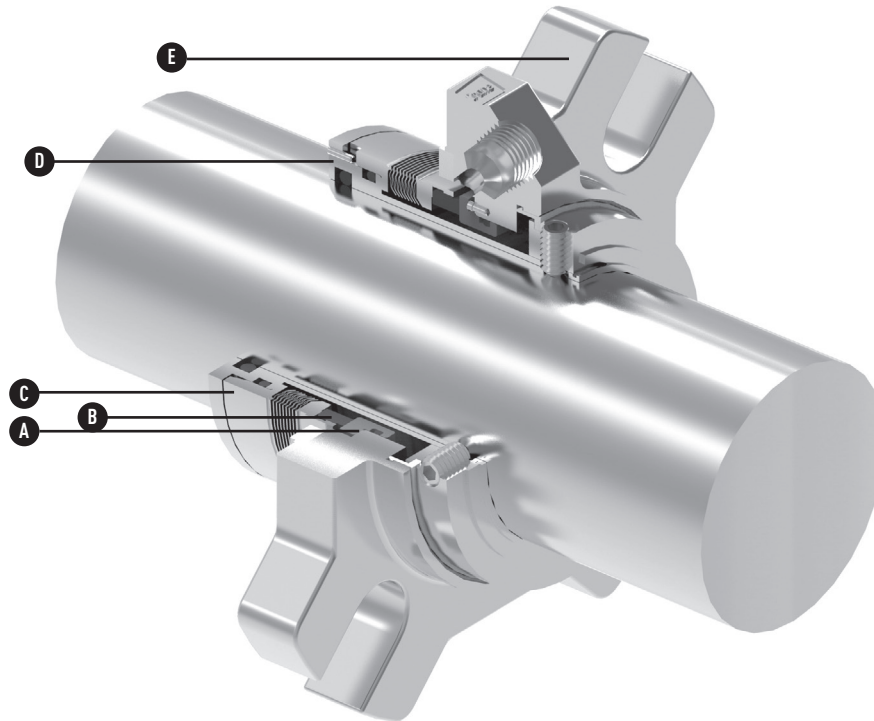


- A – Mating ring
- B – Primary ring
- C – Metal bellows seal head
- D – Sleeve
- E – Gland



Product Description

The 4615 is a member of the 4600 family with a single seal arrangement and an edge-welded metal bellows seal head design. The abrasion- and corrosion-resistant Alloy 20CB3 SS bellows enhance reliability by eliminating dynamic O-ring hang-up caused by process contamination, thermal gradients and material deficiencies.

Type 4600 series meets key industry pump standards and is designed to permit use in rotating shaft equipment including ANSI and DIN pumps.

Design Features

- Factory assembled cartridge seal provides quick installation and eliminates installation errors.
- Abrasion- and corrosion-resistant Alloy 20CB3 SS bellows.
- Metal bellows design eliminates dynamic O-ring hang-up caused by process contamination, thermal gradients, and material deficiencies.
- Optimized primary ring design reduces face loading, horsepower consumption, heat generation and face wear.
- Reverse balanced face design allows for OD pressure and ID pressure-vacuum conditions.
- Unique pre-set PTFE centering bushing is left in place during installation meaning no need for spacer removal prior to pump start-up.

Performance Capabilities

- Temperature: -20 to 266°F/-30 to 130°C
- Pressure: Up to 220 psig/15 barg
- Speed: Up to 3,600 rpm

