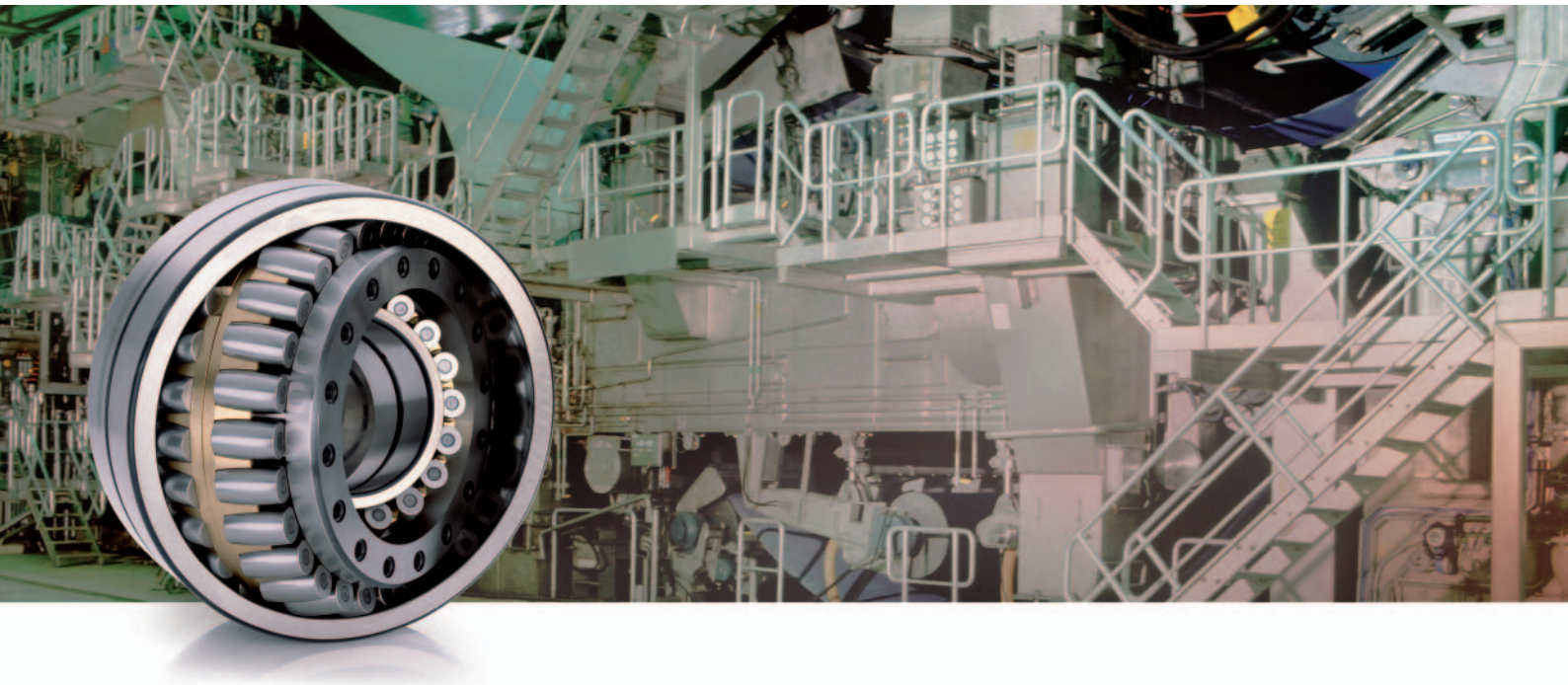
FAG



Triple Ring Bearings for the Paper Industry

In Deflection Compensating Rolls

Technical Product Information

SCHAEFFLER GROUP
INDUSTRIAL

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Triple ring bearings for the paper industry

Triple ring bearings for the paper industry

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FAG triple ring bearings for the paper industry

In order to achieve a constant distribution of pressure and thus uniform paper thickness over the entire web width, so-called deflection compensating rolls are used in presses and calenders in paper machinery.
In these rolls, the roll shell rotates about the stationary roll axis. The roll shell is supported in relation to the axis by means of various hydraulic systems that influence the geometry of the roll shell and match this to the shell profile of the opposing roll. Such rolls can be driven or non-driven. In the case of driven rolls, triple ring bearings are frequently used. When triple ring bearings are fitted, the stationary axis – the so-called crosshead – is supported in the bearing inner ring.
The rotating middle ring connects the drive to the roll shell.

