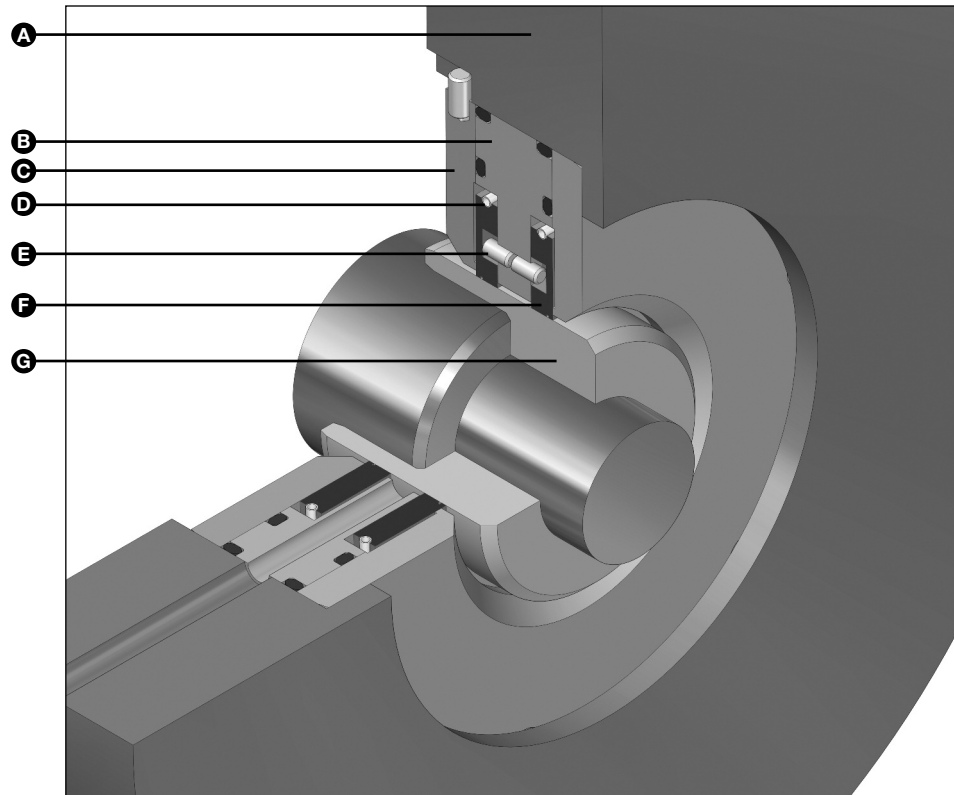


- A – Housing
- B – Retainer
- C – Clamp Plate
- D – Garter Spring
- E – Anti-rotation Pin
- F – Bushing Segment
- G – Sleeve



Product Description

The Type 93FR is a non-contacting carbon bushing designed to protect dry gas seals from bearing oil ingress.

- Segments are specifically designed to prevent oil migration.
- Separation gas (normally nitrogen or air) is injected between the two segmented bushings effectively creating a pressure barrier between the bearing and dry gas seal cavity.
- Advanced materials and design eliminate wear under normal running, promoting long service life.

Design Features

- Non-contacting for longer life and improved reliability; low heat generation
- Runs at low operating pressure differential enabling low gas consumption
- Specially designed segments further minimise gas consumption
- Universal design, independent of shaft rotation
- Will retrofit many traditional carbon bushing rings
- Suitable for running with nitrogen separation gas irrespective of dew point
- Self-centring design minimizes wear even during upset conditions

Performance Capabilities

- Size range: 1.57" to 14.76"/40 mm to 375 mm with sleeve to fit all metric or imperial shaft sizes
- Operating temperature: -40°F to 450°F/-40°C to 230°C
- Speed: up to 430 fps/130 mp/s
- Maximum separation gas operating differential pressure: 7.5 psi/0.5 bar
- Recommended separation gas operating differential pressure: 0.75 to 1.5 psi/0.05 to 0.1 bar
- Separation gases: nitrogen, air
- Vibration levels to API617