Application Criteria

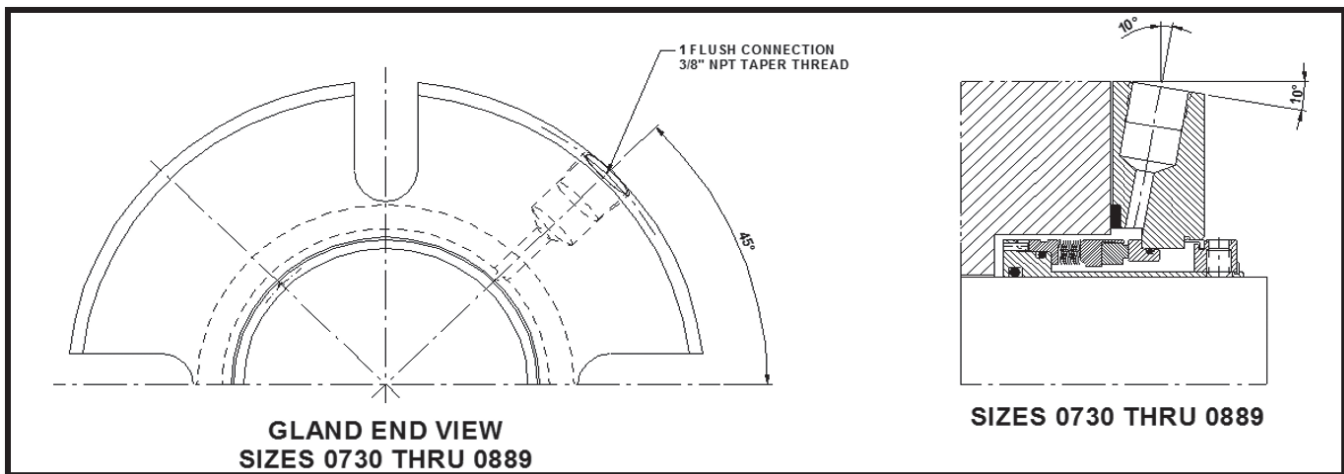
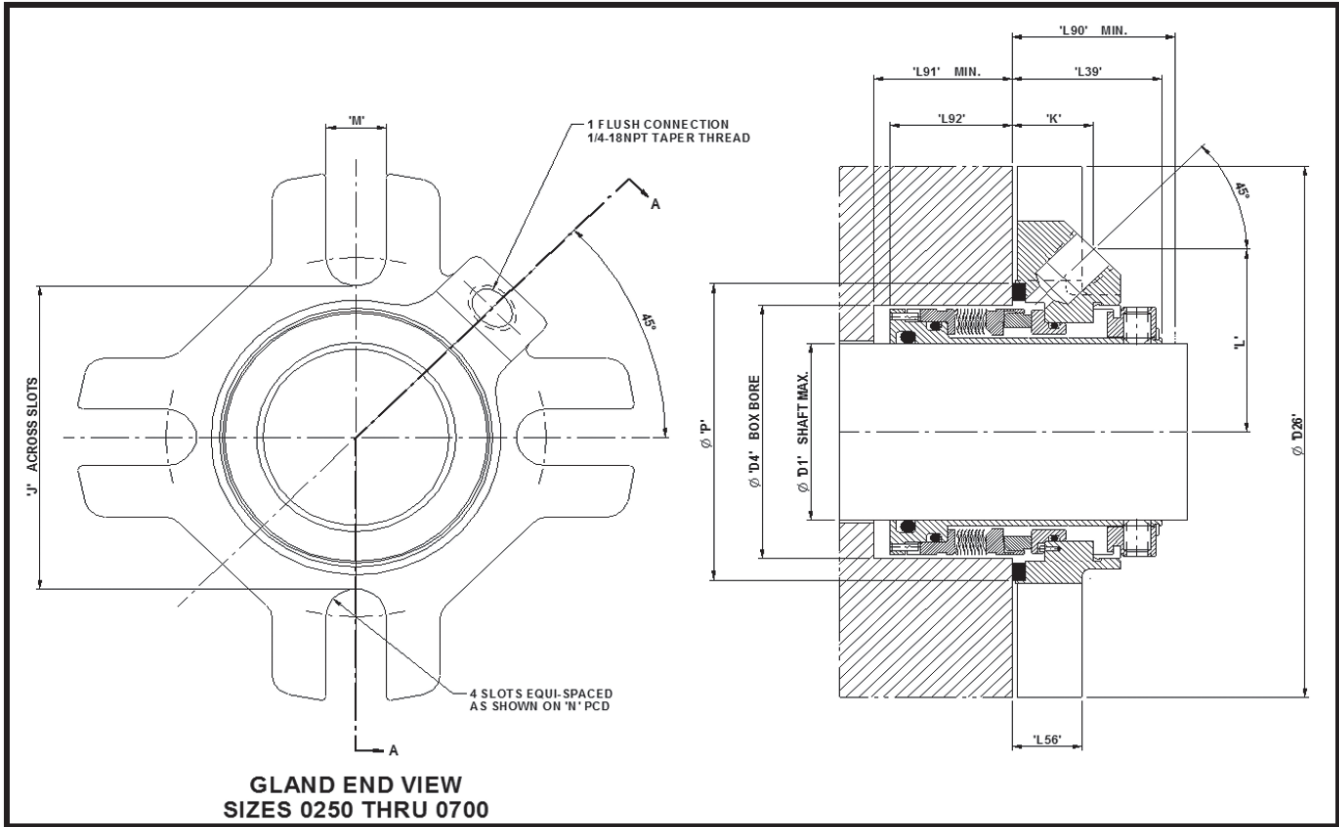
The Type 4615 cartridge seals may be customized for specific installations after review and evaluation by John Crane. The following data is needed to evaluate the proposed service:

- | | |
|-------------------------------|--------------------|
| • Make and model of equipment | • Process fluid |
| • Shaft or sleeve OD | – Specific gravity |
| • Seal cavity dimensions | – Box pressure |
| • Speed | – Vapor pressure |
| | – Temperature |
| | – Viscosity |

