

TYPE 2874 & 2874XP

NON-CONTACTING, OUTWARD PUMPING
DUAL GAS SEAL

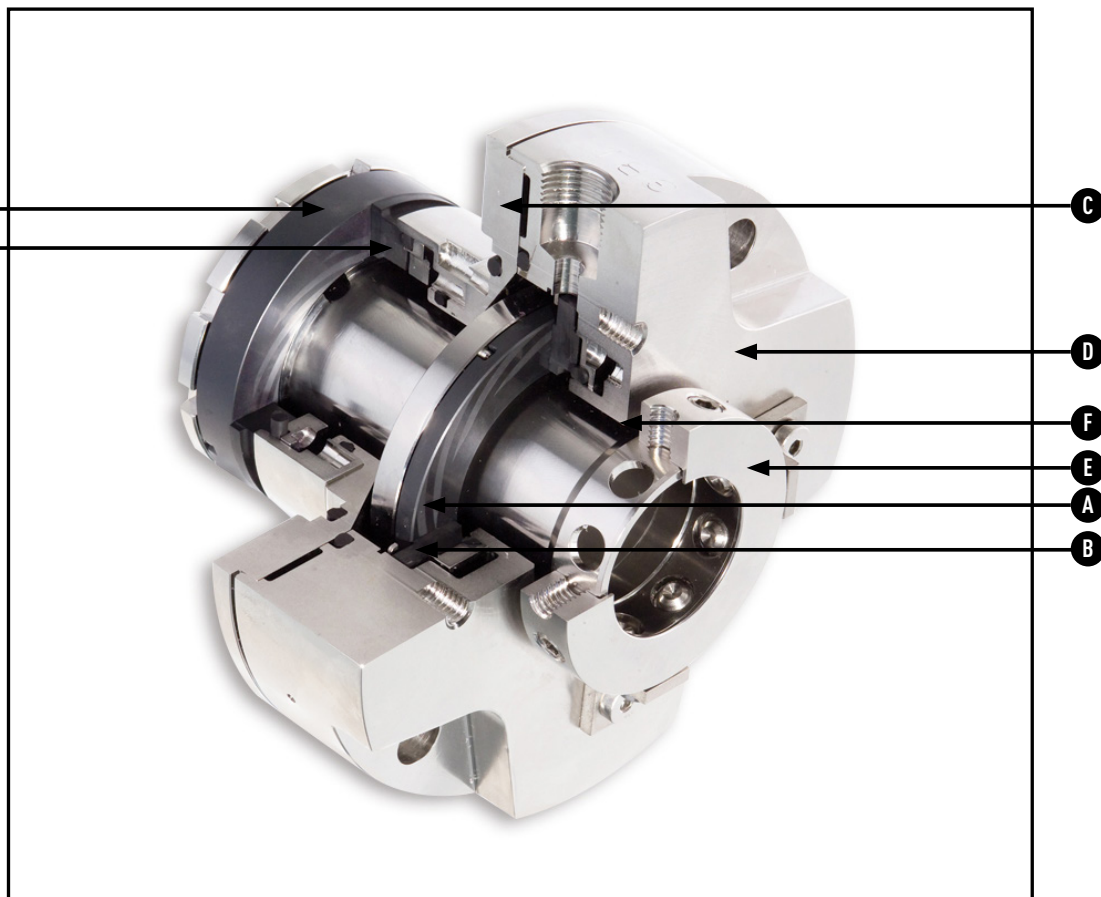
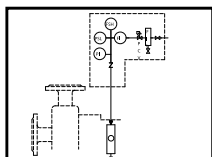
Technical Specification

- A – Mating ring
- B – Primary ring
- C – Gland adapter
- D – Gland plate
- E – Collar
- F – Sleeve

Outward pumping
spiral grooves



API 682/ISO 21049 3NC
Plan 74 compliant



The Type 2874 and the Type 2874XP are gas lubricated, non-contacting dual cartridge seal designed for use in API, ANSI and DIN large seal chambers. The XP version is an extended version of Type 2874 and has improved differential pressure capabilities.

