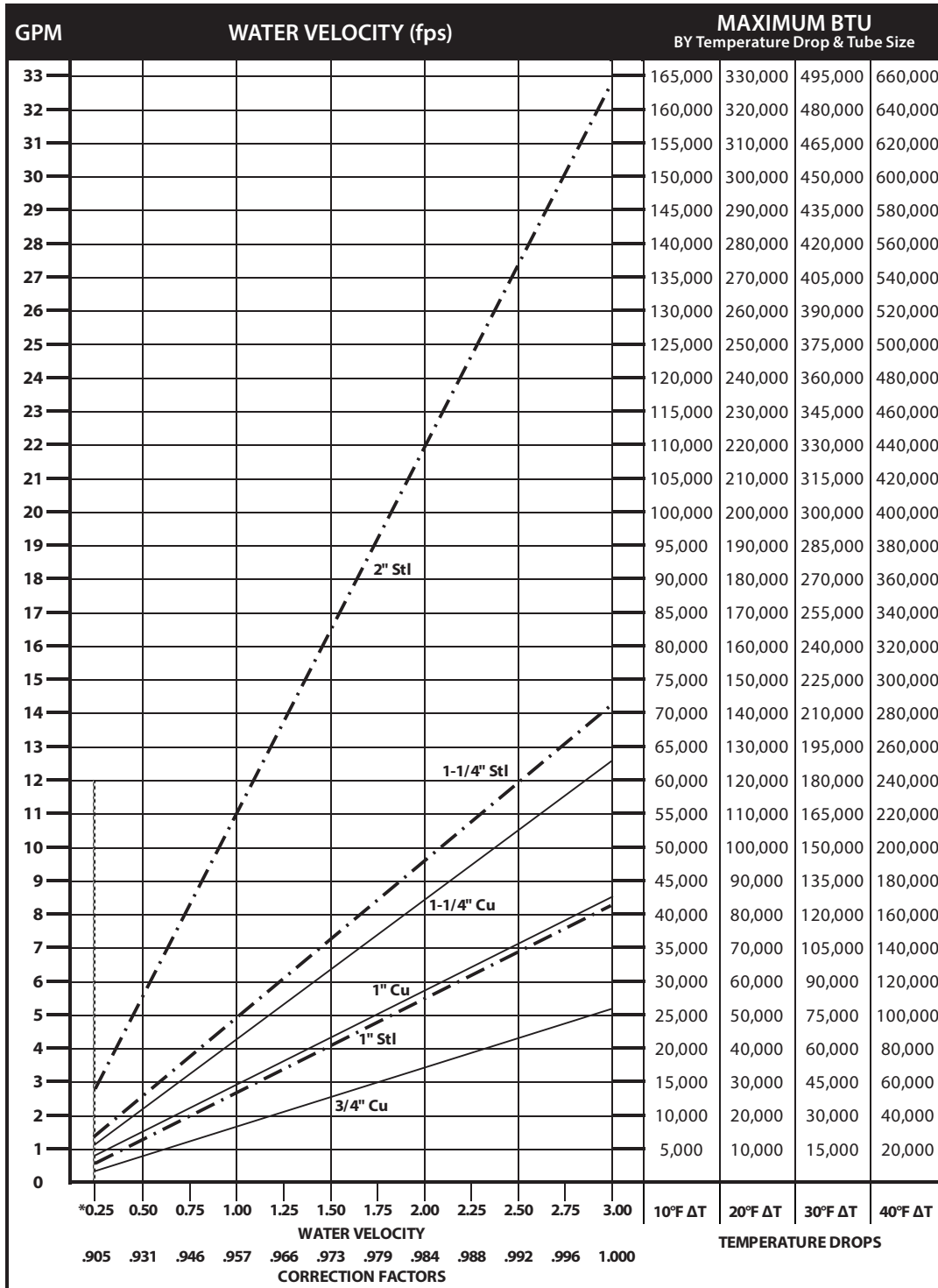
| CORRECTION FACTORS FOR WATER TEMPERATURES AND AIR TEMPERATURES OTHER THAN STANDARD |                             |      |           |      |      |      |      |      |      |      |      |      |      |      |      |
|------------------------------------------------------------------------------------|-----------------------------|------|-----------|------|------|------|------|------|------|------|------|------|------|------|------|
| AVERAGE WATER<br>TEMP. °F                                                          | ENTERING AIR TEMPERATURE °F |      |           |      |      |      |      |      |      |      |      |      |      |      |      |
|                                                                                    | 45                          | 55   | STD<br>65 | 70   | 75   | 80   | 85   | 90   | 95   | 100  | 110  | 120  | 130  | 140  | 150  |
| 90                                                                                 | .19                         | .13  | .11       | .06  |      |      |      |      |      |      |      |      |      |      |      |
| 100                                                                                | .25                         | .19  | .15       | .11  | .08  | .06  |      |      |      |      |      |      |      |      |      |
| 110                                                                                | .31                         | .25  | .20       | .16  | .13  | .11  | .08  | .06  |      |      |      |      |      |      |      |
| 120                                                                                | .38                         | .31  | .26       | .21  | .19  | .16  | .13  | .11  | .08  | .06  |      |      |      |      |      |
| 130                                                                                | .45                         | .38  | .33       | .28  | .25  | .21  | .19  | .16  | .13  | .11  | .06  |      |      |      |      |
| 140                                                                                | .53                         | .45  | .40       | .34  | .31  | .28  | .25  | .21  | .19  | .16  | .11  | .06  |      |      |      |
| 150                                                                                | .61                         | .53  | .45       | .41  | .38  | .34  | .31  | .28  | .25  | .21  | .16  | .11  | .06  |      |      |
| 160                                                                                | .69                         | .61  | .53       | .49  | .45  | .41  | .38  | .34  | .31  | .28  | .21  | .16  | .11  | .06  |      |
| 170                                                                                | .77                         | .69  | .61       | .57  | .53  | .49  | .45  | .41  | .38  | .34  | .28  | .21  | .16  | .11  | .06  |
