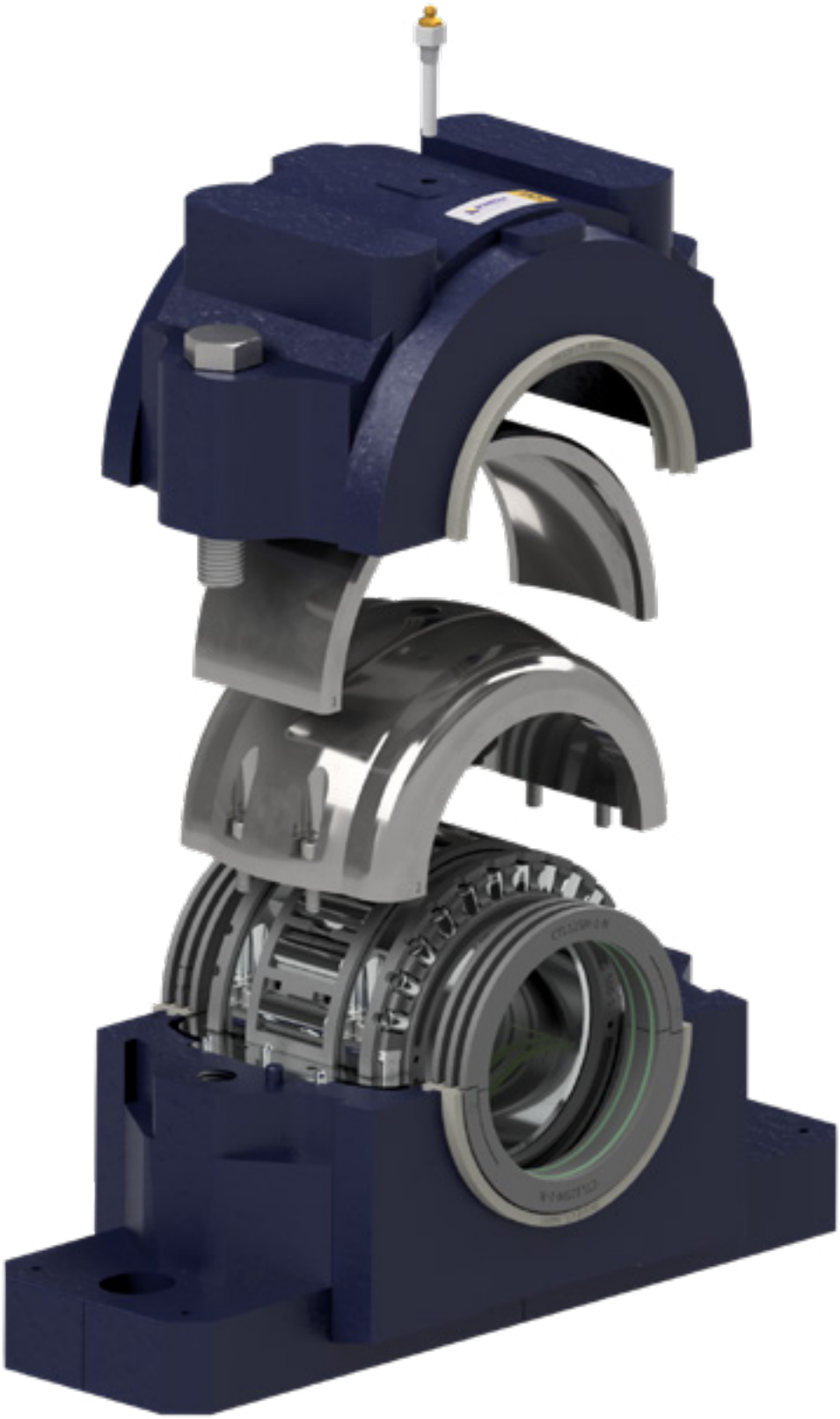
NBC GROUP LTD

BOWMAN
SPLIT BEARINGS DIVISION



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WE INNOVATE, MANUFACTURE, AND DISTRIBUTE PERFORMANCE-ENGINEERED SPLIT ROLLER BEARINGS

Our high-load capacity split roller bearings are superior in design compared to other bearings on the market for accommodating axial load.

Using state-of-the-art 3D printing technology, we have created the most advanced split roller bearing cage design in the world, that offers performance improvements and requires less lubrication.

A division of the multinational bearing manufacturer, Bowman International, we serve a spectrum of industries around the world, with products innovated for performance, fast maintenance, and competitor-compatibility.

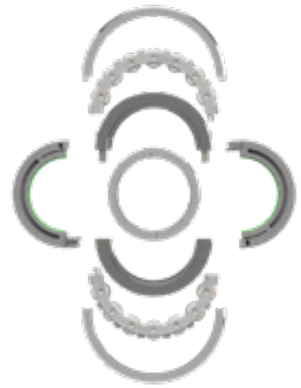
PRODUCT RANGE

ADVANCED SPLIT ROLLER BEARINGS

For significantly higher axial load capacity, faster bearing changes and superior design, our Advanced Split Roller Bearing has been engineered specifically for higher load applications.

SN/SD/SAF SPLIT ROLLER BEARINGS

To replace equivalent solid self-aligning roller bearings, without removing ancillary equipment from the shaft, our SN/SD/SAF Split Roller Bearing has been engineered to dramatically reduce bearing change-out times.



ENHANCED SPLIT ROLLER BEARINGS

Engineered to directly replace other manufacturer's split roller bearings, our Enhanced Split Roller Bearing fits directly into your existing cartridge/housing or method of mounting for fast bearing change outs.

PRODUCT SELECTION:
THE ADVANCED RANGE

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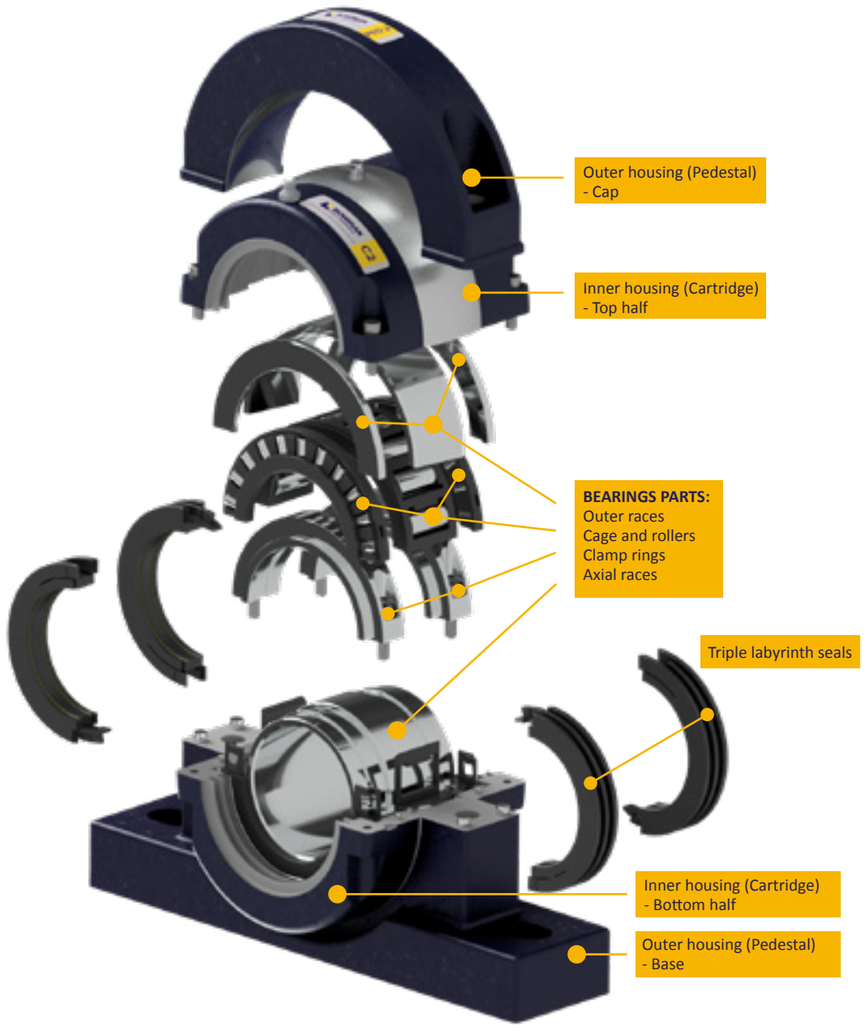
BOWMAN ADVANCED SPLIT ROLLER BEARINGS RANGE INTRODUCTION

The Bowman Advanced Split Roller Bearing has been designed to improve performance and uptime in high load applications. In fact, thanks to our patented cages produced using 3D printing processes, it offers significantly more axial load carrying capacity than any other split bearing available in the market, offering faster bearing changes and simplified installation and maintenance processes.

KEY FEATURES AND BENEFITS

- Mount into existing pedestal or other housing type
- Significantly increased axial load carrying capacity
- 30 mm to 300 mm (1 3/16 in. to 12 in.)
- Larger sizes manufactured to order
- Dimensionally interchangeable
- Cover both the S1/01/LSM/LSE and S2/02/MSM/MSE variants
- Patented 3D printed cages
- Requires less lubricant
- Faster bearing changes for reduced downtime
- Patented triple labyrinth extended seal for extending the life of worn shafts



CARTRIDGES AND PEDESTALS

CARTRIDGES

Bowman split roller bearings are mounted within an inner housing which in turn is mounted within an outer housing. The outer housing connects the Bowman split bearing unit to the mounting structure. This joint between the inner and outer housings allows misalignment between the shaft and the mounting structure and reduces edge-loading of the bearing.

Whilst providing location for the bearing, the inner housing also contains the 3D printed triple-labyrinth seals, which remain concentric to the shaft even with shaft/mounting structure misalignment. Triple-labyrinth seals are fitted to the shaft and rotate within close tolerances to the inner housing, resulting in efficient non-contact sealing for a wide range of environmental conditions.

Bowman inner housings are manufactured from high strength ductile cast iron and can be installed in outer housings (such as pedestals, flanges, take-up units etc) from other split roller bearing manufacturers.

There are two different Bowman inner housings for each bearing group size - one to fit the Light/01/E Series outer housings of other manufacturers, and one to fit the Medium/02 Series. This is because of the high capacities of the Bowman bearings which are, in most cases, suitable as a direct interchange for both other manufacturers bearing series.

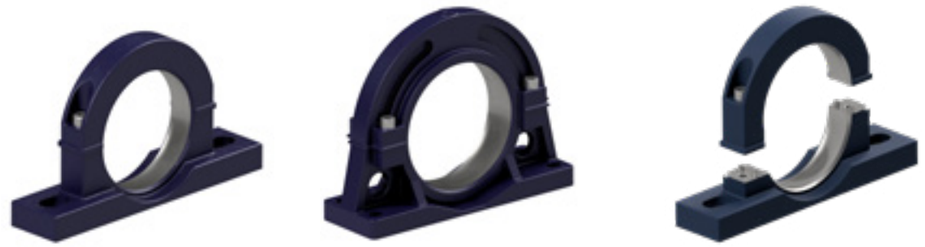
PEDESTALS

Bowman split roller bearing unit outer housings are designed to be interchangeable with existing split roller bearing manufacturers outer housings and hence share the spherical ball socket dimensions, heights to shaft centre, base foot print and fixing bolt dimensions. Bowman outer housings are manufactured from high strength ductile cast iron. Bowman can also provide bespoke outer housings to order, as well as our unique stepped pedestals which enable our units to be fitted under an existing shaft in situ.

MOUNTING OPTIONS

The most popular method of mounting is via standard pedestal housings, but Bowman's split roller bearings can be mounted in a variety of outer supports to suit a range of applications and installation scenarios.

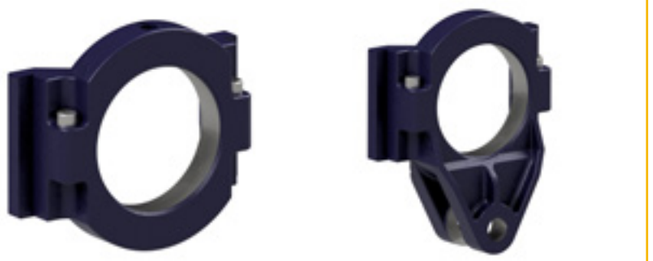
Bespoke pedestals can be designed and manufactured to order. Our pedestals are dimensionally interchangeable with housings from other bearing manufacturers.



PEDESTALS

FLANGES

ROD END



TAKE UP

HANGER

TRIPLE LABYRINTH SEALS

STANDARD AND EXTENDED SEALS TO OVERCOME WORN SHAFTS

Peak performance and long life of the roller bearing depends on keeping contaminants out of the bearing and protecting the lubricant within the housing. The lubricant not only enhances the running of the bearing but also protects the bearing surfaces from corrosion. Effective sealing and maintaining the integrity of the housing is therefore of prime importance.

Bowman units incorporate an inner/outer housing with a spherical ball socket which maintains the triple labyrinth seals concentric with the shaft even under shaft/mounting structure misalignment. This allows the use of tight running clearances between seal and inner housing seal bore surfaces.

Seals are directly interchangeable with other manufacturer triple labyrinth seals and can replace both nitrile rubber and aluminium seals. They can be ordered separately to the inner housing, specific to the shaft size required.

Seals can be fitted and released in seconds using the handy release tool which comes as standard with each seal.

- Compatible with all major split roller bearing manufacturer's housings
- Can replace nitrile rubber and aluminium types
- Intrinsically safe – can be used where aluminium is prohibited
- Gripped on the shaft with viton 'o' rings as standard
- Suitable for temperatures from 0°C to 100°C (32°F - 212°F)
- Ease of installation. No tools required
- Simple to release using the removal tool supplied with each seal
- Lighter than other types of triple labyrinth seals
- Operates up to bearing maximum speeds
- Special shaft sizes easily accommodated with bespoke seals
- Extended seals can be supplied to overcome worn shaft area

Standard Triple Labyrinth Seal

Extended Triple Labyrinth Seal to accommodate worn shafts

Blanking plates are available to seal the end bore where the shaft terminates within the inner housing. Blanking plates are also available to seal the end bore where the shaft extends beyond the inner housing. Blanking plates and extended blanking plates are ordered specific to the inner housing.

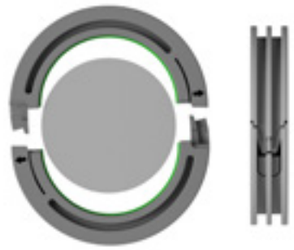
SEAL INSTALLATION

Insert tool, aligning arrows on seal and tool

Press and hold tool whilst applying light pressure to the bore of the seal until the joint separates

Repeat action on opposite joint

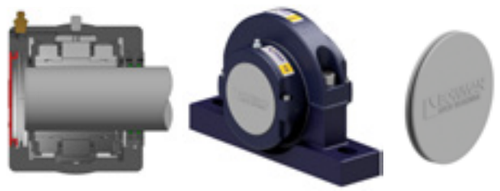
Pull both seal halves apart



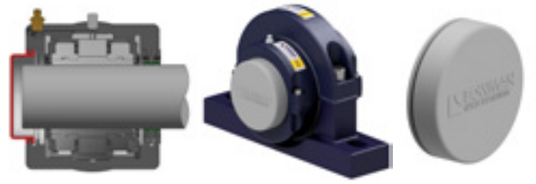
The seals can be installed before or after the radial & axial bearings are assembled. If fitted before the bearing, slide the seals axially away to each side of the bearing position allowing space to assemble the bearing.

- Lightly lubricate the bore of each seal half, ensuring the 'O' rings remain in place.
- Place both halves around the shaft ensuring male and female joints are aligned.
- Clip the two halves together so that the 'arrow-head' is retained in the corresponding recess.
- Grip the seal at the joints and move the assembled seal into the correct position by sliding along the shaft.
- Greasing the labyrinths before closing the cartridge serves to lubricate the seals and adds an additional grease barrier against contamination.
- Seals rotate with the shaft and axially align themselves with their corresponding cartridge grooves during operation.

BLANKING PLATE



EXTENDED BLANKING PLATE



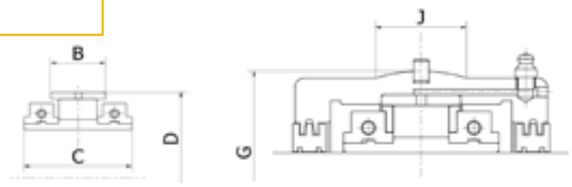
BEARING RATING AND SELECTION

BEARING RATINGS

GROUP SIZE	BEARING BORE Ø		CAPACITIES				SPEED rpm	PART NUMBER FREE / FIXED	
	(mm)	(inch)	RADIAL		AXIAL			(mm)	(inch)
			DYNAMIC CR (kN)	STATIC COR (kN)	DYNAMIC CA (kN)	STATIC COA (kN)			
108	30 35 40	1 3/16 1 1/4 1 7/16 1 1/2	97	108	42	138	4360	BSBA M30 BSBA M35 BSBA M40	BSBA E103 BSBA E104 BSBA E107 BSBA E108
200	45 50	1 11/16 1 3/4 1 15/16 2	123	146	50	140	3500	BSBA M45 BSBA M50	BSBA E111 BSBA E112 BSBA E115 BSBA E200
208	55 60 65	2 3/16 2 1/4 2 7/16 2 1/2	152	192	70	246	2890	BSBA M55 BSBA M60 BSBA M65	BSBA E203 BSBA E204 BSBA E207 BSBA E208
300	70 75	2 11/16 2 3/4 2 15/16 3	203	268	79	313	2440	BSBA M70 BSBA M75	BSBA E211 BSBA E212 BSBA E215 BSBA E300
308	80 85 90	3 3/16 3 1/4 3 7/16 3 1/2	293	414	103	388	2090	BSBA M80 BSBA M85 BSBA M90	BSBA E303 BSBA E304 BSBA E307 BSBA E308
400	95 100 105	3 11/16 3 3/4 3 15/16 4	371	544	130	550	1820	BSBA M95 BSBA M100 BSBA M105	BSBA E311 BSBA E312 BSBA E315 BSBA E400
408	110 115	4 3/16 4 1/4 4 7/16 4 1/2	418	615	162	656	1610	BSBA M110 BSBA M115	BSBA E403 BSBA E404 BSBA E407 BSBA E408
500	120 125 130	4 11/16 4 3/4 4 15/16 5	561	874	178	770	1460	BSBA M120 BSBA M125 BSBA M130	BSBA E411 BSBA E412 BSBA E415 BSBA E500
508	135 140	5 3/16 5 1/4 5 7/16 5 1/2	593	937	210	895	1330	BSBA M135 BSBA M140	BSBA E503 BSBA E504 BSBA E507 BSBA E508
600	150 155 600 / 160	5 11/16 5 3/4 5 15/16 6	634	1040	233	1028	1240	BSBA M150 BSBA M155 BSBA M160	BSBA E511 BSBA E512 BSBA E515 BSBA E600
608	160 608 / 170	6 7/16 6 1/2	672	1083	235	1094	1070	BSBA M160 BSBA M170	BSBA E607 BSBA E608
700	170 175 180	6 15/16 7	715	1201	278	1368	1010	BSBA M170 BSBA M175 BSBA M180	BSBA E615 BSBA E700
800	190 200	7 15/16 8	753	1327	281	1459	890	BSBA M190 BSBA M200	BSBA E715 BSBA E800
900	220 230	9	893	1588	281	1459	780	BSBA M220 BSBA M230	BSBA E900
1000	240 250 1000 / 260	10	988	1872	267	1459	700	BSBA M240 BSBA M250 BSBA M260	BSBA E1000
1100	260 270 275 280	11	1146	2216	292	1641	620	BSBA M260 BSBA M270 BSBA M275 BSBA M280	BSBA E1100
1200	290 300	12	1125	2234	316	1823	570	BSBA M290 BSBA M300	BSBA E1200

PRODUCT RANGE AND DIMENSIONS

ROLLER BEARINGS AND INNER HOUSINGS (CARTRIDGES)



SIZE GROUP	B (E7) (mm)	C (mm)	D Ø (H7) (mm)	AXIAL FLOAT REF (i) (mm)	INNER HOUSING REF (ii)	G Ø (g6) (mm)	J (mm)	INNER HOUSING REF (iii)	G Ø (g6) (mm)	J (mm)
108	30	62.7	84.14	9	C1	100.00	25	-	-	-
200	32	63.7	98.42	10	C2	117.48	25	C2A	134.94	32
208	35	68.7	114.30	12	C3	134.94	32	C3A	157.16	38
300	40	78.7	133.35	12	C4	157.16	38	C4A	177.80	50
308	51	88.7	152.40	17	C5	177.80	50	C5A	203.20	50
400	59	94.7	174.62	17	C6	203.20	50	C6A	231.78	64
408	60	109.7	203.20	19	C7	231.78	64	C7A	266.70	76
500	71	116.7	222.25	20	C8	266.70	76	C8A	295.28	82
508	73	121.7	241.30	23	C9	279.40	76	C9A	323.85	90
600	73	121.7	254.00	23	C10	295.28	82	C10A	336.55	95
608	65	136.7	273.05	11	C11	311.15	76	C11A	368.30	95
700	65	136.7	285.75	11	C12	323.85	70	C12A	381.00	95
800	65	144.7	311.15	11	C13	358.78	86	C13A	425.50	105
900	70	148.7	342.90	12	C14	387.35	82	C14A	457.20	110
1000	70	148.7	374.65	12	C15	419.10	90	C15A	495.30	118
1100	77	175.2	406.40	13	C16	454.00	95	C16A	527.10	130
1200	77	175.2	438.15	13	C17	489.00	98	C17A	552.50	128