TYPE 4615

SINGLE METAL BELLOWS SEAL

Standard Bore Typical Arrangement



TYPE 4615

SINGLE METAL BELLOWS SEAL

| Dimensional Data (Inches) | | | | | | | | | | | | | | | | |
|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Size Code | D1 | D4 | | D26 | L92 | L91 | L39 | M | N | | J | K | L | P | L56 | L90 |
| | | Min. | Max. | | | | | | Min. | Max. | | | | | | |
| 254 | 1.000 | 1.625 | 1.937 | 4.125 | 1.064 | 1.189 | 1.364 | 0.437 | 2.625 | 3.750 | 2.189 | 0.753 | 1.345 | 2.126 | 0.503 | 1.489 |
| 285 | 1.125 | 1.750 | 2.063 | 4.250 | 1.067 | 1.192 | 1.364 | 0.437 | 2.750 | 3.875 | 2.311 | 0.761 | 1.416 | 2.244 | 0.503 | 1.489 |
| 317 | 1.250 | 1.875 | 2.189 | 4.370 | 1.064 | 1.189 | 1.364 | 0.437 | 2.875 | 4.000 | 2.437 | 0.748 | 1.488 | 2.382 | 0.503 | 1.489 |
| 349 | 1.375 | 2.000 | 2.311 | 4.500 | 1.067 | 1.192 | 1.364 | 0.437 | 3.062 | 4.125 | 2.626 | 0.750 | 1.584 | 2.539 | 0.503 | 1.489 |
| 381 | 1.500 | 2.250 | 2.500 | 5.000 | 1.136 | 1.261 | 1.409 | 0.563 | 3.434 | 4.500 | 2.874 | 0.768 | 1.723 | 2.795 | 0.661 | 1.534 |
| 412 | 1.625 | 2.375 | 2.500 | 5.000 | 1.147 | 1.272 | 1.409 | 0.563 | 3.434 | 4.500 | 2.874 | 0.768 | 1.723 | 2.795 | 0.661 | 1.534 |
| 444 | 1.750 | 2.500 | 2.626 | 5.250 | 1.152 | 1.277 | 1.409 | 0.563 | 3.562 | 4.750 | 3.000 | 0.763 | 1.808 | 2.933 | 0.661 | 1.534 |
| 476 | 1.875 | 2.625 | 3.000 | 5.500 | 1.157 | 1.282 | 1.409 | 0.563 | 3.875 | 5.000 | 3.311 | 0.759 | 1.930 | 3.228 | 0.661 | 1.534 |
| 508 | 2.000 | 2.750 | 3.000 | 5.500 | 1.157 | 1.282 | 1.409 | 0.563 | 3.875 | 5.000 | 3.311 | 0.759 | 1.930 | 3.228 | 0.661 | 1.534 |
| 539 | 2.125 | 2.875 | 3.311 | 5.750 | 1.157 | 1.282 | 1.409 | 0.689 | 4.375 | 5.125 | 3.689 | 0.770 | 2.096 | 3.622 | 0.661 | 1.534 |
| 571 | 2.250 | 3.000 | 3.311 | 5.750 | 1.162 | 1.287 | 1.409 | 0.689 | 4.375 | 5.125 | 3.689 | 0.770 | 2.096 | 3.622 | 0.661 | 1.534 |
| 603 | 2.375 | 3.125 | 3.563 | 6.000 | 1.162 | 1.287 | 1.409 | 0.689 | 4.625 | 5.375 | 3.937 | 0.752 | 2.173 | 3.858 | 0.661 | 1.534 |
| 635 | 2.500 | 3.375 | 3.874 | 6.250 | 1.269 | 1.394 | 1.428 | 0.689 | 4.875 | 5.625 | 4.189 | 0.729 | 2.353 | 4.114 | 0.661 | 1.553 |
| 666 | 2.625 | 3.375 | 3.874 | 6.250 | 1.269 | 1.394 | 1.428 | 0.689 | 4.875 | 5.625 | 4.189 | 0.729 | 2.353 | 4.114 | 0.661 | 1.553 |
| 698 | 2.750 | 3.625 | 3.874 | 6.250 | 1.269 | 1.394 | 1.428 | 0.689 | 4.875 | 5.625 | 4.189 | 0.693 | 2.389 | 4.114 | 0.661 | 1.553 |
| 730 | 2.875 | 3.937 | 4.500 | 8.110 | 1.366 | 1.491 | 1.688 | 0.811 | 5.708 | 6.699 | 4.897 | 0.634 | 3.982 | 4.803 | 1.185 | 1.813 |
| 762 | 3.000 | 3.937 | 4.500 | 8.110 | 1.366 | 1.491 | 1.688 | 0.811 | 5.708 | 6.699 | 4.897 | 0.634 | 3.982 | 4.803 | 1.185 | 1.813 |
| 793 | 3.125 | 4.062 | 4.748 | 8.110 | 1.366 | 1.491 | 1.696 | 0.811 | 5.945 | 6.699 | 5.134 | 0.634 | 3.982 | 5.039 | 1.185 | 1.821 |
| 825 | 3.250 | 4.187 | 4.748 | 8.110 | 1.366 | 1.491 | 1.696 | 0.811 | 5.945 | 6.699 | 5.134 | 0.634 | 3.982 | 5.039 | 1.185 | 1.821 |
| 857 | 3.375 | 4.312 | 4.874 | 8.110 | 1.381 | 1.506 | 1.696 | 0.811 | 6.063 | 6.699 | 5.252 | 0.634 | 3.982 | 5.157 | 1.185 | 1.821 |
| 889 | 3.500 | 4.437 | 5.000 | 8.504 | 1.381 | 1.506 | 1.696 | 0.811 | 6.220 | 7.093 | 5.409 | 0.654 | 4.176 | 5.315 | 1.185 | 1.821 |

