

MODULAR TILTING PAD THRUST BEARINGS

Compact Equalized – CQ Range



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BENEFITS

Waukesha Bearings:

- The strength of the world's largest provider of hydrodynamic bearings for turbomachinery
- A culture of continuous improvement to meet customer and market needs
- The widest range of material and design options to provide optimum solutions
- The unique option of a dry bearing solution - active magnetic bearings
- Full engineering support service including rotordynamics
- The most complete range of test rig validation and support
- Quality assurance to meet every requirement – approved to ISO 9001

Equalized Tilting Pad Thrust Bearings:

- Able to safely carry the highest axial loads at high speeds in turbomachinery
- Best able to accommodate misalignment or deflection in supporting structure
- Able to include special features, materials and instrumentation
- Meet industry specifications such as API

WBC Modular Tilting Pad Thrust Bearings - Compact Equalized CQ Range

- Normally supplied with 'Directed Lubrication'* but offers the option of flooded
- Normally supplied with offset pivot pads but with the option of central pivot pads
- Equal load capability for both directions of rotation with central pivot pads.
- Normally supplied split in two halves but offers the option of a one-piece ring
- Pads are identical and interchangeable whether offset, either hand, or central pivot
- Levelling links carry load within bearing and never pivot directly on machine casing
- Oil flow is controlled within the bearing using normal supply pressures
- The widest range of optional sizes, materials and features

- The minimum practical axial length, 30%-40% less than the traditional bearing
- Allows combined radial and equalized thrust bearings with minimal overall length
- For existing machines can retrofit any existing design of equalized bearing
- Includes an easily removable integral spacer with allowance for axial adjustment
- Can also be supplied finished to length and/or with enclosed shims for adjustment
- Easy to handle, no loose components or internal oil seals whether one-piece or split
- Contract drawing and design data provided for every application
- Proven in countless applications since its introduction in 1995



* 'Directed Lubrication' was our ground breaking development in the 1960's to increase load capacity and reduce losses and temperatures at higher speeds. As a concept it has become the industry standard. The special design features, especially the bi-directional spray nozzles and including the balanced oil inlet arrangement, have been more fully proven over a longer period than by any other product subsequently developed and aiming to achieve similar results.

GENERAL DESCRIPTION

Principles

The mode of operation of tilting pad thrust bearings is well established. The main principles followed in this range are based on those of the WBC modular range of non-equalized thrust bearings, as shown in our Designers Handbook No 5A (DHB 5A), which has become a standard for this type of bearing. The essential difference, that of equalization, is also a well established concept. This compact range offers full load capability, equivalent to or greater than other designs, whether equalized or non-equalized.

Sizes

The size tables give details of the 6, 8, 11 and 14 series (number of pads in a ring) and the pads range from size 103 (approximately 26mm or 1 inch square) to size 415 (approximately 105mm or 4.15 inches square). This gives a range of load capacities in standard configuration from 15,300N or 3,400 lbf to 691,000N or 155,000 lbf. For load capacities with the option of central pivot pads, suitable for both directions of rotation, see DHB 5A. Any intermediate series, with nominal load capacity based on a simple ratio of the number of pads in a ring, can be selected for optimisation of size and load capacity. The modular design also allows selection of bearing series beyond 14.

Materials

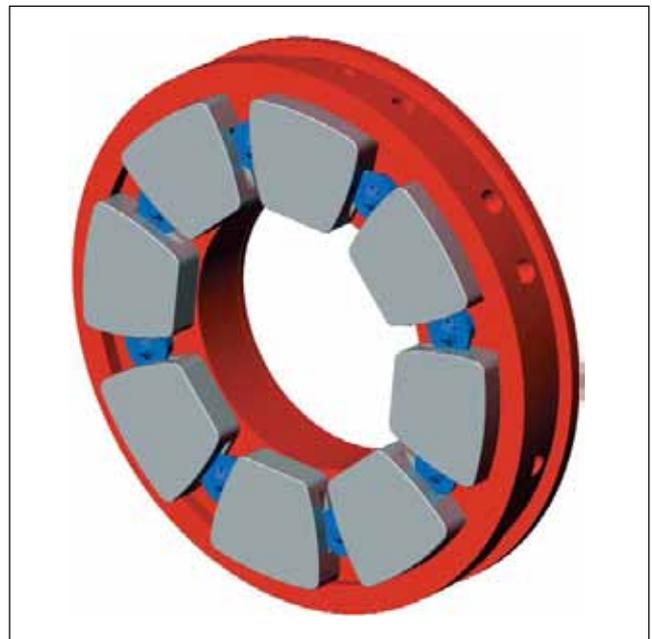
Standard pads are steel backed and lined with tin-based white metal or babbitt to specification ISO SnSb8Cu4, ASTM B23 Grade 2, SAE12 and BS 3332/A. In fact, WBC controls the lead content to a lower level than required by these specifications in order to achieve improved performance under conditions of thermal cycling.

Anti-Rotation

The tables give the standard anti-rotation pin position which is optimal from the bearing design point of view. In case the machine casing cannot accommodate the corresponding slot or hole in this position, an alternative anti-rotation pin position is shown.

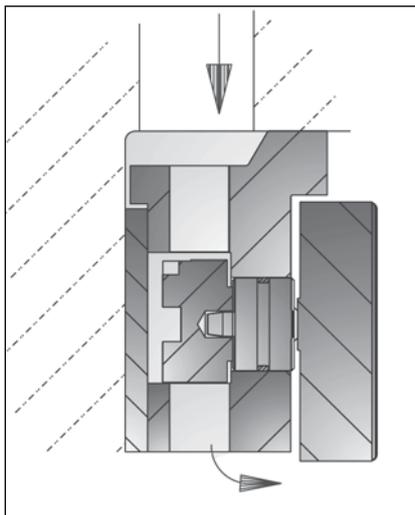
Interchangeability

This modular range is designed for optimum compactness and flexibility. As such, it can match or improve upon the space envelope required for any similar bearing product. It can therefore retrofit or be made completely interchangeable with other equalized bearing types. It can also be customised in terms of external dimensions.

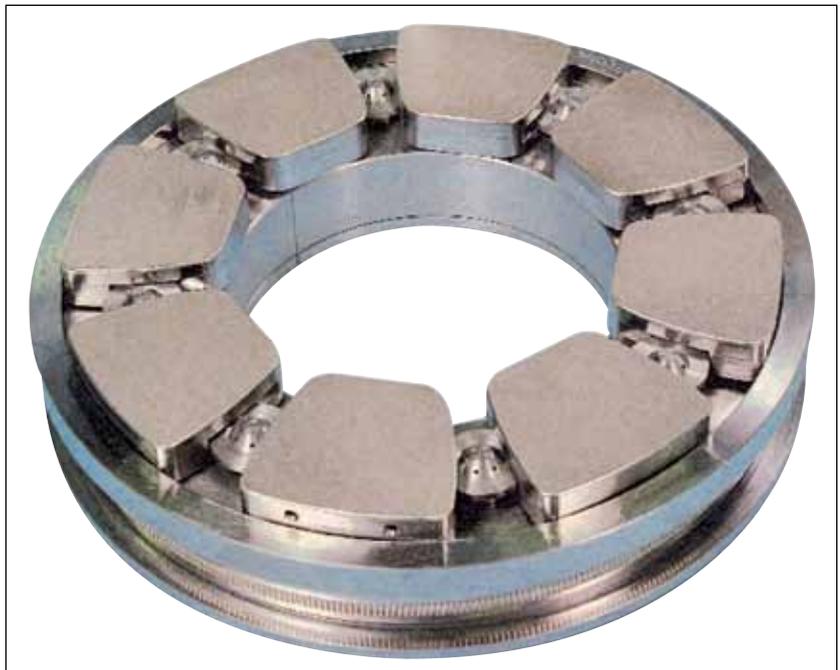


LUBRICATION

These thrust bearings will normally be supplied with the 'Directed Lubrication' system of lubrication (see Pg. 2) since, even at relatively low sliding speeds, benefits such as the avoidance of shaft oil seals make this an obvious preference. However, there may be occasions when flooded lubrication is more appropriate, and this option is available. For a general explanation of the differences between flooded and 'Directed Lubrication' see the relevant section of DHB 5A. The figure below illustrates the differences in a flooded version for this equalized range.