Product description

- Non-contacting, internally pressurised outward pumping dual seal cartridge for new and existing pumps
- For Maximum Achievable Control Technology (MACT) and high-reliability sealing of volatile or hazardous fluids in chemical, petrochemical and refining processes.
- For process fluids that display turbidity or solids in suspension.
- For sealing high purity fluids without potential for product contamination.
- For sealing fluids that are sensitive to thermal gain or decay.
- For use in API, ANSI and DIN large bore seal chambers.

Design features

- Inside diameter (ID) to outside diameter (OD) pumping spiral groove arrangement places process fluid at the OD of the inboard seal. Eliminates low flow regions in close proximity to inboard seal, reduces dewatering and hang-up
- Rotating mating ring imparts centrifugal flow to fluid in the seal chamber of equipment
- 0.0 fugitive emissions
- Reverse pressure capability
- Simplified barrier gas support system

Performance capabilities

- Temperature: -30°F to 500°F / -34°C to 262°C
- Pressure: vacuum to 600 psi(g) / 41.4 bar(g) barrier pressure
- Speed: 1450 rpm to 3600 rpm
- Axial movement: +/-0.040" / 1.02mm
- Runout: 0.002" / 0.05mm TIR

Barrier consumption

The Type 2874 and the Type 2874XP use inert barrier gas to lubricate the seal faces. The inboard seal is operated at a 30 to 50 psi(g) / 2.07 bar(g) to 3.45 bar(g) pressure differential, and the outboard seal operates at full pressure differential. Therefore, it is estimated that 75 percent of total barrier consumption passes outboard into the atmosphere.

The barrier consumption of the Type 2874 and Type 2874XP can be estimated by the user as one standard cubic foot of barrier gas per inch of shaft diameter, per hour, per 100 psi(g) / 6.9 bar(g) of barrier pressure.

More specific values are available from John Crane.

