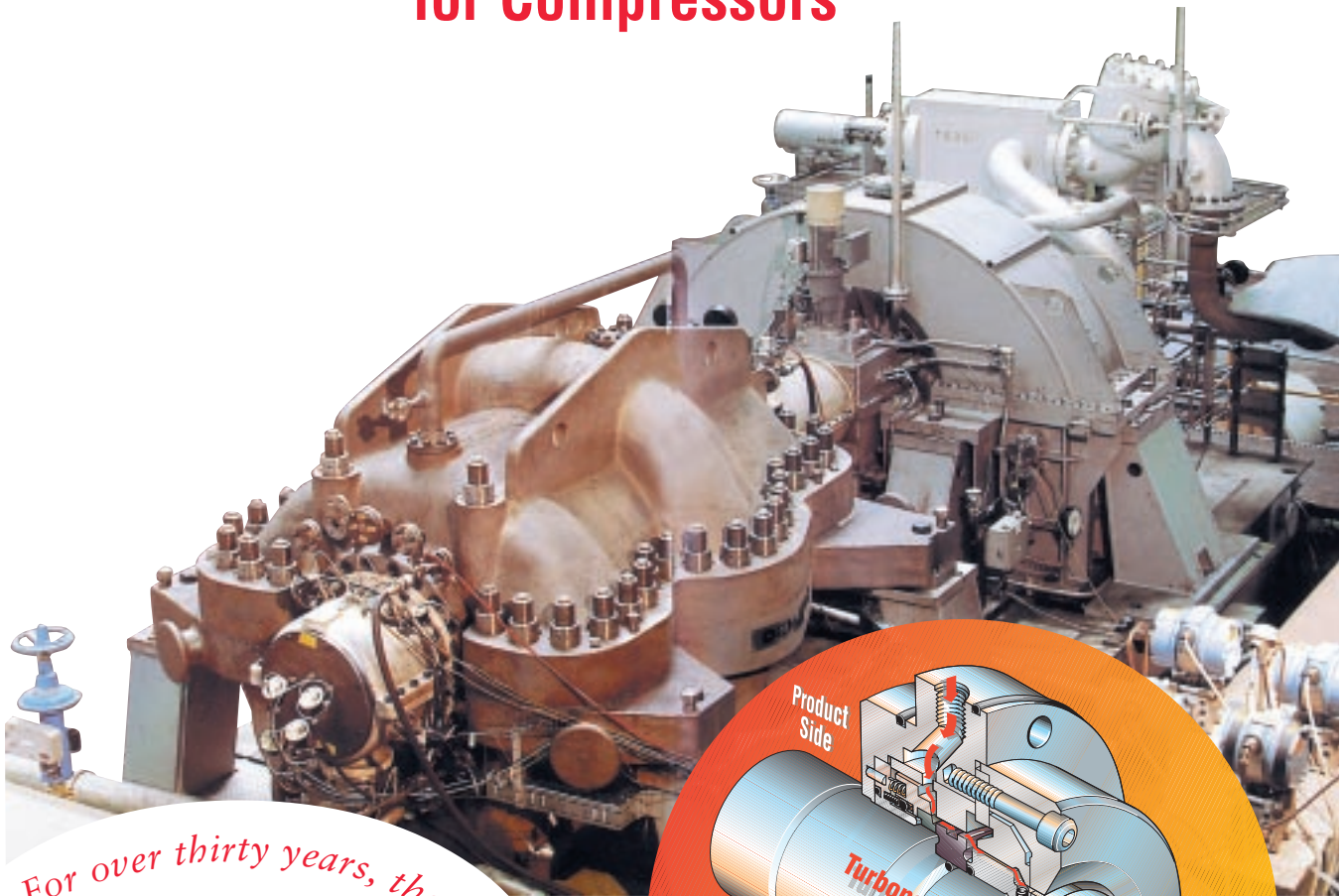


TURBOPAC Mechanical Seals for Compressors



For over thirty years, the sealing solution in axial mounted seals for turbocompressors.

Turbopac
oil lubricated **compressor seal**

Turbocompressors are high-speed dynamic compressors that are used in a variety of industries including: natural gas production & stripping plants, chemical and petrochemical processes, gas pipelines, refiners, gasification of coal, reinjection and steel mills.

The mechanical seal requirements for turbocompressors is challenging due to the diversity of applications and compressor designs. In all cases, the seal must function at high speeds without allowing process gas to leak to the atmosphere or air to leak into the process.

