

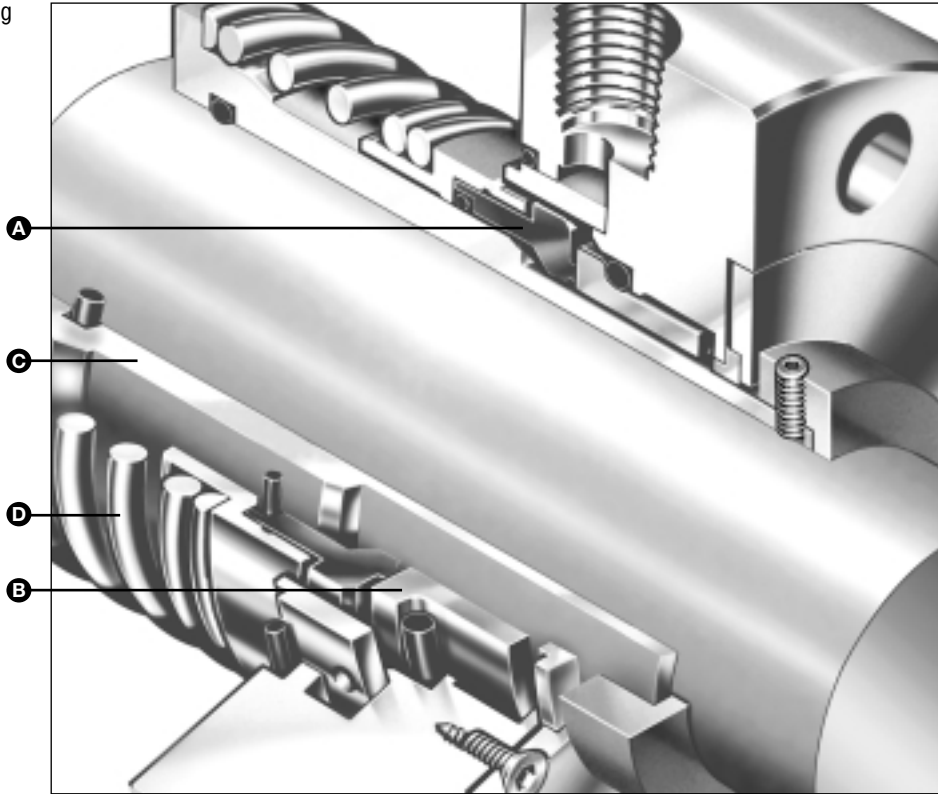


# TYPE RRA/RRE

O-Ring, Engineered Cartridge Seals

RRA/RRE

- A – Face/Primary Ring
- B – Seat/Mating Ring
- C – Sleeve
- D – Spring



Seal Type RREL/R shown

## Product Description

The RRAL/RRAR and RREL/RRER are balanced single-spring, engineered cartridge seals used for general duty and process industry applications.

These seals use standard components and are engineered for individual applications. In addition, the RREL/R is ideally suited for use on light hydrocarbons. The unique single-spring drive eliminates the requirement for keys and pins that can fret, has greater tolerance to misalignment and setting, and is more resistant to corrosion.

RRA and RRE seals use a unique drive spring arrangement with the selection of left or right hand spring dependent on the direction of pump rotation.

- RREL/R and RRAL/R meet API 610 requirements.
- RREL/R is qualification tested to API 682 for hydrocarbons and light hydrocarbons. RRAL/R is API 682 qualified for aqueous and hydrocarbon duties.
- RRAL/R is dimensionally interchangeable with the RROL/R and can be used to upgrade the seal.

## Design Features

- Soft Start, Single-Spring Drive
- Universal Cavity for Secondary Seal Options
- Anti-Distortion Rotary Face
- External Drive Cartridge Design
- Multipoint Injection (Standard on RREL/R)