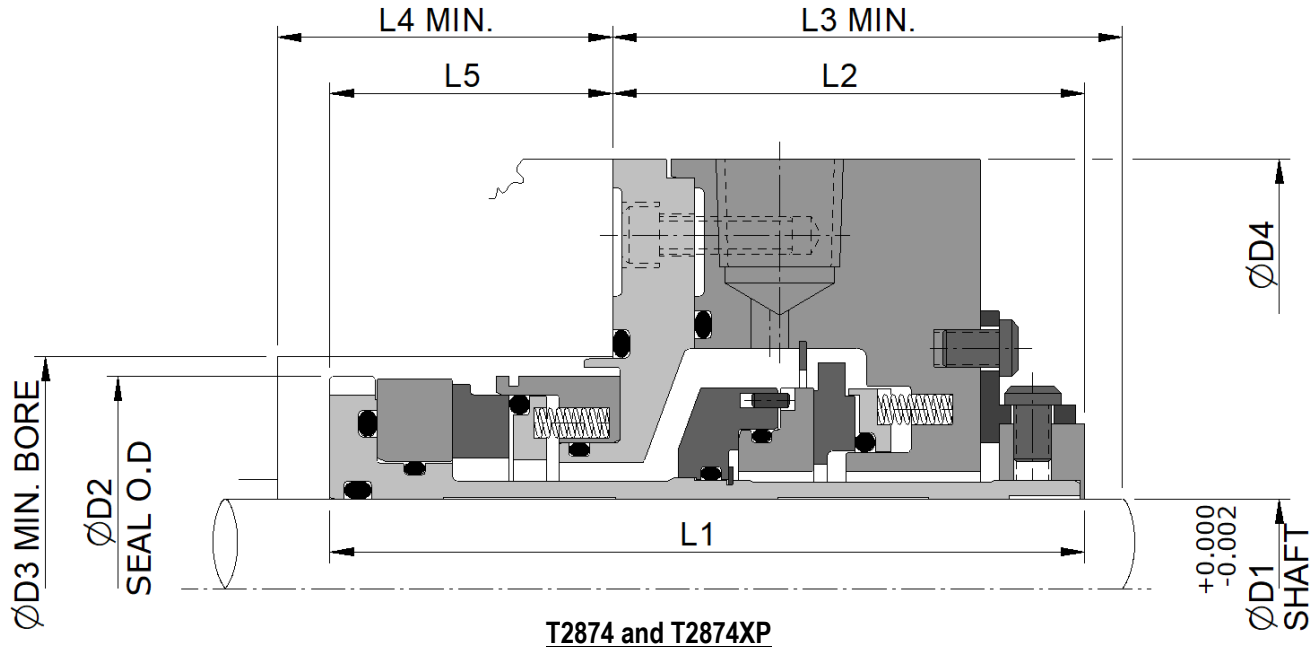


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Technical Specification

Type 2874 and Type 2874XP Typical Arrangements



Type 2874 and Type 2874XP Dimensions in mm - IMPERIAL

Seal size (mm)	Seal size code	ØD1 SHAFT	ØD2 SEAL O.D.	ØD3 MIN. BORE	L1	L2	L3 MIN.	L4 MIN.	L5	CW REF. DRAWING	CCW REF. DRAWING
1.375*	0349	34.93	71.65	73.03	104.78	53.98	55.55	52.37	50.80	HSP-1033467	HSP-1034130
1.375**	0349	34.93	71.65	73.03	104.78	53.98	55.55	66.09	50.80	HSP-1033468	HSP-1034131
1.500	0381	38.10	79.38	85.73	127.00	79.38	82.55	50.80	47.63	HSP-1033469	HSP-1034132
1.625	0412	41.28	85.73	88.90	121.13	69.24	71.42	53.98	51.87	HSP-1033470	HSP-1034133
1.750	0444	44.45	88.90	92.08	121.13	76.66	81.74	47.63	44.45	HSP-1033471	HSP-1034134
1.875	0476	47.63	99.87	100.00	127.00	91.44	94.62	49.20	47.63	HSP-1033472	HSP-1034135
2.000	0508	50.80	95.25	98.43	117.27	65.07	68.25	54.76	52.17	HSP-1033473	HSP-1034136
2.125	0539	53.98	98.43	104.65	127.00	60.33	88.90	44.45	41.28	HSP-1033474	HSP-1034137
2.250	0571	57.15	104.78	114.30	117.27	53.75	55.55	65.07	63.50	HSP-1033475	HSP-1034138
2.375	0603	60.33	107.95	117.48	117.27	53.75	55.55	66.24	63.50	HSP-1033476	HSP-1034139
2.500	0635	63.50	111.13	120.65	121.13	63.09	66.27	63.50	58.01	HSP-1033477	HSP-1034140
2.625	0666	66.68	117.48	127.00	127.00	73.79	76.96	74.60	53.21	HSP-1033478	HSP-1034141
2.750	0698	69.85	123.83	127.00	127.00	73.03	76.20	80.16	53.98	HSP-1033479	HSP-1034142
3.000	0762	76.20	127.00	149.23	127.00	76.20	91.67	64.67	50.80	HSP-1033480	HSP-1034143
3.500	0889	88.90	130.18	152.40	127.00	100.79	103.96	49.20	26.21	HSP-1033481	HSP-1034144
4.000	1016	101.60	142.88	165.10	127.00	76.20	84.96	70.03	50.80	HSP-1033482	HSP-1034145