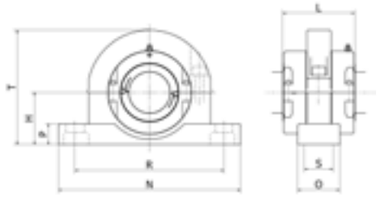
Ref (i) Total axial float. Maximum offset from centreline is half of this amount
Ref (ii) Bowman Inner housings to match 'Light' or '01/E' series from other manufacturers
Ref (iii) Bowman Inner housings to match 'Medium' or '02/E' series from other manufacturers

Notes:
1) Spherical diameter of corresponding outer housing requires G7 tolerance
2) Recess / abutment for inner race would require D11 tolerance on race width C
3) Recommended abutment diameter and shaft fillet radii:

For bearings up to and including 308 group: +5mm on shaft diameter and maximum 1.2mm fillet radii

For bearings from 400 to 1200 group: +10mm on shaft diameter and maximum 2.3mm fillet radii

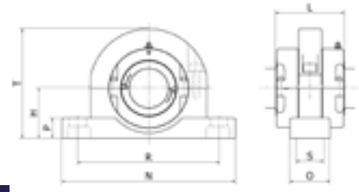
OVERALL DIMENSIONS INTERCHANGEABLE 01/01E/LIGHT/S1 LIGHT OUTER HOUSINGS (PEDESTALS)



SIZE GROUP	H (mm)	R MIN (mm)	R MAX (mm)	S (mm)	FIXING BOLTS	N (mm)	O (mm)	P (mm)	T (mm)	L (mm)	BOWMAN REF
108	60	172	192	-	M12	228	60	22	138	105	PED1
200	70	203	227	-	M16	270	60	25	158	106	PED2
208	80	226	242	-	M16	280	70	32	180	120	PED3
300	95	260	280	-	M20	330	76	38	208	131	PED4
308	112	312	328	-	M24	380	90	44	252	148	PED5
400	125	342	366	-	M24	420	102	52	272	154	PED6
408	143	374	410	-	M24	466	120	60	314	179	PED7
500	162	438	462	120	M24	508	178	38	372	191	PED8
508	181	470	494	120	M24	558	178	41	405	198	PED9
600	181	484	508	120	M24	558	178	41	415	208	PED10
608	213	356	380	114	M24	508	178	32	430	228	PED11
700	235	376	400	128	M24	534	190	35	470	234	PED12
800	248	410	434	140	M24	572	204	38	495	242	PED13
900	270	440	480	140	M30	636	216	40	540	256	PED14
1000	292	482	522	140	M30	686	228	44	585	256	PED15
1100	311	514	554	140	M30	724	228	48	620	283	PED16
1200	343	564	604	178	M30	762	254	50	685	283	PED17

Notes:
1) Overall length (L) is taken over seals
2) Pedestal design shown for representation only

OVERALL DIMENSIONS INTERCHANGEABLE 02/02E/MEDIUM/S2 SERIES OUTER HOUSINGS (PEDESTALS)



SIZE GROUP	H (mm)	R Min (mm)	R Max (mm)	S (mm)	FIXING BOLTS	N (mm)	O (mm)	P (mm)	T (mm)	L (mm)	BOWMAN REF
200	80	226	242	-	Ø16	280	70	32	180	106	PED3
208	95	260	280	-	Ø20	330	76	38	208	120	PED4
300	112	312	328	-	Ø24	380	90	44	252	131	PED5
308	125	342	366	-	Ø24	420	102	52	272	148	PED6
400	143	374	410	-	Ø24	466	120	60	314	154	PED7
408	162	438	462	120	Ø24	508	178	38	372	179	PED8
500	181	484	508	120	Ø24	558	178	41	415	191	PED10
508	203	534	558	120	Ø24	610	178	51	460	198	PED9A
600	210	546	570	128	Ø24	636	204	50	470	208	PED10A
608	267	428	468	172	M30	596	242	44	535	228	PED11A
700	273	438	478	166	M30	636	242	44	545	234	PED12A
800	305	488	528	190	M30	686	266	50	610	242	PED13A
900	324	530	570	190	M36	750	280	50	650	256	PED14A
1000	356	576	616	204	M36	812	292	54	710	256	PED15A
1100	378	514	554	254	M30	914	330	60	760	283	PED16A
1200	394	546	586	254	M30	958	330	60	790	283	PED17A

Notes:
1) Overall length (L) is taken over seals
2) Pedestal design shown for representation only

SELECTION GUIDE

LSE/01/01E/S1

SIZE GROUP	BEARING BORE Ø (inch)	BEARING		INNER HOUSING	OUTER HOUSING	SEAL
		FIXED	FREE	CARTRIDGE	PEDESTAL	
108	1 3/16 1 1/4 1 7/16 1 1/2	BSBA E103 F BSBA E104 F BSBA E107 F BSBA E108 F	BSBA E103 E BSBA E104 E BSBA E107 E BSBA E108 E	C1	PED1	CTL103 CTL104 CTL107 CTL108
200	1 11/16 1 3/4 1 15/16 2	BSBA E111 F BSBA E112 F BSBA E115 F BSBA E200 F	BSBA E111 E BSBA E112 E BSBA E115 E BSBA E200 E	C2	PED2	CTL111 CTL112 CTL115 CTL200
208	2 3/16 2 1/4 2 7/16 2 1/2	BSBA E203 F BSBA E204 F BSBA E207 F BSBA E208 F	BSBA E203 E BSBA E204 E BSBA E207 E BSBA E208 E	C3	PED3	CTL203 CTL204 CTL207 CTL208
300	2 11/16 2 3/4 2 15/16 3	BSBA E211 F BSBA E212 F BSBA E215 F BSBA E300 F	BSBA E211 E BSBA E212 E BSBA E215 E BSBA E300 E	C4	PED4	CTL211 CTL212 CTL215 CTL300
308	3 3/16 3 1/4 3 7/16 3 1/2	BSBA E303 F BSBA E304 F BSBA E307 F BSBA E308 F	BSBA E303 E BSBA E304 E BSBA E307 F BSBA E308 E	C5	PED5	CTL303 CTL304 CTL307 CTL308
400	3 11/16 3 3/4 3 15/16 4	BSBA E311 F BSBA E312 F BSBA E315 F BSBA E400 F	BSBA E311 E BSBA E312 E BSBA E315 E BSBA E400 E	C6	PED6	CTL311 CTL312 CTL315 CTL400
408	4 3/16 4 1/4 4 7/16 4 1/2	BSBA E403 F BSBA E404 F BSBA E407 F BSBA E408 F	BSBA E403 E BSBA E404 E BSBA E407 E BSBA E408 E	C7	PED7	CTL403 CTL404 CTL407 CTL408
500	4 11/16 4 3/4 4 15/16 5	BSBA E411 F BSBA E412 F BSBA E415 F BSBA E500 F	BSBA E411 E BSBA E412 E BSBA E415 E BSBA E500 E	C8	PED8	CTL411 CTL412 CTL415 CTL500
508	5 3/16 5 1/4 5 7/16 5 1/2	BSBA E503 F BSBA E504 F BSBA E507 F BSBA E508 F	BSBA E503 E BSBA E504 E BSBA E507 E BSBA E508 E	C9	PED9	CTL503 CTL504 CTL507 CTL508
600	5 11/16 5 3/4 5 15/16 6	BSBA E511 F BSBA E512 F BSBA E515 F BSBA E600 F	BSBA E511 E BSBA E512 E BSBA E515 E BSBA E600 E	C10	PED10	CTL511 CTL512 CTL515 CTL600
608	6 7/16 6 1/2	BSBA E607 F BSBA E608 F	BSBA E607 E BSBA E608 E	C11	PED11	CTL607 CTL608
700	6 15/16 7	BSBA E615 F BSBA E700 F	BSBA E615 E BSBA E700 E	C12	PED12	CTL615 CTL700
800	7 15/16 8	BSBA E715 F BSBA E800 F	BSBA E715 E BSBA E800 E	C13	PED13	CTL715 CTL800
900	9	BSBA E900 F	BSBA E900 E	C14	PED14	CTL900
1000	10	BSBA E1000 F	BSBA E1000 E	C15	PED15	CTL1000
1100	11	BSBA E1100 F	BSBA E1100 E	C16	PED16	CTL1100
1200	12	BSBA E1200 F	BSBA E1200 E	C17	PED17	CTL1200

Note: 2 x Seals required per inner housing (unless using end cap/blanking plate)

MSE/02/02E/S2

SIZE GROUP	BEARING BORE Ø (inch)	BEARING		INNER HOUSING	OUTER HOUSING	SEAL
		FIXED	FREE	CARTRIDGE	PEDESTAL	
200	1 11/16 1 3/4 1 15/16 2	BSBA E111 F BSBA E112 F BSBA E115 F BSBA E200 F	BSBA E111 E BSBA E112 E BSBA E115 E BSBA E200 E	C2A	PED3	CTL111 CTL112 CTL115 CTL200
208	2 3/16 2 1/4 2 7/16 2 1/2	BSBA E203 F BSBA E204 F BSBA E207 F BSBA E208 F	BSBA E203 E BSBA E204 E BSBA E207 E BSBA E208 E	C3A	PED4	CTL203 CTL204 CTL207 CTL208
300	2 11/16 2 3/4 2 15/16 3	BSBA E211 F BSBA E212 F BSBA E215 F BSBA E300 F	BSBA E211 E BSBA E212 E BSBA E215 E BSBA E300 E	C4A	PED5	CTL211 CTL212 CTL215 CTL300
308	3 3/16 3 1/4 3 7/16 3 1/2	BSBA E303 F BSBA E304 F BSBA E307 F BSBA E308 F	BSBA E303 E BSBA E304 E BSBA E307 F BSBA E308 E	C5A	PED6	CTL303 CTL304 CTL307 CTL308
400	3 11/16 3 3/4 3 15/16 4	BSBA E311 F BSBA E312 F BSBA E315 F BSBA E400 F	BSBA E311 E BSBA E312 E BSBA E315 E BSBA E400 E	C6A	PED7	CTL311 CTL312 CTL315 CTL400
408	4 1/4 4 7/16 4 1/2	BSBA E404 F BSBA E407 F BSBA E408 F	BSBA E404 E BSBA E407 E BSBA E408 E	C7A	PED8	CTL404 CTL407 CTL408
500	4 11/16 4 3/4 4 15/16 5	BSBA E411 F BSBA E412 F BSBA E415 F BSBA E500 F	BSBA E411 E BSBA E412 E BSBA E415 E BSBA E500 E	C8A	PED10	CTL411 CTL412 CTL415 CTL500
508	5 3/16 5 1/4 5 7/16 5 1/2	BSBA E503 F BSBA E504 F BSBA E507 F BSBA E508 F	BSBA E503 E BSBA E504 E BSBA E507 E BSBA E508 E	C9A	PED9A	CTL503 CTL504 CTL507 CTL508
600	5 11/16 5 3/4 5 15/16 6	BSBA E511 F BSBA E512 F BSBA E515 F BSBA E600 F	BSBA E511 E BSBA E512 E BSBA E515 E BSBA E600 E	C10A	PED10A	CTL511 CTL512 CTL515 CTL600
608	6 7/16 6 1/2	BSBA E607 F BSBA E608 F	BSBA E607 E BSBA E608 E	C11A	PED11A	CTL607 CTL608
700	6 15/16 7	BSBA E615 F BSBA E700 F	BSBA E615 E BSBA E700 E	C12A	PED12A	CTL615 CTL700
800	7 15/16 8	BSBA E715 F BSBA E800 F	BSBA E715 E BSBA E800 E	C13A	PED13A	CTL715 CTL800
900	9	BSBA E900 F	BSBA E900 E	C14A	PED14A	CTL900
1000	10	BSBA E1000 F	BSBA E1000 E	C15A	PED15A	CTL1000
1100	11	BSBA E1100 F	BSBA E1100 E	C16A	PED16A	CTL1100
1200	12	BSBA E1200 F	BSBA E1200 E	C17A	PED17A	CTL1200

Note: *2 x Seals required per inner housing (unless using end cap / blanking plate)

LSM/01/01E/S1

SIZE GROUP	BEARING BORE Ø (mm)	BEARING		INNER HOUSING	OUTER HOUSING	SEAL
		FIXED	FREE	CARTRIDGE	PEDESTAL	
108	30	BSBA M30 F	BSBA M30 E	C1	PED1	CTL030M
	35	BSBA M35 F	BSBA M35 E			CTL35M
	40	BSBA M40 F	BSBA M40 E			CTL40M
200	45	BSBA M45 F	BSBA M45 E	C2	PED2	CTL45M
	50	BSBA M50 F	BSBA M50 E			CTL50M
208	55	BSBA M55 F	BSBA M55 E	C3	PED3	CTL55M
	60	BSBA M60 F	BSBA M60 E			CTL60M
	65	BSBA M65 F	BSBA M65 E			CTL65M
300	70	BSBA M70 F	BSBA M70 E	C4	PED4	CTL70M
	75	BSBA M75 F	BSBA M75 E			CTL75M
308	80	BSBA M80 F	BSBA M80 E	C5	PED5	CTL80M
	85	BSBA M85 F	BSBA M85 E			CTL85M
	90	BSBA M90 F	BSBA M90 E			CTL90M
400	95	BSBA M95 F	BSBA M95 E	C6	PED6	CTL95M
	100	BSBA M100 F	BSBA M100 E			CTL100M
	105	BSBA M105 F	BSBA M105 E			CTL105M
408	110	BSBA M110 F	BSBA M110 E	C7	PED7	CTL110M
	115	BSBA M115 F	BSBA M115 E			CTL115M
500	120	BSBA M120 F	BSBA M120 E	C8	PED8	CTL120M
	125	BSBA M125 F	BSBA M125 E			CTL125M
	130	BSBA M130 F	BSBA M130 E			CTL130M
508	135	BSBA M135 F	BSBA M135 E	C9	PED9	CTL135M
	140	BSBA M140 F	BSBA M140 E			CTL140M
600	150	BSBA M150 F	BSBA M150 E	C10	PED10	CTL150M
	155	BSBA M155 F	BSBA M155 E			CTL155M
	160	BSBA M160 F	BSBA M160 E	OC10		CTL160M
608	160	BSBA M160 F	BSBA M160 E	C11-600	PED11	CTL160M
	170	BSBA M170 F	BSBA M170 E	OC11		OCTL170M
700	170	BSBA M170 F	BSBA M170 E	C12-608	PED12	CTL170M
	175	BSBA M175 F	BSBA M175 E	C12		CTL175M
	180	BSBA M180 F	BSBA M180 E			CTL180M
800	190	BSBA M190 F	BSBA M190 E	C13	PED13	CTL190M
	200	BSBA M200 F	BSBA M200 E			CTL200M
900	220	BSBA M220 F	BSBA M220 E	C14	PED14	CTL220M
	230	BSBA M230 F	BSBA M230 E			CTL230M
1000	240	BSBA M240 F	BSBA M240 E	C15	PED15	CTL240M
	250	BSBA M250 F	BSBA M250 E			CTL250M
	260	BSBA M260 F	BSBA M260 E	OC15		OCTL260M
1100	260	BSBA M260 F	BSBA M260 E	C16-1000	PED16	CTL260M
	270	BSBA M270 F	BSBA M270 E	C16		CTL270M
	275	BSBA M275 F	BSBA M275 E			CTL275M
	280	BSBA M280 F	BSBA M280 E			CTL280M
1200	290	BSBA M290 F	BSBA M290 E	C17	PED17	CTL290M
	300	BSBA M300 F	BSBA M300 E			CTL300M

Note: 2 x Seals required per inner housing (unless using end cap/blanking plate)

MSM/02/02E/S2

SIZE GROUP	BEARING BORE Ø (mm)	BEARING		INNER HOUSING	OUTER HOUSING	SEAL
		FIXED	FREE	CARTRIDGE	PEDESTAL	
200	45	BSBA M45 F	BSBA M45 E	C2A	PED3	CTL45M
	50	BSBA M50 F	BSBA M50 E			CTL50M
208	55	BSBA M55 F	BSBA M55 E	C3A	PED4	CTL55M
	60	BSBA M60 F	BSBA M60 E			CTL60M
	65	BSBA M65 F	BSBA M65 E			CTL65M
300	70	BSBA M70 F	BSBA M70 E	C4A	PED5	CTL70M
	75	BSBA M75 F	BSBA M75 E			CTL75M
308	80	BSBA M80 F	BSBA M80 E	C5A	PED6	CTL80M
	85	BSBA M85 F	BSBA M85 E			CTL85M
	90	BSBA M90 F	BSBA M90 E			CTL90M
400	95	BSBA M95 F	BSBA M95 E	C6A	PED7	CTL95M
	100	BSBA M100 F	BSBA M100 E			CTL100M
	105	BSBA M105 F	BSBA M105 E			CTL105M
408	110	BSBA M110 F	BSBA M110 E	C7A	PED8	CTL110M
	115	BSBA M115 F	BSBA M115 E			CTL115M
500	120	BSBA M120 F	BSBA M120 E	C8A	PED10	CTL120M
	125	BSBA M125 F	BSBA M125 E			CTL125M
	130	BSBA M130 F	BSBA M130 E			CTL130M
508	135	BSBA M135 F	BSBA M135 E	C9A	PED9A	CTL135M
	140	BSBA M140 F	BSBA M140 E			CTL140M
600	150	BSBA M150 F	BSBA M150 E	C10A	PED10A	CTL150M
	15	BSBA M155 F	BSBA M155 E			CTL155M
	160	BSBA M160 F	BSBA M160 E	OC10A		CTL160M
608	160	BSBA M160 F	BSBA M160 E	C11A-600	PED11A	CTL160M
	170	BSBA M170 F	BSBA M170 E	OC11A		OCTL170M
700	175	BSBA M175 F	BSBA M175 E	C12A	PED12A	CTL175M
	180	BSBA M180 F	BSBA M180 E			CTL180M
800	190	BSBA M190 F	BSBA M190 E	C13A	PED13A	CTL190M
	200	BSBA M200 F	BSBA M200 E			CTL200M
900	220	BSBA M220 F	BSBA M220 E	C14A	PED14A	CTL220M
	230	BSBA M230 F	BSBA M230 E			CTL230M
1000	240	BSBA M240 F	BSBA M240 E	C15A OC15A	PED15A	CTL240M
	250	BSBA M250 F	BSBA M250 E			CTL250M
	260	BSBA M260 F	BSBA M260 E			OCTL260M
1100	270	BSBA M270 F	BSBA M270 E	C16A	PED16A	CTL270M
	275	BSBA M275 F	BSBA M275 E			CTL275M
	280	BSBA M280 F	BSBA M280 E			CTL280M
1200	290	BSBA M290 F	BSBA M290 E	C17A	PED17	CTL290M
	300	BSBA M300 F	BSBA M300 E			CTL300M

Note: *2 x Seals required per inner housing (unless using end cap / blanking plate)

CALCULATION INFORMATION

BEARING RATINGS AND SELECTION

Bearing ratings for dynamic radial capacity (C_R), dynamic axial capacity (C_A), static radial capacity (C_{OR}) and static axial capacity (C_{OA}) shown in this catalogue are based on ISO 281-1990 (dynamic capacity) and ISO 76-1987 (static capacity) respectively.

Radial and axial loads can be considered independently and Bowman split roller bearing units isolate one from the other.

BEARING RADIAL AND AXIAL RATINGS

SIZE GROUP	BEARING BORE Ø		RADIAL		AXIAL [1]		MAX SPEED rpm
	(mm)	(inch)	DYNAMIC C_R (kN)	STATIC C_{OR} (kN)	DYNAMIC C_A (kN)	STATIC C_{OA} (kN)	
108	30, 35, 40	1.1875 - 1.5	97	108	42	138	4360
200	45, 50	1.6875 - 2.0	123	146	50	140	3500
208	55, 60, 65	2.1875 - 2.5	152	192	70	246	2890
300	70, 75	2.6875 - 3.0	203	268	79	313	2440
308	80, 85, 90	3.1875 - 3.5	293	414	103	388	2090
400	100, 105	3.6875 - 4.0	371	544	130	550	1820
408	110, 115	4.1875 - 4.5	418	615	162	656	1610
500	120, 125, 130	4.6875 - 5.0	561	874	178	770	1460
508	135, 140	5.1875 - 5.5	593	937	210	895	1330
600	150, 155, 160	5.6875 - 6.0	634	1040	233	1028	1240
608	170	6.4375 - 6.5	672	1083	235	1094	1070
700	175, 180	6.9375 - 7.0	715	1201	278	1368	1010
800	190, 200	7.9375 - 8.0	753	1327	281	1459	890
900	220, 230	9.0	893	1588	281	1459	780
1000	240, 250, 260	10.0	988	1872	267	1459	700
1100	270, 275, 280	11.0	1146	2216	292	1641	620
1200	290, 300	12.0	1125	2234	316	1823	570

1) Axial ratings apply only to fixed bearings where the radial inner race is located against shaft abutments. Shaft abutment should be shaft diameter +5mm for bearings up to and including 308 group, and +10mm for bearings from 400 to 1200 group.