| Dimensional Data (Millimeters) | | | | | | | | | | | | | | | | |
|--------------------------------|----|-------|-------|-------|------|------|------|------|-------|-------|-------|------|-------|-------|------|------|
| Size Code | D1 | D4 | | D26 | L92 | L91 | L39 | M | N | | J | K | L | P | L56 | L90 |
| | | Min. | Max. | | | | | | Min. | Max. | | | | | | |
| 250 | 25 | 41.3 | 49.2 | 104.8 | 27.0 | 30.2 | 34.7 | 11.1 | 66.7 | 95.3 | 55.6 | 19.1 | 34.2 | 54.0 | 12.8 | 37.8 |
| 280 | 28 | 44.5 | 52.4 | 108.0 | 27.1 | 30.3 | 34.7 | 11.1 | 69.9 | 98.4 | 58.7 | 19.3 | 36.0 | 57.0 | 12.8 | 37.8 |
| 300 | 30 | 46.4 | 55.6 | 111.0 | 27.0 | 30.2 | 34.7 | 11.1 | 73.0 | 101.6 | 61.9 | 19.0 | 37.8 | 60.5 | 12.8 | 37.8 |
| 320 | 32 | 47.6 | 55.6 | 111.0 | 27.0 | 30.2 | 34.7 | 11.1 | 73.0 | 101.6 | 61.9 | 19.0 | 37.8 | 60.5 | 12.8 | 37.8 |
| 330 | 33 | 50.8 | 58.7 | 114.3 | 27.1 | 30.3 | 34.7 | 11.1 | 77.8 | 104.8 | 66.7 | 19.1 | 40.2 | 64.5 | 12.8 | 37.8 |
| 350 | 35 | 50.8 | 58.7 | 114.3 | 27.1 | 30.3 | 34.7 | 11.1 | 77.8 | 104.8 | 66.7 | 19.1 | 40.2 | 64.5 | 12.8 | 37.8 |
| 380 | 38 | 57.2 | 63.5 | 127.0 | 28.9 | 32.0 | 35.8 | 14.3 | 87.2 | 114.3 | 73.0 | 19.5 | 43.8 | 71.0 | 16.8 | 39.0 |
| 400 | 40 | 60.3 | 63.5 | 127.0 | 29.1 | 32.3 | 35.8 | 14.3 | 87.2 | 114.3 | 73.0 | 19.5 | 43.8 | 71.0 | 16.8 | 39.0 |
| 430 | 43 | 63.5 | 66.7 | 133.4 | 29.3 | 32.4 | 35.8 | 14.3 | 90.5 | 120.7 | 76.2 | 19.4 | 45.9 | 74.5 | 16.8 | 39.0 |
| 450 | 45 | 63.5 | 66.7 | 133.4 | 29.3 | 32.4 | 35.8 | 14.3 | 90.5 | 120.7 | 76.2 | 19.4 | 45.9 | 74.5 | 16.8 | 39.0 |
| 480 | 48 | 66.7 | 76.2 | 139.7 | 29.4 | 32.6 | 35.8 | 14.3 | 98.4 | 127.0 | 84.1 | 19.3 | 49.0 | 82.0 | 16.8 | 39.0 |
| 500 | 50 | 69.9 | 76.2 | 139.7 | 29.4 | 32.6 | 35.8 | 14.3 | 98.4 | 127.0 | 84.1 | 19.3 | 49.0 | 82.0 | 16.8 | 39.0 |
| 530 | 53 | 73.0 | 84.1 | 146.1 | 29.4 | 32.6 | 35.8 | 17.5 | 111.1 | 130.2 | 93.7 | 19.6 | 53.2 | 92.0 | 16.8 | 39.0 |
| 550 | 55 | 73.0 | 84.1 | 146.1 | 29.4 | 32.6 | 35.8 | 17.5 | 111.1 | 130.2 | 93.7 | 19.6 | 53.2 | 92.0 | 16.8 | 39.0 |
| 580 | 58 | 79.4 | 90.5 | 152.4 | 29.5 | 32.7 | 35.8 | 17.5 | 117.5 | 136.5 | 100.0 | 19.1 | 55.2 | 98.0 | 16.8 | 39.0 |
| 600 | 60 | 79.4 | 90.5 | 152.4 | 29.5 | 32.7 | 35.8 | 17.5 | 117.5 | 136.5 | 100.0 | 19.1 | 55.2 | 98.0 | 16.8 | 39.0 |
| 630 | 63 | 85.7 | 98.4 | 158.8 | 32.2 | 35.4 | 36.3 | 17.5 | 123.8 | 142.9 | 106.4 | 18.5 | 59.8 | 104.5 | 16.8 | 39.5 |
| 650 | 65 | 85.7 | 98.4 | 158.8 | 32.2 | 35.4 | 36.3 | 17.5 | 123.8 | 142.9 | 106.4 | 18.5 | 59.8 | 104.5 | 16.8 | 39.5 |
| 700 | 70 | 92.1 | 98.4 | 158.8 | 32.2 | 35.4 | 36.3 | 17.5 | 123.8 | 142.9 | 106.4 | 17.6 | 60.7 | 104.5 | 16.8 | 39.5 |
| 750 | 75 | 100.0 | 114.3 | 206.0 | 34.7 | 37.9 | 42.9 | 20.6 | 145.0 | 170.2 | 124.4 | 16.1 | 101.1 | 122.0 | 30.1 | 46.1 |
| 800 | 80 | 106.4 | 120.6 | 206.0 | 34.7 | 37.9 | 43.1 | 20.6 | 151.0 | 170.2 | 130.4 | 16.1 | 101.1 | 128.0 | 30.1 | 46.3 |
| 850 | 85 | 109.5 | 123.8 | 206.0 | 35.1 | 38.3 | 43.1 | 20.6 | 154.0 | 170.2 | 133.4 | 16.1 | 101.1 | 131.0 | 30.1 | 46.3 |