## Performance Capabilities

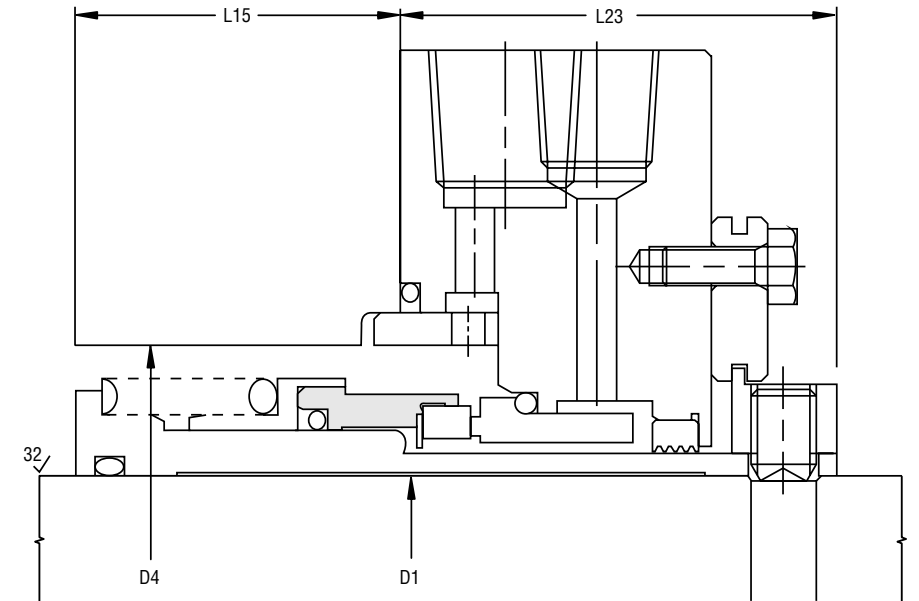
- Temperature:  
-40°C to 260°C/-40°F to 500°F
- Pressure:  
Vacuum to 70 bar g/1015 psig
- Speed:  
Up to 4500 rpm
- Axial Movement Tolerance:  
±3.00mm/0.118"