Rolling element bearing life calculations given below are based on ISO standards, where statistical life expectancy for rolling contact fatigue provides a reasonable estimate of service life under conditions of adequate lubrication and protection against contamination and excessive misalignment.

In practice the service life of a bearing may be determined by factors other than the normal fatigue life.

CALCULATING BEARING RADIAL LIFE

Expected radial bearing life is calculated by the following equation:

	$L10_R$	=	$[C_R / (P_R \times f_{Rd})]^{10/3}$
WHERE:	$L10_R$	=	Expected radial life of 90% of similar bearings under similar operating conditions (in millions of revolutions)
	C_R	=	Radial dynamic rating (kN)
	P_R	=	Dynamic radial load (kN)
	f_{Rd}	=	Radial dynamic (or service) factor

Radial Dynamic (or Service) Factors f_{Rd} are determined depending on application conditions, as below:

STEADY LOAD / SMALL FLUCTUATIONS	1.0 to 1.3
LIGHT TO MEDIUM FLUCTUATIONS	1.3 to 2.0
HEAVY SHOCK, RECIPROCATION OR VIBRATION	2.0 to 3.5

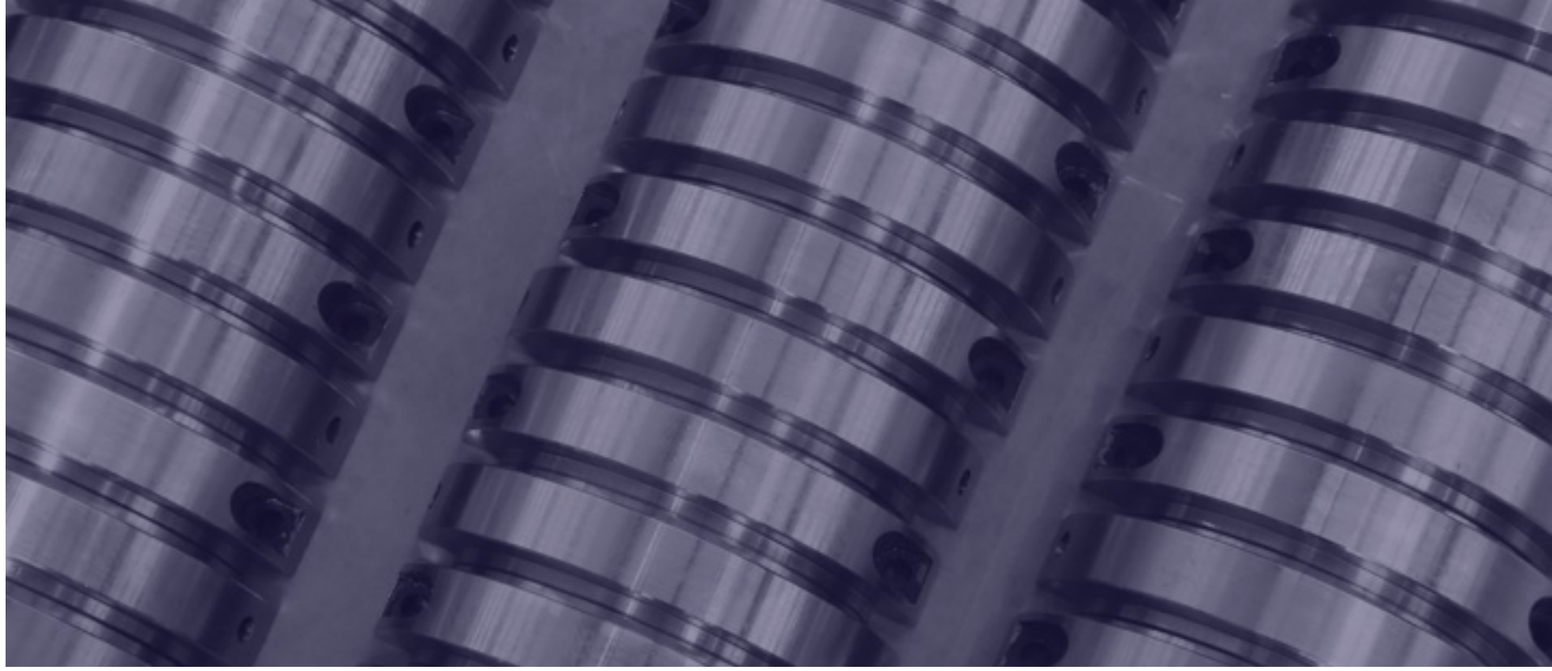
CALCULATING BEARING AXIAL LIFE

Expected axial bearing life is calculated by the following equation:

	$L10_A$	=	$[C_A / (P_A \times f_{Ad})]^{10/3}$
WHERE:	$L10_A$	=	Expected axial life of 90% of similar bearings under similar operating conditions (in millions of revolutions)
	C_A	=	Axial dynamic rating (kN)
	P_A	=	Dynamic axial load (kN)
	f_{Ad}	=	Axial dynamic (or service) factor

Axial Dynamic (or Service) Factors f_{Ad} are determined depending on application conditions, as below:

STEADY LOAD / SMALL FLUCTUATIONS	1.0 to 1.3
LIGHT TO MEDIUM FLUCTUATIONS	1.3 to 2.0
HEAVY SHOCK, RECIPROCATION OR VIBRATION	2.0 to 3.5



STATIC RATINGS

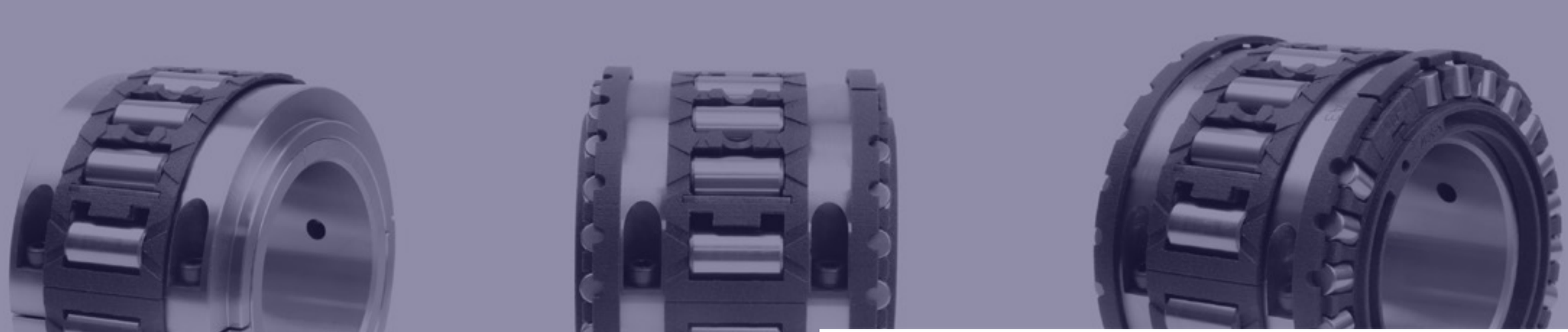
The static rating is defined as that load which causes a permanent deformation of 0.0001 times the diameter of the roller and can be considered to correspond to a contact stress of 4,000 MPa at the centre of the most heavily loaded roller. For slow rotation speeds (less than 5 rpm) consider static ratings for the bearing selection.

	C_{OR}	≥	$f_{Rs} \times P_{OR}$ (Radial)
	C_{OA}	≥	$f_{As} \times P_{OA}$ (Axial)
WHERE:	C_{OR}	=	Bearing radial static rating (kN)
	C_{OA}	=	Bearing axial static rating (kN)
	P_{OR}	=	Bearing radial static load (kN)
	P_{OA}	=	Bearing axial static load (kN)
	f_{Rs}	=	Static safety factor (radial)
	f_{As}	=	Static safety factor (axial)

Guidelines for appropriate static safety factor are below:

TYPE OF OPERATION	REQUIREMENT FOR SMOOTH OPERATION		
	LOW	NORMAL	HIGH
SMOOTH / VIBRATION FREE	1	1.5	3
NORMAL	1	2	3.5
HIGH SHOCK LOADS	2.5	3	4

(Refer to our Technical Department for advice on service factors)



BEARING LIFE REQUIREMENTS

Suggested lives and factors for specific operating conditions are shown below:

OPERATING CONDITIONS

It is best practice to specify a bearing that provides an L10 life of at least 10,000 hours, unless the bearing is being selected based on static rating.

	LIFE FACTOR fL	LIFE HOURS L10
8 HOURS DAILY WORKING	3.0 - 4.0	20,000 - 50,000
CONTINUOUS OPERATION MAIN DRIVES, LARGE ELECTRICAL MACHINERY, FLYWHEELS AND MINING	4.4 - 5.0	70,000 - 100,000
CONTINUOUS OPERATION AND AN EXCEPTIONALLY HIGH DEGREE OF RELIABILITY	5.0 - 6.0	100,000 - 200,000

We recommend that bearings are specified to provide an L10 life of a least 10,000 hours, except for bearings selected on the basis of static rating.

DYNAMIC FACTOR

Select the appropriate dynamic factor (fd) from the chart below:

CONDITIONS	fd
STEADY LOAD OR SMALL FLUCTUATIONS	1.0 - 1.3
LIGHT SHOCK	1.3 - 2.0
HEAVY SHOCK, VIBRATION OR RECIPROCATION	2.0 - 3.5

LIFE ADJUSTMENT FACTORS FOR CRITICAL APPLICATIONS

By using the tables and equations in this catalogue it is possible to specify high-capacity split roller bearings that are adequate for normal applications.

For non-standard or critical applications that require reliability greater than 90%, replace the L10 equation with Lna = al x L10. The table below will help you.

RELIABILITY	%	95	96	97	98	99
	al	0.62	0.53	0.44	0.33	0.21

BASIC STATIC LOAD RATINGS (Cor)

Bowman uses established ISO standards for calculating load ratings for its high load capacity bearings. Under these standards, the basic static load rating is denoted by Cor. The basic static load rating is dined at the static (radial) load and corresponds to a contact stress of 4,000 MPa (580,000 psi) at the centre of the most heavily loaded roller/raceway contact – producing a permanent deformation of 0.0001 times the roller diameter. In applications where rotation is intermittent or less than 5 rpm, bearing size can be selected based on the static load carrying capacity.

This table will help you determine the requisite basic load rating:

			Cor = So x P
WHERE:	Cor	=	Basic static radial load rating (kN)
	P	=	Effective bearing load (kN)
	So	=	Static safety factor

Bearing Static Safety factors, So

TYPES OF OPERATION	REQUIREMENTS FOR SMOOTH RUNNING		
	LOW	NORMAL	HIGH
VIBRATION FREE	1	1.5	3
NORMAL	1	2	3.5
HIGH SHOCK LOADS	2.5	3	4

SELECTION FOR AXIAL LOAD

Bowman's high capacity split roller bearings accommodate significantly more axial load than competing products. It is therefore important to consider axial thrust independently from radial load when specifying the bearings. To do this, you need to know the speed and desired shaft size so that you can determine the axial load applied to the bearing.

The following formula will help you work out the axial load:

			$Ca > (fd_a \times fdn \times Pa) / fb$
WHERE:	Ca	=	Axial rating
	fd_a	=	Dynamic or service factor
	Pa	=	Calculated axial load
	fdn	=	Velocity (dn) factor
	fb	=	Bearing factor (see scale opposite)

Notes:

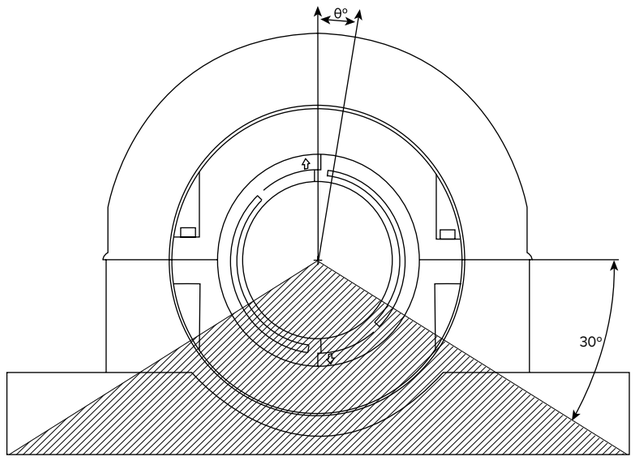
- Where the load is accurately known, the dynamic or services factor fda may be in creased from 1 for peak overload periods to 1.1 or 1.2 for general running depending on smoothness
- Make allowances in the calculated loads to ensure the axial capacity of the bearing is not exceeded
- The axial load capacity is decreased by 50% if the lubricant does not contain an extreme pressure additive

TEMPERATURE

The operating temperatures for any standard bearing is between 0°C and 100°C (32°F - 212°F). When the temperature is expected to be above 100°C (212°F) special consideration must be given to the specification of material, lubrication and seals. The design of the bearing may also need to be altered.

°C	170	200	250
% REDUCTION	5	15	25

PEDESTAL LOADS



The maximum safe radial load for a pedestal is based on the static rating (Cor) of the corresponding size of roller bearing. It is safe to apply the full static rating if the angle of the load falls within the highlighted area of this diagram:

CONSULT OUR TECHNICAL TEAM IF ANY OF THE FOLLOWING LOADING SCENARIOS APPLY:

- The radial load falls outside of the highlighted area on the above diagram
- The radial load exceeds Cor
- The axial loads exceeds 50% of the axial rating (Ca) of the corresponding roller bearing

SHAFT TOLERANCE AND SURFACE FINISH

Split roller bearings rely on accurate shaft form and diameter to ensure the desired bearing diametric clearance is obtained. Journal diameter at bearing seating is generally required to be within h7 tolerance (based on BS4500 / BS-EN-ISO 286-2) for most applications. Where shaft speeds and loads permit, wider tolerances can be used. Generally:

- h6 tolerance should be applied where speed is over 150,000dn mm
- h7 tolerance can be applied for speeds between 50,000dn mm and 150,000dn mm
- For speeds under 50,000dn mm, h9 tolerance can be applied

Note, 'dn' is an expression of shaft speed used by bearing manufacturers,
where:- **'dn' = bearing bore (mm) x shaft speed (rpm)**

DIAMETER	OVER	-	50 mm	80 mm	120 mm	180 mm	250 mm
	UP TO AND INCLUDING	50 mm	80 mm	120 mm	180 mm	250 mm	315 mm
TOLERANCE BAND (BS4500)	h6	+0 -0.016	+0 -0.019	+0 -0.022	+0 -0.025	+0 -0.029	+0 -0.032
	h7	+0 -0.025	+0 -0.030	+0 -0.035	+0 -0.040	+0 -0.046	+0 -0.052
	h9	+0 -0.062	+0 -0.074	+0 -0.087	+0 -0.100	+0 -0.115	+0 -0.130
	IT6	0.016	0.019	0.022	0.025	0.029	0.032
	D11	+0.080 +0.240	+0.100 +0.290	+0.120 +0.340	+0.145 +0.395	+0.170 +0.460	+0.190 +0.510

Tolerances in the table above are in mm.
IT6 is roundness and parallelism (cylindrical) of the bearing seating.
Tolerance of h9 and surface texture of 3.2µm Ra are applicable to the seal seating area.
Shaft surface finish for the bearing seating is generally 3.2µm Ra, for shafts of h7 tolerance, and 1.6µm Ra, where h6 shaft tolerance is applied.

TOLERANCES AND RECESS WIDTHS

The tolerance of the width of the recess is D11, as per this table:

WIDTH (mm)	Over	-	50	80	120
	up to and incl	50	80	120	180
TOLERANCE IN µm					
TOLERANCE D11 to BS 4500		+0.080 +0.240	+0.100 +0.290	+0.120 +0.340	+0.145 +0.395

For applications that require large shaft fillet radii, bearings with larger chamfers to the inner race bores can be provided. In such instances, special cartridges and seals are required for mounting the larger shaft diameters. A modified inner race may also be required to allow the race halves to be assembled onto the shaft in a truly radial direction.

If the bearing you are specifying is to be mounted into a shaft recess, please speak to our technical team who will advise on any necessary modifications and relevant part codes.

TEMPERATURE CHARACTERISTICS

The normal operating temperature range for Bowman split roller bearings is from 0° to 100°C (32°F - 212°F). Operating temperatures outside of this range will require consideration for lubrication, seals and materials of construction. Please consult our Technical Department for further advice.

The quantity, size and pitch circle diameter of the rollers within any roller bearing will excite vibrations at certain frequencies – this can even be present to some extent in new bearings installed in perfect conditions because of the constantly changing angular position of the rollers during operation.

The following tables indicate the frequencies of bearing parts per shaft revolution and can be used to calculate excitation frequencies – simply multiply the tabulated frequencies by the shaft speed.

CONDITION MONITORING FREQUENCY DATA

Condition monitoring of machinery is used to identify significant changes which in turn indicates developing faults and is a major component of the predictive maintenance process. By using the bearing frequency data listed below, machine operators can input the correct information into condition monitoring equipment, enabling them to identify and monitor potential faults and schedule maintenance procedures accordingly. Successful use of this system reduces downtime by enabling repairs to be planned, avoiding the possibility of catastrophic failure and breakdowns.

CAGE	RADIAL	The frequency at which a point on the radial cage rotates relative to the inner housing.
	AXIAL	The frequency at which a point on the axial cage rotates relative to the inner housing.
ROLLER	RADIAL	The frequency at which a point on a given radial roller contacts the inner race or radial outer race or the radial cage roller pocket.
	AXIAL	The frequency at which a point on a given axial roller contacts the clamp ring or axial outer race or the axial cage roller pocket.
OUTER	RADIAL	The frequency at which a point on the radial outer race contacts the radial rollers.
	AXIAL	The frequency at which a point on the axial outer race contacts the axial rollers.
INNER	RADIAL	The frequency at which a point on the inner race contacts the radial rollers.
	AXIAL	The frequency at which a point on the clamp ring contacts the axial rollers.

The tables list the pitch circle diameters and number of rollers, for use with condition monitoring equipment that accepts this information.

Note that the contact angle is 0 in all cases.

FREQUENCY DATA

- Velocity readings for a properly installed new bearing may be a high as 4mm/second
- Typically, alarm levels should be set no higher than 15mm/second
- Shutdown should occur not higher than 20mm/second

RADIAL DATA

SHAFT DIA	BEARING BORE Ø		PART FREQUENCIES				ROLLER DETAILS		
	(mm)	(inch)	CAGE	ROLLER	OUTER	INNER	RADIAL PCD (mm)	NO. OF ROLLERS	ROLLER Ø (mm)
108	30 35 40	1.1875 - 1.5	0.404	2.516	4.851	7.149	62.687	12	12
200	45 50	1.6875 - 2.0	0.415	2.845	5.806	8.194	76.20	14	13
208	55 60 65	2.1875 - 2.5	0.423	3.152	6.761	9.239	90.424	16	14
300	70 75	2.6875 - 3.0	0.425	3.251	6.797	9.203	106.426	16	16
308	80 85 90	3.1875 - 3.5	0.427	3.366	7.691	10.309	123.80	18	18
400	100 105	3.6875 - 4.0	0.429	3.463	7.727	10.273	141.351	18	20
408	110 115	4.1875 - 4.5	0.431	3.539	7.753	10.247	158.75	18	22
500	120 125 130	4.6875 - 5.0	0.431	3.569	8.626	11.374	174.625	20	24
508	135 140	5.1875 - 5.5	0.434	3.744	8.688	11.312	190.50	20	25
600	150 155 160	5.6875 - 6.0	0.438	4.002	9.647	12.353	203.20	22	25
608	170	6.4375 - 6.5	0.438	3.995	8.768	11.232	219.08	20	27
700	175 180	6.9375 - 7.0	0.442	4.234	9.719	12.281	231.78	22	27
800	190 200	7.9375 - 8.0	0.448	4.710	10.740	13.260	257.18	24	27
900	220 230	9.0	0.448	4.710	10.740	13.260	285.75	24	30
1000	240 250 260	10.0	0.452	5.191	12.664	15.336	314.33	28	30
1100	270 275 280	11.0	0.453	5.311	12.693	15.307	342.90	28	32
1200	290 300	12.0	0.457	5.761	12.794	15.206	371.48	28	32

AXIAL DATA

SHAFT DIA	BEARING BORE Ø		PART FREQUENCIES				ROLLER DETAILS		
	(mm)	(inch)	CAGE	ROLLER	OUTER	INNER	RADIAL PCD (mm)	NO. OF ROLLERS	ROLLER Ø (mm)
108	30 35 40	1.1875 - 1.5	0.500	5.724	12	12	62.687	20	6
200	45 50	1.6875 - 2.0	0.500	6.850	12	12	76.20	20	6
208	55 60 65	2.1875 - 2.5	0.500	6.152	12	12	90.424	20	8
300	70 75	2.6875 - 3.0	0.500	7.152	12	12	106.426	20	8
308	80 85 90	3.1875 - 3.5	0.500	6.690	12	12	123.80	20	10
400	100 105	3.6875 - 4.0	0.500	7.568	14	14	141.351	24	10
408	110 115	4.1875 - 4.5	0.500	7.115	14	14	158.75	24	12
500	120 125 130	4.6875 - 5.0	0.500	7.776	14	14	174.625	24	12
508	135 140	5.1875 - 5.5	0.500	7.304	14	14	190.50	24	14
600	150 155 160	5.6875 - 6.0	0.500	7.757	14	14	203.20	24	14
608	170	6.4375 - 6.5	0.500	7.824	12	12	219.08	24	14
700	175 180	6.9375 - 7.0	0.500	8.278	15	15	231.78	30	14
800	190 200	7.9375 - 8.0	0.500	9.185	16	16	257.18	32	14
900	220 230	9.0	0.500	10.205	16	16	285.75	32	14
1000	240 250 260	10.0	0.500	11.226	16	16	314.33	32	14
1100	270 275 280	11.0	0.500	12.246	18	18	342.90	36	14
1200	290 300	12.0	0.500	13.267	20	20	371.48	40	14

BEARING LUBRICATION

Bowman split bearing units are designed for grease lubrication. Grease is easier to retain in the housing than oil, offering reduced lubricant loss and improved sealing. It also offers better protection against corrosion to the rolling surfaces. Lubricant is directly injected into the path of the rollers for optimum distribution throughout the radial and axial bearings.