Section showing ring with flooded lubrication



Bearing showing universal pad design for instrumentation and direction of rotation

BEARING SELECTION

The loads given in the tables are the maximum safe continuous loads based essentially on mechanical considerations and fully meeting normal industrial safety standards such as those specified by API. A preliminary size selection may be made on the basis of the pad inside diameter (giving clearance around a given shaft) and the required load capacity (see also DHB 5A).

WBC will check the selection based on the actual sliding speed and oil conditions, confirming the bearing's safe operating envelope. The ultimate load capability will be at least twice the limit of this envelope.

At the instant of start up the load capacity of tilting pad thrust bearings is restricted; and for this range of bearings the specific load at start up should be limited to 2.0 MPa (300 psi). If the start load is higher than this, and a larger bearing is not feasible, hydrostatic jacking can be included. Such a system allows the bearing to operate with heavy loads at low speeds.

Alternative Materials

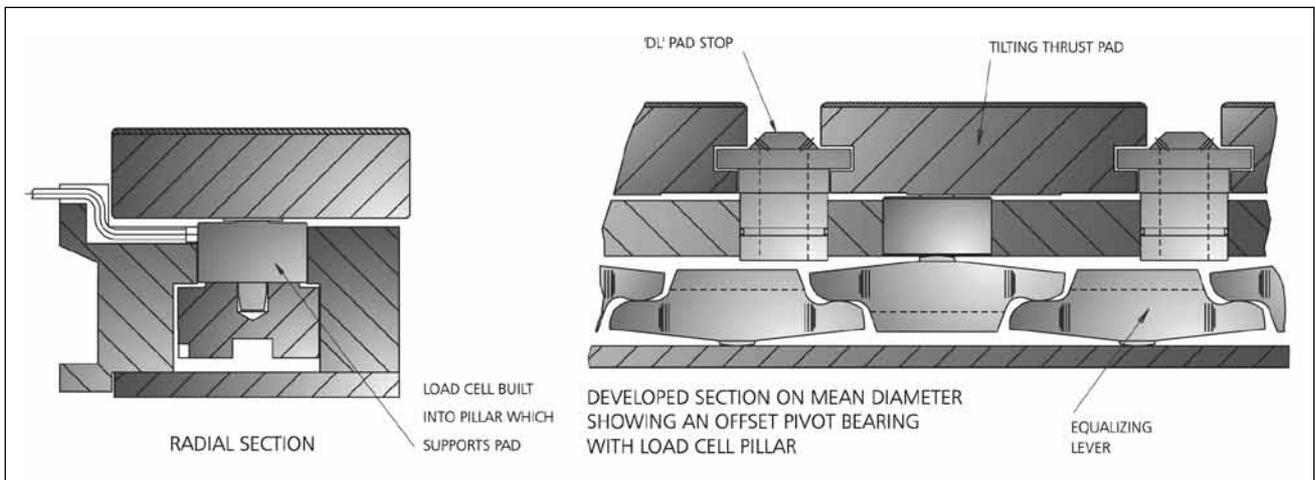
A common alternative to steel backed pads is a Copper Chrome (Cu/Cr) backing to reduce surface temperatures and increase load capacity at higher speeds. Lining materials such as Al/Sn alloys, lead bronzes and polymers are also available to meet special requirements, all as described in DHB 5A.

Instrumentation

The most common form of instrumentation is for the monitoring of temperatures in the pads, providing triggers for alarm and shutdown to protect the bearing and the machine from serious damage in the event of a fault condition arising.

The established recommendation in this respect is to add to the reading taken during the steady state worst operating condition +10°C and +15°C respectively for these trigger points.

WBC can recommend and provide such instrumentation or work to a given specification as required. See also DHB 5A. Typical would be two instrumented pads per thrust face. Because the pads in this range are identical for both faces, each instrumented pad has two drillings to maintain interchangeability between faces. Strain gauge load cells can also be provided to measure the actual thrust carried by the bearing.



Bearing showing standard design - including spacer

REFERENCE CODES

For descriptive coding prior to contract similar principles are followed as in DHB 5A and are illustrated in the tables. In essence:

6103/2CQ-2CQ(DL)

designates a double bearing (both active and inactive sides) with six pads on each split ring. Both rings have spacers with machining allowance.

6103/2CQF-2CQF(DL)

is the same but both spacers are finished to thickness.

6103/2CQS-2CQS(DL)

has shims* fitted behind spacers with machining allowance.

6103/2CQSF-2CQSF(DL)

has shims* fitted behind spacers finished to thickness.

6103/0CQSF-2CQSF(FL)

is designed for flooded lubrication and has a one-piece ring on one side.

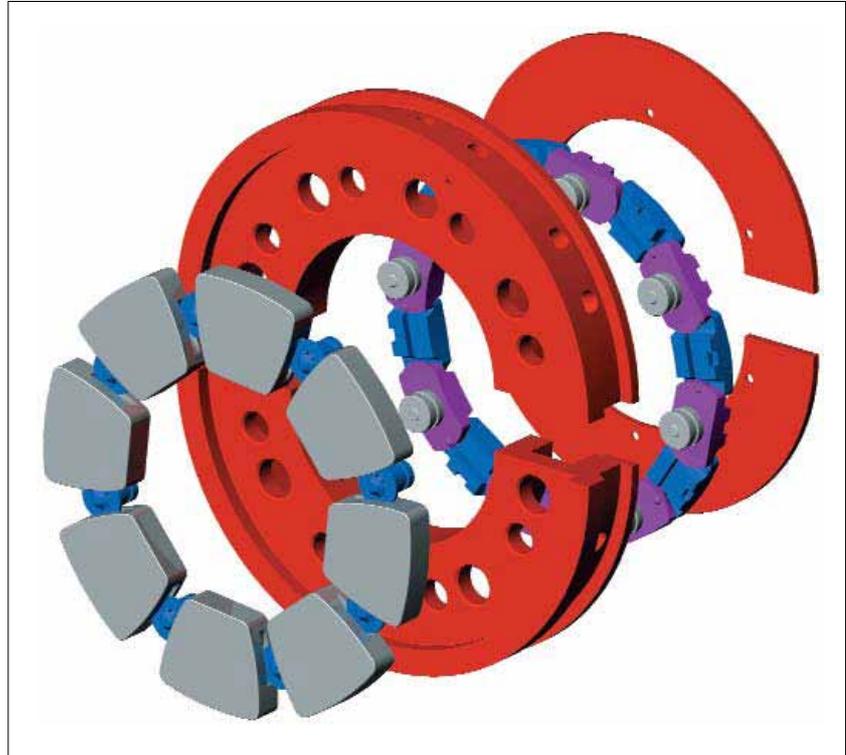
The contract drawing will fully define the bearing including any contract specific features.

* A standard set of brass shims consists of: 2 pcs 0.125mm (0.005 inch) + 3 pcs 0.250mm (0.010 inch) = total 1mm (0.040 inch)

Installation

The main adjustment required on installation is to achieve the required total axial bearing clearance by means of the spacer machining allowance and/or the shims. The actual rotor position may also be adjusted at the same time. The normal WBC supply caters for all the usual types of adjustment required and a separate instruction leaflet is available.