TYPE 4615

SINGLE METAL BELLOWS SEAL

Technical Specification

Layout Drawing Numbers

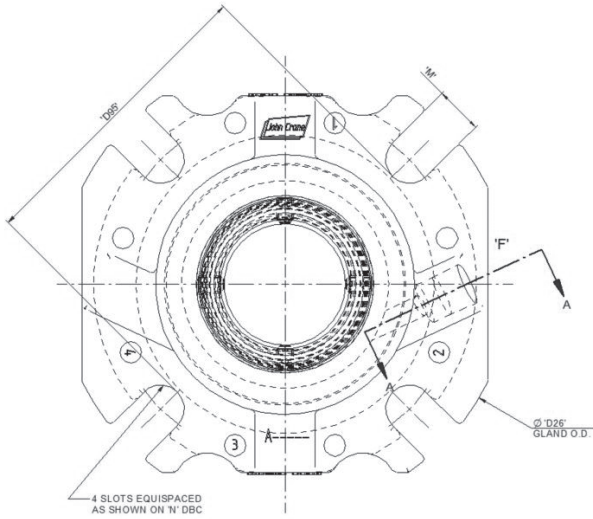
| Size Code | Seal Size | | Layout Drawing Number |
|-----------|-----------|----|-----------------------|
| | Inches | mm | |
| 0250 | | 25 | GA-233865 |
| 0254 | 1.000 | | GA-233866 |
| 0280 | | 28 | GA-233867 |
| 0285 | 1.125 | | GA-233868 |
| 0300 | | 30 | GA-233869 |
| 0317 | 1.250 | | GA-233870 |
| 0320 | | 32 | GA-233871 |
| 0330 | | 33 | GA-233872 |
| 0349 | 1.375 | | GA-233873 |
| 0350 | | 35 | GA-233874 |
| 0380 | | 38 | GA-233875 |
| 0381 | 1.500 | | GA-233876 |
| 0400 | | 40 | GA-233877 |
| 0412 | 1.625 | | GA-233878 |
| 0430 | | 43 | GA-233879 |
| 0444 | 1.750 | | GA-237803 |
| 0450 | | 45 | GA-233880 |
| 0476 | 1.875 | | GA-233881 |
| 0480 | | 48 | GA-233882 |
| 0500 | | 50 | GA-233883 |
| 0508 | 2.000 | | GA-233884 |
| 0530 | | 53 | GA-233885 |

| Size Code | Seal Size | | Layout Drawing Number |
|-----------|-----------|----|-----------------------|
| | Inches | mm | |
| 0539 | 2.125 | | GA-233886 |
| 0550 | | 55 | GA-233887 |
| 0571 | 2.250 | | GA-233888 |
| 0580 | | 58 | GA-233889 |
| 0600 | | 60 | GA-233890 |
| 0603 | 2.375 | | GA-233891 |
| 0630 | | 63 | GA-233892 |
| 0635 | 2.500 | | GA-233893 |
| 0650 | | 65 | GA-233894 |
| 0666 | 2.625 | | GA-233895 |
| 0698 | 2.750 | | GA-233896 |
| 0700 | | 70 | GA-233897 |
| 0730 | 2.875 | | GA-233898 |
| 0750 | | 75 | GA-233899 |
| 0762 | 3.000 | | GA-233900 |
| 0793 | 3.125 | | GA-233901 |
| 0800 | | 80 | GA-233902 |
| 0825 | 3.250 | | GA-233903 |
| 0850 | | 85 | GA-233904 |
| 0857 | 3.375 | | GA-233905 |
| 0889 | 3.500 | | GA-233906 |