*Goulds 3196 ST Big Bore

**Duriron Mark III Group IK



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DUAL GAS SEAL

Technical Specification

Type 2874 and Type 2874XP Dimensions in inches - IMPERIAL

Seal size (mm)	Seal size code	ØD1 SHAFT	ØD2 SEAL O.D.	ØD3 MIN. BORE	L1	L2	L3 MIN.	L4 MIN.	L5	CW REF. DRAWING	CCW REF. DRAWING
1.375*	0349	1.375	2.821	2.875	4.125	2.125	2.187	2.062	2.000	HSP-1033467	HSP-1034130
1.375**	0349	1.375	2.821	2.875	4.125	2.125	2.187	2.602	2.000	HSP-1033468	HSP-1034131
1.500	0381	1.500	3.125	3.375	5.000	3.125	3.250	2.000	1.875	HSP-1033469	HSP-1034132
1.625	0412	1.625	3.375	3.500	4.769	2.726	2.812	2.125	2.042	HSP-1033470	HSP-1034133
1.750	0444	1.750	3.500	3.625	4.769	3.018	3.218	1.875	1.750	HSP-1033471	HSP-1034134
1.875	0476	1.875	3.932	3.937	5.000	3.600	3.725	1.937	1.875	HSP-1033472	HSP-1034135
2.000	0508	2.000	3.750	3.875	4.617	2.562	2.687	2.156	2.054	HSP-1033473	HSP-1034136
2.125	0539	2.125	3.875	4.120	5.000	2.375	3.500	1.750	1.625	HSP-1033474	HSP-1034137
2.250	0571	2.250	4.125	4.500	4.617	2.116	2.187	2.562	2.500	HSP-1033475	HSP-1034138
2.375	0603	2.375	4.250	4.625	4.617	2.116	2.187	2.608	2.500	HSP-1033476	HSP-1034139
2.500	0635	2.500	4.375	4.750	4.769	2.484	2.609	2.500	2.284	HSP-1033477	HSP-1034140
2.625	0666	2.625	4.625	5.000	5.000	2.905	3.030	2.937	2.095	HSP-1033478	HSP-1034141
2.750	0698	2.750	4.875	5.000	5.000	2.875	3.000	3.156	2.125	HSP-1033479	HSP-1034142
3.000	0762	3.000	5.000	5.875	5.000	3.000	3.609	2.546	2.000	HSP-1033480	HSP-1034143
3.500	0889	3.500	5.125	6.000	5.000	3.968	4.093	1.937	1.032	HSP-1033481	HSP-1034144
4.000	1016	4.000	5.625	6.500	5.000	3.000	3.345	2.757	2.000	HSP-1033482	HSP-1034145

*Goulds 3196 ST Big Bore

**Duriron Mark III Group IK

Please note that both the Type 2874 and the Type 2874XP currently only have imperial sizes.

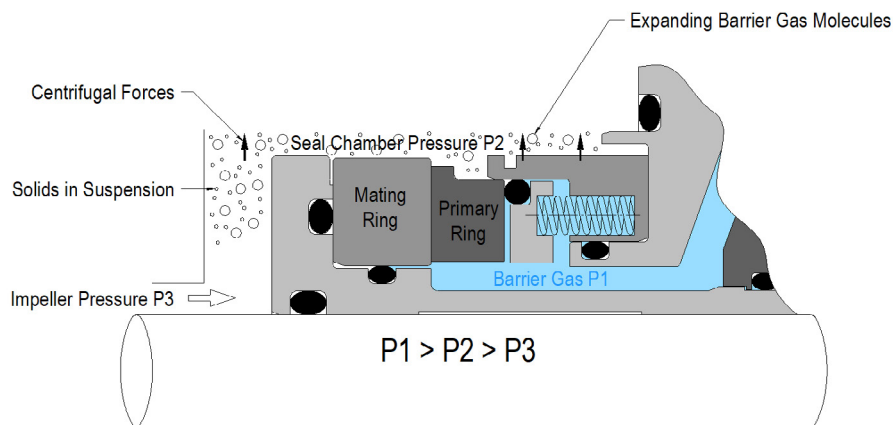
Type 2874 and Type 2874XP Dimensions in inches - IMPERIAL

Historically, a sleeve mounted rotating mating ring is chosen because of its advantage where the gland plate and shaft have lost perpendicular alignment.

In this arrangement, the flexible element of the seal (the stationary primary ring) can deflect to a fixed position to match the rotating face. In an arrangement that features a rotating flexible member, the primary ring would flex and change position 'once per shaft' revolution to accommodate the 'out of square' stationary face.

The rotating mating ring arrangement offers significant benefits that add to the durability of the Type 2874 and Type 2874XP. Seal chamber face runout to shaft can be a maximum of 0.002"/0.05mm TIR for the Type 2874 and Type 2874XP standard size range.

For larger seals contact John Crane.





TYPE 2874 & 2874XP

NON-CONTACTING, OUTWARD PUMPING DUAL GAS SEAL

Technical Specification

The Type 2874 and Type 2874XP use unique spiral groove technology developed and patented by John Crane.

