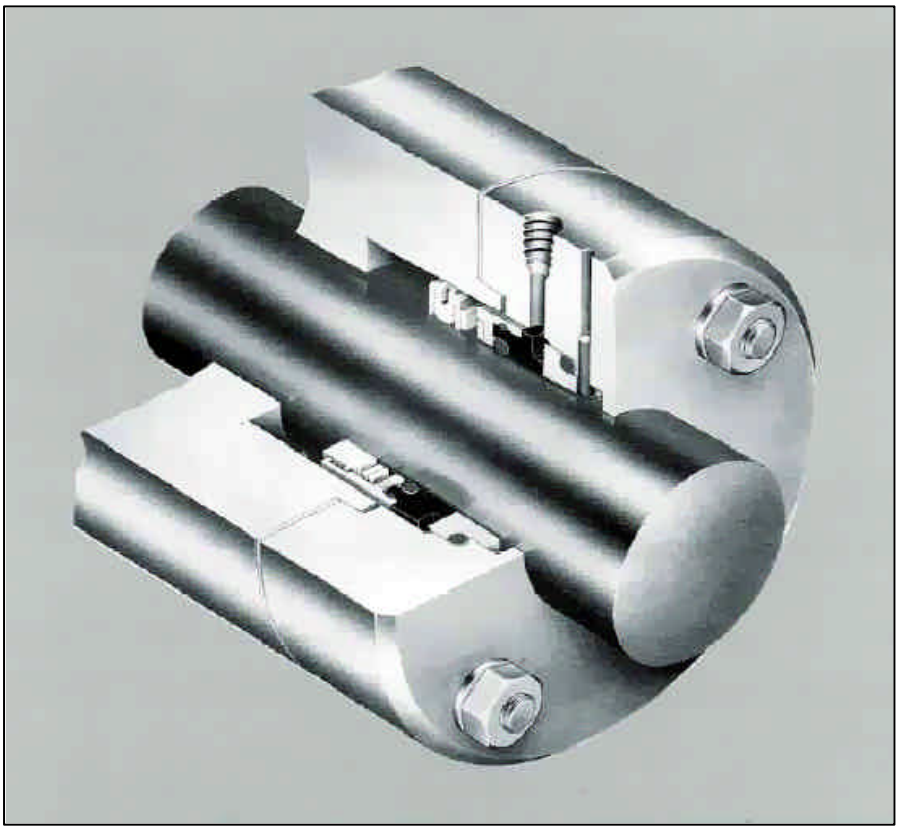
Type R33 and 34

O-ring Seals

Type R33 and 34



Industries Served
Chemical Processing
Food Processing
Marine
Petrochemical Processing
Pharmaceutical
Pulp and Paper

Applications

- All rotating machines for sealing gases and liquids.

  Centrifugal, screw and volumetric pumps, agitators, mixers, boosters, compressors, fans.

Operating Conditions

- **Temperature:**
  -60°C to +260°C /
  -75°F to +500°F
  depending on materials used

- **Pressure:**
  Type R33
  Seal sizes = 100 mm:
  Up to 20 bar g/290 psig
  Seal sizes > 100 mm:
  Up to 7 bar g/360 psig

  Type 34
  Seal sizes = 100 mm:
  Up to 65 bar g/940 psig
  Seal sizes > 100 mm:
  Up to 7 bar g/100 psig

- **Speed:**
  Up to 20 m/s/5000 fpm

Design Features / Benefits

Size
For diameters from 10 to 100 mm, this seal complies with DIN 24960, NF E 29991 and ISO 3069 Norms with the benefits to be shorter than L1K.

Monobloc type Seal
With its removable and clamped face this seal is easy to fit.

Drive
The same driving device complies with both types R33 and 34. Indifferent to rotational direction.