Flowserve delivers axial mechanical seals arranged in the following configurations:

- product side, single mechanical seal combined with an atmospheric floating ring or labyrinth seal
- double mechanical seals in face to face arrangements

The gaps of the floating ring seal or labyrinth are designed to have the barrier and cooling fluid continuously diverted to the bearing side. The gap is increased allowing additional flow through the seal for higher surface speed machines in order to dissipate the heat generated by the resulting increased friction. In some cases a portion of the flow is even diverted back to the oil tank prior to the floating ring seal in order to provide sufficient cooling.

Double mechanical seals are typically operated with a barrier pressure of 3 to 5 bar over the gas pressure. When the compressor is standing still but remains pressurized, the sealing function must be maintained even if the barrier pressure drops. The Turbopac seal is designed to operate under these real world conditions including shutdown as well as under reverse pressure.

high operational **safety**

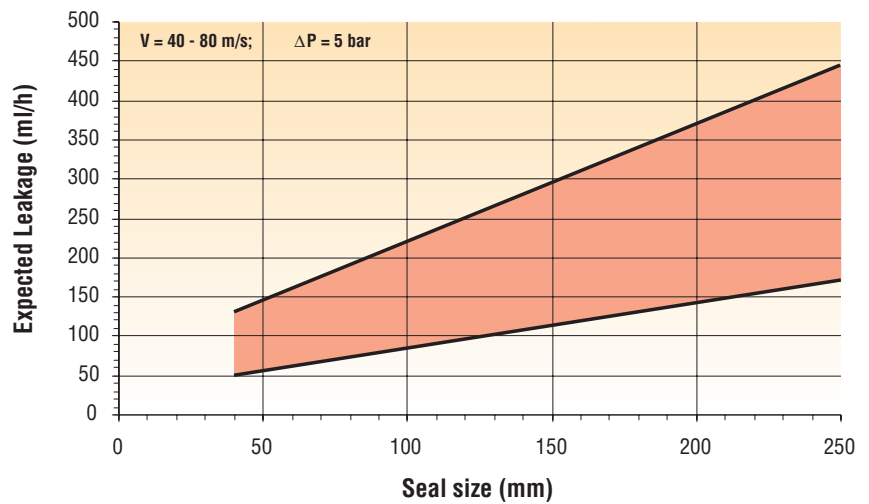
Turbopac

low cost sealing solutions

Since 1968, more than 8000 Turbopac compressor seals have been delivered worldwide. Dependability and performance like this are due in part to the following features:

- non-rotating spring assembly allows higher rotational speeds
- higher safety, efficiency and reduced oil lose from the low leakage rate
- the robust design provides long life and lower life cycle cost
- static seal even under reverse pressure leaves the unit pressurized for reduced gas loss and higher safety
- available in a cartridge design for simple installation
- designed to handle emergency shut downs for added safety

Expected product side leakage of a Turbopac seal

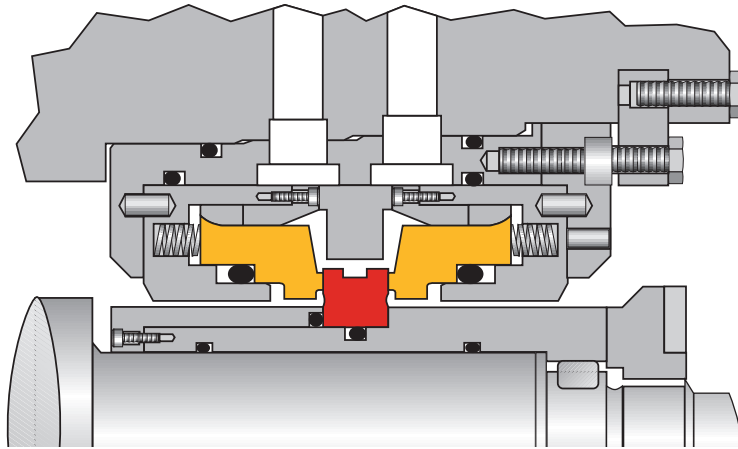


Materials

	Turbopac 368	Turbopac 375	Turbopac 2100
Seal ring	SiC / X39Cr Mo 17-1 (=1.4122) SiC	SiC Si C / 42Ni/Fe (=1.3917)	SiC Si C / 42Ni/Fe (=1.3917)(product side) SiC Si C (atmospheric side)
Mating ring	SiC	SiC	SiC
Gaskets	Elastomers, PTFE	Elastomers, PTFE encapsulated	Elastomers, PTFE PTFE encapsulated
Springs	316 TI (AISI) (=1.4571)	316 TI (AISI) (=1.4571)	316 TI (AISI) (=1.4571)
other components	X39CrMo17-1 (=1.4122)	42Ni/Fe (=1.3917)	42Ni/Fe (=1.3917)