Bearing designs

Depending on the manufacturer and design of the rolls, FAG produces three different designs of triple ring bearings:

triple ring bearings
- with one spherical roller bearing each as the inner and outer bearing (Beloit design for CC rolls “controlled crown rolls”)
- with one double row cylindrical roller bearing as the inner bearing and one spherical roller bearing as the outer bearing (Küsters design for S rolls “swimming rolls”)
- with one double row cylindrical roller bearing as the outer bearing and one spherical roller bearing as the inner bearing (Farrel design).

The middle rings of these bearings have threaded holes in both end faces so that the roll shell can be driven either directly or via a coupling.

Lubrication

Triple ring bearings are lubricated with oil.
The bearings have the necessary lubrication grooves and lubrication holes for reliable lubricant supply.

Material

The inner rings subjected to the very highest loads are made from particularly clean rolling bearing steel (bearing suffix “.04”/ formerly D).
In some earlier cases, the middle ring was also made from this material
(bearing suffix “.05”/ formerly E).

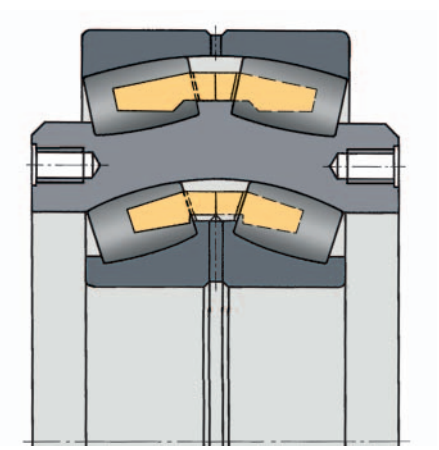
Delivery

FAG triple ring bearings are manufactured to meet specific orders.

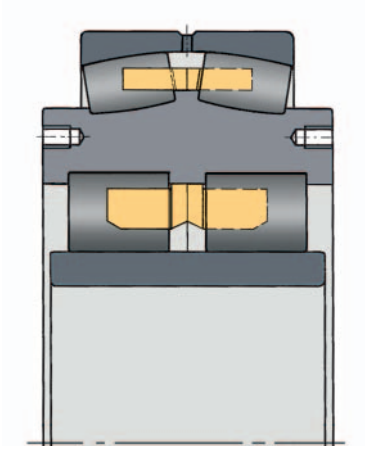
Triple ring bearings for the paper industry