Wave Spring
Wave spring with ample axial movement to maintain seal face contact regardless of wear, with the following advantages:

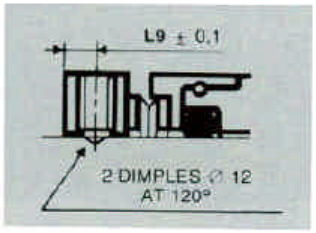
- minimal space required
- important deflection
- indifferent to rotating direction
- standard material stainless steel AISI 316, complies with the API specification.

Wide Range of O-rings
Seal equipped with choice of O-rings in elastomers, or PTFE.

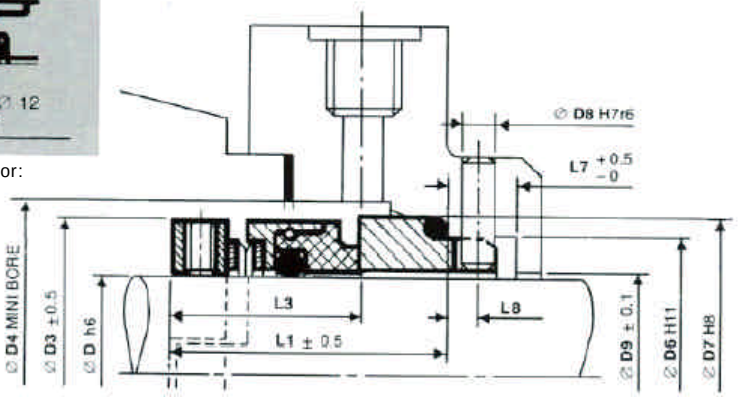
Type R33

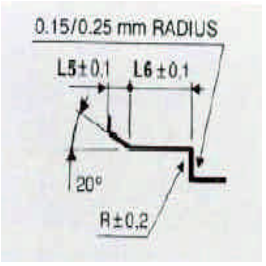
O-ring Seals

Typical Arrangement / Dimensional Data

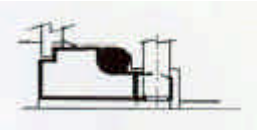


Drive with needle screw for:
Type R33 ØD = 155 mm
Type 34 ØD = 150 mm





Seal ring recess to be finished as shown.



Clamped-in device to prevent the optional 265X seal from axial movement. Please consult John Crane.

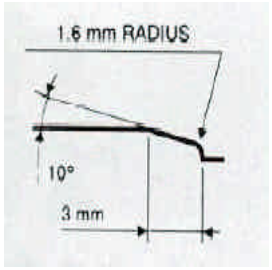
Chart 1. Type R33 Metric Range Dimensional Data (mm)