| 180                                                                                | .86                         | .77  | .69       | .65  | .61  | .57  | .53  | .49  | .45  | .41  | .34  | .28  | .21  | .16  | .11  |
| 190                                                                                | .95                         | .86  | .78       | .73  | .69  | .65  | .61  | .57  | .53  | .49  | .41  | .34  | .28  | .21  | .16  |
| 200                                                                                | 1.05                        | .95  | .86       | .82  | .77  | .73  | .69  | .65  | .61  | .57  | .49  | .41  | .34  | .28  | .21  |
| 210                                                                                | 1.14                        | 1.05 | .95       | .91  | .86  | .82  | .77  | .73  | .69  | .65  | .57  | .49  | .41  | .34  | .28  |
| ► 215 (STD.)                                                                       | 1.19                        | 1.09 | 1.00      | .95  | .91  | .86  | .82  | .77  | .73  | .69  | .61  | .53  | .45  | .38  | .31  |
| 220                                                                                | 1.24                        | 1.14 | 1.05      | 1.00 | .95  | .91  | .86  | .82  | .77  | .73  | .65  | .57  | .49  | .41  | .34  |
| 230                                                                                | 1.34                        | 1.24 | 1.14      | 1.09 | 1.05 | 1.00 | .95  | .91  | .86  | .82  | .73  | .65  | .57  | .49  | .41  |
| 240                                                                                | 1.44                        | 1.34 | 1.25      | 1.19 | 1.14 | 1.09 | 1.05 | 1.00 | .95  | .91  | .82  | .73  | .65  | .57  | .49  |
| 250                                                                                | 1.55                        | 1.44 | 1.34      | 1.29 | 1.24 | 1.19 | 1.14 | 1.09 | 1.05 | 1.00 | .91  | .82  | .73  | .65  | .57  |
| 260                                                                                | 1.66                        | 1.55 | 1.44      | 1.39 | 1.34 | 1.29 | 1.24 | 1.19 | 1.14 | 1.09 | 1.00 | .91  | .82  | .73  | .65  |
| 270                                                                                | 1.76                        | 1.66 | 1.55      | 1.50 | 1.44 | 1.39 | 1.34 | 1.29 | 1.24 | 1.19 | 1.09 | 1.00 | .91  | .82  | .73  |
| 280                                                                                | 1.87                        | 1.76 | 1.66      | 1.60 | 1.55 | 1.50 | 1.44 | 1.39 | 1.34 | 1.29 | 1.19 | 1.09 | 1.00 | .91  | .82  |
| 290                                                                                | 1.99                        | 1.87 | 1.76      | 1.71 | 1.66 | 1.60 | 1.55 | 1.50 | 1.44 | 1.39 | 1.29 | 1.19 | 1.09 | 1.00 | .91  |
| 300                                                                                | 2.10                        | 1.99 | 1.87      | 1.82 | 1.76 | 1.71 | 1.66 | 1.60 | 1.55 | 1.50 | 1.39 | 1.29 | 1.19 | 1.09 | 1.00 |