Bearing designs

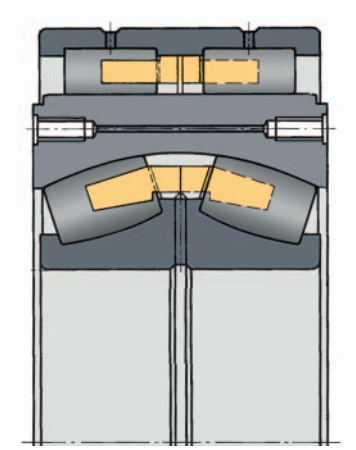
Bearing designs



Beloit design

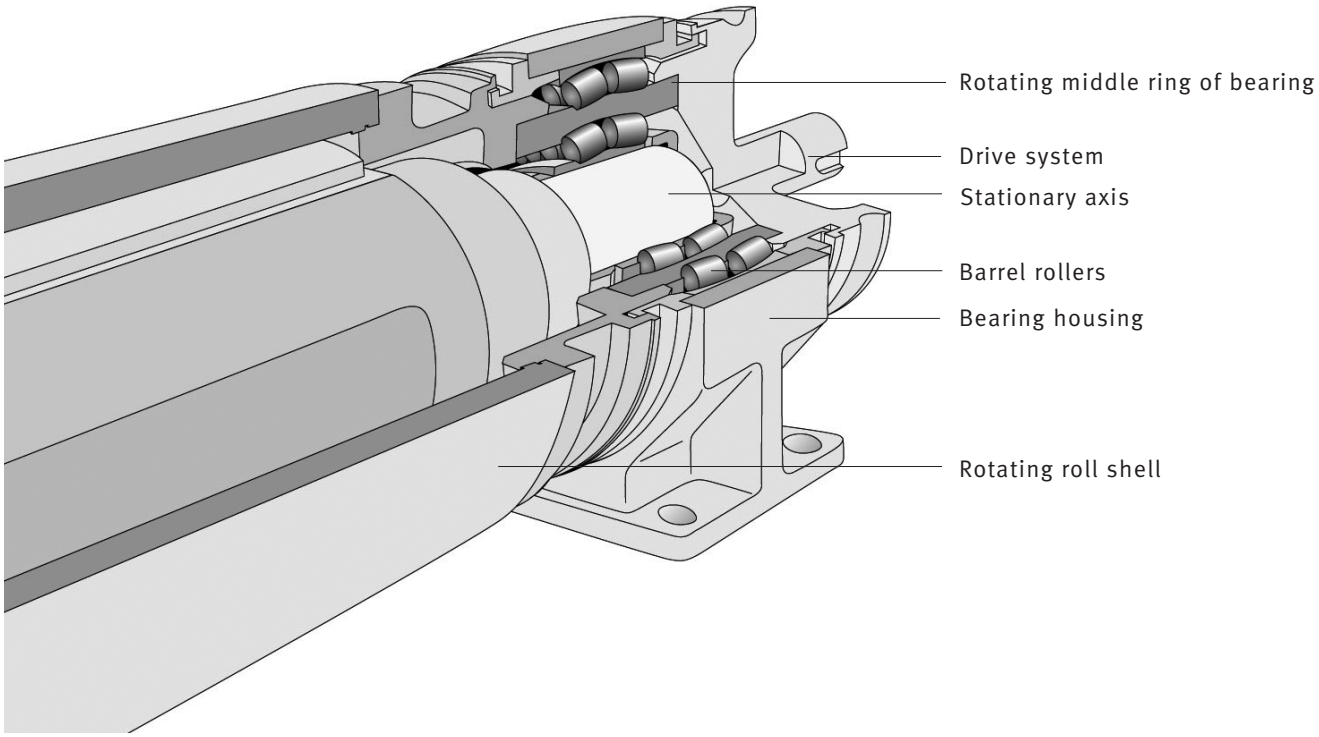


Küsters design



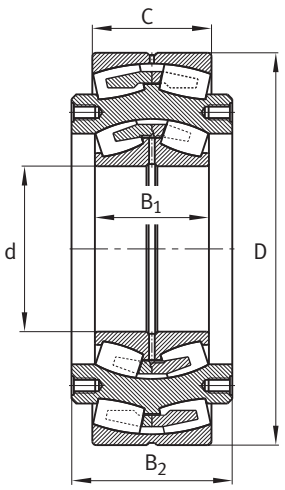
Farrel design

FAG triple ring bearings with one spherical roller bearing each as the inner and outer bearing (Beloit design for CC rolls “controlled crown rolls”)