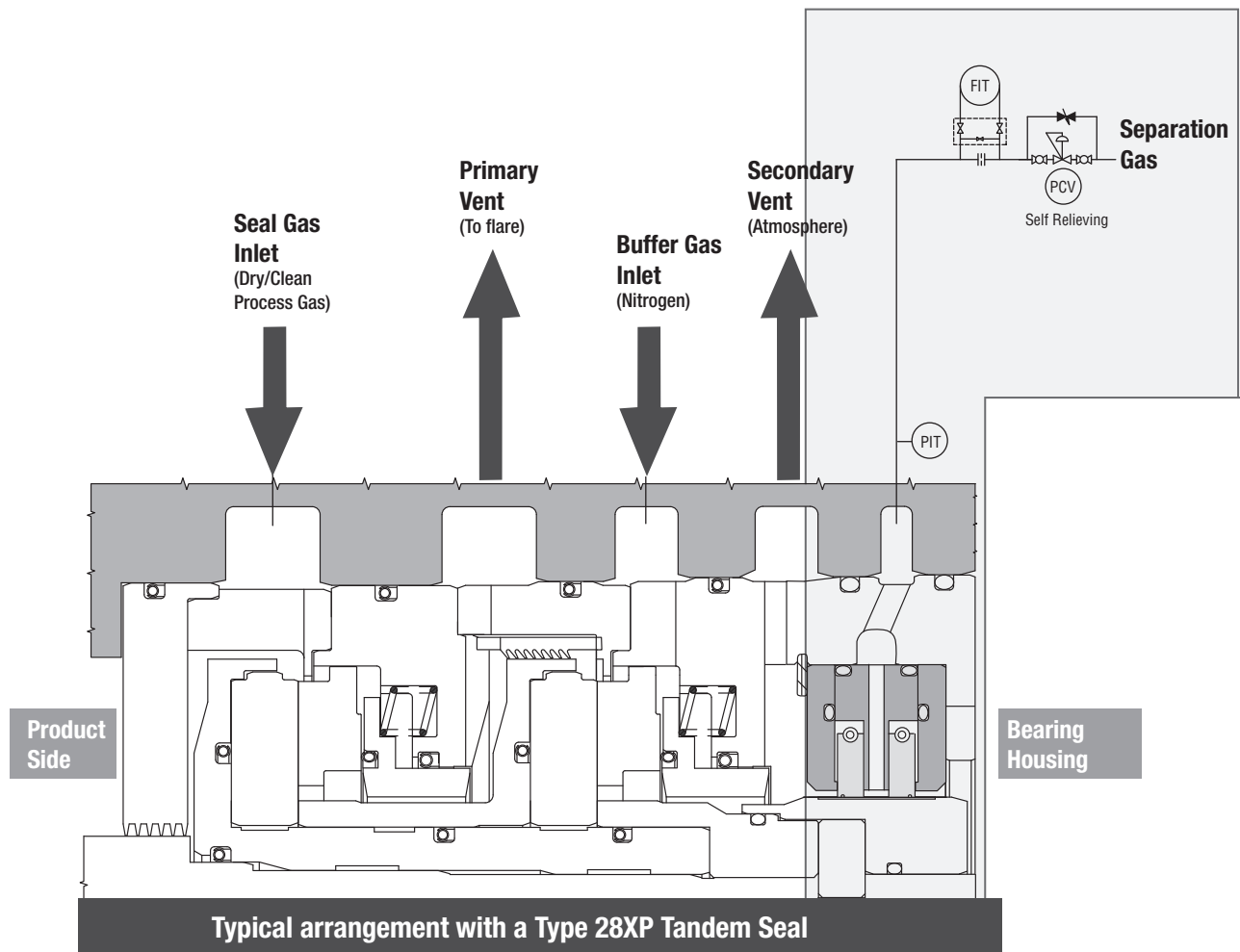
For alternative conditions, consult John Crane.