Inner housing lubrication points are tapped 1/8" NPT and fitted with nipples for grease lubrication. Grease nipples can be replaced with other fittings or pipes, however pipework must be flexible to allow the inner/outer housing spherical ball joint to operate correctly. BSP fittings may be used, but care must be taken to avoid blocking off the lubrication cross drilling in the inner housing as BSP fittings generally screw in further than NPT fittings.

LUBRICANT TYPE

Greases of NLGI No.2 designation are recommended for most applications. For centrally pumped systems a No.1 grease may be used for increased dispensation.

Greases with extreme pressure (EP) additives are recommended. However, Bowman split bearing units do not rely upon EP greases being used to achieve the axial capacities listed, unlike existing manufacturers units.

Grease with a lithium complex thickener is usually used for normal applications operating at temperatures between 0° and 80°C. When water resistance is required a grease with an aluminium complex thickener can be used. Some greases may not mix with each other so if changing lubricants, the bearing unit must be solvent-cleaned of the old lubricant before using the new lubricant.

Please contact our technical department if lubrication advice is required.

GREASE QUANTITY FOR INITIAL LUBRICATION

The quantity of grease required for initial lubrication is dependent upon operating speed. For slow applications the bearing and housing can be packed full of grease, however at higher speeds excessive grease will cause the bearing to overheat.

The table on the opposite page shows the fully packed quantity of grease for each housing size. The actual amount should be estimated using the percentage of this quantity factored according to the shaft speed.

FULLY PACKED GREASE QUANTITY

GROUP SIZE	INNER HOUSING REF	FIXED BEARING GREASE QUANTITY (G)	FREE BEARING GREASE QUANTITY (G)
108	C1	45	80
200	C2 / C2A	55	100
208	C3 / C3A	70	150
300	C4 / C4A	90	165
308	C5 / C5A	150	325
400	C6 / C6A	170	400
408	C7 / C7A	310	640
500	C8 / C8A	420	770
508	C9 / C9A	450	950
600	C10 / C10A	465	1000
608	C11 / C11A	710	1275
700	C12 / C12A	750	1350
800	C13 / C13A	750	1360
900	C14 / C14A	1165	2020
1000	C15 / C15A	1310	2240
1100	C16 / C16A	1735	2855
1200	C17 / C17A	1925	3170

The routine greasing interval is dependent upon operating speed, temperature and environment. As a guide, the re-lubrication quantity should be around 2 – 3 grams given at the following interval:

Radial bearing with axial bearing (fixed or thrust arrangement) re-grease every 100 hours

Radial bearing only (expansion arrangement) re-grease every 400 hours

Estimation of the quantity required depending on the speed can be made using the table below.

SPEED RANGE	PERCENTAGE
0 - 50,000dn	100%
50,000dn - 100,000dn	75%
150,000dn - 200,000dn	50%
Above 200,000dn	25%

ADVANCED RANGE
ASSEMBLY INSTRUCTION

The following section shows a typical procedure for the assembly and installation of the Bowman Advanced Split Roller Bearing unit. Each bearing is supplied with detailed instructions in the box for use by the installer. The information given below is intended to guide engineers using this catalogue to understand the product and aid them in determining suitability for their machinery and plant. Further guidance on installation of specific bearings or applications can be provided by our technical department.

PRELIMINARY NOTES

- Wipe clean all bearing parts to remove preservative oil
- Take note of the marking numbers on each split component to identify matching halves
- Determine the bearing positions
- Lightly oil the shaft with thin oil and lubricate all other interfaces and threads
- Where possible, install the fixed bearing first to locate the shaft axially

SHAFT TOLERANCES

Split roller bearings rely on accurate shaft form and diameter to ensure the desired bearing diametric clearance is obtained. Journal diameter at bearing seating is generally required to be within h7 tolerance (based on BS4500 / BS-EN-ISO 286-2) for most applications. Where shaft speeds and loads permit, wider tolerances can be used. Generally:

- h6 tolerance should be applied where speed is over 150,000dn mm
- h7 tolerance can be applied for speeds between 50,000dn mm and 150,000dn mm
- For speeds under 50,000dn mm, h9 tolerance can be applied

Note, ‘dn’ is an expression of shaft speed used by bearing manufacturers,
where:- **‘dn’ = bearing bore (mm) x shaft speed (rpm)**

DIAMETER	OVER	-	50 mm	80 mm	120 mm	180 mm	250 mm
	UP TO AND INCLUDING	50 mm	80 mm	120 mm	180 mm	250 mm	315 mm
TOLERANCE BAND (BS4500)	h6	+0 -0.016	+0 -0.019	+0 -0.022	+0 -0.025	+0 -0.029	+0 -0.032
	h7	+0 -0.025	+0 -0.030	+0 -0.035	+0 -0.040	+0 -0.046	+0 -0.052
	h9	+0 -0.062	+0 -0.074	+0 -0.087	+0 -0.100	+0 -0.115	+0 -0.130
	IT6	0.016	0.019	0.022	0.025	0.029	0.032
	D11	+0.080 +0.240	+0.100 +0.290	+0.120 +0.340	+0.145 +0.395	+0.170 +0.460	+0.190 +0.510

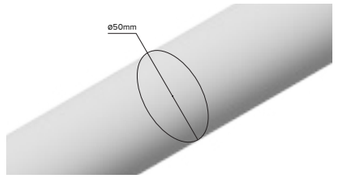
Tolerances in the table above are in mm.
IT6 is roundness and parallelism (cylindrical) of the bearing seating.
Tolerance of h9 and surface texture of 3.2µm Ra are applicable to the seal seating area.
Shaft surface finish for the bearing seating is generally 3.2µm Ra, for shafts of h7 tolerance, and 1.6µm Ra, where h6 shaft tolerance is applied.

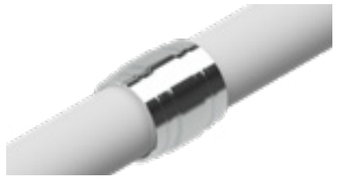
STAGE 1

Clean and inspect the shaft at the bearing seating. Determine the tolerance required from the table provided. When the two halves of the inner race are assembled around the shaft there should be a gap at each joint.

This feature ensures the race is gripped to the shaft securely by the clamp ring halves. Maintain even joint gaps on the inner race and clamp rings. Soft packing can be used to equalise the inner race joint gaps. Fit the clamp rings with their joints approximately 90° to the inner race joints.

Progressively tighten the clamp ring joint screws keeping all gaps equalised. With a soft faced hammer, tap the clamp ring halves to seat in their grooves. Finally, tighten the joint screws to the torque figure indicated in the provided table.





For expansion bearings, the inner race can be offset according to the amount of shaft thermal expansion, so that when operating temperature is reached, the rollers will run central to the outer race. When fitted, re-check the inner race and clamp ring joint gaps are equal and the race is correctly positioned axially.

STAGE 2

The radial cage is supplied with loose rollers to join the cage halves together once assembled on the inner race. Apply a film of grease to the roller path and bore of the cage before placing the cage around the race. Insert the joint coupler with its bevel edge toward the shaft. The cage halves do not have matching numbers. With the two halves around the inner race, fit the loose rollers with firm pressure until they lock in the pockets and retain the halves of the cage. Couplers can be fitted to one half of the cage before the cage is fitted. Rotate the cage to assemble the second joint.

STAGE 3

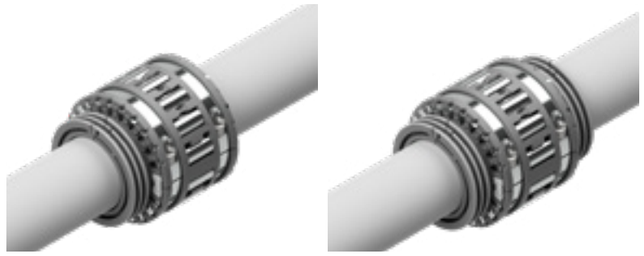
Apply a film of grease to the side face of the clamping ring and axial rollers.

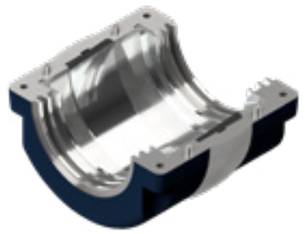
The axial cage halves are joined using clips. Place halves around the shaft then push the clip into the slots.

(applicable only for a fixed bearing)

STAGE 4

Individual instructions are supplied with each seal. Separate the seal halves using the release tool provided. Lubricate the bore of the seal and the shaft with a thin film of grease. Place the two seal halves around the shaft ensuring the male / female joints correspond and compress the 'O' rings to clip the halves together. Once fitted, the seals can be moved axially to position them relative to the housing grooves (when the housing is fitted).





STAGE 5

Prime the small radial groove of the cartridge with grease. Fit the radial outer race halves and identify the upper half by the radial lubrication holes. This must be fitted in the housing top half which has the lubrication nipple. Push the race halves into the seating grooves ensuring matching numbers coincide. The race joints will protrude slightly beyond the housing joints. Protect these faces when handling the halves.

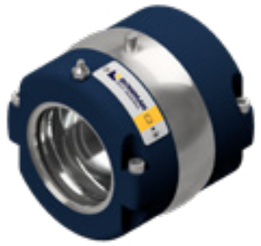
For fixed bearings, place the axial races in their recesses as shown. When pushed fully into their seating the joints of the axial races will be slightly below the face of the housing.

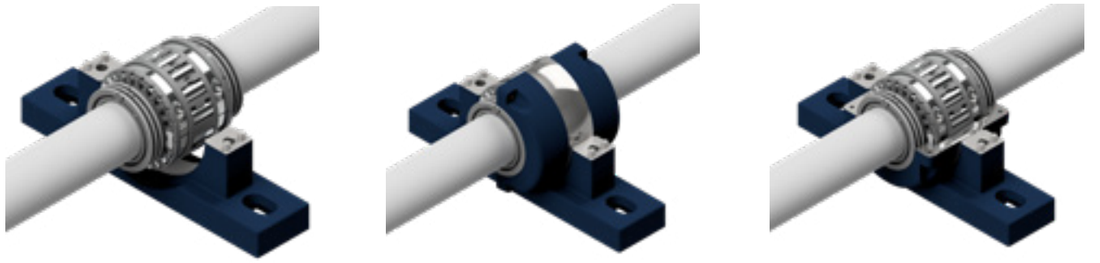
STAGE 5A

For cartridges sizes C13 to C17A, additional radial hold back screws and washers are required to retain the radial outer race in the cartridge. Insert the screws and washers supplied with the bearing, through the cartridge into the race but do not fully tighten. Assemble the two halves of the cartridge together, with their radial outer races fitted, fully tighten cartridges joint screws then fully tighten radial hold back screws. Then disassemble the cartridges halves ready for installation around the bearing. Only use the screws and washers provided and do not exceed the torque values listed within this instruction leaflet.

STAGE 6

Apply lubricant to the inside surface of the cartridge, covering the fitted races. Coat the assembled cages and rollers on the inner race and add some grease to the labyrinths of the seals. The quantity of grease to be used in the bearing can be determined from the grease weights table.





STAGE 7

With the pedestal base located in position, place the lower half of the cartridge on top of the shaft. Lubricate the spherical surfaces of the pedestal and cartridge. Align the two spherical surfaces, ensure the labyrinth seals mate with their corresponding grooves and rotate the cartridge around the shaft into the pedestal base until both joint faces are aligned. It may be necessary to manually guide the axial rollers between the clamp rings and axial outer races whilst rotating the cartridge into position.

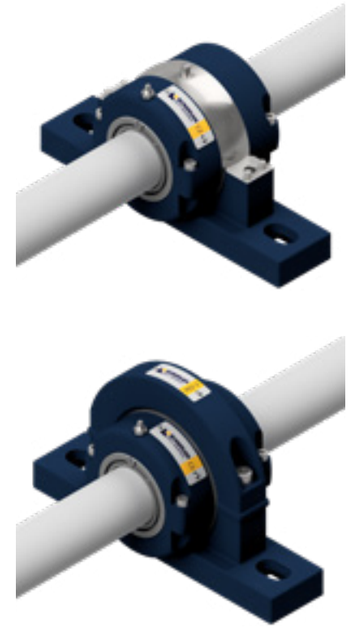
STAGE 8

Place the upper half of the cartridge on top of the shaft in position, ensuring the axial rollers & races align. Lower gently into position, then fit and progressively tighten the cartridge joint screws to the torque settings provided.

Shaft supports or jacks can now be removed.

Apply a thin film of grease to the spherical surfaces of the pedestal cap and upper half of the cartridge. Pedestal cap can now be fitted, ensuring matching numbers are together. Fit the joint screws, tighten then release approximately half a turn.

Rotate the shaft by hand or under power for a few revolutions before finally tightening the cap screws to the torque settings provided. This allows the cartridge to align the bearing with the shaft.



ASSEMBLY CHECK LIST

- Clean bearing parts and shaft before installation
- Measure shaft to ensure it is within tolerance
- Keep matched component halves together
- Equalise joint gaps on both sides of inner race and clamp rings
- Inner race must be fully tightened
- Lubricate bearing during assembly NOT after
- Lubricate seal bores, labyrinths and housing spherical surfaces
- Tighten screws according to torque figures provided

SCREW SIZES AND TIGHTENING TORQUES

SIZE GROUP	BEARING BORE Ø		CLAMP RING JOINT SCREW	TORQUE (Nm)	CARTRIDGE JOINT SCREW	TORQUE (Nm)	CARTRIDGE RADIAL SCREW	TORQUE (Nm)
	(mm)	(inch)						
108	30, 35, 40	1.1875 - 1.5	M5	8.5	M5	6.5	-	-
200	45, 50	1.6875 - 2.0	M5	8.5	M5	6.5	-	-
208	55, 60, 65	2.1875 - 2.5	M5	8.5	M5	6.5	-	-
300	70, 75	2.6875 - 3.0	M6	15	M6	11	-	-
308	80, 85, 90	3.1875 - 3.5	M6	15	M6	11	-	-
400	95, 100, 105	3.6875 - 4.0	M6	15	M6	11	-	-
408	110, 115	4.1875 - 4.5	M8	35	M8	26	-	-
500	120, 125, 130	4.6875 - 5.0	M8	35	M8	26	-	-
508	135, 140	5.1875 - 5.5	M8	35	M8	26	-	-
600	150, 155, 160	5.6875 - 6.0	M8	35	M8	26	-	-
608	170	6.4375 - 6.5	M10	70	M10	52.5	-	-
700	175, 180	6.9375 - 7.0	M10	70	M10	52.5	-	-
800	190, 200	7.9375 - 8.0	M12	120	M12	90	M12	60
900	220, 230	9.0	M12	120	M12	90	M12	60
1000	240, 250, 260	10.0	M12	120	M12	90	M12	60
1100	270, 275, 280	11.0	M16	300	M16	225	M12	60
1200	290, 300	12.0	M16	300	M16	225	M12	60

(All screws are metric coarse thread, socket-head cap screws grade 12.9)

TIGHTENING TORQUES

PEDESTAL	JOINT SCREW	TORQUE (Nm)
PED1	M10	52.5
PED2	M10	52.5
PED3	M12	90
PED4	M16	225
PED5	M20	420
PED6	M20	420
PED7	M24	712
PED8	M24	712
PED9	M24	712
PED10	M24	712

PEDESTAL	JOINT SCREW	TORQUE (Nm)
PED11	M20	420
PED12	M20	420
PED13	M20	420
PED14	M20	420
PED15	M24	712
PED16	M24	712
PED17	M24	712

PEDESTAL	JOINT SCREW	TORQUE (Nm)
PED9A	M24	712
PED10A	M24	712
PED11A	M24	712
PED12A	M24	712
PED13A	M24	712
PED14A	M24	712
PED15A	M24	712
PED16A	M24	712
PED17A	M24	712

HEXAGON KEY SIZES

SCREW SIZE	KEY SIZE (A/F) (mm)
M5	4
M6	5
M8	6
M10	8
M12	10
M16	14
M20	17
M24	19

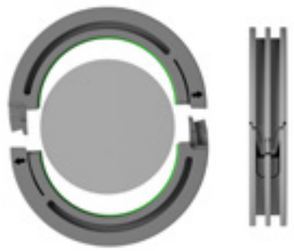
SEAL INSTALLATION

Insert tool, aligning arrows on seal and tool

Press and hold tool whilst applying light pressure to the bore of the seal until the joint separates

Repeat action on opposite joint

Pull both seal halves apart



The seals can be installed before or after the radial & axial bearings are assembled. If fitted before the bearing, slide the seals axially away to each side of the bearing position allowing space to assemble the bearing.

- Lightly lubricate the bore of each seal half, ensuring the 'O' rings remain in place.
- Place both halves around the shaft ensuring male and female joints are aligned.
- Clip the two halves together so that the ' arrow-head' is retained in the corresponding recess.
- Grip the seal at the joints and move the assembled seal into the correct position by sliding along the shaft.
- Greasing the labyrinths before closing the cartridge serves to lubricate the seals and adds an additional grease barrier against contamination.
- Seals rotate with the shaft and axially align them selves with their corresponding cartridge grooves during operation.

PRODUCT SELECTION:
THE SN/SD/SAF RANGE

CONTENTS

- RANGE INTRODUCTION – FEATURES AND BENEFITS 44
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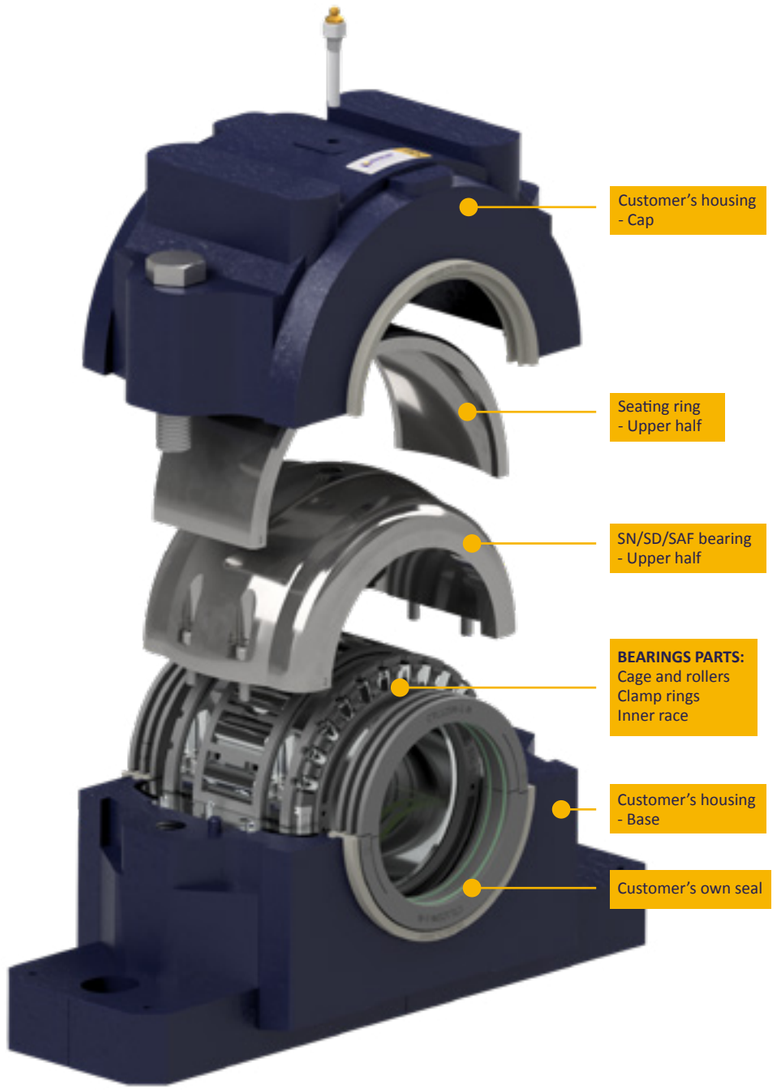


BOWMAN SN/SD/SAF SPLIT ROLLER BEARINGS RANGE INTRODUCTION

The Bowman patented SN/SD/SAF Split Roller Bearing has been designed to replace equivalent solid spherical roller bearings, delivering dramatically reduced bearing change out times, keeping downtime minimal.