Triple ring bearings for the paper industry

Beloit design



FAG triple ring bearings, d = 180–420 mm

Dimensions					Load ratings Inner		Fatigue limit load	Load ratings Outer		Fatigue limit load	Limiting speed
					dyn.	stat.		dyn.	stat.		
d	D	C	B_1[3]	B_2	C_r	C_{0r}	C_{ur} Inner	C_r	C_{0r}	C_{ur} Outer	n_g Outer
mm					kN	kN	kN	kN	kN	kN	min^{-1}
180	480	160	140	215,9	1 470	2 470	158	2 600	5 400	360	950
200	520	180	160	241,3	1 820	3 100	202	3 100	6 500	530	850
220	600	200	180	279,4	2 240	3 850	233	3 900	8 400	670	700
240	620	200	200	279,4	2 700	4 700	360	4 050	8 800	710	670
260	680	218	218	317,5	3 250	5 700	485	4 750	10 600	710	630
280	720	218	218	317,5	3 400	6 100	520	4 950	11 300	850	560
300	780	250	243	342,9	4 050	7 400	550	5 900	13 600	910	530
320	820	258	258	368,3	4 400	8 200	610	6 400	14 600	1 050	500
340	870	272	280	393,7	5 500	10 200	820	7 100	16 700	1 200	480
380	980	308	300	431,8	6 300	11 900	930	9 000	21 500	1 460	450
400	1 030	315	315	444,5	7 000	13 400	960	9 600	23 000	1 550	430
420	1 090	335	335	457,2	8 300	16 300	1 220	10 800	26 000	1 730	400

[1] Suffix ".04" (formerly D): Inner ring made from particularly pure rolling bearing steel.

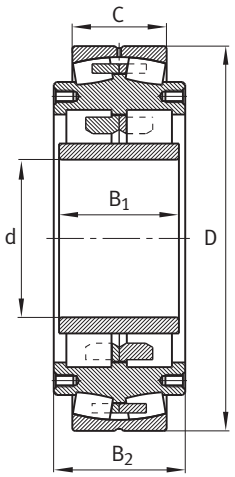
[2] The interchange designations were taken from the documents available to us.
They give information on identical main dimensions only.
The cage and bearing designs are not always identical.

[3] If an SKF design is being replaced, it must be noted that the inner ring is narrower.
SKF uses bearing series 232 for the inner system (with compensation by means of two spacer rings).

Designation[1]	Customer designation	Interchange designation[2]		Design		Mass ≈
Bearing				Spherical roller bearing		
				Inner[3]	Outer	
FAG	Beloit	SKF[3]	Torrington	FAG		kg
Z-525349.04.DRGL	O.S-20350-08	BSTB462825C	B9483G	24236-B-MB	24064-B-MB	177
Z-531033.04.DRGL	O.S-20350-12	BSTB462826C	B9484G	24240-B-MB	24068-B-MB	231
Z-527870.04.DRGL	O.S-20350-09	BSTB462827C	B9485G	24244-B-MB	24080-B-MB	356
Z-531040.04.DRGL	O.S-20350-11	BSTB462828C	B9486G	24248-MB	24084-B-MB	370
Z-522933.04.DRGL	O.S-20350-03	BSTB462606C	B9362G (B7362G)	24 252-B-MB	24092-B-MB	498
Z-525350.04.DRGL	O.S-20350-07	BSTB462829C	B9417G	24256-B-MB	240/500-B-MB	560
Z-522401.04.DRGL	O.S-20350-01	BSTB461619C	B9193G (B7193G)	24260-B-MB	240/530-B-MB	750
Z-525351.04.DRGL	O.S-20350-04	BSTB461902C	B9194G	24264-B-MB	240/560-B-MB	864
Z-522400.04.DRGL	O.S-20350-00	BSTB460924C	B9094G (B7094G)	24268-B-MB	240/600-B-MB	1 020
Z-522934.04.DRGL	O.S-20350-02	BSTB461903C	B9310G (B7310G)	24276-B-MB	240/670-B-MB	1 450
Z-563933.04.DRGL	O.S-20350-06	BSTB461874C	B9311G (B7311G)	24280-B-MB	240/710-B-MB	1 650
Z-531796.04.DRGL	O.S-20350-10	BSTB462862C	B9312G	24284-B-MB	240/750-B-MB	1 970