| CORRECTION FACTORS FOR STEAM PRESSURES AND AIR TEMPERATURES OTHER THAN STANDARD |          |                             |      |      |           |      |      |      |      |      |      |      |      |      |      |      |
|---------------------------------------------------------------------------------|----------|-----------------------------|------|------|-----------|------|------|------|------|------|------|------|------|------|------|------|
| STEAM                                                                           |          | ENTERING AIR TEMPERATURE °F |      |      |           |      |      |      |      |      |      |      |      |      |      |      |
| PRESSURE                                                                        |          | TEMP.<br>°F                 | 45   | 55   | STD<br>65 | 70   | 75   | 80   | 85   | 90   | 100  | 110  | 120  | 130  | 140  | 150  |
| GAUGE                                                                           | ABS. PSI |                             |      |      |           |      |      |      |      |      |      |      |      |      |      |      |
| (VAC) 15"                                                                       | 7.32     | 178.9                       | 0.90 | 0.80 | 0.70      | 0.65 | 0.60 | 0.56 | 0.51 | 0.45 | 0.39 | 0.32 | 0.25 | 0.18 | 0.13 | 0.08 |
| HG                                                                              | 9.78     | 192.2                       | 1.02 | 0.91 | 0.81      | 0.76 | 0.71 | 0.66 | 0.62 | 0.55 | 0.48 | 0.40 | 0.33 | 0.26 | 0.20 | 0.14 |
| (VAC) 10"                                                                       | 12.25    | 202.9                       | 1.11 | 1.00 | 0.90      | 0.85 | 0.79 | 0.75 | 0.70 | 0.63 | 0.56 | 0.48 | 0.40 | 0.33 | 0.27 | 0.20 |
| (VAC) 5"                                                                        |          |                             |      |      |           |      |      |      |      |      |      |      |      |      |      |      |
| 0 PSI<br>▶ .899<br>5                                                            | 14.696   | 212.0                       | 1.19 | 1.09 | 0.97      | 0.92 | 0.87 | 0.82 | 0.77 | 0.70 | 0.63 | 0.54 | 0.46 | 0.38 | 0.31 | 0.25 |
|                                                                                 | 15.595   | 215.0                       | 1.22 | 1.11 | 1.00      | 0.95 | 0.90 | 0.84 | 0.80 | 0.75 | 0.65 | 0.57 | 0.48 | 0.40 | 0.33 | 0.26 |
|                                                                                 | 19.70    | 227.1                       | 1.34 | 1.22 | 1.11      | 1.05 | 1.00 | 0.95 | 0.90 | 0.81 | 0.75 | 0.66 | 0.57 | 0.49 | 0.41 | 0.34 |
| 10<br>15<br>20                                                                  | 24.70    | 239.4                       | 1.45 | 1.33 | 1.22      | 1.17 | 1.11 | 1.05 | 1.00 | 0.91 | 0.85 | 0.75 | 0.66 | 0.58 | 0.50 | 0.42 |
|                                                                                 | 29.70    | 249.8                       | 1.55 | 1.43 | 1.31      | 1.26 | 1.20 | 1.14 | 1.09 | 1.00 | 0.94 | 0.84 | 0.75 | 0.66 | 0.57 | 0.49 |