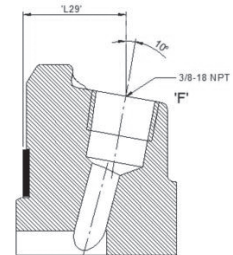
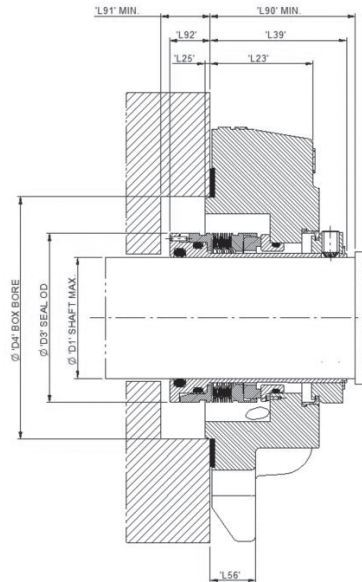
TYPE 4615

SINGLE METAL BELLOWS SEAL

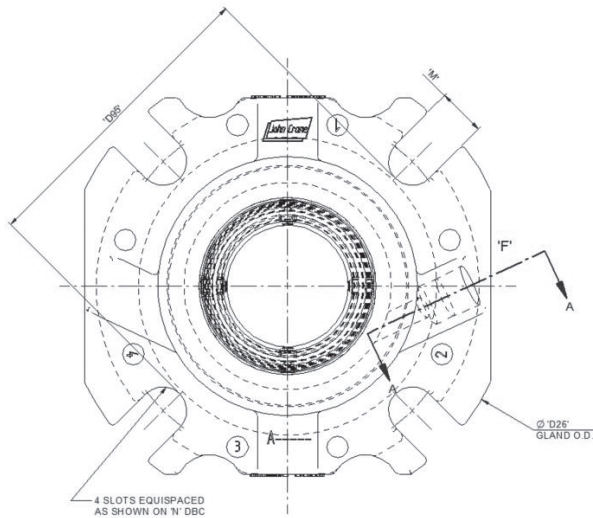
Big Bore Typical Arrangement



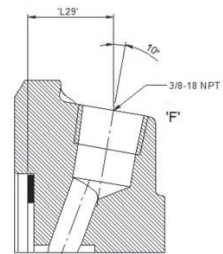
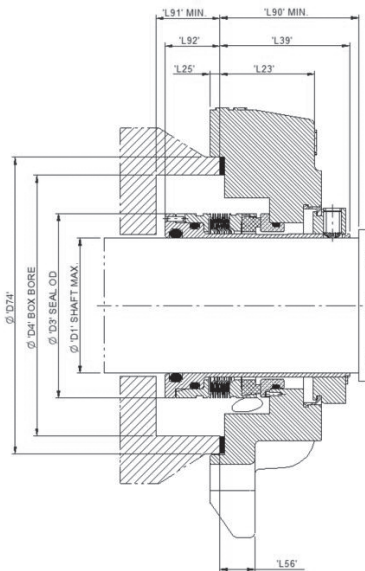
GLAND END VIEW
SIZES 0349, 0444, 0635, 0698