Seal Size	Seal Size Code	D	D3	D4	D6	D7	D8	D9	L1	L3	L5	L6	L7	L8	L9	R
10	0100	10	20	22	17	21	3	10.5	28.0	19.5	1.5	4	8.5	5	-	1.0
12	0120	12	22	24	19	23	3	12.5	28.0	19.5	1.5	4	8.5	5	-	1.0
14	0140	14	24	26	21	25	3	14.5	28.0	19.5	1.5	4	8.5	5	-	1.0
16	0160	16	26	28	23	27	3	16.5	28.5	19.5	1.5	4	8.5	5	-	1.0
18	0180	18	29	34	27	33	3	18.5	30.5	20.5	2.0	5	9.0	5	-	1.5
20	0200	20	31	36	29	35	3	20.5	30.5	20.5	2.0	5	9.0	5	-	1.5
22	0220	**22**	33	38	31	37	3	22.5	30.5	20.5	2.0	5	9.0	5	-	1.5
24	0240	**24**	36	40	33	39	3	24.5	32.5	22.5	2.0	5	9.0	5	-	1.5
25	0250	**25**	39	41	34	40	3	25.8	33.5	23.5	2.0	5	9.0	5	-	1.5
28	0280	**28**	42	44	37	43	3	28.8	33.5	23.5	2.0	5	9.0	5	-	1.5
30	0300	**30**	44	46	39	45	3	30.8	34.5	24.5	2.0	5	9.0	5	-	1.5
32	0320	**32**	46	48	42	48	3	32.8	34.5	24.5	2.0	5	9.0	5	-	1.5
33	0330	**33**	47	49	42	48	3	33.8	34.5	24.5	2.0	5	9.0	5	-	1.5
35	0350	**35**	49	51	44	50	3	35.8	34.5	24.5	2.0	5	9.0	5	-	1.5
38	0380	**38**	53	58	49	56	4	38.8	38.0	27.0	2.0	6	9.0	5	-	1.5
40	0400	**40**	55	60	51	58	4	40.8	39.0	28.0	2.0	6	9.0	5	-	1.5
43	0430	**43**	58	63	54	61	4	43.8	39.0	28.0	2.0	6	9.0	5	-	1.5
45	0450	**45**	60	65	56	63	4	45.8	39.0	28.0	2.0	6	9.0	5	-	1.5
48	0480	**48**	63	68	59	65	4	48.8	39.0	28.0	2.0	6	9.0	5	-	1.5
50	0500	**50**	66	70	62	70	4	50.8	40.0	27.0	2.5	6	9.0	5	-	2.0
53	0530	**53**	69	73	65	73	4	53.8	40.0	27.0	2.5	6	9.0	5	-	2.0
55	0550	**55**	71	75	67	75	4	55.8	40.0	27.0	2.5	6	9.0	5	-	2.0
58	0580	**58**	77	83	70	78	4	58.8	42.0	29.0	2.5	6	9.0	5	-	2.0
60	0600	**60**	79	85	72	80	4	60.8	42.0	29.0	2.5	6	9.0	5	-	2.0
63	0630	**63**	82	88	75	83	4	63.8	45.0	32.0	2.5	6	9.0	5	-	2.0
65	0650	**65**	84	90	77	85	4	65.8	45.0	32.0	2.5	6	9.0	5	-	2.0
68	0680	**68**	87	93	81	90	4	68.8	47.0	33.5	2.5	7	9.0	5	-	2.0
70	0700	**70**	89	95	83	92	4	70.8	47.0	32.0	2.5	7	9.0	5	-	2.0
75	0750	**75**	94	104	88	97	4	75.8	47.0	32.0	2.5	7	9.0	5	-	2.0
80	0800	**80**	100	109	95	105	4	80.8	48.0	32.5	3.0	7	9.0	5	-	2.5
85	0850	**85**	105	114	100	110	4	85.8	48.0	32.5	3.0	7	9.0	5	-	2.5
90	0900	**90**	112	119	105	115	4	90.8	54.0	38.5	3.0	7	9.0	5	-	2.5
95	0950	**95**	117	124	110	120	4	95.8	54.0	38.5	3.0	7	9.0	5	-	2.5
100	1000	**100**	122	129	115	125	4	100.8	54.0	38.5	3.0	7	9.0	5	-	2.5
105	1050	**105**	127	134	122	161	5	105.8	64.0	42.0	3.0	9	10.0	6	-	2.5
110	1100	**110**	137	150	127	136	5	110.8	68.0	46.0	3.0	9	10.0	6	-	2.5
115	1150	**115**	142	155	132	141	5	115.8	68.0	46.0	3.0	9	10.0	6	-	2.5
120	1200	**120**	452	160	137	146	5	120.8	72.0	50.0	3.0	9	10.0	6	-	2.5
125	1250	**125**	157	165	142	151	5	125.8	72.0	50.0	3.0	9	10.0	6	-	2.5
130	1300	**130**	162	170	147	156	5	130.8	72.0	50.0	3.0	9	10.0	6	-	2.5
135	1350	**135**	167	175	157	166	8	135.8	82.0	57.0	3.0	9	13.0	7	-	2.5
140	1400	**140**	172	180	162	171	8	140.8	82.0	57.0	3.0	9	13.0	7	-	2.5
145	1450	**145**	177	185	167	176	8	145.8	82.0	57.0	3.0	9	13.0	7	-	2.5
150	1500	**150**	182	190	172	181	8	150.8	82.0	57.0	3.0	9	13.0	7	-	2.5
155	1550	**155**	187	200	177	186	8	155.8	82.0	57.0	3.0	9	13.0	7	7.5	2.5
160	1600	**160**	192	205	182	191	8	160.8	82.0	57.0	3.0	9	13.0	7	7.5	2.5
165	1650	**165**	202	215	192	201	8	165.8	93.0	65.0	3.0	10	14.0	7	9.0	2.5
170	1700	**170**	207	220	197	206	8	170.8	93.0	65.0	3.0	10	14.0	7	9.0	2.5
175	1750	**175**	212	225	202	211	8	175.8	93.0	65.0	3.0	10	14.0	7	9.0	2.5