|                                                                                 | 34.70    | 258.5                       | 1.63 | 1.52 | 1.40      | 1.33 | 1.28 | 1.23 | 1.17 | 1.07 | 1.02 | 0.92 | 0.82 | 0.73 | 0.64 | 0.55 |
| 25<br>30<br>40                                                                  | 39.70    | 266.8                       | 1.71 | 1.59 | 1.47      | 1.41 | 1.36 | 1.30 | 1.25 | 1.15 | 1.09 | 0.98 | 0.89 | 0.80 | 0.71 | 0.62 |
|                                                                                 | 44.70    | 274.0                       | 1.78 | 1.66 | 1.54      | 1.48 | 1.42 | 1.37 | 1.31 | 1.21 | 1.15 | 1.05 | 0.95 | 0.85 | 0.76 | 0.68 |
|                                                                                 | 54.70    | 286.7                       | 1.91 | 1.79 | 1.66      | 1.61 | 1.54 | 1.49 | 1.43 | 1.32 | 1.27 | 1.16 | 1.06 | 0.97 | 0.87 | 0.78 |
| 50<br>60<br>70                                                                  | 64.70    | 297.7                       | 2.02 | 1.90 | 1.77      | 1.71 | 1.65 | 1.60 | 1.54 | 1.42 | 1.37 | 1.26 | 1.16 | 1.06 | 0.96 | 0.87 |
|                                                                                 | 74.70    | 307.3                       | 2.10 | 2.00 | 1.87      | 1.81 | 1.75 | 1.69 | 1.63 | 1.51 | 1.47 | 1.35 | 1.25 | 1.15 | 1.05 | 0.95 |
|                                                                                 | 84.70    | 316.0                       | 2.20 | 2.09 | 1.95      | 1.89 | 1.83 | 1.77 | 1.71 | 1.59 | 1.55 | 1.44 | 1.33 | 1.23 | 1.12 | 1.03 |
| 80<br>90<br>100                                                                 | 94.70    | 323.9                       | 2.27 | 2.17 | 2.03      | 1.97 | 1.91 | 1.85 | 1.80 | 1.69 | 1.63 | 1.52 | 1.41 | 1.31 | 1.20 | 1.10 |
|                                                                                 | 104.70   | 331.2                       | 2.36 | 2.24 | 2.11      | 2.05 | 1.98 | 1.93 | 1.87 | 1.74 | 1.70 | 1.59 | 1.48 | 1.38 | 1.28 | 1.17 |
|                                                                                 | 114.70   | 337.9                       | 2.43 | 2.31 | 2.18      | 2.11 | 2.05 | 2.00 | 1.94 | 1.81 | 1.77 | 1.65 | 1.54 | 1.44 | 1.33 | 1.23 |
| 125<br>150<br>175<br>200                                                        | 139.70   | 352.9                       | 2.59 | 2.47 | 2.33      | 2.27 | 2.21 | 2.16 | 2.10 | 1.96 | 1.92 | 1.80 | 1.69 | 1.59 | 1.48 | 1.38 |
|                                                                                 | 164.70   | 365.9                       | 2.73 | 2.62 | 2.47      | 2.43 | 2.35 | 2.29 | 2.23 | 2.08 | 2.05 | 1.94 | 1.82 | 1.72 | 1.61 | 1.51 |
|                                                                                 | 189.70   | 377.4                       | 2.86 | 2.74 | 2.60      | 2.54 | 2.47 | 2.41 | 2.35 | 2.21 | 2.17 | 2.05 | 1.95 | 1.85 | 1.73 | 1.63 |
|                                                                                 | 214.70   | 387.8                       | 2.95 | 2.85 | 2.71      | 2.63 | 2.58 | 2.52 | 2.47 | 2.31 | 2.29 | 2.17 | 2.06 | 1.96 | 1.84 | 1.75 |