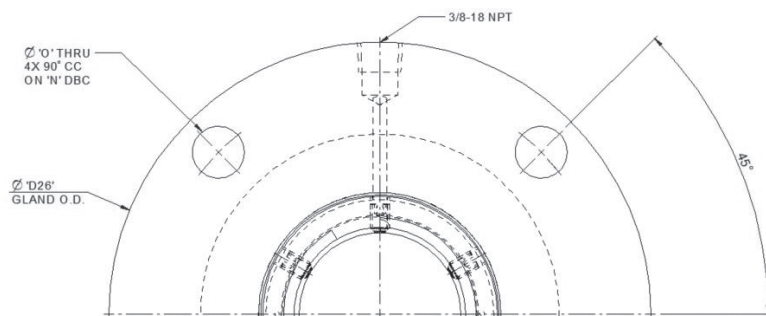
SECTION A-A



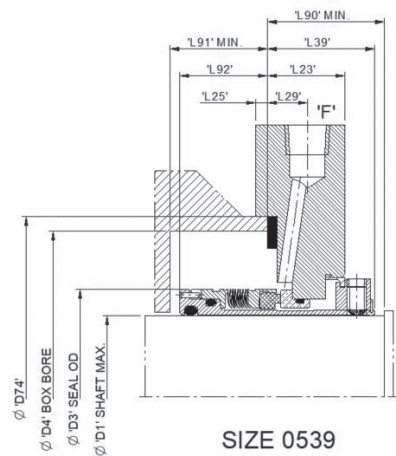
GLAND END VIEW
SIZES 0476, 0666



SECTION A-A



GLAND END VIEW
SIZE 0539



SIZE 0539



TYPE 4615

SINGLE METAL BELLOWS SEAL

Technical Specification

| Dimensional Data (Inches) | | | | | | | | | | | | | | | | | | |
|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Size Code | D1 | D3 | D4 | | D26 | D74 | D95 | L23 | L25 | L29 | L39 | L56 | L90 | L91 | L92 | M | N | O |
| | | | Min. | Max. | | | | | | | | | | | | | | |
| 0349 | 1.375 | 1.937 | 2.875 | 3.023 | 5.375 | N/A | 3.500 | 1.446 | 0.046 | 1.017 | 1.928 | 0.623 | 2.053 | 0.628 | 0.503 | 0.562 | 4.062 | N/A |
| 0444 | 1.750 | 2.437 | 3.500 | 3.925 | 6.500 | N/A | 4.403 | 1.487 | 0.077 | 1.058 | 1.975 | 0.656 | 2.100 | 0.711 | 0.586 | 0.687 | 5.093 | N/A |
| 0476 | 1.875 | 2.562 | 3.625 | 3.734 | 6.500 | 4.125 | 4.403 | 1.316 | 0.140 | 0.885 | 1.804 | 0.485 | 1.929 | 0.887 | 0.762 | 0.687 | 5.093 | N/A |
| 0539 | 2.215 | 2.812 | 2.875 | 4.187 | 7.156 | 4.562 | N/A | 1.018 | 0.153 | 0.526 | 1.412 | N/A | 1.537 | 1.279 | 1.154 | N/A | 5.250 | 0.437 |
| 0539 | 2.215 | 2.812 | 2.875 | 4.336 | 7.125 | 4.711 | N/A | 1.018 | 0.153 | 0.526 | 1.412 | N/A | 1.537 | 1.279 | 1.154 | N/A | 6.000 | 0.687 |
| 0635 | 2.500 | 3.312 | 4.750 | 4.875 | 8.000 | N/A | 5.375 | 1.695 | 0.079 | 1.266 | 2.261 | 0.656 | 2.386 | 0.561 | 0.436 | 0.687 | 6.062 | N/A |
| 0666 | 2.625 | 3.312 | 4.625 | 4.740 | 8.000 | 5.125 | 5.375 | 1.617 | 0.140 | 1.185 | 2.307 | 0.578 | 2.432 | 0.516 | 0.390 | 0.687 | 6.062 | N/A |
| 0698 | 2.750 | 3.562 | 4.750 | 4.875 | 8.000 | N/A | 5.375 | 1.695 | 0.079 | 1.266 | 2.261 | 0.656 | 2.386 | 0.561 | 0.436 | 0.687 | 6.062 | N/A |

| Layout Drawing Numbers | | |
|------------------------|---------------|-----------------------|
| Size Code | Size (Inches) | Layout Drawing Number |
| 0444 | 1.75 | GA-247299 |
| 0476 | 1.875 | GA-247300 |
| 0539 | 2.125 | GA-247578 |
| 0539 | 2.125 | GA-247301 |
| 0635 | 2.5 | GA-247302 |
| 0666 | 2.625 | GA-247304 |
| 0698 | 2.75 | GA-247305 |