The inboard mating ring of the Type 2874 and Type 2874XP features micro machined spiral grooves. The inboard carbon primary ring seals against an un-grooved sealing dam of the mating ring. The face pair is pressurised on the inside diameter to a pressure differential of 20 to 30 psi(g) / 2.07 bar(g) to 3.45 bar(g)

When the pump shaft turns, spiral grooves compress the pressurised barrier gas and create a lifting force on the primary ring. The result is non-contacting operation. With barrier gas at the ID of the face pair, the spiral grooves are designed to pump gas to the OD. The stiff ring of compressed barrier gas exiting the face pair creates a highly effective dry seal.

ID to OD barrier gas pumping exposes the inboard seal to a relatively large volume of liquid. This reduces dewatering/drying effects of exiting barrier gas and results in a more tolerant, durable seal particularly where high solids fluids are sealed.

The Type 2874 and Type 2874XP feature reverse pressure capability. In the event of a pressure reversal where seal chamber pressure exceeds barrier gas pressure, the secondary seal shifts closing the inboard seal and preventing product release. The outboard seal faces handling full differential pressure, use conventional OD to ID pumping spiral grooves.

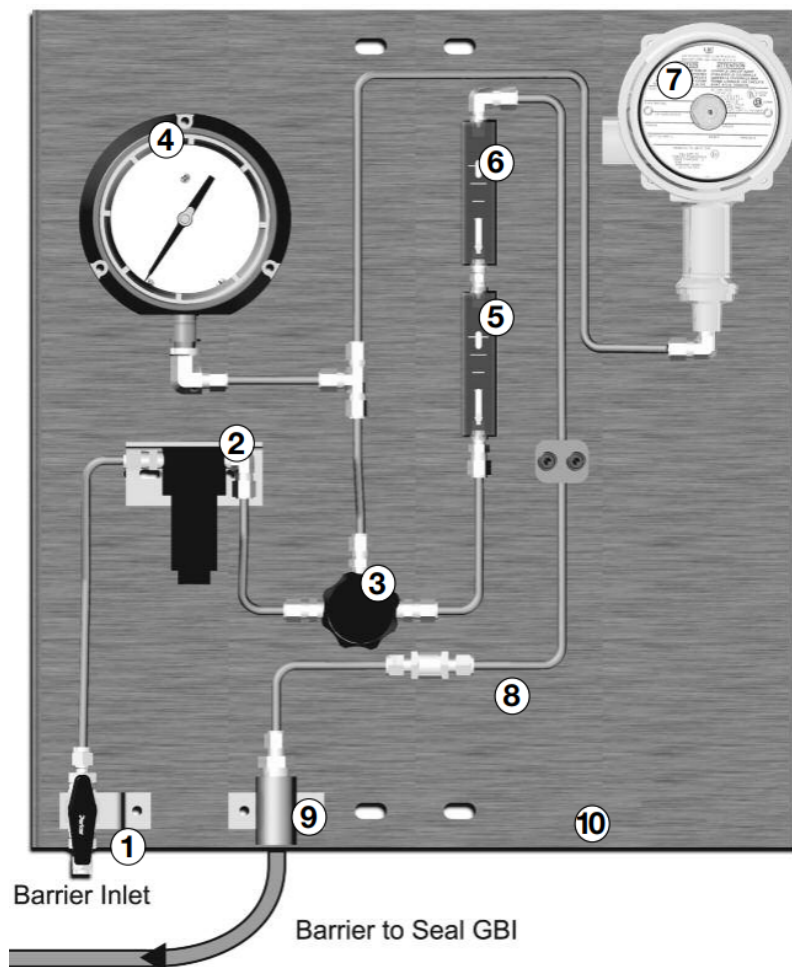
When the pump shaft rotates, spiral grooves compress barrier gas and create a lifting force resulting in non-contacting operation. The outboard seal pumps inert barrier gas into the atmosphere.