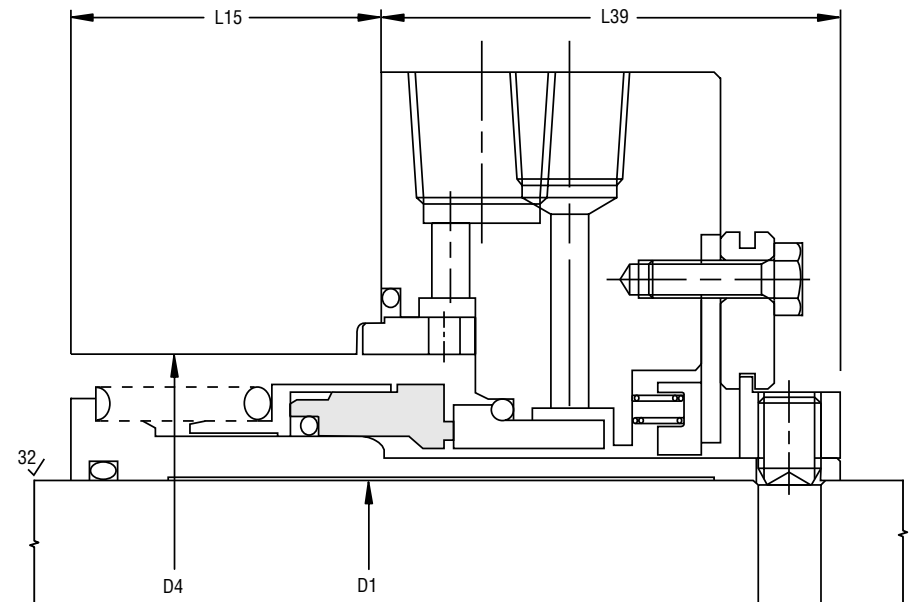
# TYPE RRA/RRE

O-Ring, Engineered Cartridge Seals

## Type RRA/R Typical Arrangement



## Type RRE/R Typical API 682 Type A Arrangement



RRA/RRE



# TYPE RRA/RRE

## O-Ring, Engineered Cartridge Seals

### Type RRAL/R and RREL/R Dimensional Data (mm)

| Seal Size (mm) | D1<br>+0.00/-0.05 | D4* | L15 Min. | L23* | L39** |
|----------------|-------------------|-----|----------|------|-------|
| 020A           | 15                | 41  | 27.0     | 61.5 | 70.5  |
| 022A           | 18                | 44  | 28.5     | 61.5 | 70.5  |
| 025A           | 21                | 48  | 33.5     | 61.5 | 70.5  |
| 028A           | 25                | 50  | 34.5     | 61.5 | 70.5  |
| 032A           | 29                | 56  | 40.5     | 62.5 | 71.5  |
| 036A           | 33                | 61  | 42.5     | 62.5 | 71.5  |
| 040A           | 38                | 66  | 42.5     | 62.5 | 71.5  |
| 045A           | 43                | 73  | 44.5     | 69.5 | 78.5  |
| 050A           | 46                | 78  | 44.5     | 69.5 | 78.5  |
| 053A           | 49                | 81  | 47.5     | 69.5 | 78.5  |
| 056A           | 53                | 85  | 50.5     | 69.5 | 78.5  |
| 060A           | 56                | 90  | 50.5     | 69.5 | 78.5  |
| 063A           | 60                | 93  | 53.5     | 69.5 | 78.5  |
| 067A           | 63                | 102 | 55.5     | 69.5 | 78.5  |
| 070A           | 68                | 107 | 55.5     | 69.5 | 78.5  |
| 075A           | 73                | 111 | 58.0     | 69.5 | 78.5  |
| 080A           | 78                | 118 | 58.0     | 69.5 | 78.5  |
| 085A           | 83                | 122 | 61.0     | 69.5 | 78.5  |
| 090A           | 88                | 127 | 61.0     | 72.5 | 81.5  |
| 095A           | 93                | 134 | 64.0     | 72.5 | 81.5  |
| 100A           | 98                | 141 | 65.5     | 72.5 | 81.5  |
| 105A           | 103               | 149 | 66.5     | 75.5 | 84.5  |
| 110A           | 108               | 152 | 67.0     | 78.5 | 87.5  |
| 115A           | 113               | 159 | 70.0     | 78.5 | 87.5  |
| 120A           | 118               | 164 | 70.0     | 78.5 | 87.5  |
| 125A           | 123               | 174 | 77.0     | 78.5 | 87.5  |
| 130A           | 128               | 179 | 76.5     | 78.5 | 87.5  |
| 135A           | 133               | 186 | 81.5     | 78.5 | 87.5  |
| 140A           | 138               | 191 | 81.5     | 78.5 | 87.5  |
| 145A           | 143               | 196 | 85.5     | 78.5 | 87.5  |

### Type RRAL/R and RREL/R Dimensional Data (inches)

| Seal Size (inches) | D1<br>+0.000/-0.002 | D4*  | L15 Min. | L23* | L39** |
|--------------------|---------------------|------|----------|------|-------|
| 020A               | 0.60                | 1.61 | 1.06     | 2.42 | 2.77  |
| 022A               | 0.72                | 1.73 | 1.12     | 2.42 | 2.77  |
| 025A               | 0.84                | 1.89 | 1.32     | 2.42 | 2.77  |
| 028A               | 1.00                | 1.97 | 1.36     | 2.42 | 2.77  |
| 032A               | 1.16                | 2.20 | 1.59     | 2.45 | 2.82  |
| 036A               | 1.30                | 2.40 | 1.67     | 2.45 | 2.82  |
| 040A               | 1.50                | 2.60 | 1.67     | 2.45 | 2.82  |
| 045A               | 1.70                | 2.90 | 1.75     | 2.72 | 3.08  |
| 050A               | 1.81                | 3.07 | 1.75     | 2.72 | 3.08  |
| 053A               | 1.93                | 3.19 | 1.87     | 2.72 | 3.08  |
| 056A               | 2.10                | 3.35 | 2.00     | 2.72 | 3.08  |
| 060A               | 2.20                | 3.54 | 2.00     | 2.72 | 3.08  |
| 063A               | 2.36                | 3.66 | 2.11     | 2.72 | 3.08  |
| 067A               | 2.48                | 4.02 | 2.20     | 2.72 | 3.08  |
| 070A               | 2.68                | 4.21 | 2.20     | 2.72 | 3.08  |
| 075A               | 2.87                | 4.37 | 2.28     | 2.72 | 3.08  |
| 080A               | 3.07                | 4.65 | 2.28     | 2.72 | 3.08  |
| 085A               | 3.27                | 4.80 | 2.40     | 2.72 | 3.08  |
| 090A               | 3.46                | 5.00 | 2.40     | 2.84 | 3.20  |
| 095A               | 3.66                | 5.28 | 2.52     | 2.84 | 3.20  |
| 100A               | 3.86                | 5.55 | 2.58     | 2.84 | 3.20  |
| 105A               | 4.06                | 5.87 | 2.62     | 2.97 | 3.34  |
| 110A               | 4.25                | 5.98 | 2.64     | 3.09 | 3.44  |
| 115A               | 4.45                | 6.26 | 2.76     | 3.09 | 3.44  |
| 120A               | 4.65                | 6.46 | 2.76     | 3.09 | 3.44  |
| 125A               | 4.84                | 6.85 | 3.03     | 3.09 | 3.44  |
| 130A               | 5.04                | 7.05 | 3.01     | 3.09 | 3.44  |
| 135A               | 5.24                | 7.32 | 3.21     | 3.09 | 3.44  |
| 140A               | 5.43                | 7.52 | 3.21     | 3.09 | 3.44  |
| 145A               | 5.63                | 7.72 | 3.37     | 3.09 | 3.44  |

\*D4 is the minimum seal chamber bore over the spring.