The normal minimum total axial clearance figure is given in the tables for each bearing size. It may be possible to reduce this figure after consultation with WBC. The maximum allowable



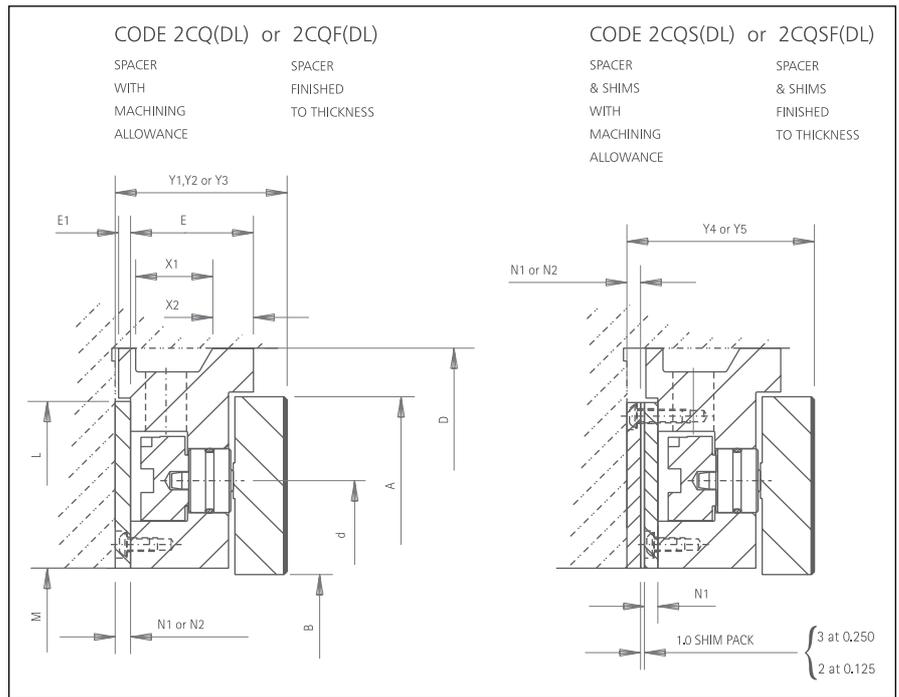
clearance figure is normally defined by the maximum allowable axial movement of the machine rotor within the stator.

To remove some of the machining allowance from a spacer the thrust bearing should be placed pad face down on a clean, soft surface. The spacer should then be removed and the required amount ground from the outer surface of the spacer (the one incorporating the heads of the holding screws). Please take note of the minimum allowable spacer thickness, N1, in the tables.

If, as an option, a separate spacer with machining allowance is supplied, which is wheeled in behind the thrust bearing, the nominal dimensions will be: inside diameter, M, outside diameter, D, and thickness, N2 (refer to Pgs. 7-14). Material removal for axial adjustment can, in this case, be from either face of the spacer.

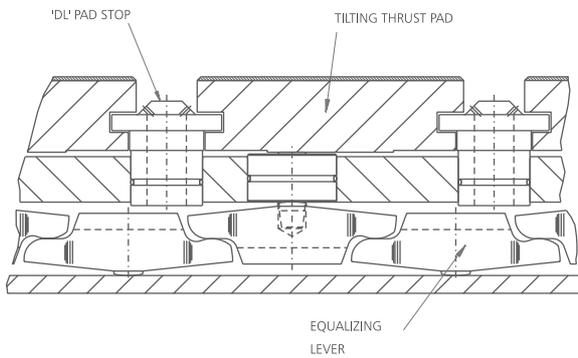
SERIES 6 —

Split Ring with 'Directed Lubrication'

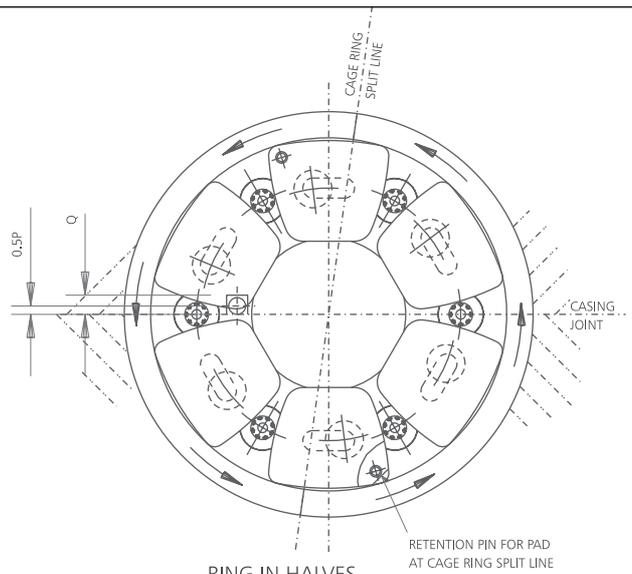


SIZE	Thrust Ring Dimensions													'DIRECTED LUBRICATION' Oil Inlet	Thrust Surface	Mean Dia	Max Spec Load	Max Load See Page 4	Total Axial Clear
	Pad O.Dia		Pad I.Dia		Ring Thickness			Ring O.Dia	Hsg. Bore	M/c Allow.	Ring I.Dia	X1	X2						
	A	B	Min Axial Length	With M/c Allow.	Finished To Thickness	With Shim Pack	Finished To Thickness												
	Y1	Y2	Y3	Y4	Y5	D	E	E1	M										
6103	92	38	26	28	26.187 25.987	32.0	30.212 29.912	107.91 107.88	107.99 107.95	18	2.0	40	12.0	5	4100	65.8	3.75	15300	0.30
6112	100	41	28	30	28.187 27.987	34.0	32.212 31.912	115.85 115.82	115.93 115.89	20	2.0	43	13.0	6	4900	71.7	3.90	19100	0.30
6123	109	45	30	32	30.387 30.187	36.0	34.412 34.112	126.96 126.92	127.04 127.00	22	2.0	47	13.5	6	5800	78.2	3.95	22900	0.30
6134	119	49	32	34	32.287 32.087	38.0	36.312 36.012	139.66 139.62	139.74 139.70	23	2.0	52	14.5	7	6900	85.1	4.00	27600	0.35
6146	130	54	36	38	36.288 36.087	42.5	40.813 40.512	147.60 147.56	147.68 147.64	26	2.5	56	16.0	8	8250	93.0	4.10	33800	0.35
6159	142	59	38	40	38.387 38.187	44.5	42.912 42.612	165.06 165.02	165.14 165.10	27	2.5	62	17.0	10	9800	102.0	4.10	40100	0.35
6174	155	64	42	44	42.288 42.087	49.0	47.313 47.012	179.35 179.31	179.43 179.39	30	3.0	67	18.0	11	11700	111.0	4.15	48500	0.40
6190	169	70	45	47	45.388 45.187	52.0	50.413 50.112	193.63 193.58	193.73 193.68	32	3.0	73	19.0	11	13900	120.4	4.25	59000	0.40
6207	184	76	50	52	50.388 50.187	57.5	55.913 55.612	209.50 209.45	209.60 209.55	36	3.5	80	22.5	12	16600	132.0	4.25	70500	0.40
6225	201	83	53	55	53.388 53.187	60.5	58.913 58.612	228.55 228.50	228.65 228.60	38	3.5	87	23.0	13	19700	143.0	4.30	84700	0.50
6246	219	91	60	62	60.089 59.884	68.0	66.114 65.809	247.60 247.55	247.70 247.65	43	4.0	95	28.0	14	23500	157.0	4.35	102200	0.50
6269	239	99	64	66	64.289 64.085	73.0	70.814 70.510	266.64 266.59	266.75 266.70	46	4.5	104	29.0	15	28000	172.0	4.35	121800	0.50
6293	261	108	68	71	68.488 68.286	78.0	75.513 75.212	292.04 291.99	292.15 292.10	49	5.0	113	32.0	15	33200	187.0	4.40	146000	0.50
6320	285	118	72	75	72.189 71.986	82.0	79.214 78.911	317.44 317.38	317.56 317.50	51	5.0	124	32.5	16	39700	205.0	4.40	174600	0.60
6348	310	128	80	83	80.289 80.085	90.5	87.814 87.510	342.84 342.78	342.96 342.90	57	5.5	135	36.5	17	47000	222.0	4.45	209100	0.60
6380	339	140	85	88	85.289 85.085	96.0	93.314 93.010	371.42 371.36	371.54 371.48	60	6.0	147	38.5	19	56200	243.0	4.45	250000	0.60
6415	369	153	95	98	95.490 95.285	107.0	104.515 104.210	406.33 406.27	406.46 406.40	68	7.0	160	41.5	23	66700	264.0	4.45	296800	0.60