From Keenan and Keyes — Linear Interpolation. NOTE: Gauge pressure should be corrected for altitude.

Rate of pitch for steam ½" drop over 20-foot run.

# Design Data



## DYNAMIC FORMULAS

$$\text{BTU} = \text{GPM} \times 500 \times \text{TD}$$

$$\text{GPM} = \left( \frac{\text{BTU}}{500} \right) \div \text{TD}$$

$$\text{TD} = \left( \frac{\text{BTU}}{500} \right) \div \text{GPM}$$

\*Do not design below .25 fps.

## Pressure Drop at Given Water Velocities (Feet of Water per 100 ft. of pipe) based on Hazen - Williams calculation

| Nominal Pipe Size | Water Velocity (ft/sec) |      |      |      |      |      |      |      |      |      |      |      |
|-------------------|-------------------------|------|------|------|------|------|------|------|------|------|------|------|
|                   | 0.25                    | 0.50 | 0.75 | 1.00 | 1.25 | 1.50 | 1.75 | 2.00 | 2.25 | 2.50 | 2.75 | 3.00 |
| 3/4" Copper       | 0.06                    | 0.20 | 0.42 | 0.72 | 1.09 | 1.53 | 2.04 | 2.61 | 3.25 | 3.95 | 4.71 | 5.53 |
| 1" Copper         | 0.04                    | 0.15 | 0.32 | 0.54 | 0.81 | 1.14 | 1.52 | 1.94 | 2.42 | 2.94 | 3.50 | 4.11 |
| 1 1/4" Copper     | 0.03                    | 0.12 | 0.25 | 0.43 | 0.64 | 0.90 | 1.20 | 1.54 | 1.92 | 2.33 | 2.78 | 3.26 |
| 1" Steel          | 0.04                    | 0.15 | 0.32 | 0.54 | 0.81 | 1.14 | 1.52 | 1.95 | 2.42 | 2.94 | 3.51 | 4.12 |
| 1 1/4" Steel      | 0.03                    | 0.11 | 0.23 | 0.40 | 0.60 | 0.84 | 1.12 | 1.44 | 1.79 | 2.17 | 2.59 | 3.05 |
| 2" Steel          | 0.02                    | 0.07 | 0.14 | 0.25 | 0.37 | 0.52 | 0.69 | 0.89 | 1.10 | 1.34 | 1.60 | 1.88 |

# Design Data

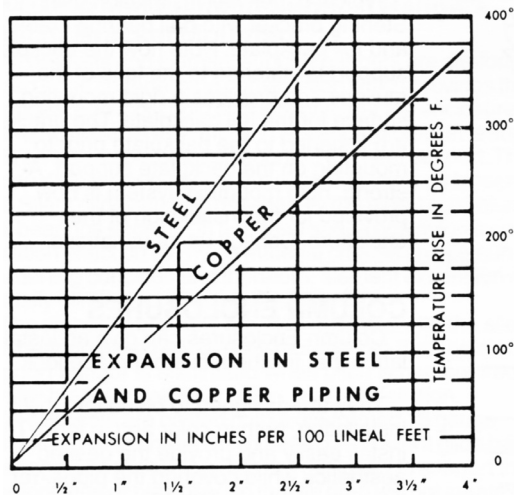
## GUARANTEED WORKING PRESSURES

- 1" IPS — 780 at Temperatures up to 650°F.  
 1-1/4" IPS — 660 at Temperatures up to 650°F.  
 2" IPS — 405 at Temperatures up to 650°F.  
 1-1/4" CU — 194 at Temperatures up to 300°F.  
 1" CU 204 at Temperatures up to 300°F.  
 3/4" CU 218 PSI at Temperatures up to 300°F.

MAXIMUM PRESSURES AT OTHER TEMPERATURES  
 ARE AVAILABLE UPON REQUEST.

### Pipe Water Capacities and Quantities Circulated at Velocity of 3 Feet Per Second

| Nominal Pipe Size | Pipe I.D. (inches) | Gals Per Lin. Ft. | GPM @ 3' per sec Velocity |
|-------------------|--------------------|-------------------|---------------------------|
| 3/4" Copper       | 0.835              | 0.028             | 5.12                      |
| 1" Copper         | 1.077              | 0.047             | 8.52                      |
| 1 1/4" Copper     | 1.315              | 0.071             | 12.70                     |
| 1" Steel          | 1.075              | 0.047             | 8.49                      |
| 1 1/4" Steel      | 1.395              | 0.079             | 14.29                     |
| 2" Steel          | 2.115              | 0.183             | 32.85                     |