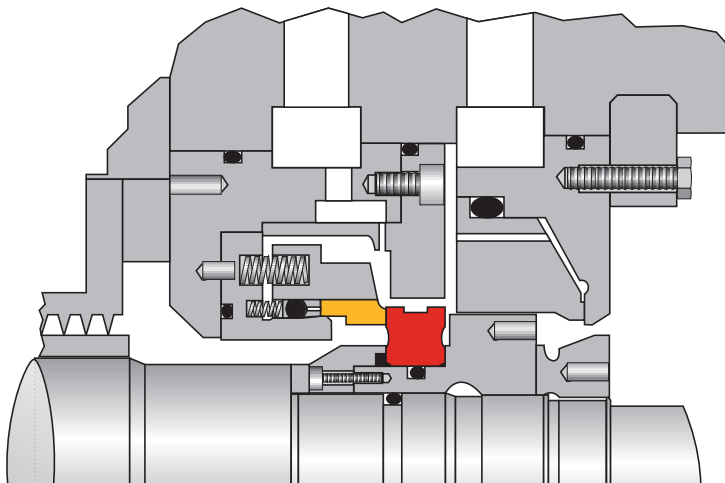
Operating Parameters

	Turbopac 368	Turbopac 375	Turbopac 2100
Shaft size	40 - 180 mm	40 - 260 mm	40 - 160 mm
Surface speed	60 m/s	90 m/s	90 m/s
Temperature	140°C	180°C	180°C
Pressure	25 bar	50 bar	300 bar



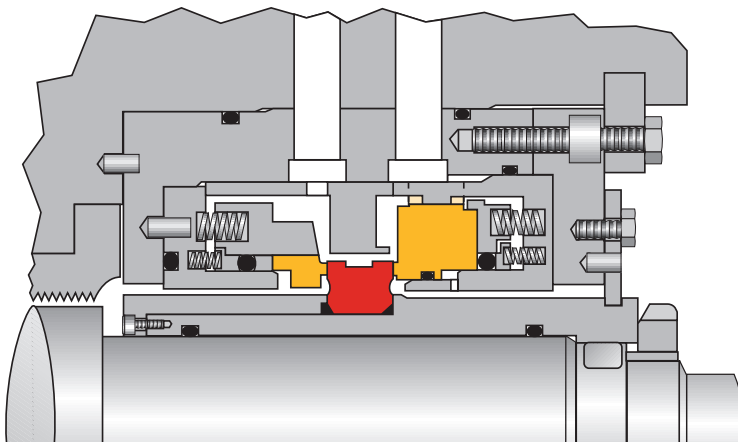
Turbopac 368

double mechanical seal in a face to face arrangement



Turbopac 375

single mechanical seal with reverse pressure capability
and floating ring seal on the atmospheric side



Turbopac 2100

double mechanical seal in a face to face arrangement
for high pressure applications

Turbopac 368

The mechanical seal for Screw Compressors

The Turbopac 368 is available as a bidirectional balanced single or double mechanical seal. It is also designed to fit in the low radial cross section dimensions of screw compressor seal housings. The Turbopac 368 is equipped with a reverse pressure capability, to accommodate sealing during shut down and a drop of barrier pressure.

Turbopac 375

The mechanical seal for Turbo Compressors

The Turbopac 375 is a bidirectional balanced single mechanical seal for more demanding applications. The sturdy constructional design and the flow of barrier liquid provide optimized operational safety and reliability for higher speed and pressure applications. When barrier pressure drops, the reverse pressure capability of this seal allows a controlled shut down of the compressor as well as a sealing function at stand still. The cartridge design makes a fast and sure installation possible.

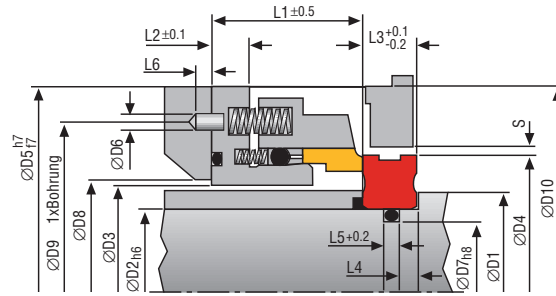
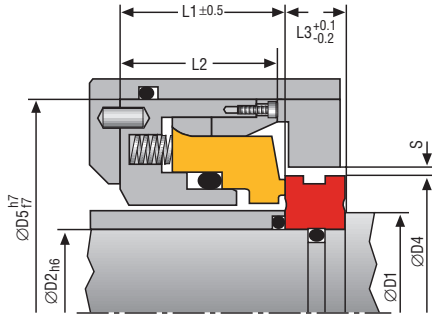
Turbopac 2100

The mechanical seal for high pressure applications

The Turbopac 2100 is a bidirectional balanced double mechanical seal. The constructional design on the gas side corresponds to a Turbopac 375, combined with a high-pressure seal on the atmospheric side. The special structural design of the seal faces allow higher pressures to be sealed at high circumferential speed. As a cartridge design, this seal provides unique benefits of a high pressure compressor mechanical seal. For specialty designs like reverse pressure applications, see your Flowserve Compressor Seal representative.