All dimensions are in mm



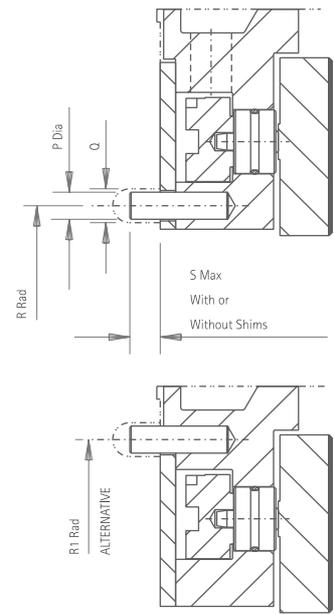
DEVELOPED SECTION ON MEAN DIAMETER
SHOWING AN OFFSET PIVOT BEARING



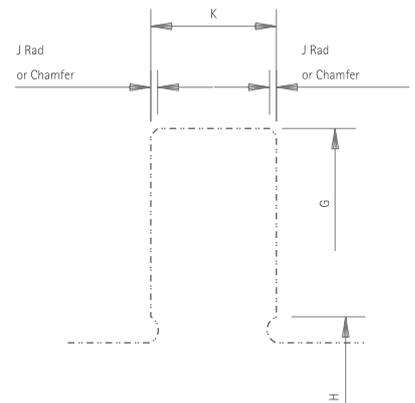
RING IN HALVES
WITH 'DIRECTED LUBRICATION'

SIZE	Collar				Spacer				Stop Pin					Approx Weight of 2CQ kg
	O.Dia	I.Dia	Thick	J	O.Dia	I.Dia	Thickness		P	Q	R	R1	S	
							Min	With M/c Allow						
G	H	K	L	M	N1	N2								
6103	95	35	0.4	17	92	40	3.0	5.0	4	5	23	45.0	4	0.88
6112	104	38	0.4	19	100	43	3.0	5.0	4	5	25	48.5	4	1.11
6123	113	42	0.8	21	110	47	3.0	5.0	4	5	28	53.0	4	1.42
6134	123	46	0.8	22	119	52	3.0	5.0	5	6	30	58.5	5	1.89
6146	134	51	0.8	25	130	56	3.5	5.5	6	7	33	62.5	6	2.10
6159	146	56	0.8	27	143	62	3.5	5.5	6	7	36	69.5	6	3.05
6174	159	61	0.8	30	155	67	4.0	6.0	8	9	39	75.5	8	3.89
6190	173	67	0.8	32	168	73	4.0	6.0	8	9	43	81.5	8	5.11
6207	188	72	0.8	35	184	80	4.5	6.5	10	11	47	89.0	10	6.49
6225	205	79	0.8	38	200	87	4.5	6.5	10	11	51	97.5	10	8.57
6246	223	87	0.8	43	219	95	5.0	7.0	12	13	56	105.5	12	9.98
6269	243	95	0.8	48	240	104	5.5	7.5	12	13	61	114.5	12	12.81
6293	265	104	0.8	53	261	113	6.0	9.0	12	13	67	125.0	12	16.57
6320	289	114	0.8	56	286	124	6.0	9.0	16	17	73	136.5	16	21.56
6348	315	124	0.8	64	310	135	6.5	9.5	16	17	79	147.5	16	27.08
6380	344	136	0.8	67	340	147	7.0	10.0	20	22	86	160.5	20	35.40
6415	374	149	0.8	76	369	160	8.0	11.0	20	22	94	175.5	20	44.19

All dimensions are in mm



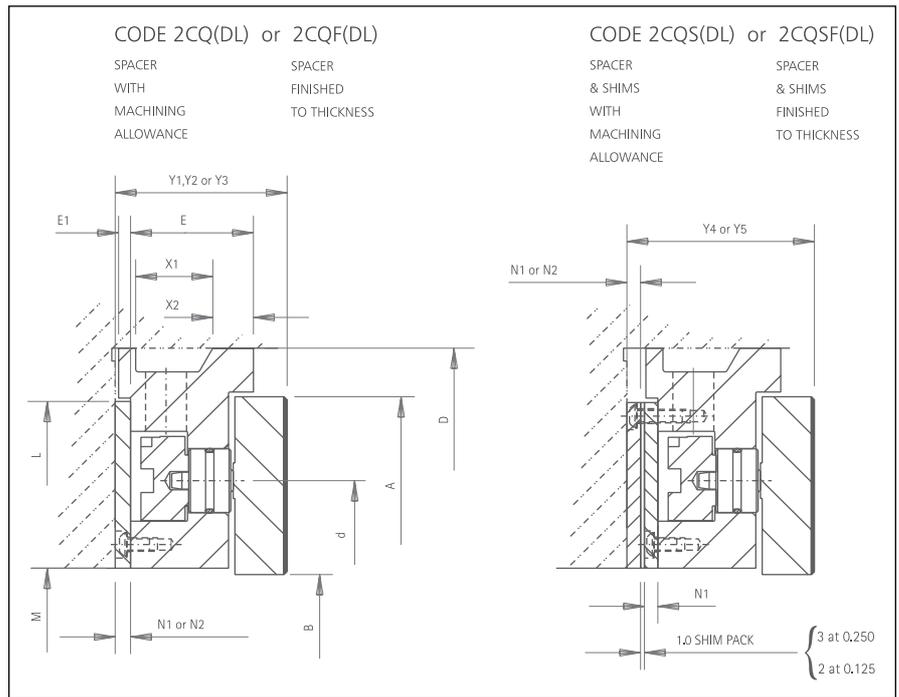
STOP PIN DETAILS



COLLAR DETAILS

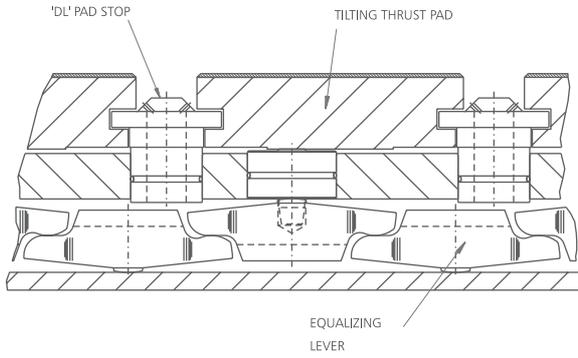
SERIES 8 —

Split Ring with 'Directed Lubrication'