These bearings include a seating ring for mounting into existing plummer/pillow blocks for a fast performance upgrade and simplified maintenance.

KEY FEATURES AND BENEFITS

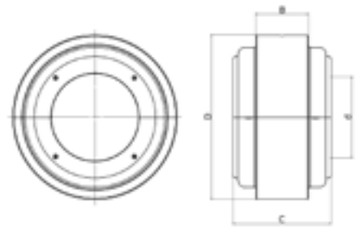
- Replaces equivalent spherical roller bearings
- Seating ring included for mounting into existing plummer/pillow block
- Faster bearing changes for reduced downtime
- 135 mm to 300 mm (5 3/16 in. to 12 in.)
- Larger sizes manufactured to order
- Patented 3D printed cages
- Requires less lubricant
- Patented triple labyrinth extended seal for extending the life of worn shaft

ONGOING RANGE EVOLUTION

Our SN/SD/SAF range signifies an evolutionary change in how heavy side industries replace solid spherical bearings. Using state-of-the-art technologies and unrivalled engineering expertise, we are continually evolving, testing, and validating new sizes to add to this growing range.

Email sales@bowman.co.uk with your size requirements and we will contact you when the range has expanded enough to meet your needs.

BEARING RATING AND SELECTION



BEARING DIMENSIONS
DIMENSIONALLY INTERCHANGEABLE 222 SERIES

BEARING DESIGNATION 222-- CCK/W33[2]		EXISTING COMPONENTS		BOWMAN				DIMENSIONS		
SHAFT DIAMETER 'd'		222-- CCK/W33		DESIGNATION[1]	BEARING RATINGS (kN)[3]					
mm	inch	BEARING	HOUSING	(*add F for Fixed, E for Expansion)	RADIAL Dyn. Cr	RADIAL STATIC Cor	AXIAL Ca	D	B[4]	C
135	5 3/16 5 1/4	22230	(F)SNL530 SAF530	BSBG M135 * 22230 (F)SNL530 BSBG E503 * 22230 SAF530 BSBG E504 * 22230 SAF530	593	937	210	270 270	73 82.8	154 154
140	5 7/16 5 1/2	22232	SNL3038 (F)SNL532 SAF532 SAF532	BSBG M140 * 22232 SNL3038 BSBG M140 * 22232(F)SNL532 BSBG E507 * 22232 SAF532 BSBG E508 * 22232 SAF532	593	937	210	290 290 290	97.5 80 89.8	154 154 154
150	5 15/16 6	22234	SNL3040 SAF534 SAF534	BSBG M150 * 22234 SNL3040 BSBG E515 * 22234 SAF534 BSBG E600 * 22234 SAF534	634	1040	233	310 310	104 95.8	179 179
160	6 7/16	22236	SNL3138 SAF536	BSBG M160 * 22236 SNL3138 BSBG E607 * 22236 SAF536	634 672	1040 1083	233 235	320 320	105 95.8	161 196
170	6 15/16 7	22238	SNL3140 SAF538 SAF538	BSBG M170 * 22238 SNL3140 BSBG E615 * 22238 SAF538 BSBG E700 * 22238 SAF538	672	1083	235	340 340	92 101.8	178 198
180	7 1/8 7 3/16	22240	SNL3048 SAF540 SAF540	BSBG M180 * 22240 SNL3048 BSBG E702 * 22240 SAF540 BSBG E703 * 22240 SAF540	715	1201	278	360 360	119 107.8	198 198
200	7 15/16 8	22244	SNL3148 SAF544 SAF544	BSBG M200 * 22244 SNL3148 BSBG E715 * 22244 SAF544 BSBG E800 * 22244 SAF544	753	1327	281	400 400	118 117.8	206 206
220	8 7/8 8 15/16 9	22248	SNL3152	BSBG M220 * 22248 SNL3152 BSBG E807 * 22248 SNL3152 BSBG E815 * 22248 SNL3152 BSBG E900 * 22248 SNL3152	893	1588	281	440	142	213
240	9 7/16 9 1/2	22252	SNL3064	BSBG M240 * 22252 SNL3064 BSBG E907 * 22252 SNL3064 BSBG E908 * 22252 SNL3064	988	1872	267	480	155.5	213
260	9 15/16 10	22256	SNL3160	BSBG M260 * 22256 SNL3160 BSBG E915 * 22256 SNL3160 BSBG E1000 * 22256 SNL3160	988	1872	267	500	130	213
280	10 15/16 11	22260	SNL3164	BSBG M280 * 22260 SNL3164 BSBG E1015 * 22260 SNL3164 BSBG E1100 * 22260 SNL3164	1146	2216	292	540	140	242
300	11 1/2 11 15/16 12	22264	SNL3168	BSBG M300 * 22264 SNL3168 BSBG E1108 * 22264 SNL3168 BSBG E1115 * 22264 SNL3168 BSBG E1200 * 22264 SNL3168	1125	2234	316	580	170	242

BEARING DIMENSIONS
DIMENSIONALLY INTERCHANGEABLE 230 SERIES

BEARING DESIGNATION 222-- CCK/W33[2]		EXISTING COMPONENTS		BOWMAN				DIMENSIONS		
SHAFT DIAMETER 'd'		222-- CCK/W33		DESIGNATION[1]	BEARING RATINGS (kN)[3]					
mm	inch	BEARING	HOUSING	(*add F for Fixed, E for Expansion)	RADIAL Dyn. Cr	RADIAL STATIC Cor	AXIAL Ca	D	B[4]	C
260	9 15/16 10	23056	SNL3056 SAF056 SAF056	BSBG M260 * 23056 SNL3056 BSBG E915 * 23056 SAF056 BSBG E1000 * 23056 SAF056	988	1872	267	420 420	126 106	213 213
280	10 15/16 11	23060	SNL3060	BSBG M280 * 23060 SNL3060 BSBG E1015 * 23060 SNL3060 BSBG E1100 * 23060 SNL3060	1146	2216	292	460	143	242
300	11 1/2 11 15/16 12	23064	SNL3064	BSBG M300 * 23064 SNL3064 BSBG E1108 * 23064 SNL3064 BSBG E1115 * 23064 SNL3064 BSBG E1200 * 23064 SNL3064	1125	2234	316	480	131	242

BEARING DIMENSIONS
DIMENSIONALLY INTERCHANGEABLE 231 SERIES

BEARING DESIGNATION 222-- CCK/W33[2]		EXISTING COMPONENTS		BOWMAN				DIMENSIONS		
SHAFT DIAMETER 'd'		222-- CCK/W33		DESIGNATION[1]	BEARING RATINGS (kN)[3]					
mm	inch	BEARING	HOUSING	(*add F for Fixed, E for Expansion)	RADIAL Dyn. Cr	RADIAL STATIC Cor	AXIAL Ca	D	B[4]	C
170	6 15/16 7	23138	SNL3138	BSBG M170 * 23138 SNL3138 BSBG E615 * 23138 SNL3138 BSBG E700 * 23138 SNL3138	672	1083	235	320	104	178
180	7 1/8 7 3/16	23140	SNL3140	BSBG M180 * 23140 SNL3140 BSBG E702 * 23140 SNL3140 BSBG E703 * 23140 SNL3140	715	1201	278	340	112	198
200	7 15/16 8	23144	SNL3144	BSBG M200 * 23144 SNL3144 BSBG E715 * 23144 SNL3144 BSBG E800 * 23144 SNL3144	753	1327	281	370	120	186
220	8 7/8 8 15/16 9	23148	SNL3148	BSBG M220 * 23148 SNL3148 BSBG E807 * 23148 SNL3148 BSBG E815 * 23148 SNL3148 BSBG E900 * 23148 SNL3148	893	1588	281	400	128	213
240	9 7/16 9 1/2	23152	SNL3152	BSBG M240 * 23152 SNL3152 BSBG E907 * 23152 SNL3152 BSBG E908 * 23152 SNL3152	988	1872	267	440	144	213
260	9 15/16 10	23156	SNL3156	BSBG M260 * 23156 SNL3156 BSBG E915 * 23156 SNL3156 BSBG E1000 * 23156 SNL3156	988	1872	267	460	146	213
280	10 15/16 11	23160	SNL3160	BSBG M260 * 23156 SNL3156 BSBG E915 * 23156 SNL3156 BSBG E1000 * 23156 SNL3156	1146	2216	292	500	160	242
300	11 1/2 11 15/16 12	23164	SNL3164	BSBG M300 * 23164 SNL3164 BSBG E1108 * 23164 SNL3164 BSBG E1115 * 23164 SNL3164 BSBG E1200 * 23164 SNL3164	1125	2234	316	540	176	242

Note:
1. Typical designations shown. Other housing / shaft size combinations can be provided upon request
2. Existing bearing must have tapered bore and be adaptor sleeve mounted
3. Internal bearing parts are from the Advanced range. For further details refer to the Advanced bearing section of catalogue
4. Existing bearing locating rings may be required to axially position the BSBG outer sleeve, for both fixed and expansion bearings. (Further details upon request)

CALCULATION INFORMATION

BEARING RATINGS AND SELECTION

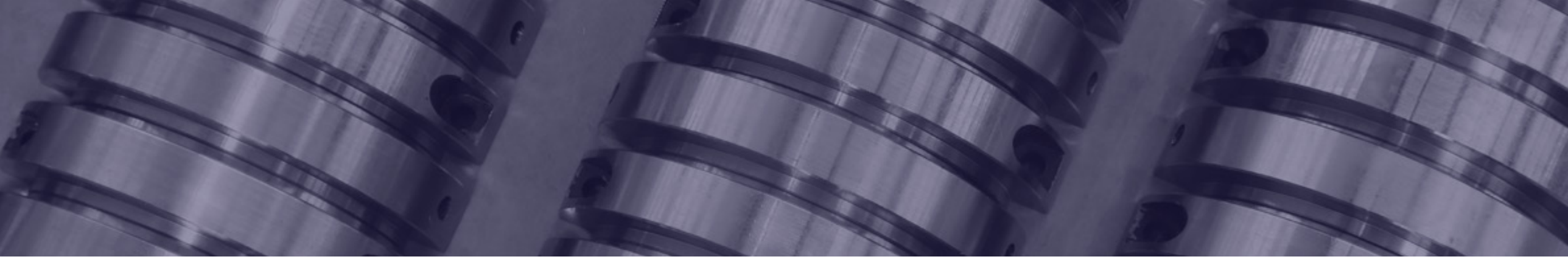
Bearing ratings for dynamic radial capacity (C_R), dynamic axial capacity (C_A), static radial capacity (C_{OR}) and static axial capacity (C_{OA}) shown in this catalogue are based on ISO 281-1990 (dynamic capacity) and ISO 76-1987 (static capacity) respectively.

Radial and axial loads can be considered independently and Bowman split roller bearing units isolate one from the other.

BEARING RADIAL AND AXIAL RATINGS

SIZE GROUP	BEARING BORE Ø		RADIAL		AXIAL [1]		MAX SPEED rpm
	(mm)	(inch)	DYNAMIC C_R (kN)	STATIC C_{OR} (kN)	DYNAMIC C_A (kN)	STATIC C_{OA} (kN)	
508	135 140	5.1875 - 5.5	593	937	210	895	1330
600	150 155 60	5.6875 - 6.0	634	1040	233	1028	1240
608	170	6.4375 - 6.5	672	1083	235	1094	1070
700	175 180	6.9375 - 7.0	715	1201	278	1368	1010
800	190 200	7.9375 - 8.0	753	1327	281	1459	890
900	220 230	9.0	893	1588	281	1459	780
1000	240 250 260	10.0	988	1872	267	1459	700
1100	270 275 280	11.0	1146	2216	292	1641	620
1200	290 300	12.0	1125	2234	316	1823	570

1) Axial ratings apply only to fixed bearings where the radial inner race is located against shaft abutments. Shaft abutment should be shaft diameter +5mm for bearings up to and including 308 group, and +10mm for bearings from 400 to 1200 group.



Rolling element bearing life calculations given below are based on ISO standards, where statistical life expectancy for rolling contact fatigue provides a reasonable estimate of service life under conditions of adequate lubrication and protection against contamination and excessive misalignment.

In practice the service life of a bearing may be determined by factors other than the normal fatigue life.

CALCULATING BEARING RADIAL LIFE

Expected radial bearing life is calculated by the following equation:

	$L10_R$	=	$[C_R / (P_R \times f_{Rd})]^{10/3}$
WHERE:	$L10_R$	=	Expected radial life of 90% of similar bearings under similar operating conditions (in millions of revolutions)
	C_R	=	Radial Dynamic Rating (kN)
	P_R	=	Dynamic Radial Load (kN)
	f_{Rd}	=	Radial Dynamic (or Service) Factor

Radial Dynamic (or Service) Factors f_{Rd} are determined depending on application conditions, as below:

STEADY LOAD / SMALL FLUCTUATIONS	1.0 to 1.3
LIGHT TO MEDIUM FLUCTUATIONS	1.3 to 2.0
HEAVY SHOCK, RECIPROCATION OR VIBRATION	2.0 to 3.5

CALCULATING BEARING AXIAL LIFE

Expected axial bearing life is calculated by the following equation:

	$L10_A$	=	$[C_A / (P_A \times f_{Ad})]^{10/3}$
WHERE:	$L10_A$	=	Expected axial life of 90% of similar bearings under similar operating conditions (in millions of revolutions)
	C_A	=	Axial Dynamic Rating (kN)
	P_A	=	Dynamic Axial Load (kN)
	f_{Ad}	=	Axial Dynamic (or Service) Factor

STEADY LOAD / SMALL FLUCTUATIONS	1.0 to 1.3
LIGHT TO MEDIUM FLUCTUATIONS	1.3 to 2.0
HEAVY SHOCK, RECIPROCATION OR VIBRATION	2.0 to 3.5

Axial Dynamic (or Service) Factors f_{Ad} are determined depending on application conditions, as below:

STATIC RATINGS

The static rating is defined as that load which causes a permanent deformation of 0.0001 times the diameter of the roller and can be considered to correspond to a contact stress of 4,000 MPa at the centre of the most heavily loaded roller. For slow rotation speeds (less than 5 rpm) consider static ratings for the bearing selection.

	C_{OR}	≥	$f_{Rs} \times P_{OR}$ (Radial)
	C_{OA}	≥	$f_{As} \times P_{OA}$ (Axial)
WHERE:	C_{OR}	=	Bearing Radial Static Rating (kN)
	C_{OA}	=	Bearing Axial Static Rating (kN)
	P_{OR}	=	Bearing Radial Static Load (kN)
	P_{OA}	=	Bearing Axial Static Load (kN)
	f_{Rs}	=	Static Safety Factor (Radial)
	f_{As}	=	Static Safety Factor (Axial)

Guidelines for appropriate static safety factor are below:

TYPE OF OPERATION	REQUIREMENT FOR SMOOTH OPERATION		
	LOW	NORMAL	HIGH
SMOOTH / VIBRATION FREE	1	1.5	3
NORMAL	1	2	3.5
HIGH SHOCK LOADS	2.5	3	4

(Refer to our Technical Department for advice on service factors)

BEARING LIFE REQUIREMENTS

Suggested lives and factors for specific operating conditions are shown below:

OPERATING CONDITIONS

It is best practice to specify a bearing that provides an L10 life of at least 10,000 hours, unless the bearing is being selected based on static rating.

	LIFE FACTOR fL	LIFE HOURS L10
8 HOURS DAILY WORKING	3.0 - 4.0	20,000 - 50,000
CONTINUOUS OPERATION MAIN DRIVES, LARGE ELECTRICAL MACHINERY, FLYWHEELS AND MINING	4.4 - 5.0	70,000 - 100,000
CONTINUOUS OPERATION AND AN EXCEPTIONALLY HIGH DEGREE OF RELIABILITY	5.0 - 6.0	100,000 - 200,000

We recommend that bearings are specified to provide an L10 life of a least 10,000 hours, except for bearings selected on the basis of static rating.

DYNAMIC FACTOR

Select the appropriate dynamic factor (fd) from the chart below:

CONDITIONS	fd
STEADY LOAD OR SMALL FLUCTUATIONS	1.0 - 1.3
LIGHT SHOCK	1.3 - 2.0
HEAVY SHOCK, VIBRATION OR RECIPROCATION	2.0 - 3.5

LIFE ADJUSTMENT FACTORS FOR CRITICAL APPLICATIONS

By using the tables and equations in this catalogue it is possible to specify high-capacity split roller bearings that are adequate for normal applications.

For non-standard or critical applications that require reliability greater than 90%, replace the L10 equation with Lna = al x L10. The table below will help you.

RELIABILITY	%	95	96	97	98	99
	al	0.62	0.53	0.44	0.33	0.21

BASIC STATIC LOAD RATINGS (Cor)

Bowman uses established ISO standards for calculating load ratings for its high load capacity bearings. Under these standards, the basic static load rating is denoted by Cor. The basic static load rating is dined at the static (radial) load and corresponds to a contact stress of 4,000 MPa (580,000 psi) at the centre of the most heavily loaded roller/raceway contact – producing a permanent deformation of 0.0001 times the roller diameter. In applications where rotation is intermittent or less than 5 rpm, bearing size can be selected based on the static load carrying capacity.

This table will help you determine the requisite basic load rating:

			Cor = So x P
WHERE:	Cor	=	basic static radial load rating (kN)
	P	=	Effective bearing load (kN)
	So	=	Static safety factor

Bearing Static Safety factors, So

TYPES OF OPERATION	REQUIREMENTS FOR SMOOTH RUNNING		
	LOW	NORMAL	HIGH
VIBRATION FREE	1	1.5	3
NORMAL	1	2	3.5
HIGH SHOCK LOADS	2.5	3	4

SELECTION FOR AXIAL LOAD

Bowman's high capacity split roller bearings accommodate significantly more axial load than competing products. It is therefore important to consider axial thrust independently from radial load when specifying the bearings. To do this, you need to know the speed and desired shaft size so that you can determine the axial load applied to the bearing.

The following formula will help you work out the axial load:

			Ca > (fd_a x fdn x Pa) / fb
WHERE:	Ca	=	axial rating
	fd_a	=	dynamic or service factor
	Pa	=	calculated axial load
	fdn	=	velocity (dn) factor
	fb	=	bearing factor (see scale opposite)

Notes:

- Where the load is accurately known, the dynamic or services factor fda may be in creased from 1 for peak overload periods to 1.1 or 1.2 for general running depending on smoothness
- Make allowances in the calculated loads to ensure the axial capacity of the bearing is not exceeded
- The axial load capacity is decreased by 50% if the lubricant does not contain an extreme pressure additive

TEMPERATURE

The operating temperatures for any standard bearing is between 0°C and 100°C (32°F - 212°F). When the temperature is expected to be above 100°C (212°F) special consideration must be given to the specification of material, lubrication and seals. The design of the bearing may also need to be altered.

°C	170	200	250
% REDUCTION	5	15	25

SHAFT TOLERANCE AND SURFACE FINISH

Split roller bearings rely on accurate shaft form and diameter to ensure the desired bearing diametric clearance is obtained. Journal diameter at bearing seating is generally required to be within h7 tolerance (based on BS4500 / BS-EN-ISO 286-2) for most applications. Where shaft speeds and loads permit, wider tolerances can be used. Generally:

h6 tolerance should be applied where speed is over 150,000dn mm
h7 tolerance can be applied for speeds between 50,000dn mm and 150,000dn mm
For speeds under 50,000dn mm, h9 tolerance can be applied

Note, 'dn' is an expression of shaft speed used by bearing manufacturers,
where:- **'dn' = bearing bore (mm) x shaft speed (rpm)**

DIAMETER	OVER	-	50mm	80mm	120mm	180mm	250mm
	UP TO AND INCLUDING	50mm	80mm	120mm	180mm	250mm	315mm
TOLERANCE BAND (BS4500)	h6	+0 -0.016	+0 -0.019	+0 -0.022	+0 -0.025	+0 -0.029	+0 -0.032
	h7	+0 -0.025	+0 -0.030	+0 -0.035	+0 -0.040	+0 -0.046	+0 -0.052
	h9	+0 -0.062	+0 -0.074	+0 -0.087	+0 -0.100	+0 -0.115	+0 -0.130
	IT6	0.016	0.019	0.022	0.025	0.029	0.032
	D11	+240 +80	+290 +100	+340 +120	+395 +145	+0.170 +0.460	+0.190 +0.510

Tolerances in the table above are in mm.
IT6 is roundness and parallelism (cylindrical) of the bearing seating.
Tolerance of h9 and surface texture of 3.2µm Ra are applicable to the seal seating area.
Shaft surface finish for the bearing seating is generally 3.2µm Ra, for shafts of h7 tolerance, and 1.6µm Ra, where h6 shaft tolerance is applied.