\*L23 is the standard seal gland plate width with a standard safety bushing.

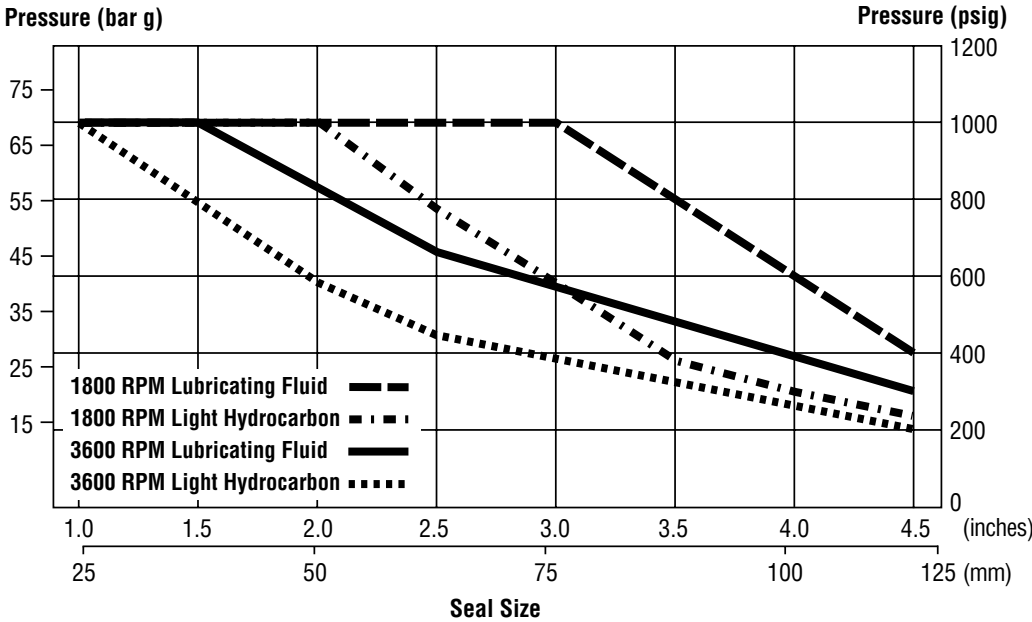
\*\*L39 is the standard seal gland plate width for seals with a floating carbon safety bushing as designed for API 682 applications.



# TYPE RRA/RRE

O-Ring, Engineered Cartridge Seals

## Basic Pressure Rating



The Basic Pressure Rating is for a standard seal, as shown in the typical arrangement, when installed according to the criteria given in this data sheet and generally accepted industrial practices.

The Basic Pressure Rating assumes stable operation in a clean, cool, lubricating, non-volatile liquid with an adequate flush rate. Ratings are also shown for non-lubricating, volatile fluids. When used with the Multiplier Factors, the Basic Pressure Rating can be adjusted to provide a conservative estimate of the dynamic pressure rating. For process services outside this range and sizes above 4.50" or for a more accurate assessment of the dynamic pressure rating, contact John Crane for more information.

## Multiplier Factors

|   | Selection Considerations   | Multiplier Factor                    |                                      |
|---|--|--------------------------------------|--------------------------------------|
|   |  | RREL/R                               | RRAL/R                               |
| <b>Sealed Fluid Lubricity</b>                     | Petrol/Gasoline, Kerosene, or Better<br>Water and Aqueous Solutions<br>Flashing Hydrocarbons                     | x 1.00<br>x 0.75<br>refer curve      | x 1.00<br>x 0.75<br>use RRE          |
| <b>Sealed Fluid Temperature (for carbon only)</b> | Up to 80°C/175°F<br>From 80°C to 120°C/175°F to 250°F<br>From 120°C to 180°C/250°F to 355°F<br>Above 180°C/350°F | x 1.00<br>x 0.90<br>x 0.80<br>x 0.65 | x 1.00<br>x 0.80<br>x 0.70<br>x 0.55 |

### Example for Determining Pressure Rating Limits:

**Seal:** 50mm/2" diameter Type RREL/R

**Product:** Propane Butane (s.g. 0.50)

**Face Materials:** Carbon vs. Silicon Carbide

**Operating Temperature:** 43°C/110°F

**Speed:** 3600 rpm

The maximum operating pressure for this application is:

40 bar g/580 psig at 3600 rpm.