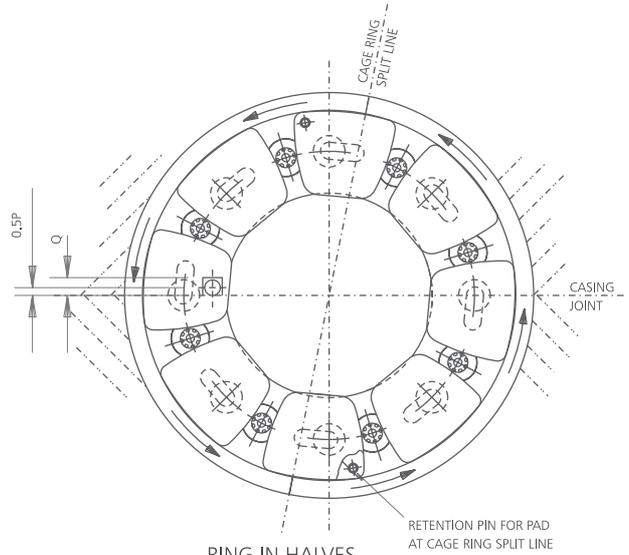


SIZE	Thrust Ring Dimensions													'DIRECTED LUBRICATION' Oil Inlet	Thrust Surface	Mean Dia	Max Spec Load	Max Load See Page 4	Total Axial Clear
	Pad O.Dia		Ring Thickness			With Shim Pack		Ring O.Dia	Hsg. Bore	M/c Allow.	Ring I.Dia	X1	X2						
	A	B	Min Axial Length	With M/c Allow.	Finished To Thickness	With M/c Allow.	Finished To Thickness												
	Y1	Y2	Y3	Y4	Y5	D		E	E1	M	mm ²	d	MPa						
8103	114	61	26	28	26.187 25.987	32.0	30.212 29.912	130.14 130.10	130.22 130.18	18	2.0	63	12.0	5	5500	89.2	3.75	20600	0.30
8112	125	67	28	30	28.187 27.987	34.0	32.212 31.912	139.66 139.62	139.74 139.70	20	2.0	69	13.0	6	6500	96.5	3.90	25300	0.30
8123	136	73	30	32	30.387 30.187	36.0	34.412 34.112	152.36 152.32	152.44 152.40	22	2.0	75	13.5	6	7750	106.0	3.95	30600	0.30
8134	148	79	32	34	32.287 32.087	38.0	36.312 36.012	168.24 168.20	168.32 168.28	23	2.0	82	14.5	7	9250	116.0	4.00	37000	0.35
8146	162	87	36	38	36.288 36.087	42.5	40.813 40.512	180.91 180.86	181.01 180.96	26	2.5	89	16.0	8	11000	126.0	4.10	45100	0.35
8159	176	95	38	40	38.387 38.187	44.5	42.912 42.612	196.80 196.75	196.90 196.85	27	2.5	97	17.0	10	13100	137.0	4.10	53700	0.35
8174	192	103	42	44	42.288 42.087	49.0	47.313 47.012	215.85 215.80	215.95 215.90	30	3.0	106	18.0	11	15500	150.0	4.15	64300	0.40
8190	210	113	45	47	45.388 45.187	52.0	50.413 50.112	234.90 234.85	235.00 234.95	32	3.0	116	19.0	11	18600	163.0	4.25	79000	0.40
8207	229	123	50	52	50.388 50.187	57.5	55.913 55.612	253.94 253.89	254.05 254.00	36	3.5	127	22.5	12	22100	178.0	4.25	93900	0.40
8225	250	134	53	55	53.388 53.187	60.5	58.913 58.612	279.34 279.29	279.45 279.40	38	3.5	138	23.0	13	26300	196.0	4.30	113000	0.50
8246	273	146	60	62	60.089 59.884	68.0	66.114 65.809	301.57 301.52	301.68 301.63	43	4.0	151	28.0	14	31300	213.0	4.35	136100	0.50
8269	298	160	64	66	64.289 64.085	73.0	70.814 70.510	323.79 323.73	323.91 323.85	46	4.5	164	29.0	15	37300	232.0	4.35	162200	0.50
8293	324	174	68	71	68.488 68.286	78.0	75.513 75.212	355.54 355.48	355.66 355.60	49	5.0	179	32.0	15	44300	253.0	4.40	194900	0.50
8320	354	190	72	75	72.189 71.986	82.0	79.214 78.911	384.12 384.06	384.24 384.18	51	5.0	196	32.5	16	52900	276.0	4.40	232700	0.60
8348	386	207	80	83	80.289 80.085	90.5	87.814 87.510	415.86 415.80	415.99 415.93	57	5.5	213	36.5	17	62700	300.0	4.45	279000	0.60
8380	421	226	85	88	85.289 85.085	96.0	93.314 93.010	453.96 453.90	454.09 454.03	60	6.0	233	38.5	19	74800	328.0	4.45	332800	0.60
8415	460	247	95	98	95.490 95.285	107.0	104.515 104.210	495.23 495.17	495.36 495.30	68	7.0	254	41.5	23	89000	358.0	4.45	396000	0.60

All dimensions are in mm



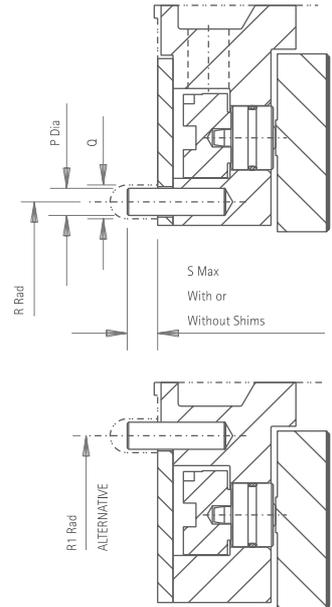
DEVELOPED SECTION ON MEAN DIAMETER
SHOWING AN OFFSET PIVOT BEARING



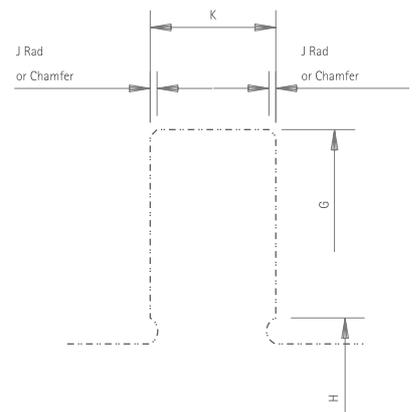
RING IN HALVES
WITH 'DIRECTED LUBRICATION'

SIZE	Collar				Spacer				Stop Pin					Approx Weight of 2CQ kg
	O.Dia	I.Dia	Thick	J	O.Dia	I.Dia	Thickness		P	Q	R	R1	S	
							Min	With M/c Allow						
G	H	K	L	M	N1	N2	R	R1	S					
8103	117	58	0.8	17	114	63	3.0	5.0	4	5	35	56.5	4	1.41
8112	129	64	0.8	19	124	69	3.0	5.0	4	5	38	61.0	4	1.81
8123	140	70	0.8	21	137	75	3.0	5.0	4	5	42	66.5	4	2.32
8134	152	76	0.8	22	149	82	3.0	5.0	5	6	46	73.0	5	3.03
8146	166	84	0.8	25	162	89	3.5	5.5	6	7	50	79.0	6	3.58
8159	180	92	0.8	27	176	97	3.5	5.5	6	7	54	86.0	6	4.96
8174	196	100	0.8	30	192	106	4.0	6.0	8	9	59	94.0	8	6.37
8190	214	110	0.8	32	210	116	4.0	6.0	8	9	64	102.5	8	8.43
8207	233	119	0.8	35	229	127	4.5	6.5	8	9	70	111.5	8	10.93
8225	254	130	0.8	38	251	138	4.5	6.5	10	11	77	123.0	10	14.25
8246	277	142	0.8	43	273	151	5.0	7.0	12	13	84	132.5	12	17.38
8269	302	156	0.8	48	297	164	5.5	7.5	12	13	91	143.0	12	22.05
8293	328	170	0.8	51	324	179	6.0	9.0	16	17	100	157.0	16	29.00
8320	358	186	0.8	56	354	196	6.0	9.0	16	17	109	170.5	16	37.78
8348	391	203	1.5	60	384	213	6.5	9.5	16	17	118	185.0	16	48.07
8380	426	222	1.5	67	419	233	7.0	10.0	20	22	129	202.5	20	63.00
8415	465	243	1.5	73	457	254	8.0	11.0	20	22	141	220.5	20	79.65