TOLERANCES AND RECESS WIDTHS

The tolerance of the width of the recess is D11, as per this table:

WIDTH (mm)	Over	-	50	80	120
	up to and incl	50	80	120	180
TOLERANCE IN µm					
TOLERANCE D11 to BS 4500		+240	+290	+340	+395
		+80	+100	+120	+145

For applications that require large shaft fillet radii, bearings with larger chamfers to the inner race bores can be provided. In such instances, special cartridges and seals are required for mounting the larger shaft diameters. A modified inner race may also be required to allow the race halves to be assembled onto the shaft in a truly radial direction.

If the bearing you are specifying is to be mounted into a shaft recess, please speak to our technical team who will advise on any necessary modifications and relevant part codes.

TEMPERATURE CHARACTERISTICS

The normal operating temperature range for Bowman split roller bearings is from 0° to 100°C (32°F - 212°F). Operating temperatures outside of this range will require consideration for lubrication, seals and materials of construction. Please consult our Technical Department for further advice.

The quantity, size and pitch circle diameter of the rollers within any roller bearing will excite vibrations at certain frequencies – this can even be present to some extent in new bearings installed in perfect conditions because of the constantly changing angular position of the rollers during operation.

The following tables indicate the frequencies of bearing parts per shaft revolution and can be used to calculate excitation frequencies – simply multiply the tabulated frequencies by the shaft speed.

CONDITION MONITORING FREQUENCY DATA

Condition monitoring of machinery is used to identify significant changes which in turn indicates developing faults and is a major component of the predictive maintenance process. By using the bearing frequency data listed below, machine operators can input the correct information into condition monitoring equipment, enabling them to identify and monitor potential faults and schedule maintenance procedures accordingly. Successful use of this system reduces downtime by enabling repairs to be planned, avoiding the possibility of catastrophic failure and breakdowns.

CAGE	RADIAL	The frequency at which a point on the radial cage rotates relative to the inner housing.
	AXIAL	The frequency at which a point on the axial cage rotates relative to the inner housing.
ROLLER	RADIAL	The frequency at which a point on a given radial roller contacts the inner race or radial outer race or the radial cage roller pocket.
	AXIAL	The frequency at which a point on a given axial roller contacts the clamp ring or axial outer race or the axial cage roller pocket.
OUTER	RADIAL	The frequency at which a point on the radial outer race contacts the radial rollers.
	AXIAL	The frequency at which a point on the axial outer race contacts the axial rollers.
INNER	RADIAL	The frequency at which a point on the inner race contacts the radial rollers.
	AXIAL	The frequency at which a point on the clamp ring contacts the axial rollers.

The tables also list the pitch circle diameters and number of rollers, for use with condition monitoring equipment that accepts this information.

Note that the contact angle is 0 in all cases.

FREQUENCY DATA

- Velocity readings for a properly installed new bearing may be a high as 4mm/second
- Typically, alarm levels should be set no higher than 15mm/second
- Shutdown should occur not higher than 20mm/second

RADIAL DATA

SHAFT DIA	BEARING BORE Ø		PART FREQUENCIES				ROLLER DETAILS		
	(mm)	(inch)	CAGE	ROLLER	OUTER	INNER	RADIAL PCD (mm)	NO. OF ROLLERS	ROLLER Ø (mm)
508	135 140	5.1875 - 5.5	0.434	3.744	8.688	11.312	190.50	20	25
600	150 155 160	5.6875 - 6.0	0.438	4.002	9.647	12.353	203.20	22	25
608	170	6.4375 - 6.5	0.438	3.995	8.768	11.232	219.08	20	27
700	175 180	6.9375 - 7.0	0.442	4.234	9.719	12.281	231.78	22	27
800	190 200	7.9375 - 8.0	0.448	4.710	10.740	13.260	257.18	24	27
900	220 230	9.0	0.448	4.710	10.740	13.260	285.75	24	30
1000	240 250 260	10.0	0.452	5.191	12.664	15.336	314.33	28	30
1100	270 275 280	11.0	0.453	5.311	12.693	15.307	342.90	28	32
1200	290 300	12.0	0.457	5.761	12.794	15.206	371.48	28	32

AXIAL DATA

SHAFT DIA	BEARING BORE Ø		PART FREQUENCIES				ROLLER DETAILS		
	(mm)	(inch)	CAGE	ROLLER	OUTER	INNER	RADIAL PCD (mm)	NO. OF ROLLERS	ROLLER Ø (mm)
508	135 140	5.1875 - 5.5	0.500	7.304	14	14	190.50	24	14
600	150 155 160	5.6875 - 6.0	0.500	7.757	14	14	203.20	24	14
608	170	6.4375 - 6.5	0.500	7.824	12	12	219.08	24	14
700	175 180	6.9375 - 7.0	0.500	8.278	15	15	231.78	30	14
800	190 200	7.9375 - 8.0	0.500	9.185	16	16	257.18	32	14
900	220 230	9.0	0.500	10.205	16	16	285.75	32	14
1000	240 250 260	10.0	0.500	11.226	16	16	314.33	32	14
1100	270 275280	11.0	0.500	12.246	18	18	342.90	36	14
1200	290 300	12.0	0.500	13.267	20	20	371.48	40	14

BEARING LUBRICATION

Bowman split bearing units are designed for grease lubrication. Grease is easier to retain in the housing than oil, offering reduced lubricant loss and improved sealing. It also offers better protection against corrosion to the rolling surfaces. Lubricant is directly injected into the path of the rollers for optimum distribution throughout the radial and axial bearings.

Inner housing lubrication points are tapped 1/8" NPT and fitted with nipples for grease lubrication. Grease nipples can be replaced with other fittings or pipes, however pipework must be flexible to allow the inner/outer housing spherical ball joint to operate correctly. BSP fittings may be used, but care must be taken to avoid blocking off the lubrication cross drilling in the inner housing as BSP fittings generally screw in further than NPT fittings.

LUBRICANT TYPE

Greases of NLGI No.2 designation are recommended for most applications. For centrally pumped systems a No.1 grease may be used for increased dispensation.

Greases with extreme pressure (EP) additives are recommended. However, Bowman split bearing units do not rely upon EP greases being used to achieve the axial capacities listed, unlike existing manufacturers units.

Grease with a lithium complex thickener is usually used for normal applications operating at temperatures between 0° and 80°C. When water resistance is required a grease with an aluminium complex thickener can be used. Some greases may not mix with each other so if changing lubricants, the bearing unit must be solvent-cleaned of the old lubricant before using the new lubricant.

Please contact our Technical Department if lubrication advice is required.

GREASE QUANTITY FOR INITIAL LUBRICATION

The quantity of grease required for initial lubrication is dependent upon operating speed. For slow applications the bearing and housing can be packed full of grease, however at higher speeds excessive grease will cause the bearing to overheat.

The table on the opposite page shows the fully packed quantity of grease for each housing size. The actual amount should be estimated using the percentage of this quantity factored according to the shaft speed.

FULLY PACKED GREASE QUANTITY

SHAFT SIZE (mm)	SN/SD/SAF GROUP SIZE	FIXED BEARING GREASE QUANTITY (g)	FREE BEARING GREASE QUANTITY (g)
110 - 115	GROUP 7	250	510
125	GROUP 8	330	610
135 - 140	GROUP 9	360	760
150 - 160	GROUP 10	370	800
170	GROUP 11	560	1020
180	GROUP 12	600	1080
200	GROUP 13	600	1080
220	GROUP 14	930	1600
240 - 260	GROUP 15	1040	1790
280	GROUP 16	1380	2280
300	GROUP 17	1540	2500

The routine greasing interval is dependent upon operating speed, temperature and environment. As a guide, the re-lubrication quantity should be around 2 – 3 grams given at the following interval:

Radial bearing with axial bearing (fixed or thrust arrangement) re-grease every 100 hours

Radial bearing only (expansion arrangement) re-grease every 400 hours

Estimation of the quantity required depending on the speed can be made using the table below.

SPEED RANGE	PERCENTAGE
0 - 50,000dn	100%
50,000dn - 100,000dn	75%
150,000dn - 200,000dn	50%
Above 200,000dn	25%

SN/SD/SAF
ASSEMBLY INSTRUCTIONS

PRELIMINARY NOTES

Determine the bearing positions and where possible install the fixed bearing first, as this then locates the shaft axially. Clean all bearing parts to remove preservative oil before fitting. Split components have marking numbers at the joint to identify matching halves. Lightly oil the shaft with thin oil. Other interfaces and threads should also be lubricated.

SHAFT TOLERANCES

Split roller bearings rely on accurate shaft form and diameter to ensure the desired bearing diametric clearance is obtained. Journal diameter at bearing seating is generally required to be within h7 tolerance (based on BS4500 / BS-EN-ISO 286-2) for most applications. Where shaft speeds and loads permit, wider tolerances can be used. Generally:

- h6 tolerance should be applied where speed is over 150,000dn mm
- h7 tolerance can be applied for speeds between 50,000dn mm and 150,000dn mm
- For speeds under 50,000dn mm, h9 tolerance can be applied

Note, 'dn' is an expression of shaft speed used by bearing manufacturers,
where:- **'dn' = bearing bore (mm) x shaft speed (rpm)**

DIAMETER	OVER	-	50 mm	80 mm	120 mm	180 mm	250 mm
	UP TO AND INCLUDING	50 mm	80 mm	120 mm	180 mm	250 mm	315 mm
TOLERANCE BAND (BS4500)	h6	+0 -0.016	+0 -0.019	+0 -0.022	+0 -0.025	+0 -0.029	+0 -0.032
	h7	+0 -0.025	+0 -0.030	+0 -0.035	+0 -0.040	+0 -0.046	+0 -0.052
	h9	+0 -0.062	+0 -0.074	+0 -0.087	+0 -0.100	+0 -0.115	+0 -0.130
	IT6	0.016	0.019	0.022	0.025	0.029	0.032
	D11	+0.080 +0.240	+0.100 +0.290	+0.120 +0.340	+0.145 +0.395	+0.170 +0.460	+0.190 +0.510

Tolerances in the table above are in mm.
IT6 is roundness and parallelism (cylindrical) of the bearing seating.
Tolerance of h9 and surface texture of 3.2µm Ra are applicable to the seal seating area.
Shaft surface finish for the bearing seating is generally 3.2µm Ra, for shafts of h7 tolerance, and 1.6µm Ra, where h6 shaft tolerance is applied.

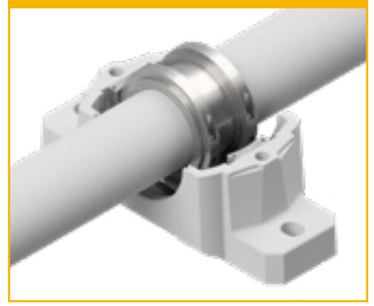
STAGE 1

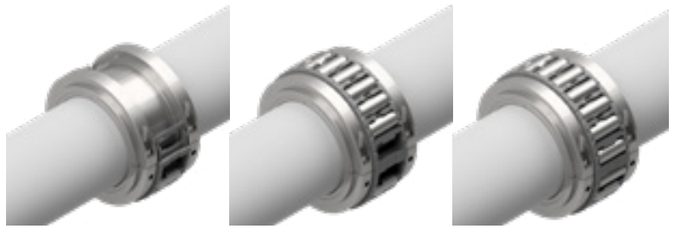
Clean and inspect the shaft at the bearing seating. Determine the tolerance required from the table provided. When the two halves of the inner race are assembled around the shaft there should be a gap at each joint. This feature ensures the race is gripped to the shaft securely by the clamping ring halves. Maintain even joint gaps on the inner race and clamping rings. Soft packing can be used to equalise the inner race joint gaps. Fit the clamping rings with their joints approximately 90° to the inner race joints. Progressively tighten the clamping ring joint screws keeping all gaps equalised. With a soft faced hammer, tap the clamping ring halves to seat in their grooves. Finally, tighten the joint screws to the torque figure indicated in the provided table.

For expansion bearings, the inner race can be offset according to the amount of shaft thermal expansion, so that when operating temperature is reached, the rollers will run central to the outer race. When fitted, re-check the inner race and clamping ring joint gaps are equal, and the race is correctly positioned axially.

STAGE 2

Insert the lower half seating ring (without the through-hole at 90° to joints) into the housing base.





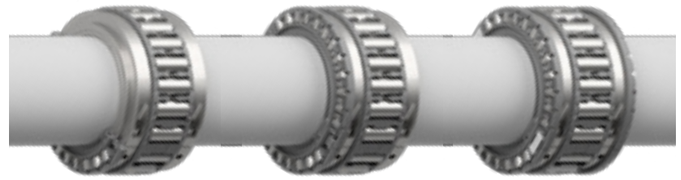
STAGE 3

The radial cage is supplied with a number of loose rollers, which join the cage halves once assembled on the inner race. Apply a film of grease to the roller path and bore of the cage before placing the cage around the race. Insert the joint coupler with its bevel edge toward the shaft. The cage halves do not have matching numbers, instead they have a male / female tenon. With the two halves around the inner race, fit the loose rollers with firm pressure until they lock in the pockets and retain the halves of the cage. Couplers can be fitted to one half of the cage before the cage is fitted. Rotate the cage to assemble the second joint.

STAGE 4

Apply a film of grease to the side face of the clamping ring and axial rollers.

The axial cage halves are joined using clips. Place halves around the shaft then push the clip into the slots.



(applicable only for a fixed bearing)

STAGE 5 WHERE PROVIDED

Fit the seal carrier plates to the ends of the SN/SD/SAF housing using the M4 screws supplied (seals may already be inserted into the carrier).

STAGE 6

Apply lubricant to the inside surface of the SN/SD/SAF housing, covering the entire surface. Coat the assembled cages and rollers on the inner race and add some grease to the seals. The quantity of grease to be used in the bearing can be determined from the grease weights table.

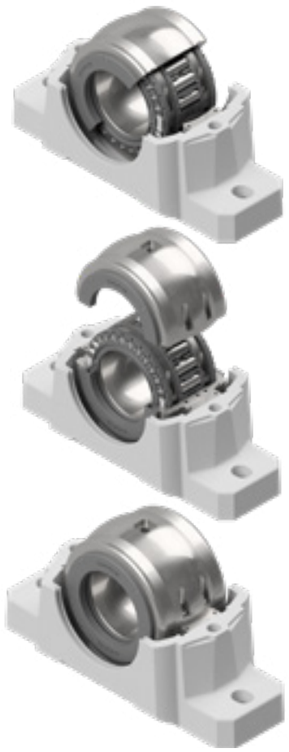
STAGE 7

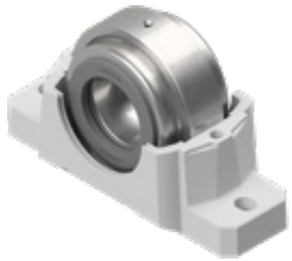
Place the lower half of the SN/SD/SAF housing on top of the shaft. Lubricate the spherical surfaces of the housing and seating ring. Align the two spherical surfaces and rotate the housing around the shaft into the seating ring until both joint faces are aligned. It may be necessary to manually guide the axial rollers into position between the clamping rings and thrust faces whilst rotating the housing into position.

STAGE 8

Noting the orientation of the housing lower half, place the upper half of the SN/SD/SAF housing on top of the shaft in position ensuring the axial rollers & races align. Lower gently into position, then fit and progressively tighten the joint screws.

Shaft supports or jacks can now be removed.





STAGE 9

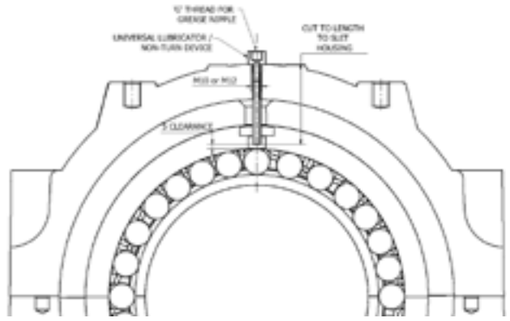
Apply a thin film of grease to the spherical surfaces of the upper housing half of the seating ring. Place the upper half of the seating ring on top of the housing and align it with its lower half.

The SN/SD/SAF outer housing needs to be checked for any internal casting interference. A checker tool can be supplied for this purpose. Run the checker tool around the outer race seat of the outer housing and remove any internal material that fouls the checker tool as it is rotated around the bore of the outer race seat. The image on the next page shows a lubrication casting that needs removing from the outer housing top half.

STAGE 10

The pedestal cap can now be fitted, ensuring the matching numbers are together. Fit and tighten the joint screws. The existing SN/SD/SAF housing seals should be used to prevent contaminants from entering the housing.

CHECKER TOOL



The bearing is supplied with a universal lubricator / non-turn device. This must be installed into the existing housing cap at top centre, so it aligns through the hole in both the seating ring and SN/SD/SAF housing. Due to variation in housing design between manufacturers, the stem may need to be cut to the desired length.

The lubricator is threaded to accept a standard G1/4 or G1/8 grease nipple depending on size (supplied with the bearing). The housing must be drilled through and tapped M10 or M12 to accommodate the lubricator. When measuring and cutting to length, ensure the adaptor passes into the SN/SD/SAF housing, while maintaining clearance between the end of the adaptor and the rollers.

CHECK LIST

- Clean bearings parts and shaft before installation
- Measure shaft to ensure it is within tolerance
- Keep matched component halves together
- Equalise joint gaps on both sides of inner race and clamp rings
- Inner race must be fully tightened
- Lubricate bearing during assembly NOT after
- Lubricate seal bores, labyrinth and housing spherical surfaces
- Tighten screws according to torque figures provided

SCREW SIZES AND TIGHTENING TORQUES

SHAFT DIAMETER (mm)	SN/SD/SAF GROUP SIZE	CLAMP RING JOINT SCREW SIZE	TORQUE (Nm)	BEARING JOINT SCREW SIZE	TORQUE (Nm)
135 - 140	GROUP 9	M8	35	M8	35
150 - 160	GROUP 10	M8	35	M8	35
170	GROUP 11	M10	70	M10	70
180	GROUP 12	M10	70	M10	70
200	GROUP 13	M12	120	M10	70
220	GROUP 14	M12	120	M10	70
240 - 260	GROUP 15	M12	120	M10	70
280	GROUP 16	M16	300	M12	120
300	GROUP 17	M16	300	M12	120

PRODUCT SELECTION:
THE ENHANCED RANGE

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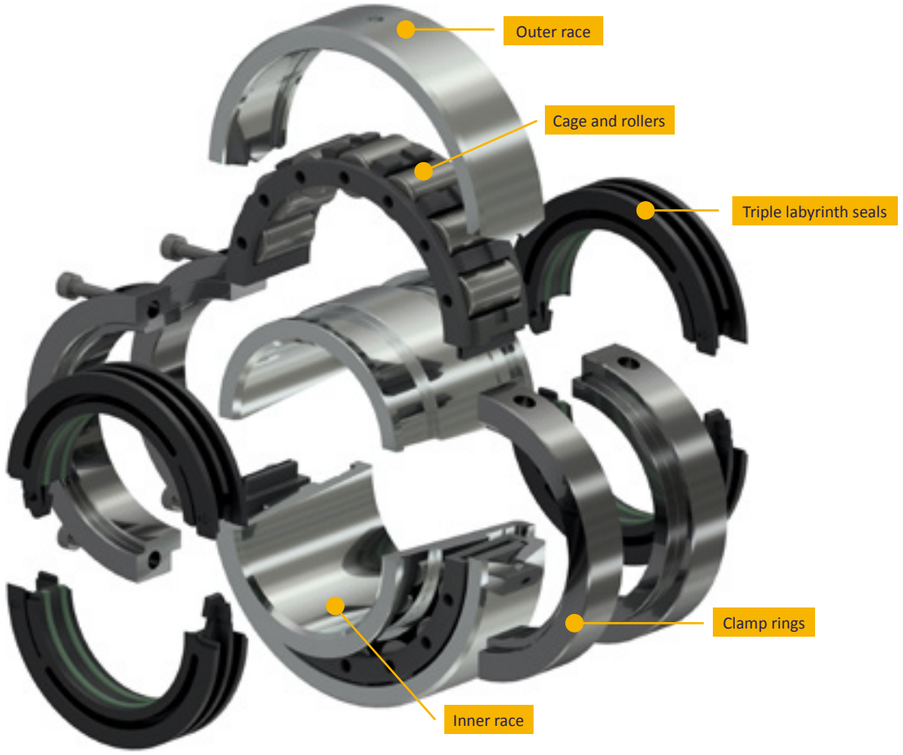
- RANGE INTRODUCTION – FEATURES AND BENEFITS 66
- CALCULATION INFORMATION 67
- ASSEMBLY INSTRUCTIONS 71



BOWMAN ENHANCED SPLIT ROLLER BEARINGS
RANGE INTRODUCTION

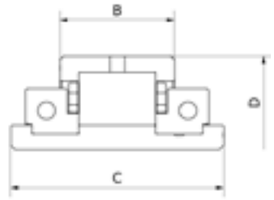
The Bowman Enhanced Split Roller Bearing is dimensionally interchangeable with other split roller bearings and fits directly into other manufacturer's cartridges.

Our cages, produced using 3D printed processes, have a unique complex pocket design and a higher number of rollers.