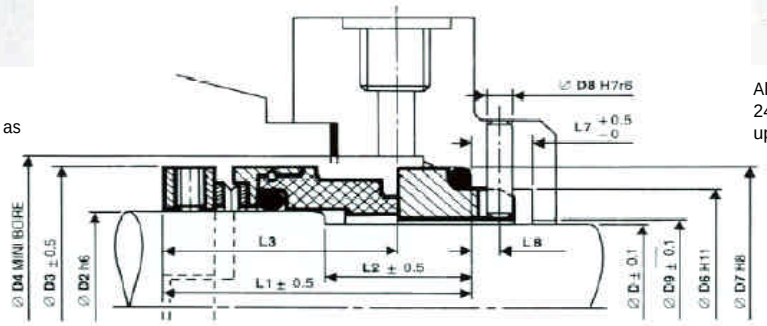
Type 34

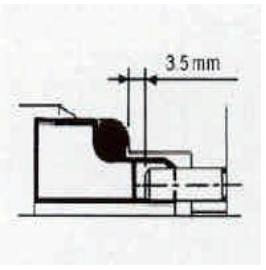
O-ring Seals

Typical Arrangement / Dimensional Data



For ease of installation the lead-in edge of the shaft or sleeve should be chamfered as shown.





Alternative method of pinning 248X type (seat for ØD from 10 up to 175 mm)

Chart 2. Type 34 Metric Range Dimensional Data (mm)