Materials of construction

Seal Component	Standard	Option
Inner Gland Plate ASM Liner Sleeve Retainer Disc	316 Stainless Steel (0550)	Titanium (1955) Alloy C276 (0690) Monel (1800) Alloy 20CB3 SS (0560) Hastelloy B-3 (0680)
Primary Rings	Antimony Impregnated Carbon (9048)	Ni-Cr Impregnated Carbon (9060)*
O-Rings	Fluoroelastomer (9549)	Perfluoroelastomer (9579) Perfluoroelastomer (9580) Low Temp Fluoroelastomer (9531) Ethylene Propylene (9561) Nitrile (9501)
Mating Ring	Ni Bonded Tungsten Carbide (9205)	Self-Sintered Silicon Carbide (9221)
Snap Rings	18/8 Stainless Steel (0500)	-
Springs	Alloy C276 (0690)	-
Cap Head Screws	316 Stainless Steel (0550)	-
Cup Point Grub Screws	ASTM A453 Grade 660 class C (0649)	-
Spacers	316 Stainless Steel Sintered (0570)	-
Collar	Duplex Stainless Steel (0594)	-
Holding Clips	Zinc Plated Steel (0220)	-

*for FDA Requirement only.

Barrier gas supply systems



Standard components

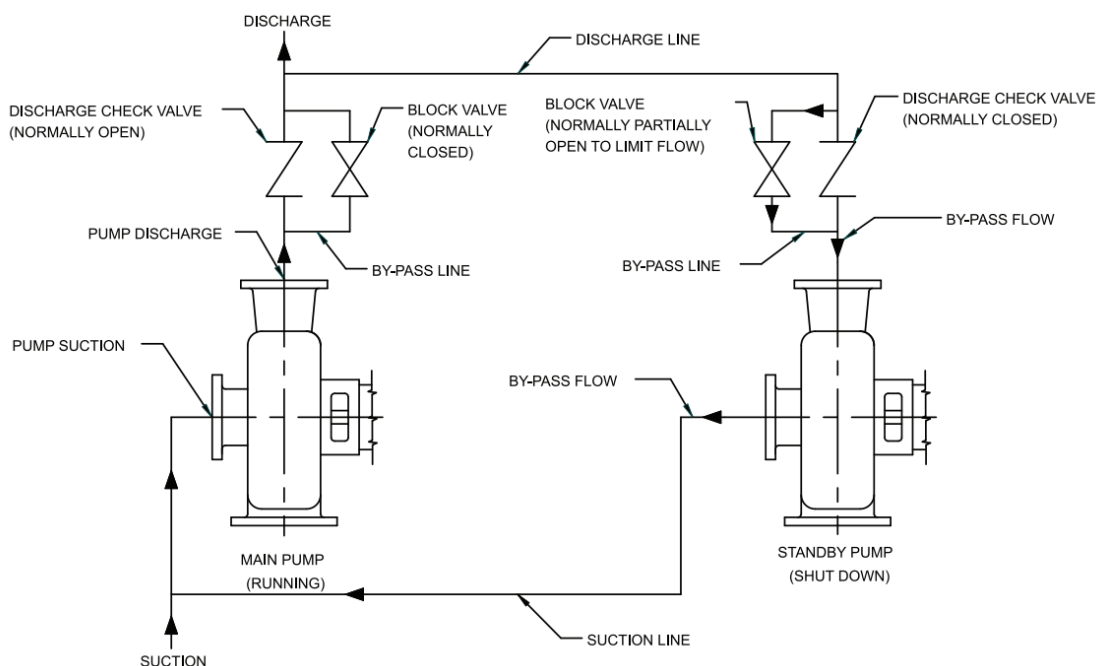
- 1 Isolating ball valve – 316 SS
- 2 Coalescing filter – 316 SS
- 3 Pressure regulator – 316 SS
(Low pressure option Aluminium)
- 4 Gauge – Phenolic/316 SS
- 5 Flow indicator – Low range
- 6 Flow indicator – High range
- 7 Pressure switch (optional)
15A 125/240/480 (SPDT)
- 8 Check valve – 316 SS
(Viton optional elastomers)
- 9 Connection to seal
- 10 Back panel – 304 SS

Note: Engineered gas panels can be configured to customer requirements.