Triple ring bearings for the paper industry

Küsters design



FAG triple ring bearings, d = 100–400 mm

Dimensions					Load ratings Inner		Fatigue limit load	Load ratings Outer		Fatigue limit load	Limiting speed
					dyn.	stat.		dyn.	stat.		
d	D	C	B_1	B_2	C_r	C_{0r}	C_{ur} Outer	C_r	C_{0r}	C_{ur} Outer	n_g Outer
mm					kN	kN	kN	kN	kN	kN	min^{-1}
100	260	69	90	100	495	730	94	590	1 180	121	2 000
120	300	80	105	115	700	1 020	126	740	1 580	117	1 500
140	360	100	119	129	900	1 290	151	1 130	2 380	218	1 200
160	420	118	138	148	1 270	1 980	225	1 580	3 400	295	1 000
180	460	118	153	160	1 430	2 290	255	1 690	3 750	320	950
200	520	140	175	180	1 970	3 300	355	2 270	5 200	430	800
220	560	140	195	205	2 240	3 750	395	2 380	5 600	450	700
240	600	160	215	225	2 750	4 800	500	2 900	6 700	530	670
240	650	170	215	225	2 900	4 750	490	3 250	7 800	600	630
260	680	170	233	248	3 400	6 000	610	3 450	8 400	650	600
280	700	180	233	248	3 400	6 100	600	3 750	9 000	680	560
300	780	200	258	273	4 350	7 300	690	4 500	11 200	820	500
300	780	240	280	300	4 750	8 300	800	5 500	13 300	980	530
320	820	218	273	288	4 850	8 300	750	5 200	13 400	970	500
340	870	230	295	310	5 500	9 900	890	5 700	14 700	1 040	480
360	870	230	295	320	5 300	10 200	940	5 700	14 700	1 040	480
380	960	243	315	335	6 500	11 200	990	6 800	16 900	1 170	450
400	1 010	258	330	350	6 700	12 800	1 130	7 200	18 300	1 250	430

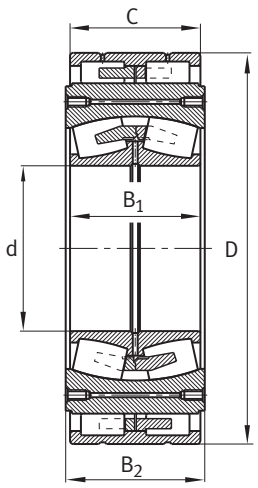
[1] Suffix ".04" (formerly D): Inner ring made from particularly pure rolling bearing steel.

[2] The interchange designations were taken from the documents available to us.
They give information on identical main dimensions only.
The cage and bearing designs are not always identical.

Designation[1]	Customer designation	Interchange designation[2]	Inner design	Outer design	Mass ≈
Bearing			Cylindrical roller bearing	Spherical roller bearing	
FAG	Küsters	SKF	FAG	FAG	kg
Z-531149.04.DRGL	069.239.4-01		Special design	Special design	25
Z-531150.04.DRGL	069.239.4-02		Special design	24944-B-MB	37
Z-531151.04.DRGL	069.239.4-03	BVTB321656	Special design	24952-B-MB	58
Z-531152.04.DRGL	069.239.4-04	321553A	Special design	24960-B-MB	93
Z-531153.04.DRGL	069.239.4-05	BVTB321647	Special design	Special design	131
Z-531154.04.DRGL	069.239.4-06	BVTB321558	Special design	Special design	179
Z-531156.04.DRGL	069.239.4-07	321557A	Special design	Special design	237
Z-531158.04.DRGL	069.239.4-08	321559A	Special design	Special design	298
Z-531159.04.DRGL	069.239.4-09	321561B	Special design	Special design	380
Z-531160.04.DRGL	069.239.4-10		Special design	Special design	439
Z-531162.04.DRGL	069.239.4-11		Special design	Special design	453
Z-531163.04.DRGL	069.239.4-12	321565B	Special design	Special design	629
Z-531177.04.DRGL			Special design	Special design	727
Z-531164.04.DRGL	069.239.4-13		Special design	Special design	761
Z-531166.04.DRGL	069.239.4-14		Special design	Special design	928
Z-531165.04.DRGL	069.239.4-15	321 569B	Special design	Special design	891
Z-531167.04.DRGL	069.239.4-16	BVTB321646	Special design	Special design	1 170
Z-531168.04.DRGL	069.239.4-17		Special design	Special design	1 390