Seal Size	Seal Size Code	D	D2	D3	D4	D6	D7	D8	D9	L1	L2	L3	L5	L6	L7	L8	L9	R
10	0100	10	14	24	26	17	21	3	10.5	37.0	18	28.5	1.5	4	8.5	5	-	1.0
12	0120	12	16	26	28	19	23	3	12.5	37.0	18	28.5	1.5	4	8.5	5	-	1.0
14	0140	14	18	28	34	21	25	3	14.5	37.0	18	28.5	1.5	4	8.5	5	-	1.0
16	0160	16	20	31	36	23	27	3	16.5	37.0	18	28.5	1.5	4	8.5	5	-	1.0
18	0180	18	22	33	38	27	33	3	18.5	38.5	20	28.5	2.0	5	9.0	5	-	1.5
20	0200	20	24	36	40	29	35	3	20.5	41.5	20	31.5	2.0	5	9.0	5	-	1.5
22	0220	**22**	26	40	42	31	37	3	22.5	42.5	20	32.5	2.0	5	9.0	5	-	1.5
24	0240	**24**	28	42	44	33	39	3	24.5	42.5	20	32.5	2.0	5	9.0	5	-	1.5
25	0250	**25**	30	44	46	34	40	3	25.8	43.5	20	33.5	2.0	5	9.0	5	-	1.5
28	0280	**28**	33	47	49	37	43	3	28.8	43.5	20	33.5	2.0	5	9.0	5	-	1.5
30	0300	**30**	35	49	51	39	45	3	30.8	43.5	20	33.5	2.0	5	9.0	5	-	1.5
33	0330	**33**	38	54	58	42	48	3	33.8	44.5	20	34.5	2.0	5	9.0	5	-	1.5
35	0350	**35**	40	56	60	44	50	3	35.8	45.5	20	35.5	2.0	5	9.0	5	-	1.5
38	0380	**38**	43	59	63	49	56	4	38.8	49.0	23	38.0	2.0	6	9.0	5	-	1.5
40	0400	**40**	45	61	65	51	58	4	40.8	49.0	23	38.0	2.0	6	9.0	5	-	1.5
43	0430	**43**	48	63	68	54	61	4	43.8	49.0	23	38.0	2.0	6	9.0	5	-	1.5
45	0450	**45**	50	66	70	56	63	4	45.8	49.0	23	38.0	2.0	6	9.0	5	-	1.5
48	0480	**48**	53	69	73	59	65	4	48.8	49.0	23	38.0	2.0	6	9.0	5	-	1.5
50	0500	**50**	55	71	75	62	70	4	50.8	49.0	23	38.0	2.0	6	9.0	5	-	2.0
53	0530	**53**	58	77	83	65	73	4	53.8	51.0	25	38.0	2.5	6	9.0	5	-	2.0
55	0550	**55**	60	79	85	67	75	4	55.8	52.0	25	39.0	2.5	6	9.0	5	-	2.0
58	0580	**58**	63	82	88	70	78	4	58.8	55.0	25	39.0	2.5	6	9.0	5	-	2.0
60	0600	**60**	65	84	90	72	80	4	60.8	55.0	25	42.0	2.5	6	9.0	5	-	2.0
63	0630	**63**	68	87	93	75	83	4	63.8	55.0	25	42.0	2.5	6	9.0	5	-	2.0
65	0650	**65**	70	89	95	77	85	4	65.8	55.0	25	42.0	2.5	6	9.0	5	-	2.0
70	0700	**70**	75	94	104	83	92	4	70.8	58.0	28	43.0	2.5	7	9.0	5	-	2.0
75	0750	**75**	80	100	109	88	97	4	75.8	59.0	28	44.0	2.5	7	9.0	5	-	2.0
80	0800	**80**	85	105	114	95	105	4	80.8	59.0	28	43.5	3.0	7	9.0	5	-	2.5
85	0850	**85**	90	112	119	100	110	4	85.8	66.0	28	50.5	3.0	7	9.0	5	-	2.5
90	0900	**90**	95	117	124	105	115	4	90.8	66.0	28	50.5	3.0	7	9.0	5	-	2.5
95	0950	**95**	100	122	129	110	120	4	95.8	66.0	28	50.5	3.0	7	9.0	5	-	2.5
100	1000	**100**	105	127	135	115	125	4	100.8	66.0	28	50.5	3.0	7	9.0	5	-	2.5
105	1050	**105**	110	137	150	122	161	5	105.8	83.0	42	61.0	3.0	9	10.0	6	-	2.5
110	1100	**110**	115	142	155	127	136	5	110.8	83.0	42	61.0	3.0	9	10.0	6	-	2.5
115	1150	**115**	120	452	160	132	141	5	115.8	87.0	42	65.0	3.0	9	10.0	6	-	2.5
120	1200	**120**	125	157	165	137	146	5	120.8	87.0	42	65.0	3.0	9	10.0	6	-	2.5
125	1250	**125**	130	162	170	142	151	5	125.8	87.0	42	65.0	3.0	9	10.0	6	-	2.5
130	1300	**130**	135	167	175	147	156	5	130.8	92.0	42	70.0	3.0	9	10.0	6	-	2.5
135	1350	**135**	140	172	180	157	166	8	135.8	97.0	47	72.0	3.0	9	13.0	7	-	2.5
140	1400	**140**	145	177	185	162	171	8	140.8	97.0	47	72.0	3.0	9	13.0	7	-	2.5
145	1450	**145**	150	182	190	167	176	8	145.8	97.0	47	72.0	3.0	9	13.0	7	-	2.5
150	1500	**150**	155	187	200	172	181	8	150.8	97.0	47	72.0	3.0	9	13.0	7	7.5	2.5
155	1550	**155**	160	192	205	177	186	8	155.8	97.0	47	72.0	3.0	9	13.0	7	7.5	2.5
160	1600	**160**	165	202	215	182	191	8	160.8	103.0	47	78.0	3.0	9	13.0	7	9.0	2.5
165	1650	**165**	170	207	220	192	201	8	165.8	108.0	52	80.0	3.0	10	14.0	7	9.0	2.5
170	1700	**170**	175	212	225	197	206	8	170.8	108.0	52	80.0	3.0	10	14.0	7	9.0	2.5