All dimensions are in mm



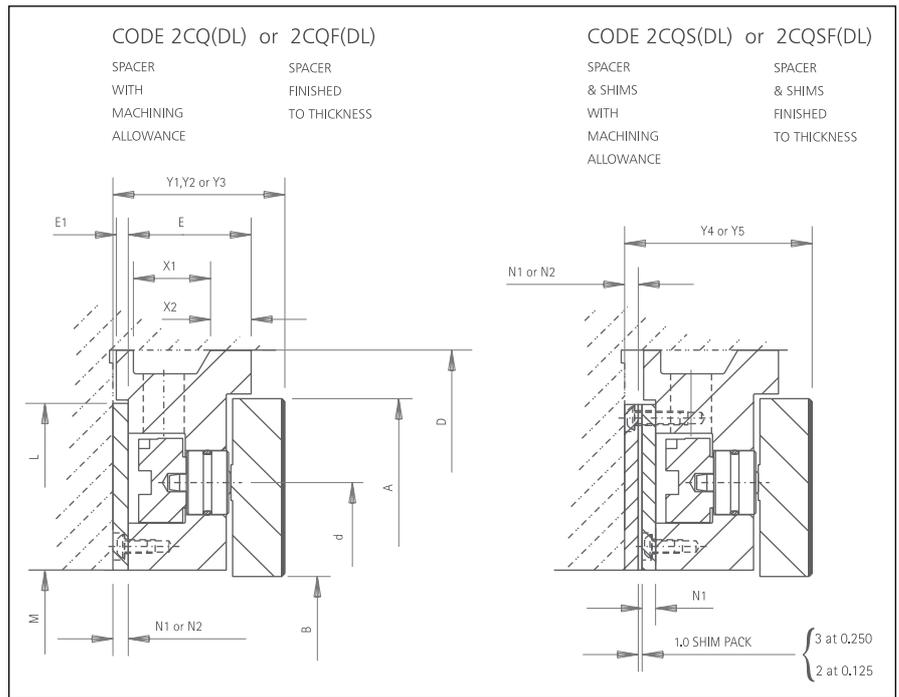
STOP PIN DETAILS



COLLAR DETAILS

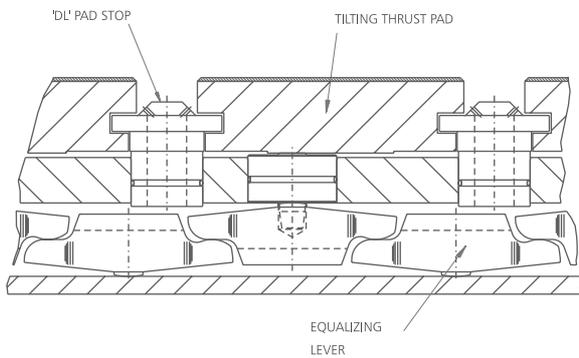
SERIES 11 —

Split Ring with 'Directed Lubrication'

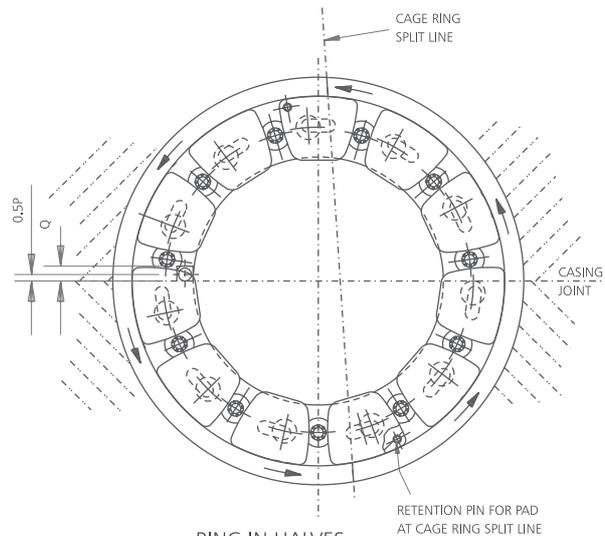


SIZE	Thrust Ring Dimensions													'DIRECTED LUBRICATION' Oil Inlet	Thrust Surface	Mean Dia	Max Spec Load	Max Load See Page 4	Total Axial Clear
	Pad		Ring Thickness					Ring O.Dia	Hsg. Bore	M/c Allow.	Ring I.Dia	X1	X2						
	O.Dia	I.Dia	Min Axial Length	With M/c Allow.	Finished To Thickness	With Shim Pack	Finished To Thickness												
	A	B	Y1	Y2	Y3	Y4	Y5	D	E	E1	M	mm ²	d						
11103	147	95	26	28	26.187 25.987	32.0	30.212 29.912	168.24 168.20	168.32 168.28	18	2.0	97	12.0	5	7550	123	3.75	28300	0.30
11112	161	104	28	30	28.187 27.987	34.0	32.212 31.912	180.93 180.88	181.03 180.98	20	2.0	106	13.0	6	8950	135	3.90	34900	0.30
11123	175	113	30	32	30.387 30.187	36.0	34.412 34.112	196.80 196.75	196.90 196.85	22	2.0	116	13.5	6	10600	145	3.95	41800	0.30
11134	191	123	32	34	32.287 32.087	38.0	36.312 36.012	212.68 212.63	212.78 212.73	23	2.0	126	14.5	7	12700	158	4.00	50800	0.35
11146	209	135	36	38	36.288 36.087	42.5	40.813 40.512	234.90 234.85	235.00 234.95	26	2.5	137	16.0	8	15100	174	4.10	61900	0.35
11159	228	147	38	40	38.387 38.187	44.5	42.912 42.612	253.94 253.89	254.05 254.00	27	2.5	150	17.0	10	17900	191	4.10	73300	0.35
11174	248	160	42	44	42.288 42.087	49.0	47.313 47.012	279.34 279.29	279.45 279.40	30	3.0	163	18.0	11	21300	208	4.15	88300	0.40
11190	271	175	45	47	45.388 45.187	52.0	50.413 50.112	301.57 301.52	301.68 301.63	32	3.0	178	19.0	11	25500	226	4.25	108300	0.40
11207	296	191	50	52	50.388 50.187	57.5	55.913 55.612	323.79 323.73	323.91 323.85	36	3.5	194	22.5	12	30400	246	4.25	129200	0.40
11225	322	208	53	55	53.388 53.187	60.5	58.913 58.612	355.54 355.48	355.66 355.60	38	3.5	212	23.0	13	36100	270	4.30	155200	0.50
11246	352	227	60	62	60.089 59.884	68.0	66.114 65.809	384.12 384.06	384.24 384.18	43	4.0	231	28.0	14	43000	292	4.35	187000	0.50
11269	384	248	64	66	64.289 64.085	73.0	70.814 70.510	415.86 415.80	415.99 415.93	46	4.5	252	29.0	15	51400	320	4.35	223500	0.50
11293	419	270	68	71	68.488 68.286	78.0	75.513 75.212	453.96 453.90	454.09 454.03	49	5.0	275	32.0	15	60900	349	4.40	267900	0.50
11320	457	295	72	75	72.189 71.986	82.0	79.214 78.911	495.23 495.17	495.36 495.30	51	5.0	301	32.5	16	72900	381	4.40	320700	0.60
11348	498	321	80	83	80.289 80.085	90.5	87.814 87.510	539.67 539.60	539.82 539.75	57	5.5	327	36.5	17	86500	415	4.45	384900	0.60
11380	545	351	85	88	85.289 85.085	96.0	93.314 93.010	584.12 584.05	584.27 584.20	60	6.0	357	38.5	19	102500	455	4.45	456100	0.60
11415	593	382	95	98	95.490 95.285	107.0	104.515 104.210	641.27 641.19	641.43 641.35	68	7.0	390	41.5	23	122000	494	4.45	542900	0.60

All dimensions are in mm



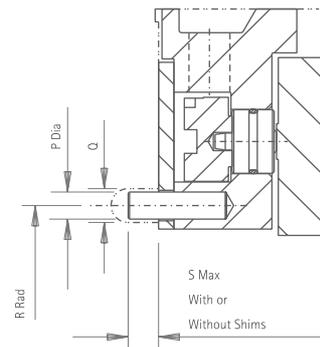
DEVELOPED SECTION ON MEAN DIAMETER
SHOWING AN OFFSET PIVOT BEARING



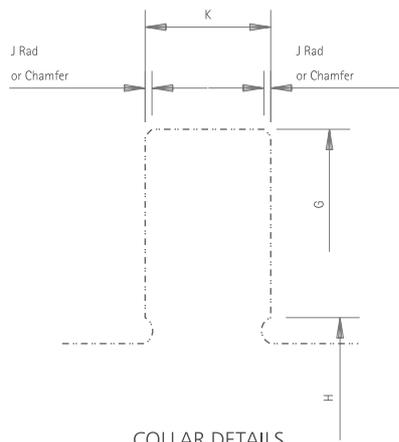
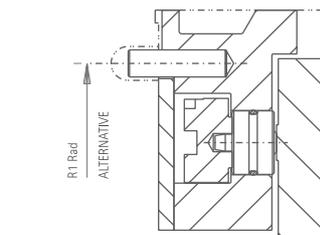
RING IN HALVES
WITH 'DIRECTED LUBRICATION'