Triple ring bearings for the paper industry

Farrell design



FAG triple ring bearings, d = 150–400 mm

Dimensions					Load ratings Inner		Fatigue limit load	Load ratings Outer		Fatigue limit load	Limiting speed
					dyn.	stat.		dyn.	stat.		
d	D	C	B_1 [3]	B_2	C_r	C_{0r}	C_{ur} Inner	C_r	C_{0r}	C_{ur} Outer	n_g Outer
mm					kN	kN	kN	kN	kN	kN	min^{-1}
150	393,7	118	118	130,7	1 040	1 700	108	1 320	2 750	280	1 800
170	444,5	140	140	152,7	1 400	2 290	197	1 370	3 450	355	1 600
190	482,6	150	150	162,7	1 630	2 800	163	1 700	4 150	405	1 500
220	539,75	180	180	192,7	2 240	3 800	233	2 500	6 400	620	1 300
240	590,55	200	200	212,7	2 700	4 700	360	2 800	7 500	690	1 100
240	615,95	200	200	212,7	2 700	4 700	360	2 850	7 700	700	1 000
280	666,75	218	218	230,7	3 400	6 100	520	3 500	9 500	850	950
300	717,55	243	243	255,7	4 050	7 400	550	3 700	10 600	920	850
320	768,35	258	258	270,7	4 400	8 200	600	4 250	12 900	1 110	800
340	819,15	280	280	292,7	5 500	10 200	820	4 700	15 000	1 280	750
360	869,95	290	290	302,7	5 900	11 100	880	5 500	17 400	1 440	700
380	920,75	300	300	310,2 [4]	6 300	11 900	930	6 100	18 700	1 540	670
400	971,55	315	315	327,7	7 000	13 400	960	7 000	21 200	1 740	630

[1] Suffix ".04" (formerly D): Inner ring made from particularly pure rolling bearing steel.

[2] The interchange designations were taken from the documents available to us.
They give information on identical main dimensions only.
The cage and bearing designs are not always identical.

[3] If an SKF design is being replaced, it must be noted that the inner ring is narrower.
SKF uses bearing series 232 for the inner system (with compensation by means of two spacer rings).

[4] The middle ring width in the SKF design is 312,7 mm.

Designation[1]	Customer designation	Interchange designation[2]		Inner design	Outer design	Mass ≈
Bearing				Spherical roller bearing	Cylindrical roller bearing	
FAG	Farrel	SKF[3]	Torrington	FAG	FAG	kg
Z-548685.04.DRGL			F-3818-C	24230-B	Special design	82
Z-562656.04.DRGL			F-3820-C	24234-B	Special design	121
Z-562657.04.DRGL			F-3822-C	24238-B	Special design	157
Z-561310.04.DRGL			F-3824-C	24244-B	Special design	222
Z-534669.04.DRGL			F-3826-C	24248-B	Special design	294
Z-562132.04.DRGL	236784-798-3	BVTB460228VAF	F-3828-C	24248-B	Special design	327
Z-549731.04.DRGL	236784-803-3	BVTB460230VAF	F-3830-C	24256-B	Special design	404
Z-562658.04.DRGL	236784-808-4	BVTB460232VAF	F-3832-C	24260-B	Special design	512
Z-561702.04.DRGL	236784-813-0	BVTB460234VAF	F-3834-C	24264-B	Special design	642
Z-548181.04.DRGL	236784-818-1	BVTB460236VAF	F-3836-C	24268-B	Special design	796
Z-562659.04.DRGL	236784-823-8	BVTB460238VAF	F-3838-C	24272-B	Special design	937
Z-562660.04.DRGL	236784-828-9	BVTB460240VAF	F-3840-C	24276-B	Special design	1 080
Z-562661.04.DRGL	236784-833-5	BVTB460242VAF	F-3842-C	24280-B	Special design	1 270

Notes

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MATNR 036020141-0000 / TPI 169 / GB-D / 2009081 / Printed in Germany by Mandelkow

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TPI 169 GB-D