Type R33 and 34

Specifications

Chart 3. Operating Limits

Pressure		Temperature	Speed
Operating	Static		
Refer to chart 4 and 5	80 bar/g 1200 psig	Refer to chart 7	Refer to chart 9

Chart 4. Pressure/Velocity (PV) Limits

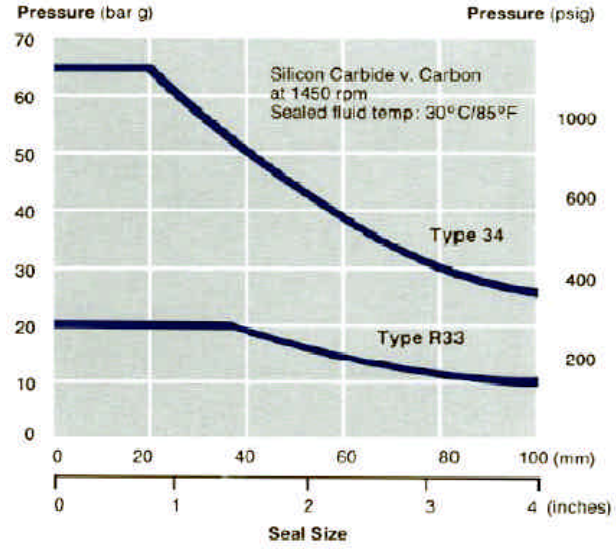
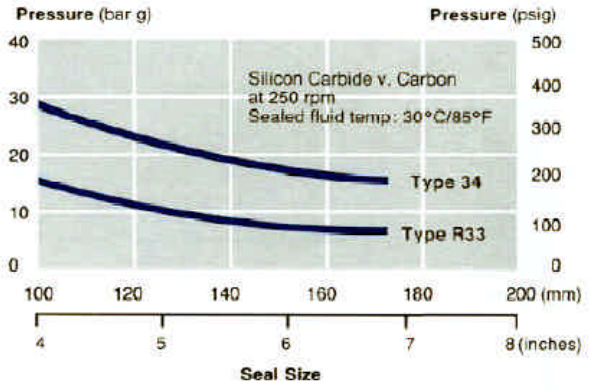


Chart 5. Pressure/Velocity (PV) Limits



Note:
To determine the maximum pressure for the size of Type R33 or 34 seal required: multiply the pressure obtained from Charts 4 or 5 by the appropriate factors given in Chart 6.

Chart 6. PV Multiplier Factors

	Selection Considerations	Press. Factor
Sealed Fluid Lubricity	Petrol, kerosene or better	X 1.00
	Water, aqueous solutions, Lighter hydrocarbons (s.g. < 0.65), etc	x 0.75
Face and Seat Materials	Silicon carbide v. Carbon	x 1.00
	Alumina ceramic or stellite v.Carbon	x 0.60
	Silicon carbide v. Silicon carbide	x 0.60
Sealed Fluid Temperature	Up to 80°C/175°F	x 1.00
	Above 80°C to 120°C/17°F to 250°F	x 0.90
	Above 120°C to 180°C/250°F to 355°F	x 0.80
	Above 180°C/355°F	x 0.65
Speed	Seal Sizes = 100 mm/4.0 in.:	
	Up to 1800 rpm	x 1.00
	Above 1800 to 3600 rpm	x 0.85
	Sal Sizes > 100/4.0 in.:	
	Up to 500 rpm	x 1.00
	Above 500 to 1800 rpm	x 0.65
	Above 1800 to 3000 rpm	x 0.50

Example for Determining PV Limits:

Seal: 33 mm diameter Type R33
Product: Petrol
Face materials: Carbon v. Silicon carbide
Operating temperature: 35°C/95°F
Operating speed: 2950 rpm

Using Chart 4, the maximum pressure would be 20 bar g/290 psig

From Chart 6, apply the multiplier factors for the specific service requirements.