SIZE	Collar				Spacer				Stop Pin					Approx Weight of 2CQ kg
	O.Dia	I.Dia	Thick	Thick	O.Dia	I.Dia	Thickness		P	Q	R	R1	S	
							Min	With M/c Allow						
G	H	J	K	L	M	N1	N2							
11103	151	91	0.8	17	148	97	3.0	5.0	4	5	52	74.0	4	1.73
11112	165	100	0.8	19	162	106	3.0	5.0	4	5	57	80.0	4	2.15
11123	179	109	0.8	21	175	116	3.0	5.0	4	5	62	87.5	4	2.63
11134	195	119	0.8	22	191	126	3.0	5.0	5	6	67	95.0	5	3.33
11146	213	131	0.8	25	210	137	3.5	5.5	6	7	73	104.0	6	4.31
11159	232	143	0.8	27	229	150	3.5	5.5	6	7	80	113.5	6	5.57
11174	252	156	0.8	30	249	163	4.0	6.0	8	9	87	124.0	8	7.49
11190	275	171	0.8	32	271	178	4.0	6.0	8	9	95	135.0	8	9.65
11207	300	187	0.8	35	295	194	4.5	6.5	8	9	104	146.0	8	11.84
11225	327	203	0.8	38	324	212	4.5	6.5	10	11	114	160.0	10	15.88
11246	357	222	0.8	43	352	231	5.0	7.0	12	13	124	173.0	12	18.32
11269	390	242	1.5	48	384	252	5.5	7.5	12	13	135	188.0	12	23.75
11293	425	264	1.5	51	419	275	6.0	9.0	16	17	148	205.5	16	30.38
11320	463	289	1.5	56	457	301	6.0	9.0	16	17	161	224.0	16	40.02
11348	504	315	1.5	60	498	327	6.5	9.5	16	17	175	244.0	16	51.72
11380	551	345	1.5	67	546	357	7.0	10.0	20	22	192	266.0	20	66.61
11415	599	376	1.5	73	594	390	8.0	11.0	20	22	209	290.5	20	84.45

All dimensions are in mm

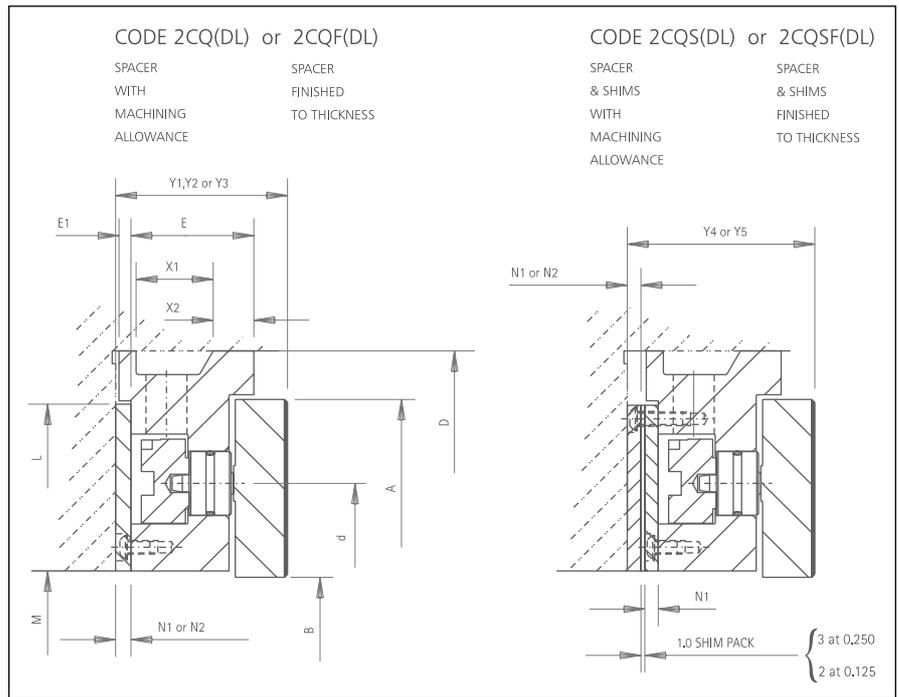


STOP PIN DETAILS



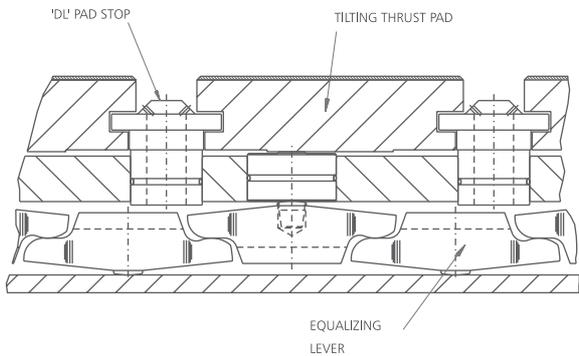
COLLAR DETAILS

SERIES 14 — Split Ring with 'Directed Lubrication'