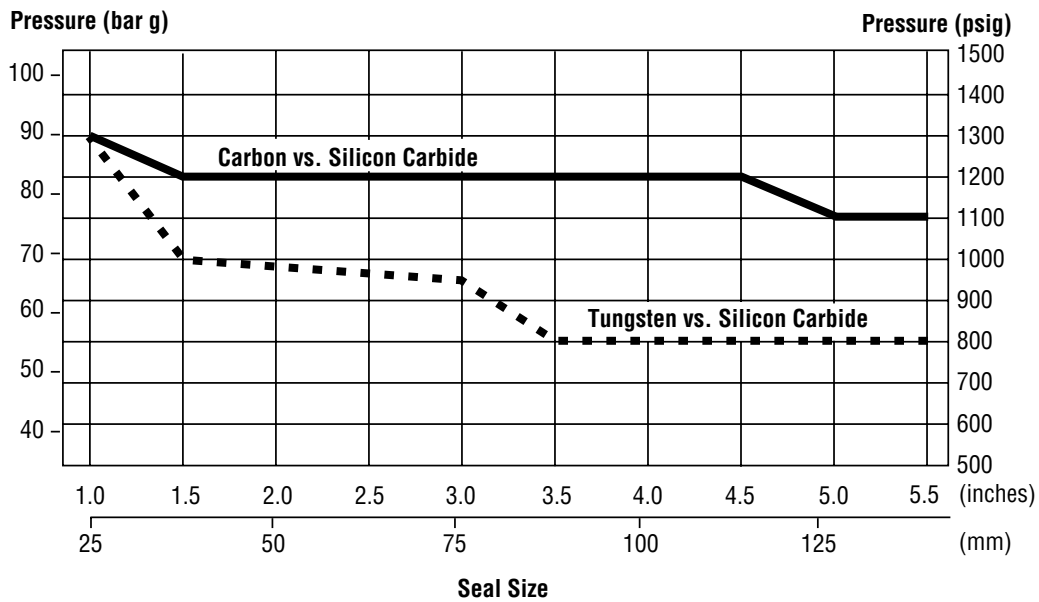
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# TYPE RRA/RRE

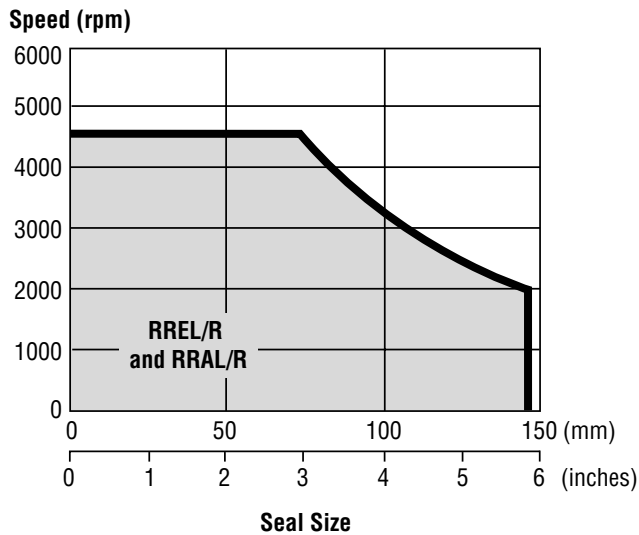
## O-Ring, Engineered Cartridge Seals

### RRA/RRE Hydrostatic/Static Pressure Limits



**NOTE:** The hydrostatic and static limits are based upon o-ring extrusion limits, not component stresses. Therefore, hydrostatic and static limits are the same.

### Speed Limits



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# TYPE RRA/RRE

## O-Ring, Engineered Cartridge Seals

### Materials of Construction

| SEAL COMPONENTS   | RRAL/R  |                                      | RREL/R  |                                      |
|-------------------|---|--------------------------------------|---|--------------------------------------|
|                   | Description   | Standard                             | Options   | Standard                             |
| Face/Primary Ring | Silicon Carbide in Duplex Stainless Steel (UNS S31803)              | —                                    | Carbon Graphite   | —                                    |
| Seat/Mating Ring  | Carbon Graphite   | Nickel Binder<br>Tungsten Carbide    | Silicon Carbide   | Nickel Binder<br>Tungsten Carbide    |
| Metal Components  | 316 Stainless Steel   | Duplex Stainless Steel               | 316 Stainless Steel   | Duplex Stainless Steel               |
| Spring            | 316 Stainless Steel   | Alloy C-276 (UNSN10276)<br>Alloy 400 | 316 Stainless Steel   | Alloy C-276 (UNSN10276)<br>Alloy 400 |
| O-Rings           | Nitrile<br>Ethylene Propylene<br>Fluorocarbon<br>Perfluoroelastomer | PTFE*                                | Nitrile<br>Ethylene Propylene<br>Fluorocarbon<br>Perfluoroelastomer | PTFE*                                |

\*Refer to John Crane



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