TYPE 93FR

FLOATING RING SEPARATION SEAL

Technical Specification

Required Installation and P&ID for Type 93FR Separation Seal

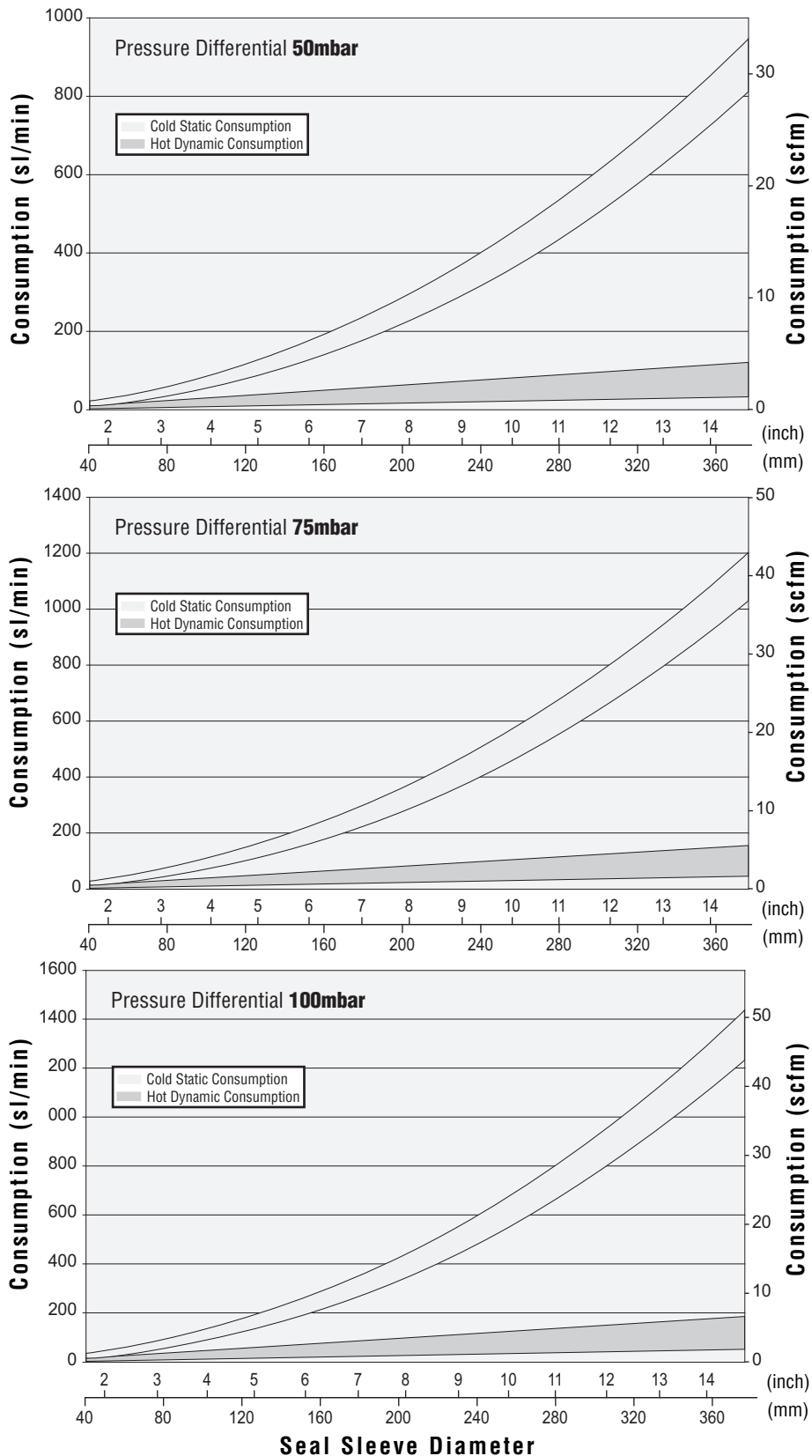


Separation gas can be pressure controlled (recommended, to minimise gas consumption) or flow controlled. Typical example shown, variations may be necessary depending on individual circumstances including availability and quality of separation gas and safety considerations.

TYPE 93FR

FLOATING RING SEPARATION SEAL

Type 93FR Consumption Rates



Shaded areas indicate expected consumption ranges for typical application conditions.
Actual consumption is dependent on application speed, temperature and individual installation.

Materials of Construction

| SEAL COMPONENT DESCRIPTION | STANDARD MATERIALS |
|--|---------------------|
| Bushing Segments | Carbon |
| Garter Spring | Stainless Steel |
| Housing Assembly Clamp Plate Assembly | 410 Stainless Steel |
| O-rings | Fluoroelastomer |

Alternative materials are available, consult John Crane Engineering.

Performance Recommendations

- Separation gas specification:
Filtration: 10 microns and dry.
Proper consideration must be given as to the possibility of explosive mixtures.
- Operating environment:
Vibration levels within API 617.
Bearing housing should be well drained.
Bearing housing should not be pressurized.
Consideration should be given to the secondary vent piping as not to cause an excessive back pressure.
Oil exiting the bearing cavity directed at the separation seal should be noted at design.

Alternative Applications

The Type 93FR is normally supplied as a double separation seal as depicted in this data sheet however individual carbon rings can be supplied for use on other applications where an effective barrier is required i.e. bearing chambers, fans, blowers, gearboxes and other high speed low pressure applications - please consult John Crane.



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