KEY FEATURES AND BENEFITS

- 30 mm to 300 mm (1 3/16 in. to 12 in.) shaft diameters
- Dimensionally interchangeable with competitor split roller bearings
- Patented 3D printed cages

CALCULATION INFORMATION



DIMENSIONS INTERCHANGEABLE WITH COMPETITOR BEARINGS 01/01E/LIGHT/S1 SERIES

GROUP SIZE	B (mm)	C (mm)	Dø (mm)
108	23.8	50.1	84.14
200	25.4	55.7	98.42
208	27.0	55.7	114.30
300	31.8	61.2	133.35
308	38.9	70.7	152.40
400	45.3	81.0	174.62
408	46.9	84.9	203.20
500	54.0	89.7	222.25
508	55.6	98.4	241.30

GROUP SIZE	B (mm)	C (mm)	Dø (mm)
600	55.6	98.4	254.00
608	60.3	109.0	273.05
700	55.5	109.0	285.75
800	60.3	109.0	311.15
900	63.5	115.0	342.90
1000	66.7	122.0	374.65
1100	69.0	128.0	406.40
1200	74.6	143.0	438.15

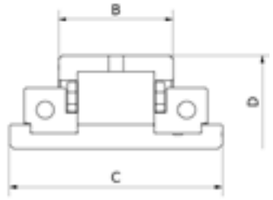
CAPACITIES AND SIZE RANGE 108 - 1200

GROUP SIZE	BEARING BORE		CAPACITIES			SPEED rpm	PART NUMBER FREE / FIXED	
			RADIAL		AXIAL			
	(mm)	(inch)	DYNAMIC Cr kN	STATIC Cor kN	DYNAMIC Ca kN		(mm)	(inch)
108	30 35 40	1 3/16 1 1/4 1 7/16 1 1/2	80	85	4.0	4360	BSBE M30 BSBE M35 BSBE M40	BSBE E103 BSBE E104 BSBE E107 BSBE E108
200	45 50	1 11/16 1 3/4 1 15/16 2	112	130	4.6	3500	BSBE M45 BSBE M50	BSBE E111 BSBE E112 BSBE E115 BSBE E200
208	55 60 65	2 3/16 2 1/4 2 7/16 2 1/2	155	189	8.6	2890	BSBE M55 BSBE M60 BSBE M65	BSBE E203 BSBE E204 BSBE E207 BSBE E208
300	70 75	2 11/16 2 3/4 2 15/16 3	190	236	12.9	2440	BSBE M70 BSBE M75	BSBE E211 BSBE E212 BSBE E215 BSBE E300

GROUP SIZE	BEARING BORE		CAPACITIES			SPEED rpm	PART NUMBER FREE / FIXED	
			RADIAL		AXIAL			
	(mm)	(inch)	DYNAMIC Cr kN	STATIC Cor kN	DYNAMIC Ca kN		(mm)	(inch)
308	80 85 90	3 3/16 3 1/4 3 7/16 3 1/2	242	314	14.3	2090	BSBE M80 BSBE M85 BSBE M90	BSBE E303 BSBE E304 BSBE E307 BSBE E308
400	95 100 105	3 11/16 3 3/4 3 15/16 4	328	438	20.6	1820	BSBE M95 BSBE M100 BSBE M105	BSBE E311 BSBE E312 BSBE E315 BSBE E400
408	110 115	4 3/16 4 1/4 4 7/16 4 1/2	358	503	21.9	1610	BSBE M110 BSBE M115	BSBE E403 BSBE E404 BSBE E407 BSBE E408
500	120 125 130	4 11/16 4 3/4 4 15/16 5	446	648	26.3	1460	BSBE M120 BSBE M125 BSBE M130	BSBE E411 BSBE E412 BSBE E415 BSBE E500
508	135 140	5 3/16 5 1/4 5 7/16 5 1/2	464	679	30.5	1330	BSBE M135 BSBE M140	BSBE E503 BSBE E504 BSBE E507 BSBE E508
600	150 155 600/160	5 11/16 5 3/4 5 15/16 6	499	762	34.3	1240	BSBE M150 BSBE M155 BSBE M160	BSBE E511 BSBE E512 BSBE E515 BSBE E600
608	160 608/170	6 7/16 6 1/2	660	993	67.0	1070	BSBE M160 BSBE M170	BSBE E607 BSBE E608
700	170 175 180	6 15/16 7	627	989	60.3	1010	BSBE M170 BSBE M175 BSBE M180	BSBE E615 BSBE E700
800	190 200	7 15/16 8	698	1116	76.1	890	BSBE M190 BSBE M200	BSBE E715 BSBE E800
900	220 230	9	734	1234	83.8	780	BSBE M220 BSBE M230	BSBE E900
1000	240 250 1000/260	10	861	1498	101.4	700	BSBE M240 BSBE M250 BSBE M260	BSBE E1000
1100	260 270 275 280	11	949	1636	133.4	620	BSBE M260 BSBE M270 BSBE M275 BSBE M280	BSBE E1100
1200	290 300	12	1090	2011	146.0	570	BSBE M290 BSBE M300	BSBE E1200

DIMENSIONS INTERCHANGEABLE WITH COMPETITOR BEARINGS 02/02E/MEDIUM/S2 SERIES

GROUP SIZE	B (mm)	C (mm)	Dø (mm)
800	90.5	156.0	368.30
900	90.5	163.0	393.70
1000	96.8	170.0	431.80
1100	101.6	186.0	463.55
1200	103.2	193.0	495.30



CAPACITIES AND SIZE RANGE 800 - 1200

GROUP SIZE	BEARING BORE		CAPACITIES			SPEED rpm	PART NUMBER FREE / FIXED	
			RADIAL		AXIAL			
	(mm)	(inch)	DYNAMIC Cr kN	STATIC Cor kN	DYNAMIC Ca kN		(mm)	(inch)
800	190 200	7 15/16 8	1172	1693	128	790	BSBEA M190 BSBEA M200	BSBEA E715 BSBEA E800
900	220 230	9	1272	1939	145	700	BSBEA M220 BSBEA M230	BSBEA E900
1000	240 250 260	10	1385	2061	175	640	BSBEA M240 BSBEA M250 BSBEA M260	BSBEA E1000
1100	270 275 280	11	1586	2521	200	582	BSBEA M270 BSBEA M275 BSBEA M280	BSBEA E1100
1200	290 300	12	1705	2831	225	540	BSBEA M290 BSBEA M300	BSBEA E1200

PART NUMBER AND REFERENCING

Ordering a Bowman split roller bearing is simple when you have the reference of the existing bearing you wish to replace, using the following examples:

SERIES REFERENCE	01/LIGHT	BSBE
	02/MEDIUM	BSBEA
TYPE OF BEARING	FIXED	F
	FREE	E
UNITS	METRIC (mm)	M
	IMPERIAL (inch)	E
EXAMPLES	METRIC (mm)	BSBE M100E
		BSBE M100F
	IMPERIAL (inch)	BSBEA E215E
		BSBEA E215F
BEARING / SHAFT SIZE	METRIC (mm)	Reference using the shaft size in millimetres (mm)
	IMPERIAL (inch)	Reference using the shaft size in inches. The last two digits are always the number of sixteenths. In a 3 digit reference number; the first number is the whole inch, in a 4 digital reference number; the first two numbers are the whole inch.

Interchangeable seals to suit existing housings can be ordered from Bowman. Simply advise us of the seal type and its shaft diameter.

FELT SEALS	F
HIGH TEMPERATURE	HT
3D PRINTED TRIPLE LABYRINTH SEAL	CTL

For details on fitting bearings and housings, refer to housing manufacturer's catalogues (also for further information on screw sizes and relevant tightening torques).

ASSEMBLY INSTRUCTIONS

PRELIMINARY NOTES

- Wipe clean all bearing parts to remove preservative oil
- Take note of the marking numbers on each split component to identify matching halves
- Determine the bearing positions
- Lightly oil the shaft with thin oil and lubricate all other interfaces and threads
- Where possible, install the fixed bearing first to locate the shaft axially

SHAFT TOLERANCES

Split roller bearings rely on accurate shaft form and diameter to ensure the desired bearing diametric clearance is obtained. Journal diameter at bearing seating is generally required to be within h7 tolerance (based on BS4500 / BS-EN-ISO 286-2) for most applications. Where shaft speeds and loads permit, wider tolerances can be used. Generally:

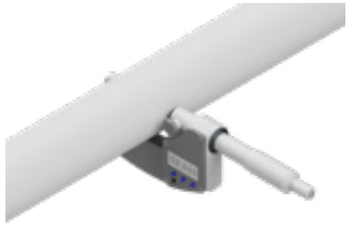
- h6 tolerance should be applied where speed is over 150,000dn mm
- h7 tolerance can be applied for speeds between 50,000dn mm and 150,000dn mm
- For speeds under 50,000dn mm, h9 tolerance can be applied

Note, 'dn' is an expression of shaft speed used by bearing manufacturers,
where:- **'dn' = bearing bore (mm) x shaft speed (rpm)**

DIAMETER	OVER	-	50 mm	80 mm	120 mm	180 mm	250 mm
	UP TO AND INCLUDING	50 mm	80 mm	120 mm	180 mm	250 mm	315 mm
TOLERANCE BAND (BS4500)	h6	+0 -0.016	+0 -0.019	+0 -0.022	+0 -0.025	+0 -0.029	+0 -0.032
	h7	+0 -0.025	+0 -0.030	+0 -0.035	+0 -0.040	+0 -0.046	+0 -0.052
	h9	+0 -0.062	+0 -0.074	+0 -0.087	+0 -0.100	+0 -0.115	+0 -0.130
	IT6	0.016	0.019	0.022	0.025	0.029	0.032
	D11	+0.080 +0.240	+0.100 +0.290	+0.120 +0.340	+0.145 +0.395	+0.170 +0.460	+0.190 +0.510

Tolerances in the table above are in mm.
IT6 is roundness and parallelism (cylindrical) of the bearing seating.
Tolerance of h9 and surface texture of 3.2µm Ra are applicable to the seal seating area.
Shaft surface finish for the bearing seating is generally 3.2µm Ra, for shafts of h7 tolerance, and 1.6µm Ra, where h6 shaft tolerance is applied.

STAGE 1



Clean and inspect the shaft at the bearing seating, ensuring it is within the correct tolerance indicated in the table provided in this instruction leaflet

When the two halves of the inner race are assembled around the shaft there should be a gap at each joint. This feature ensures the race is gripped to the shaft securely by the clamp ring halves. Maintain even joint gaps on the inner race and clamp rings. Soft packing can be used to equalise the inner race joint gaps. Fit the clamp rings with their joints approximately 90° to the inner race joints. Progressively tighten the clamp ring joint screws keeping all gaps equal. With a soft faced hammer, tap the clamp ring halves to seat in their grooves. Finally, tighten the joint screws to the torque figure indicated in the table provided in this instruction leaflet

For expansion bearings, the inner race can be offset according to the amount of shaft thermal expansion, so that when operating temperature is reached, the rollers will run central to the outer race. When fitted, re-check the inner race and clamp ring joint gaps are equal, and the race is correctly positioned axially.

STAGE 2

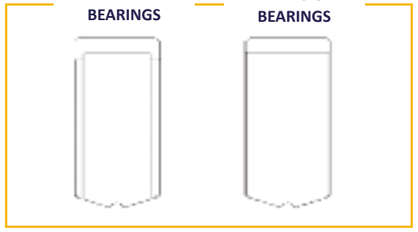
Apply a film of grease to the assembled inner race and bore of the cage before placing the cage around the race. The cage halves do not have matching numbers, instead they have a male/female tenon. Push together with firm pressure until the joints lock. Rotate the cage to assemble the second joint.

STAGE 3

The Fixed bearing locates the shaft by axially positioning the rollers between lips on the outer race, and corresponding locating faces on the clamp rings

The lipped outer races of Fixed bearings should be installed in cartridge housings with side locating rods and screws, in accordance with the housing manufacturer's instructions.

Prime the small radial groove of the housing with grease. Fit the radial outer race halves - the upper half is identifiable by the radial lubrication holes and must be fitted in the housing top half, which has the lubrication nipple. Push the race halves into the seating grooves ensuring match numbers are adjacent. The race joints will protrude slightly beyond the housing joints. Protect these faces when handling the halves.



FIXED BEARINGS ONLY:

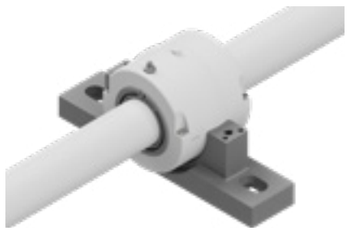
Pre-assemble the two cartridge halves away from the shaft to ensure the halves fit together accurately.

Fully tighten the joint screws first, followed by the side screws. Ensure the side screws are tight and there is a smooth transition across the joint of the fixed outer race halves. Separate the cartridge halves and assemble around the rest of the bearing.

STAGE 4

Apply lubricant to the inside surface of the housing, covering the fitted races. Coat the assembled cages and rollers on the inner race and add grease to the labyrinths of the seals or cartridge end bores.

Note: Lubricate the bearing surfaces with grease during assembly. The quantity of grease to be used to fill the housing can be determined according to the housing manufacturer's instructions.



STAGE 5

With the pedestal base located in position, place the lower half of the cartridge on top of the shaft. Lubricate the spherical surfaces of the pedestal and cartridge. Align the two spherical surfaces, ensuring the labyrinth seals (where fitted) mate with their corresponding grooves. Rotate the cartridge around the shaft into the pedestal base ensuring both joint faces are aligned. Place the upper half of the cartridge on top of the shaft, lower gently into position, then fit and progressively tighten the cartridge joint screws.

Shaft supports or jacks can now be removed.

STAGE 6

Apply a thin film of grease to the spherical surfaces of the pedestal cap and upper half of the cartridge. The pedestal cap can now be fitted, ensuring the matching numbers are paired together. Fit the joint screws, tighten then release approximately half a turn. Rotate the shaft by hand or under power for a few revolutions before finally tightening the cap screws. This allows the housings to align the bearing with the shaft.

- Clean bearing parts and shaft before installation
- Measure shaft to ensure it is within tolerance
- Keep matched component halves together
- Equalise joint gaps on both sides of inner race and clamp rings
- Inner race must be fully tightened
- Lubricate bearing during assembly NOT after
- Lubricate seal bores, labyrinths and housing spherical surfaces
- Tighten screws according to torque figures provided

SCREW SIZES AND TIGHTENING TORQUES

(clamping ring screws are grade 12.9)

BEARING SIZE	30 mm to 75 mm (1 3/16 in. to 3 in.)	80 mm to 90 mm (3 1/4 in. to 3 1/2 in.)	100 mm to 130 mm (3 3/4 in. to 5 in.)	135 mm to 200 mm (5 1/2 in. to 8 in.)	220 mm to 300 mm (9 in. to 12 in.)
SCREW SIZE (mm)	M4	M5	M6	M8	M10
KEY SIZE A/F (mm)	3	4	5	6	8
TORQUE (Nm)	4.5	8.5	15	35	70

LUBRICANT TYPE

Greases of NLGI No. 2 designation are recommended for most applications. For centrally pumped systems a No. 1 grease may be used for increased dispensation.

Greases with extreme pressure (EP) additives are recommended.

Grease with a lithium complex thickener is usually used for normal applications operating at temperatures between 0° and 100°C. When water resistance is required a grease with an aluminium complex thickener can be used. Some greases are immiscible with each other so if changing lubricants, the bearing unit must be solvent-cleaned of the old lubricant before using the new lubricant.

Please contact our Technical Department if lubrication advice is required.

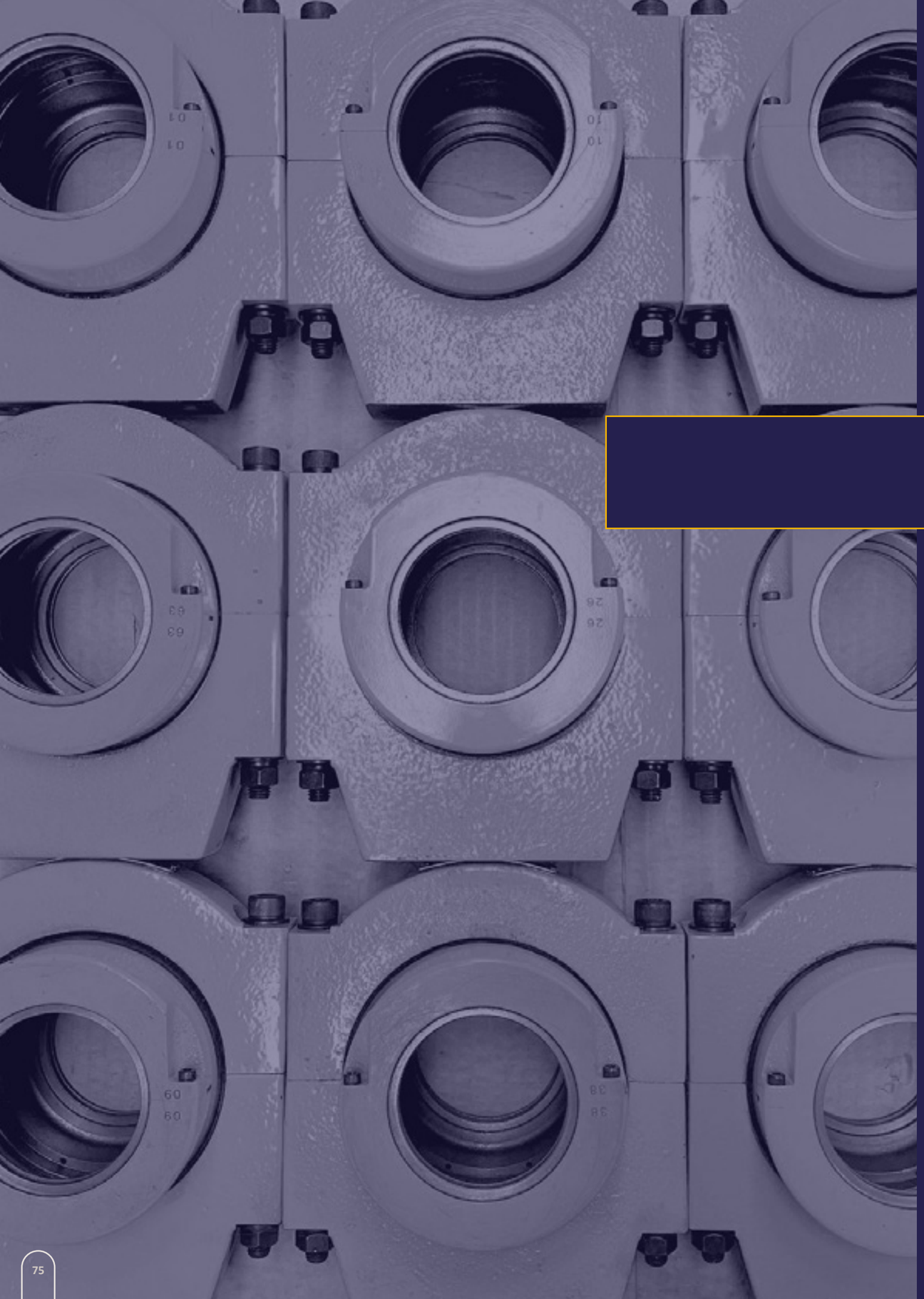
GREASE QUANTITY FOR INITIAL LUBRICATION

The quantity of grease required for initial lubrication is dependent upon operating speed. For slow applications, the bearing can be packed full of grease, however at higher speeds excessive grease will cause the bearing to overheat. Lubricate the bearing surfaces with grease during assembly. The quantity of grease required to fill the housing can be determined according to the housing manufacturer's instructions.

Re-lubrication quantity should be around 2 – 3 grams given at the following interval:

Fixed bearing:
> 100 operating hours

Expansion bearing:
> 400 operating hours



ADDITIONAL INFORMATION

CONTENTS

- NOMENCLATURE 77
- INDUSTRY APPLICATIONS 79
- SHIPPING WEIGHTS 81
- CONVERSION WORKSHEET 87

NOMENCLATURE

ADVANCED

BSBA	M	135	F	S	C	P
	M = Metric **E** = Imperial		**F** = Fixed **E** = Expansion	SEALS	CARTRIDGE	PEDESTAL

BEARING SIZE (SHAFT SIZE)
- Metric sizes are given in millimetres (mm)
- Imperial sizes are given in inches (in.) followed by 16ths

Example: 135 mm
508 (5 ½ in.)
1000 (10 in.)

EXAMPLE: BSBA M135 FSCP
- Advanced bearing
- 135 mm Shaft diameter
- Fixed
- Seals
- Cartridge
- Pedestal

SN/SD/SAF

BSBG	M	135	F	22230	SAF530
	M = Metric **E** = Imperial		**F** = Fixed **E** = Expansion	SRB BEARING REFERENCE	HOUSING REFERENCE

BEARING SIZE (SHAFT SIZE)
- Metric sizes are given in millimetres (mm)
- Imperial sizes are given in inches (in.) followed by 16ths

Example: 135 mm
508 (5 ½ in.)
1000 (10 in.)