## Glycol Correction Factors

### Fluid Temperature 200°F

| % Solution | Ethylene Glycol | Propylene Glycol |
|------------|-----------------|------------------|
| 20         | .952            | .988             |
| 30         | .921            | .968             |
| 40         | .888            | .943             |
| 50         | .852            | .912             |

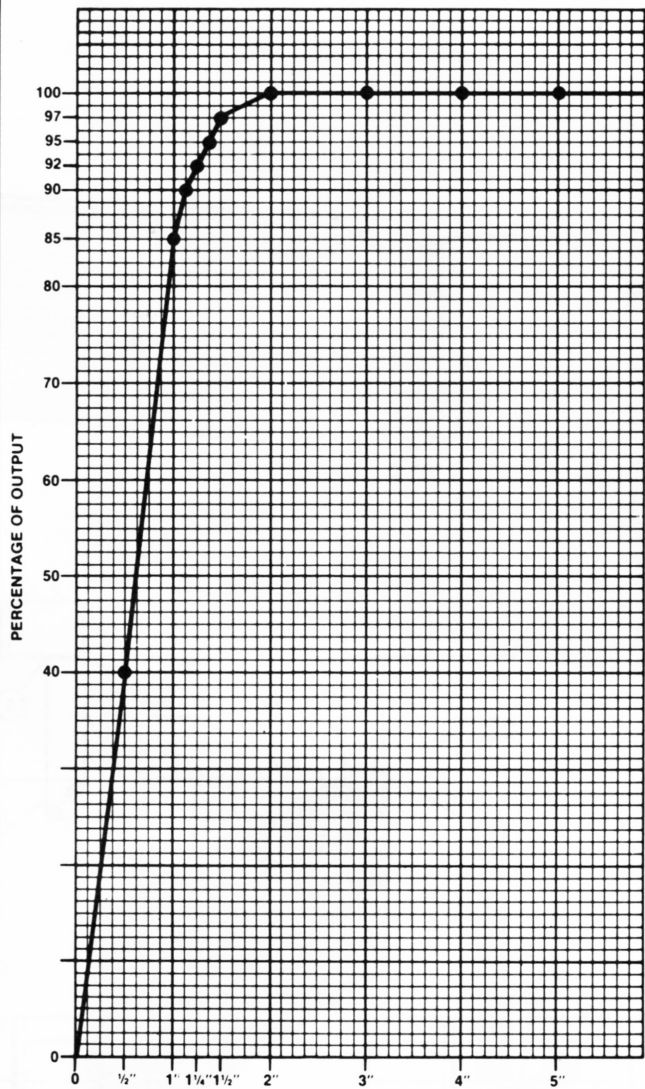
### Fluid Temperature 180°F

| % Solution | Ethylene Glycol | Propylene Glycol |
|------------|-----------------|------------------|
| 20         | .946            | .982             |
| 30         | .913            | .961             |
| 40         | .879            | .934             |
| 50         | .842            | .902             |

### Fluid Temperature 140°F

| % Solution | Ethylene Glycol | Propylene Glycol |
|------------|-----------------|------------------|
| 20         | .934            | .97              |
| 30         | .898            | .946             |
| 40         | .861            | .916             |
| 50         | .821            | .881             |

## INLET VS. OUTPUT/BTUH CAPACITY REDUCTION



RECOMMENDED MINIMUM INLET OPENING 1 1/2"  
 APPLICABLE TO COMMERCIAL FINNED-TUBE ONLY

## ALTITUDE FACTORS

Approximate factors for convective heat  
 value at varying altitudes

| Altitude   | Ferrous Units | Copper Alum. Units |
|------------|---------------|--------------------|
| Sea Level  | 1.000         | 1.000              |
| 1,000 ft.  | .984          | .969               |
| 2,000 ft.  | .968          | .938               |
| 3,000 ft.  | .952          | .908               |
| 4,000 ft.  | .936          | .878               |
| 5,000 ft.  | .920          | .850               |
| 6,000 ft.  | .904          | .822               |
| 7,000 ft.  | .889          | .795               |
| 8,000 ft.  | .874          | .768               |
| 9,000 ft.  | .859          | .743               |
| 10,000 ft. | .844          | .718               |
| 15,000 ft. | .771          | .603               |
| 20,000 ft. | .703          | .502               |