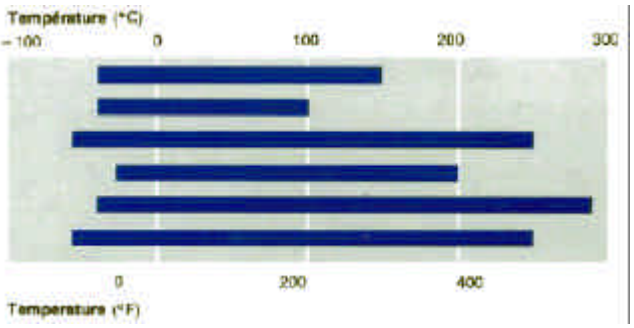
20 bar g/290 psig x 1.00 x 1.00 x 1.00 x 0.85
= 17 bar g/246 psig

Therefore, for the example given, the maximum operating pressure is 17 bar g/246 psig.

The operating parameters shown can be exceeded for certain applications. If the required operating pressure is greater than the calculated PV limit, please consult your John Crane Sales/Service Engineer.

Chart 7. Elastomer Seal Seat Ring Temperature Limits

Compound	
Ethylene Propylene	–40 ºC to +150 ºC / –40 ºF to +300 ºF
Medium Nitrite	–40 ºC to +100 ºC / –40 ºF to +215 ºF
TS (PTFE+Fluorocarbon)	–60 ºC to +250 ºC / –80 ºF to +485 ºF
Fluorocarbon	–30 ºC to +200 ºC / –22 ºF to +390 ºF
Perfluoroelastomer	–40 ºC to +290 ºC / –40 ºF to +500 ºF
Pure PTFE	–60 ºC to +250 ºC / –80 ºF to +485 ºF



Pure PTFE O-ring are to be used for:
- seals from 10 up to 22 mm
- seals from 10 up to 100 mm