EXAMPLE: BSBG M135 F SAF530
- SN/SD/SAF bearing
- 135 mm Shaft diameter
- Fixed
- Interchangeable with 22230
- Fits housing SAF530

ENHANCED

BSBE	M	135	E
	M = Metric **E** = Imperial		**F** = Fixed **E** = Expansion

BEARING SIZE (SHAFT SIZE)
- Metric sizes are given in millimetres (mm)
- Imperial sizes are given in inches (in.) followed by 16ths

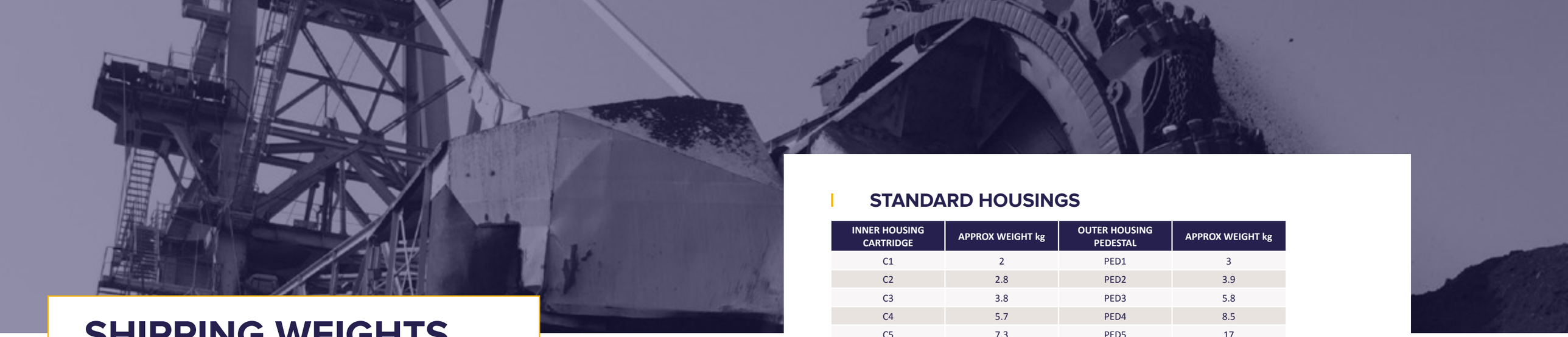
Example: 135 mm
508 (5 ½ in.)
1000 (10 in.)

EXAMPLE: BSBE M135 E
- Enhanced bearing
- 135 mm Shaft diameter
- Expansion

INDUSTRY APPLICATIONS

APPLICATION	BULK TERMINALS	CEMENT & AGGREGATE	CONSTRUCTION MATERIALS	FOOD & BEVERAGE	FOREST PRODUCTS & TIMBER	GRAINS & MALTS	METALS	MARINE	MINING & QUARRYING	POWER GENERATION	PULP & PAPER	REFINING & PETROCHEM	SUGAR	WATER TREATMENT
ANCILLARY EQUIPMENT														
PUMPS & PUMP DRIVES		◆						◆	◆	◆				◆
MOTORS		◆					◆		◆	◆	◆			
HEAT EXCHANGERS										◆				
GEARBOXES & TRANSMISSIONS	◆	◆			◆	◆	◆		◆	◆	◆		◆	
FANS & BLOWERS		◆	◆	◆	◆	◆	◆		◆	◆	◆	◆	◆	
CRANKSHAFTS		◆					◆		◆					
MECHANICAL HANDLING														
STACKER RECLAIMERS	◆						◆		◆	◆				
BUCKET WHEELS	◆						◆		◆	◆				
SCREW CONVEYOR		◆	◆			◆				◆	◆	◆	◆	◆
OVERHEAD CRANES			◆				◆				◆			
LUMBER TABLES & STACKERS					◆						◆			
LINE SHAFTING			◆				◆				◆			
ELEVATORS	◆	◆	◆			◆							◆	
COOLING BEDS							◆							
CONVEYORS	◆	◆	◆	◆	◆	◆	◆		◆	◆	◆		◆	
CONTINUOUS CASTERS							◆							

APPLICATION	BULK TERMINALS	CEMENT & AGGREGATE	CONSTRUCTION MATERIALS	FOOD & BEVERAGE	FOREST PRODUCTS & TIMBER	GRAINS & MALTS	METALS	MARINE	MINING & QUARRYING	POWER GENERATION	PULP & PAPER	REFINING & PETROCHEM	SUGAR	WATER TREATMENT
PROCESS EQUIPMENT														
WASHERS		◆		◆					◆		◆		◆	
SUGAR DIFFUSERS UNDER ROLLS													◆	
SUGAR DIFFUSER DRIVES													◆	
SHREDDERS										◆	◆		◆	
ROTARY SCREENS											◆			◆
PRESS ROLLS			◆								◆			
MIXER DRIVES		◆	◆	◆		◆					◆	◆		
KILN & MILL DRIVES		◆										◆	◆	
KILN & MILL CARRIER ROLLERS		◆							◆				◆	
DRYER ROLLS											◆			
DRUM DRIER TRUNNIONS		◆										◆	◆	
CRUSHERS		◆	◆				◆		◆	◆				
CRANE KNIVES & SLICERS													◆	
BALL MILL TRUNNIONS		◆	◆				◆		◆	◆				
BALL MILL DRIVES		◆	◆				◆		◆	◆				
OTHER APPLICATIONS														
WATER TREATMENT AERATORS														◆
WATER TREATMENT SCREENS											◆			◆
MARINE PROPULSION SHAFTS								◆						
MINE WINDERS									◆	◆				
ROTARY BIOLOGICAL CONTACTORS														◆
HYDRO ELECTRIC TURBINES										◆				



SHIPPING WEIGHTS

ADVANCED BEARINGS: SHIPPING WEIGHT DATA

SIZE GROUP	BEARING BORE Ø		BEARING APPROX WEIGHT (KG)	
	mm	inch	FREE	FIXED
108	30 35 40	1 3/16 1 1/4 1 7/16 1 1/2	1.80	2.00
200	45 50	1 11/16 1 3/4 1 15/16 2	2.30	2.60
208	55 60 65	2 3/16 2 1/4 2 7/16 2 1/2	2.90	3.40
300	70 75	2 11/16 2 3/4 2 15/16 3	4.20	5.10
308	80 85 90	3 3/16 31/4 3 7/16 3 1/2	6.20	7.10
400	95 100 105	3 11/16 3 3/4 3 15/16 4	8.50	9.80
408	110 115	4 3/16 4 1/4 4 7/16 4 1/2	13.20	14.80
500	120 125 130	4 11/16 4 3/4 4 15/16 5	17.70	19.20

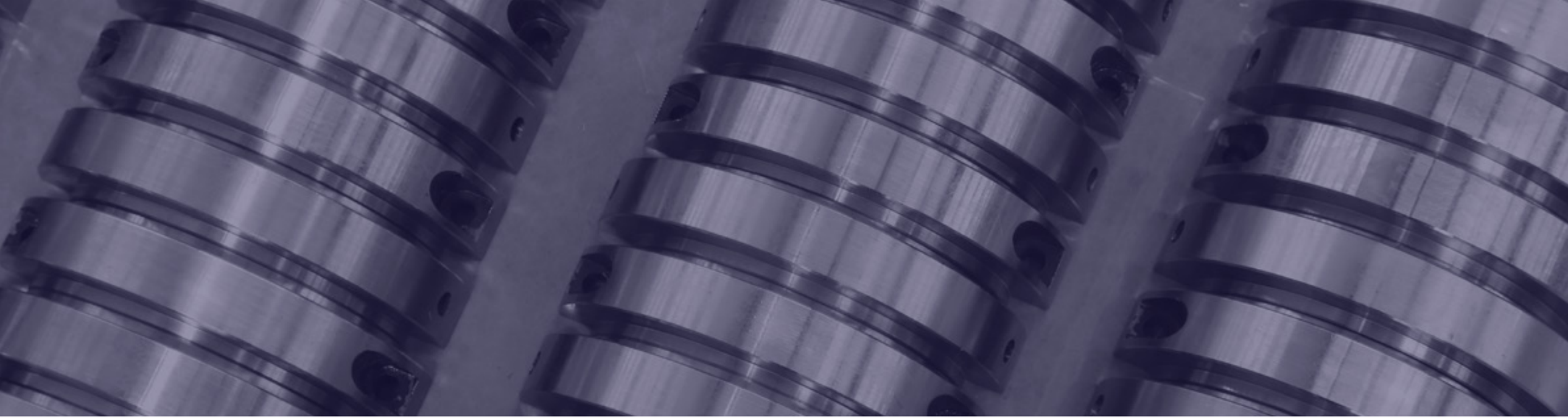
SIZE GROUP	BEARING BORE Ø		BEARING APPROX WEIGHT kg	
	mm	inch	FREE	FIXED
508	135 140	5 3/16 5 1/4 5 7/16 5 1/2	21.10	23.10
600	150 155 160	5 11/16 5 3/4 5 15/16 6	22.80	25.00
608	170	6 7/16 6 1/2	27.00	30.00
700	175 180	6 15/16 7	28.00	32.00
800	190 200	7 15/16 8	33.00	37.00
900	220 230	9	38.00	42.00
1000	240 250 260	9 1/2 10	44.00	48.00
1100	270 275 280	11	59.00	64.00
1200	290 300	12	68.00	73.00

STANDARD HOUSINGS

INNER HOUSING CARTRIDGE	APPROX WEIGHT kg	OUTER HOUSING PEDESTAL	APPROX WEIGHT kg
C1	2	PED1	3
C2	2.8	PED2	3.9
C3	3.8	PED3	5.8
C4	5.7	PED4	8.5
C5	7.3	PED5	17
C6	10	PED6	19
C7	16	PED7	32
C8	27	PED8	48
C9	28	PED9	61
C10	33	PED10	60
OC10			
C11	38	PED11	66
OC11			
C12	43	PED12	74
C13	54	PED13	96
C14	63	PED14	118
C15	71	PED15	143
OC15			
C16	89	PED16	164
C17	105	PED17	203

HIGH LOAD HOUSINGS

INNER HOUSING CARTRIDGE (HLC)	APPROX. WEIGHT kg	OUTER HOUSING PEDESTAL (HLP)	APPROX. WEIGHT kg
C2A	5.2	PED3	5.8
C3A	8	PED4	8.5
C4A	10	PED5	17
C5A	15	PED6	19
C6A	30	PED7	32
C7A	32	PED8	48
C8A	43	PED10	60
C9A	56	PED9A	84
C10A	62	PED10A	98
OC10A			
C11A	64	PED11A	130
OC11A			
C12A	69	PED12A	137
C13A	84	PED13A	145
C14A	99	PED14A	220
C15A	116	PED15A	278
OC15A			
C16A	139	PED16A	362
C17A	152	PED17A	396



ENHANCED BEARINGS : SHIPPING WEIGHT DATA
INTERCHANGEABLE WITH 01/01E/LIGHT/S1

SIZE GROUP	BEARING BORE Ø mm	BEARING BORE Ø inch	BEARING APPROX WEIGHT KG
108	30 35 40	1 3/16 1 1/4 1 7/16 1 1/2	1.20
200	45 50	1 11/16 1 3/4 1 15/16 2	1.50
208	55 60 65	2 3/16 2 1/4 2 7/16 2 1/2	1.80
300	70 75	2 11/16 2 3/4 2 15/16 3	2.50
308	80 85 90	3 3/16 3 1/4 3 7/16 3 1/2	4.00
400	95 100 105	3 11/16 3 3/4 3 15/16 4	6.00
408	110 115	4 3/16 4 1/4 4 7/16 4 1/2	10.20
500	120 125 130	4 11/16 4 3/4 4 15/16 5	13.00

SIZE GROUP	BEARING BORE Ø mm	BEARING BORE Ø inch	BEARING APPROX WEIGHT KG
508	135 140	5 3/16 5 1/4 5 7/16 5 1/2	15.00
600	150 155 600-160	5 11/16 5 3/4 5 15/16 6	17.00
608	608-170	6 7/16 6 1/2	21.00
700	170 175 180	6 15/16 7	23.00
800	190 200	7 15/16 8	25.00
900	220 230	9	32.00
1000	240 250 1000-260	10	40.00
1100	260 270 275 280	11	50.00
1200	290 300	12	60.00

INTERCHANGEABLE WITH 02/02E/MEDIUM/S2

SIZE GROUP	BEARING BORE Ø mm	BEARING BORE Ø inch	BEARING APPROX WEIGHT kg
800	190 200	7 15/16 8	25.00
900	220 230	9	32.0
1000	240 250 260	10	40.00
1100	270 275 280	11	50.00
1200	290 300	12	60.00

SN/SD/SAF BEARINGS : SHIPPING WEIGHT DATA

222 SERIES

SHAFT DIAMETER		DESIGNATION (*add F for Fixed , E for Expansion)	APPROX TOTAL WEIGHT KG
mm	inch		
135	5 3/16 5 1/4	BSBG M135 * 22230 (F)SNL530 BSBG E503 * 22230 SAF530 BSBG E504 * 22230 SAF530	42
140	5 7/16 5 1/2	BSBG M140 * 22232 SNL3038 BSBG M140 * 22232(F)SNL532 BSBG E507 * 22232 SAF532 BSBG E508 * 22232 SAF532	49
150	5 15/16 6	BSBG M150 * 22234 SNL3040 BSBG E515 * 22234 SAF534 BSBG E600 * 22234 SAF534	56
160	6 7/16	BSBG M160 * 22236 SNL3138 BSBG E607 * 22236 SAF536	55
170	6 15/16 7	BSBG M170 * 22238 SNL3140 BSBG E615 * 22238 SAF538 BSBG E700 * 22238 SAF538	61
180	7 1/8 7 3/16	BSBG M180 * 22240 SNL3048 BSBG E702 * 22240 SAF540 BSBG E703 * 22240 SAF540	72
200	7 15/16 8	BSBG M200 * 22244 SNL3148 BSBG E715 * 22244 SAF544 BSBG E800 * 22244 SAF544	92
220	8 7/8 8 15/16 9	BSBG M220 * 22248 SNL3152 BSBG E807 * 22248 SNL3152 BSBG E815 * 22248 SNL3152 BSBG E900 * 22248 SNL3152	117
240	9 7/16 9 1/2	BSBG M240 * 22252 SNL3064 BSBG E907 * 22252 SNL3064 BSBG E908 * 22252 SNL3064	143
260	9 15/16 10	BSBG M260 * 22256 SNL3160 BSBG E915 * 22256 SNL3160 BSBG E1000 * 22256 SNL3160	161
280	10 15/16 11	BSBG M280 * 22260 SNL3164 BSBG E1015 * 22260 SNL3164 BSBG E1100 * 22260 SNL3164	205
300	11 1/2 11 15/16 12	BSBG M300 * 22264 SNL3168 BSBG E1108 * 22264 SNL3168 BSBG E1115 * 22264 SNL3168 BSBG E1200 * 22264 SNL3168	244

230 SERIES

SHAFT DIAMETER		DESIGNATION (*add F for Fixed , E for Expansion)	APPROX TOTAL WEIGHT KG
mm	inch		
260	9 15/16 10	BSBG M260 * 23056 SNL3056 BSBG E915 * 23056 SAF056 BSBG E1000 * 23056 SAF056	92
280	10 15/16 11	BSBG M280 * 23060 SNL3060 BSBG E1015 * 23060 SNL3060 BSBG E1100 * 23060 SNL3060	124
300	11 1/2 11 15/16 12	BSBG M300 * 23064 SNL3064 BSBG E1108 * 23064 SNL3064 BSBG E1115 * 23064 SNL3064 BSBG E1200 * 23064 SNL3064	130

231 SERIES

SHAFT DIAMETER		DESIGNATION (*add F for Fixed , E for Expansion)	APPROX TOTAL WEIGHT KG
mm	inch		
170	6 15/16 7	BSBG M170 * 23138 SNL3138 BSBG E615 * 23138 SNL3138 BSBG E700 * 23138 SNL3138	60
180	7 1/8 7 3/16	BSBG M180 * 23140 SNL3140 BSBG E702 * 23140 SNL3140 BSBG E703 * 23140 SNL3140	65
200	7 15/16 8	BSBG M200 * 23144 SNL3144 BSBG E715 * 23144 SNL3144 BSBG E800 * 23144 SNL3144	78
220	8 7/8 8 15/16 9	BSBG M220 * 23148 SNL3148 BSBG E807 * 23148 SNL3148 BSBG E815 * 23148 SNL3148 BSBG E900 * 23148 SNL3148	91
240	9 7/16 9 1/2	BSBG M240 * 23152 SNL3152 BSBG E907 * 23152 SNL3152 BSBG E908 * 23152 SNL3152	115
260	9 15/16 10	BSBG M260 * 23156 SNL3156 BSBG E915 * 23156 SNL3156 BSBG E1000 * 23156 SNL3156	133
280	10 15/16 11	BSBG M280 * 23160 SNL3160 BSBG E1015 * 23160 SNL3160 BSBG E1100 * 23160 SNL3160	176
300	11 1/2 11 15/16 12	BSBG M300 * 23164 SNL3164 BSBG E1108 * 23164 SNL3164 BSBG E1115 * 23164 SNL3164 BSBG E1200 * 23164 SNL3164	214

Note:
1. Typical designations shown. Other housing / shaft size combinations can be provided upon request
2. Existing bearing must have tapered bore and be adaptor sleeve mounted
3. Internal bearing parts are from the Advanced range. For further details refer to the Advanced bearing section of catalogue
4. Existing bearing locating rings may be required to axially position the BSBG outer sleeve, for both fixed and expansion bearings. (Further details upon request)

HOUSED UNIT CONVERSION WORKSHEET

When converting to a different style of housed unit, use this worksheet to provide the application data specific to your project needs. This information is critical to ensuring the appropriate split cylindrical bearing unit is selected.

DATE	

CONTACT DETAILS			
CUSTOMER CONTACT		BOWMAN SPLIT BEARING CONTACT	
APPLICATION DETAILS			

DRIVE DETAILS			
MOTOR POWER		NUMBER BELTS	
DIRECT DRIVE		DRIVE PULLEY DIAMETER (mm)	
BELT DRIVE		DRIVEN PULLEY DIAMETER (mm)	
GEAR DRIVE		CURRENT DE BEARING	
GEAR RATIO		CURRENT NDE BEARING	

ENVIRONMENT			
WET (y/n)		BEARING TEMP (°C OR °F)	
DRY (y/n)		SHAFT DIAMETER (mm)	
DUST (y/n)		SHAFT SPEED (RPM)	
SEVERE (y/n)		SUBMERGED (y/n)	

LOAD			
LUBRICATION		RADIAL (KN OR LBS)	
SPECIFICATION		AXIAL (KN OR LBS)	
AMOUNT		OIL (y/n)	
		GREASE (y/n)	

DUTY	
INTERMITTENT	
CONTINUOUS	
CURRENT SEALING ARRANGEMENT	

COMPLETING WORKSHEET

- Photocopy this page
- Fill in the information
- Send a scan or photo to **sales@bowman.co.uk**

OTHER PRODUCTS AND SERVICES

LINEAR BEARINGS AND GUIDES

Bowman is proud to hold distributorships with Thomson Linear and NSK Linear and holds considerable stock of both manufacturers products. Bowman also offer a same day cutting service.

PRODUCTION VOLUME 3D PRINTING

Bowman 3D is the 3D printing division of the group. Using the latest HP Multi Jet Fusion technology, Bowman 3D offers a full production 3D printing service from design to manufacture.

PLAIN BEARINGS

Bowman is one of the leading suppliers and manufacturers of plain bearings in the UK and holds one of the largest stock profiles of plain bearings in the world.

ROD ENDS AND SPHERICAL BEARINGS

Bowman stock a large range of metric and imperial rod ends and spherical bearings from a wide range of manufacturers.

SINTERED PARTS

Bowman can offer shaped sintered components in a variety of iron or bronze materials and have the ability to produce complex shaped parts to close tolerances in volume at much lower cost than conventional methods of forming.

INSPECTION AND TESTING

Bowman in-house bearing test facility is able to determine bearing capabilities and provide fault analysis for plain and rolling element bearings. Our inspection facility guarantees the quality of each bearing that leaves our premises.

BEARING HOUSINGS

Arvis (part of the Bowman International Group) is one of the leading bearing housing designers, manufacturers and suppliers. Renowned for high quality components, fast turnaround and outstanding customer service.

FOR MORE INFORMATION ABOUT BOWMAN'S PRODUCTS OR SERVICES GET IN TOUCH

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SHELF LIFE:
Bowman Split Bearings distinguishes shelf life from lubricated bearing or components design life in the following ways:

- The shelf life of a grease-lubricated bearing or component refers to the period of time prior to use or installation.
- The shelf life of a bearing or component makes up a portion of the anticipated aggregate design life - a time frame that is impossible to accurately predict due to a range of variations such as temperature, humidity, lubricant bleed rates, oil migration and so on.
- Shelf life values are available on request from Bowman Split Bearings and assume adherence to the storage and handling guide lines suggested within our literature or by our team members. Not adhering to the storage and handling guidelines recommended by Bowman Split Bearings may reduce shelf life.
- Wherever possible, the shelf life of a product or component should be minimised.

Bowman Split Bearings, or its parent company Bowman International, are not responsible for the shelf life of any bearing or component that has been lubricated by a third party.

Version 2 – Jan 25