Pressure Rating Limits

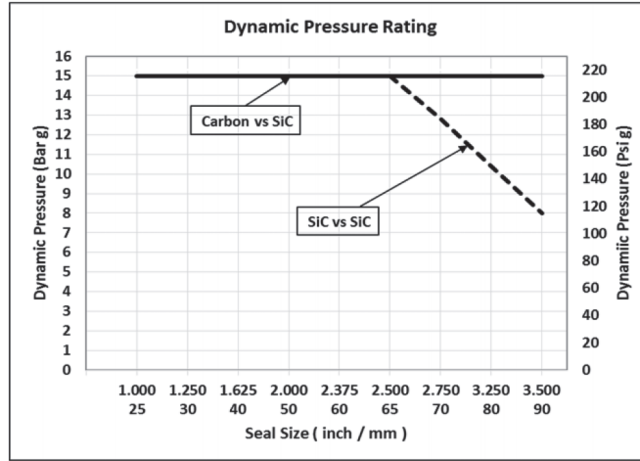


Figure 1: Dynamic pressure rating graph

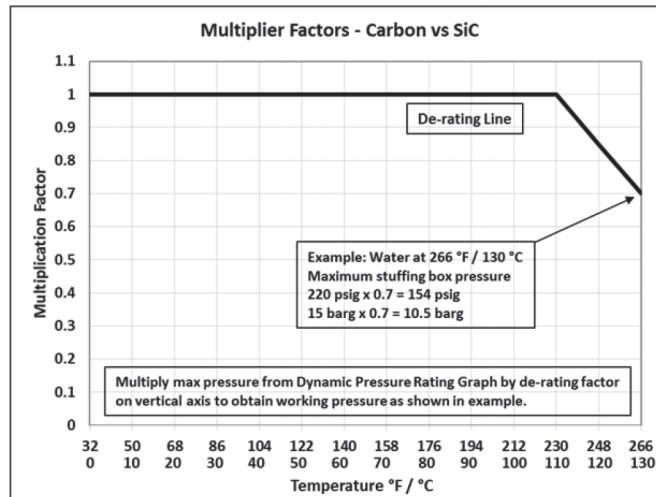


Figure 2: Multiplier factor - Carbon vs SiC

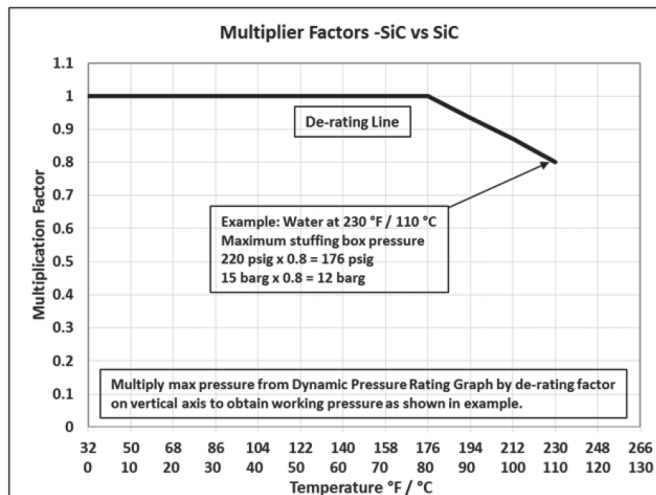


Figure 3: Multiplier factor - SiC vs SiC

Multiplier Factors

| | Selection Consideration | Multiplier Factor |
|---|---|-----------------------------|
| Sealed fluid lubricity (applies to SiC vs SiC face combination only) | Petro/Gasoline, kerosene or better | x 1.00 |
| | Water and aqueous solutions | x 0.75 |
| Sealed fluid temperature (applies to Carbon vs SiC face) | Up to 230 °F/110 °C | x 1.00 |
| | > 230 °F to 266 °F/ > 110 °C to 130 °C | x (< 1.0 to 0.7) see Fig. 2 |
| Sealed fluid temperature (applies to SiC vs SiC face) | Up to 175 °F/80 °C | x 1.00 |
| | > 175 °F to 230 °F/ > 80 °C to 110 °C | x (< 1.0 to 0.8) see Fig 3 |

Example of determining pressure rating limits:

| | |
|------------------------|------------------------------|
| Seal: | 2.000 inch/50.8 mm type 4615 |
| Operating temperature: | 266°F/130°C |
| Speed: | 1800 rpm |
| Barrier fluid: | Aqueous solution |
| Face materials: | Carbon vs. silicon carbide |

Using the pressure rating graph Fig. 1, the maximum pressure would be 220 psig/15 barg. From the Multiplier Factors table on the left, apply the multipliers for the specific service requirements to determine the maximum operating pressure for the application.

Max dynamic pressure x Temp MF x Lubricity MF = Max Operating Pressure

220 psig x 0.70 x 1.0 = 154 psig or 15 barg x 0.70 x 1.0 = 10.5 barg

The maximum operating pressure for this 2.000 inch/50.8 mm Type 4615 seal is 154 psig/10.5 barg.

Standard Materials

| Seal component | Standard material | Material options |
|-------------------------|---|--|
| Primary ring | Carbon (9003) Silicon carbide (9221) | — |
| Mating ring | Silicon carbide (9221) | Tungsten carbide (9205) |
| Bellows assembly | Alloy 20CB3 SS (0560) | — |
| Seal Hardware | 316 stainless steel (0550) | — |
| O-ring | Fluoroelastomer (9549) | Ethylene propylene (9561) Neoprene (9523) Nitrile (9501) |
| Gland gasket | Glass filled PTFE (7510) | — |
| Centering ring (spacer) | Glass filled PTFE (7517) | — |



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Middle East & Africa
United Arab Emirates
Tel: 971-481-27800
Fax: 971-488-62830

Asia Pacific
Singapore
Tel: 65-6518-1800
Fax: 65-6518-1803

If the products featured will be used in a potentially dangerous and/or hazardous process, your John Crane representative should be consulted prior to their selection and use. In the interest of continuous development, John Crane Companies reserve the right to alter designs and specifications without prior notice. It is dangerous to smoke while handling products made from PTFE. Old and new PTFE products must not be incinerated. ISO 9001 and ISO 14001 Certified, details available on request.