Type R33 and 34

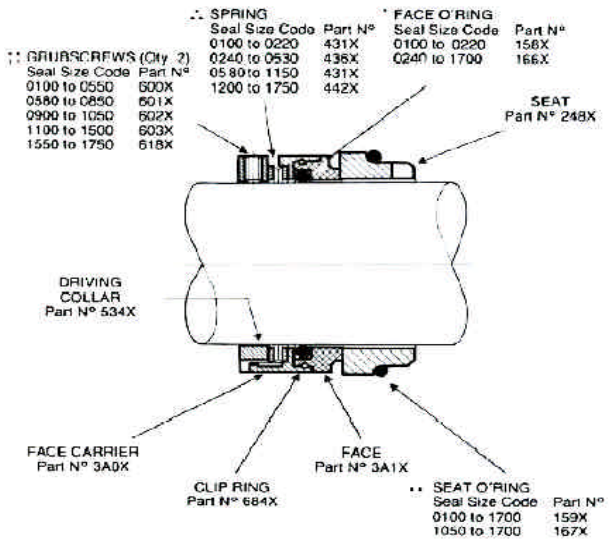
Specifications

Chart 8. Component and Material Identification Codes

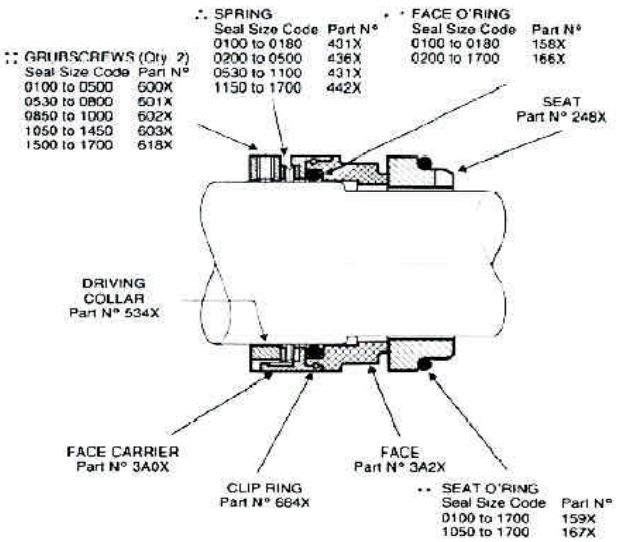
SEAL COMPONENTS		MATERIALS			
		Standard		Options	
Description	Part No.	Material	Code	Material	Code
Face U Face B	3A1X 3A2X	Metal Impregnated Carbon Resin Impregnated Carbon Silicon Carbide	448 444 088	Pure Silicon Carbide	277
Face carrier	3A0X	Stainless Steel 316L Stainless Steel 904L	224 038	Hastelloy C Hastelloy B	033 032
Face O-ring	158X 166X	Pure PTFE PTFE + Fluorocarbon (TS) Medium Nitrite Fluorocarbon Ethylene Propylene	138 330 130 134 449	Perfluoroelastomer	230
Seat O-ring	159X 167X	Pure PTFE PTFE + Fluorocarbon (TS) Medium Nitrite Fluorocarbon Ethylene Propylene	138 330 130 134 449	Perfluoroelastomer	230
Spring	431X 436X 442X	Stainless Steel 316 Stainless Steel 904L	001 038	Hastelloy 'C' Hastelloy 'B'	033 032
Driving Coilar	534X	Stainless Steel 316L Stainless Steel 904L	224 038	Hastelloy 'C' Hastelloy 'B'	033 032
Grubscrew	600X 601X 602X 603X 618X	Stainless Steel 904L	038	Hastelloy 'C' Hastelloy 'B'	033 032
Seat	248X	Pure Silicon Carbide Ceramic Stainless Steel 316L + Sterile	277 059 010	Silicon Carbide	088
Clip Ring	684X	Stainless Steel 904L	038	PTFE	138

Components part Diagram

Type R33



Type 34



Type R33 and 34

Specifications

Chart 9. Speed Limits

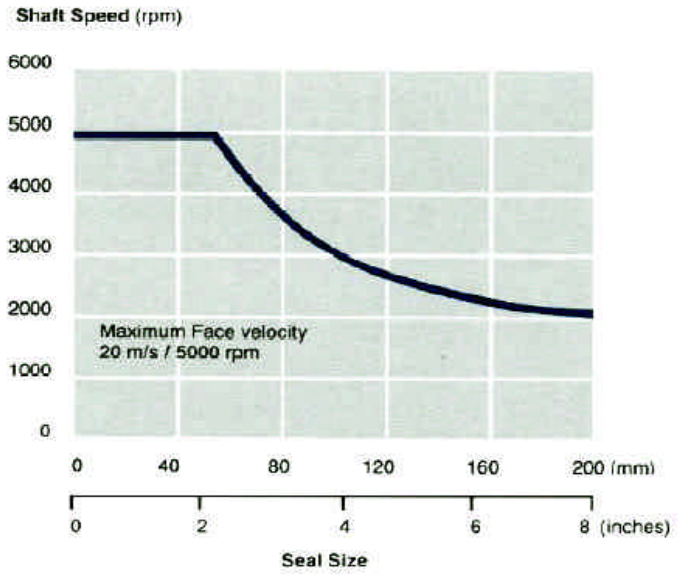


Chart 10. Criteria for Installation

Shaft / Sleeve	Limits
Surface Finish	0.16 µm Ra
Out-Of-Round (Ovality)	± 0.025 mm / 0.001 in.
Axial Float (End Play)	± 0.08 mm / 0.003 in.

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For your nearest John Crane facility, please contact one of the locations above.