Dimensional Data (mm)

Other dimensions available upon request



Turbopac 368

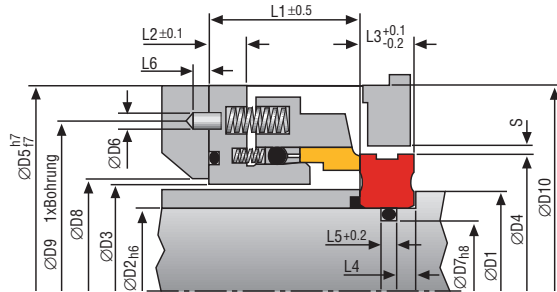
D1	D2	D3	D4	L1	L2	L3	S
40	33	88	53	28	26	10	1.5
45	38	93	57	32	30	10	1.5
50	40	100	62	32	30	12	2.0
60	50	110	72	35	33	12	2.0
70	60	120	84	35	33	12	2.0
80	70	135	95	40	38	14	2.0
90	80	145	105	40	38	14	2.0
100	90	162	115	44	42	16	2.0
110	100	172	128	44	42	16	2.5
120	110	182	138	44	42	16	2.5
130	120	192	148	46	44	18	2.5
140	130	202	159	46	44	18	2.5
160	144	230	180	48	46	20	2.5
180	164	250	200	48	46	20	3.0
200	180	270	222	48	46	20	3.0

Turbopac 2000

D1	D2	D3	D4	D5	D6	D7	D8	L1	L2	L3	L4	L5
60	50	59	63	62	115	112	113	42	42	16	11	17
70	60	69	73	72	125	122	123	42	42	16	11	17
80	70	79	83	82	135	132	133	42	42	16	11	17
90	80	89	93	92	145	142	143	42	42	16	11	17
100	90	99	103	103	160	157	158	42	42	16	11	17
110	100	109	113	113	170	167	168	42	42	16	11	17
120	110	119	123	123	185	182	183	45	45	16	11	20
130	120	129	133	133	195	192	193	45	45	20	11	20
140	130	139	143	143	206	203	204	45	45	20	11	20
150	140	149	153	153	220	216	217	50	50	20	13	20
160	144	156	161	165	233	230	231	50	50	22	13	20
170	154	166	171	175	245	240	241	50	54	22	13	25
180	164	176	181	185	255	252	253	54	54	22	13	25
190	170	187	193	195	275	270	271	54	60	24	13	27
200	180	197	203	205	285	280	281	56	60	26	15	27

Adaptive parts designed to seal chamber and machine dimensions

Turbopac 375



D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	L1	L2	L3	L4	L5	L6	S
60	50	62	77	112	5	44	66	93	108	42	11	16	6	4.5	5	2.0
70	60	72	87	122	5	54	76	103	118	42	11	16	6	4.5	5	2.0
80	70	82	97	132	5	64	86	113	128	42	11	16	6	4.5	5	2.0
90	80	92	107	142	5	74	96	123	138	42	11	16	6	4.5	5	2.0
100	90	103	120	157	5	84	106	137	153	42	11	16	6	4.5	5	2.5
110	100	113	130	167	6	94	116	147	163	42	11	16	6	4.5	5	2.5
120	110	123	141	182	6	104	126	161	179	45	11	16	6	4.5	5	2.5
130	120	133	148	192	6	114	136	169	189	45	11	20	8	4.5	5	2.5
140	130	143	158	203	6	124	146	180	199	45	11	20	8	4.5	5	2.5
150	140	153	171	216	6	134	156	192	212	50	13	20	8	4.5	5	2.5
170	154	175	191	240	8	148	178	213	235	50	13	22	8	4.5	8	2.5
180	164	185	202	252	8	158	188	225	247	54	13	22	9	4.5	8	3.0
200	180	205	232	280	8	171	210	254	275	56	15	26	9	7	8	3.0
220	200	225	247	305	8	191	230	271	300	60	15	26	9	7	8	3.0
250	230	260	293	355	9	221	265	320	346	70	17	28	9	7	10	3.0



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