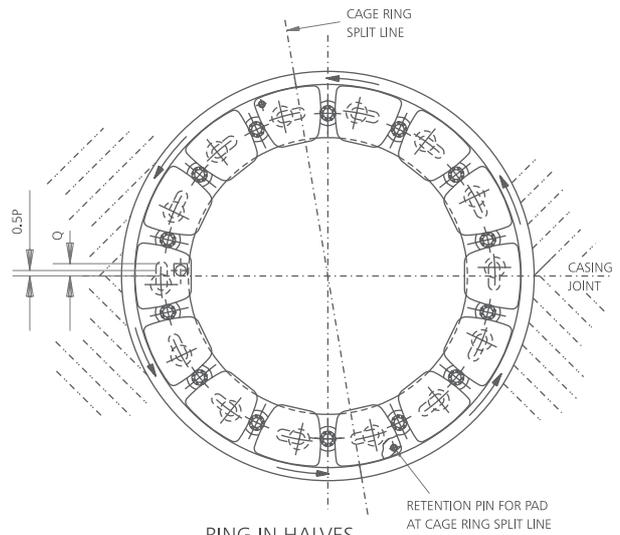


SIZE	Thrust Ring Dimensions													'DIRECTED LUBRICATION' Oil Inlet		Thrust Surface mm ²	Mean Dia d	Max Spec Load MPa	Max Load See Page 4 N	Total Axial Clear
	Pad		Ring Thickness					Ring O.Dia	Hsg. Bore	E	E1	M	X1	X2						
	O.Dia	I.Dia	Min Axial Length	With M/c Allow.	Finished To Thickness	With Shim Pack	Finished To Thickness													
	A	B	Y1	Y2	Y3	Y4	Y5	D												
14103	180	128	26	28	26.187 25.987	32.0	30.212 29.912	199.98 199.93	200.08 200.03	18	2.0	130	12.0	5	9550	156	3.75	35800	0.30	
14112	197	140	28	30	28.187 27.987	34.0	32.212 31.912	219.03 218.98	219.13 219.08	20	2.0	142	13.0	6	11400	170	3.90	44400	0.30	
14123	215	152	30	32	30.387 30.187	36.0	34.412 34.112	238.08 238.03	238.18 238.13	22	2.0	155	13.5	6	13500	185	3.95	53300	0.30	
14134	234	166	32	34	32.287 32.087	38.0	36.312 36.012	260.29 260.24	260.40 260.35	23	2.0	169	14.5	7	16100	203	4.00	64400	0.35	
14146	256	182	36	38	36.288 36.087	42.5	40.813 40.512	282.52 282.47	282.63 282.58	26	2.5	184	16.0	8	19200	222	4.10	78700	0.35	
14159	279	197	38	40	38.387 38.187	44.5	42.912 42.612	307.92 307.87	308.03 307.98	27	2.5	201	17.0	10	22900	241	4.10	93800	0.35	
14174	304	216	42	44	42.288 42.087	49.0	47.313 47.012	333.32 333.26	333.44 333.38	30	3.0	219	18.0	11	27300	263	4.15	113200	0.40	
14190	332	236	45	47	45.388 45.187	52.0	50.413 50.112	361.89 361.83	362.01 361.95	32	3.0	239	19.0	11	32500	286	4.25	138100	0.40	
14207	362	257	50	52	50.388 50.187	57.5	55.913 55.612	393.64 393.58	393.76 393.70	36	3.5	261	22.5	12	38700	313	4.25	164400	0.40	
14225	395	280	53	55	53.388 53.187	60.5	58.913 58.612	425.38 425.32	425.51 425.45	38	3.5	284	23.0	13	46000	340	4.30	197800	0.50	
14246	431	306	60	62	60.089 59.884	68.0	66.114 65.809	463.48 463.42	463.61 463.55	43	4.0	311	28.0	14	54800	373	4.35	238300	0.50	
14269	471	334	64	66	64.289 64.085	73.0	70.814 70.510	501.57 501.50	501.72 501.65	46	4.5	339	29.0	15	65000	406	4.35	282700	0.50	
14293	513	364	68	71	68.488 68.286	78.0	75.513 75.212	546.02 545.95	546.17 546.10	49	5.0	370	32.0	15	77400	445	4.40	340500	0.50	
14320	560	398	72	75	72.189 71.986	82.0	79.214 78.911	596.82 596.75	596.97 596.90	51	5.0	404	32.5	16	92300	483	4.40	406100	0.60	
14348	610	433	80	83	80.289 80.085	90.5	87.814 87.510	647.62 647.52	647.78 647.70	57	5.5	440	36.5	17	109500	526	4.45	487200	0.60	
14380	666	473	85	88	85.289 85.085	96.0	93.314 93.010	708.27 708.19	708.43 708.35	60	6.0	480	38.5	19	130700	575	4.45	581600	0.60	
14415	727	516	95	98	95.490 95.285	107.0	104.515 104.210	771.14 771.06	771.30 771.22	68	7.0	523	41.5	23	155500	627	4.45	691900	0.60	

All dimensions are in mm



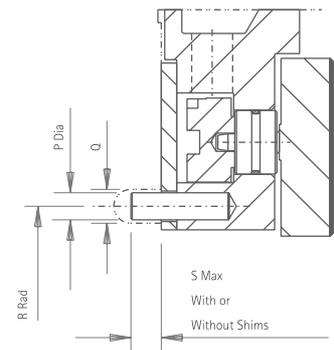
DEVELOPED SECTION ON MEAN DIAMETER
SHOWING AN OFFSET PIVOT BEARING



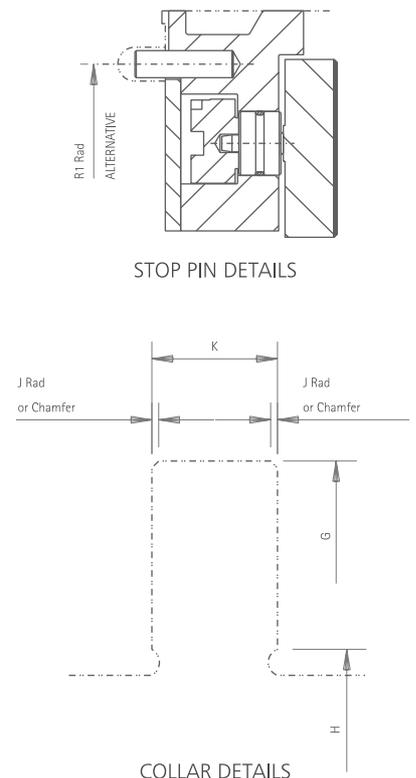
RING IN HALVES
WITH 'DIRECTED LUBRICATION'

SIZE	Collar				Spacer				Stop Pin					Approx Weight of 2CQ kg
	O.Dia	I.Dia	Thick	Thick	O.Dia	I.Dia	Thickness							
							Min	With M/c Allow	P	Q	R	R1	S	
G	H	J	K	L	M	N1	N2	P	Q	R	R1	S	kg	
14103	184	124	0.8	17	181	130	3.0	5.0	4	5	68	90.5	4	2.10
14112	201	136	0.8	19	197	142	3.0	5.0	4	5	75	99.0	4	2.82
14123	219	148	0.8	21	214	155	3.0	5.0	4	5	82	107.5	4	3.45
14134	238	162	0.8	22	235	169	3.0	5.0	5	6	89	117.5	5	4.54
14146	260	178	0.8	24	257	184	3.5	5.5	6	7	97	127.5	6	5.50
14159	284	192	0.8	27	279	201	3.5	5.5	6	7	106	139.5	6	7.33
14174	309	211	0.8	30	305	219	4.0	6.0	8	9	115	151.5	8	9.10
14190	337	231	0.8	32	332	239	4.0	6.0	8	9	126	165.0	8	11.98
14207	367	252	0.8	35	262	261	4.5	6.5	8	9	137	179.5	8	15.47
14225	401	274	1.5	38	394	284	4.5	6.5	10	11	150	195.5	10	19.58
14246	437	300	1.5	43	432	311	5.0	7.0	12	13	164	213.0	12	22.88
14269	477	328	1.5	48	470	339	5.5	7.5	12	13	179	231.0	12	29.68
14293	519	358	1.5	51	514	370	6.0	9.0	16	17	195	252.0	16	37.35
14320	566	392	1.5	54	558	404	6.0	9.0	16	17	213	275.0	16	50.10
14348	616	427	1.5	60	610	440	6.5	9.5	16	17	232	299.0	16	63.02
14380	672	467	1.5	67	666	480	7.0	10.0	20	22	253	327.0	20	85.37
14415	733	510	1.5	76	727	523	8.0	11.0	20	22	276	356.0	20	104.37

All dimensions are in mm



STOP PIN DETAILS



COLLAR DETAILS

ENQUIRY DATA SHEET FOR CQ THRUST BEARING

Complete data and send to:

E-mail: sales@waukbearing.com

or, for additional contact information, visit: www.waukeshabearings.com

Please confirm bearing selection and give estimated operating data for the following:

Name:

Project Ref:

Company:

Date:

Contact E-mail:

1. General

application

bearing style/code/description

shaft diameter

quantity/delivery

2. Thrust Load

normal

max continuous

minimum load

at instant of start up

max. momentary

3. Lubricant

type

or ISO viscosity grade

temperature at bearing inlet

pressure at bearing inlet

4. Shaft Speed

normal

max continuous

overspeed

bi- or uni-directional

5. Special Needs

instrumentation

API specification

ENGINEERED BEARING SOLUTIONS

The type of bearing described in this brochure is one of a complete range of shaft support products which Waukesha Bearings (WBC) manufactures for rotating machinery (turbines, compressors, pumps, gearboxes, motors, generators, couplings, etc).

Some other products in the Waukesha Bearings range:

Equalized and Non-equalized Tilting Pad Thrust Bearings.

Tilting Pad Journal Bearings.

Horizontal Bearing Assemblies, Self Contained and Force Lubricated.

Vertical Bearing Assemblies, Self Contained and Force Lubricated.

Medium and Heavywall Fixed Profile Journal Bearings.

Fixed Profile Thrust Washers. Marine Thrust and Line Shaft Units.

Bearings for Water and Product Lubrication.

Active Magnetic Bearing Systems.

Spares, Repairs and Bearings to Customer Drawings.

Note: The information in this brochure is given in good faith but no guarantee is given or implied in respect of such information. WBC products are subject to continued development and WBC reserves the right to make changes in the specification and design of their products without prior notice.



A compact combined radial and size 11380 CQ Thrust Bearing incorporating copper chrome backed thrust pads.



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