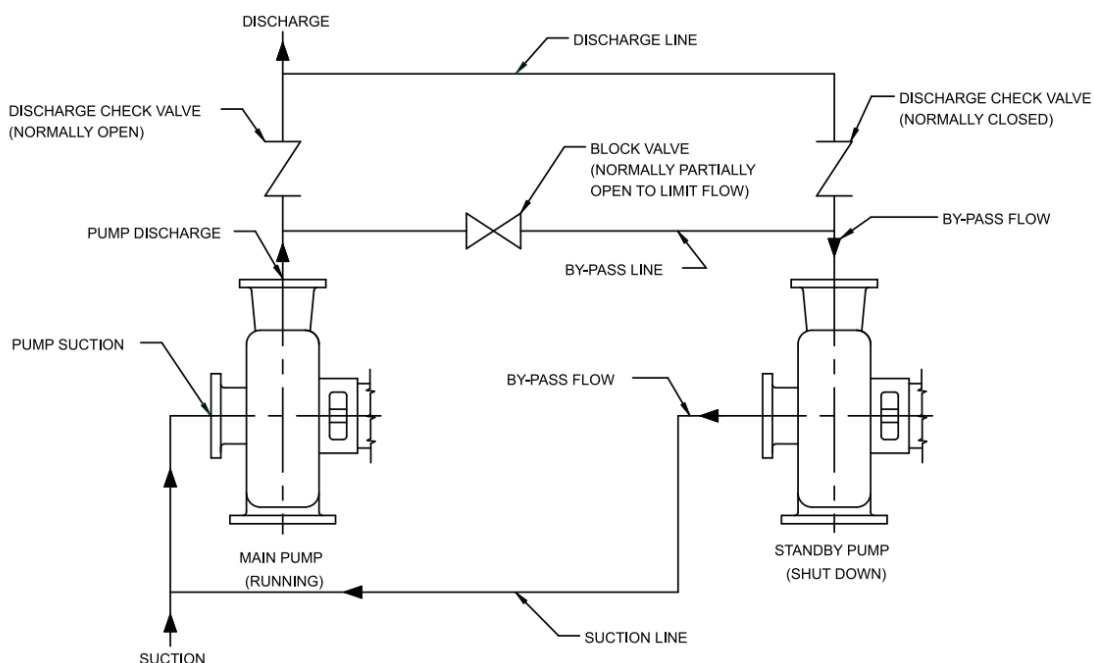
In a double seal arrangement inert gas (normally nitrogen) is supplied to the seal and maintained at a pressure higher than the seal chamber pressure. Standard instruments and controls have been arranged to deliver clean dry barrier gas at a pressure specified by the operator. Elements of the control panel are connected via 1/4" OD x 0.035" wall 316 SS seamless tubing.

- The coalescing filter is intended to remove moisture and contaminants from the barrier gas supply. Use of the filter will deliver clean dry nitrogen to the seal filtered to 0.3 – 0.6 micron nominal.
- The pressure regulator is used to set barrier pressure on the seal cartridge at 30 to 50 psi(g) / 2.07 bar(g) to 3.45 bar(g) above seal chamber pressure.
- The pressure gauge is a 4.5" (114.3mm) diameter analogue face and will indicate the pressure provided to the mechanical seal.
- Rotameters are intended to indicate flow. They are not intended to be a precise measure of barrier consumption. John Crane can provide empirical barrier consumption data upon request.
- The pressure switch is intended to indicate loss of barrier pressure and provide an output signal
- Downstream of the pressure switch, barrier gas flows through a one-way check valve. The check valve has a 1/3 psi(g) cracking pressure and protects the gas panel and nitrogen system from reverse flow.
- Instrumentation is mounted to a 304SS panel as standard and NEMA enclosures are available. Instrumentation can be augmented to deliver specific information. Contact John Crane for options.

Piping options for hot standby pumps



OPTION 1. Hot By-Pass for a Standby Pump



OPTION 2. HOT BY-PASS FOR A STANDBY PUMP

Often gas lubricated seals are installed on primary and standby pumps. Above are the recommended piping plans that allow standby pumps to manage barrier collection in static conditions. Both diagrams offer continuous circulation of pumped fluid in order to maintain temperature and avoid cavitation upon start-up of stand by equipment.

Detailed information and recommendations for specific applications are available from John Crane.



TYPE 2874 & 2874XP

NON-CONTACTING, OUTWARD PUMPING
DUAL GAS SEAL

Technical Specification



North America
United States of America
Tel: 1-847-967-2400

Europe
United Kingdom
Tel: 44-1753-224002

Latin America
Brazil
Tel: 55-11-3371-2500

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

Asia Pacific
Singapore
Tel: 65-6518-1800

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