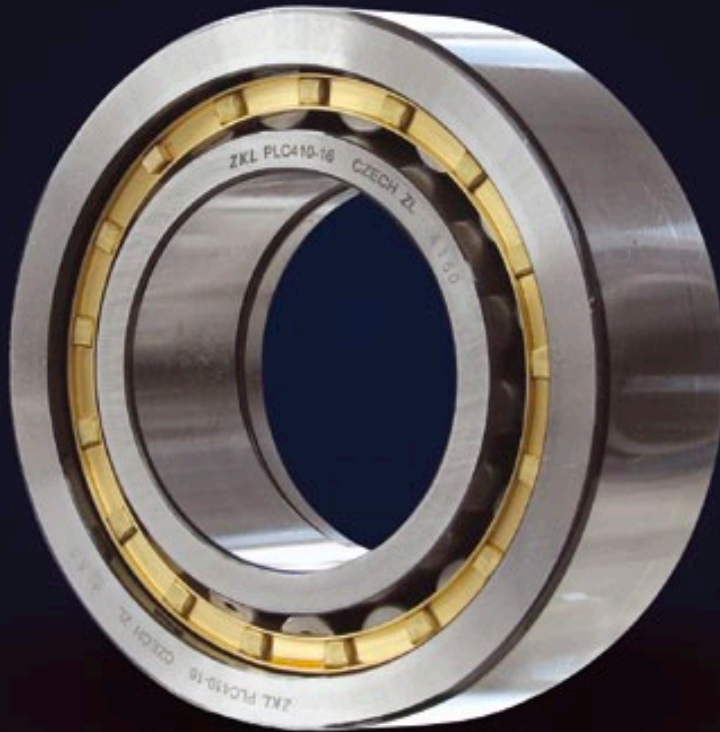




ZKL GROUP



ZKL BEARINGS FOR RAILWAY ROLLING STOCK





ZKL Bearings for Railway Rolling Stock





ZKL Bearings for Railway Rolling Stock

Railway industry is a very prospective sector worldwide and therefore ZKL pays particular attention to bearings for railway rolling stock. The production assortment of these bearings comprises bearings both for various kinds of tractions, pumps and blowers as well as for railway axles. The development and production of ZKL railway bearings match the requirements of CSN EN 12080 Standard "Railway Applications – Bearings for Axleboxes – Roller Bearings" and of UIC 510-1 International Standard dealing with technical requirements for railway cars travel gears. The design of bearings is using most modern design SW. Parameters examination is carried out by tests of bearings on own testing stations in conformity with ZKL methodics, with UIC 515-5 Standard "Methods Used for Testing of Axleboxes" and with CSN EN 12082 Standard "Railway Applications – Axleboxes – Performance Testing".

Bearings for traction motors of electric locomotives and driving wagons of electric multiple unit trains represent a special category of railway bearings. ZKL broadens out its production assortment by cylindrical roller bearings of NU and NJ design groups with HJ angle rings. Serial shipments of these bearings will start soonest after finishing performance tests in year 2011.

ZKL Roller Bearings for Railway Axleboxes

These bearings are particularly suitable for accommodation of high radial as well as shock axial loads at high speed frequencies. They are available either with machined brass cage or polyamide cage. The optimized inner design of ZKL bearings enables perfect lubrication under any operational conditions. The bearings PLC 410-33/34-2 are designed for travelling speeds up to 200 km/hr. Cylindrical roller bearings enable the advantage of easy installation with bearing housing on axle shaft.



ZKL Spherical Roller Bearings

They are suitable for accommodation of high radial loads. Their design enables to accommodate also substantial axial loads in both directions at the same time. These bearings are self-aligning and therefore can align certain misalignments or shaft deflections. For these characteristics they find wide applications wherever high loads need to be accommodated. This is particular in transmission boxes, blower drives and in some axles.



ZKL offers cylindrical roller bearings for Y25 bogies also with bearing housing 80V.

ZKL is offering the clients also further services:

- collaboration in projecting the bearings for new solutions
- cooperation in assembly processes proposals
- assistance in survey of bearings condition after operation and determination of failures and damages causes
- training of workers in bearing mounting



Basic instructions for using bearings PLC410 - 13/14 2 and PLC410 - 15/16 2 with cage from polyamide PA66

Transport and handling: Bearing may not be subjected and handling to vibrations and impress during transport they may cause damage of rolling surfaces.

Stocking: Bearings must be stocked in original wrapping from producer. Storage area must have continual temperature at intervals $20 \pm 5^\circ\text{C}$ and relative humidity up to the 60%. Failure cover or storing conditions markedly lowers stainless property.

Assembly: Assemblies of bearing have to be done by a trained person. Read this basic instruction before assembly of bearings begins. Look over bearing and check their mark, whether it matches to contracted requirements, and technical acceptance terms.

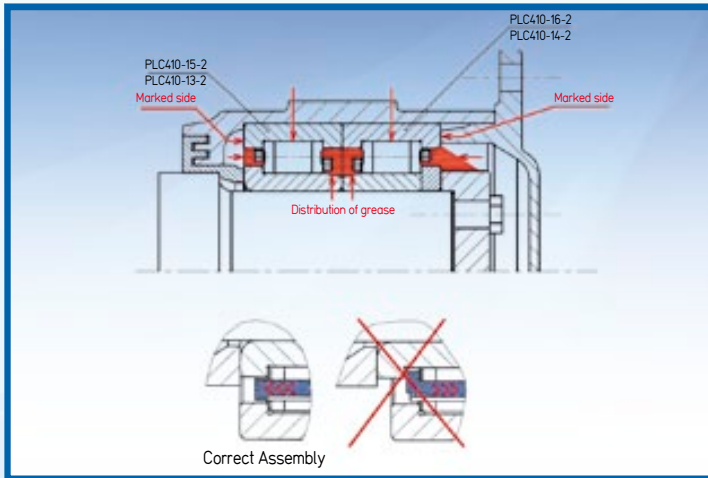
After assembly of outer bearings ring to the axle boxes it is necessary perform lubrication with authorized plastic lubricant in quantities 0,6 kg for lubrication by hand or 0,7 kg for lubrication fulfilling equipment. It isn't necessary to remove protective compound before assembly. Places which are necessary to fill by plastic grease are marked on enclosed picture.

For easier assembly it is advice to heat up inner bearing ring in oil bath or use inductive heating arrangement. Warming - up of inner bearing ring can be done up to the temperature 115°C . To finalize assembly it is necessary to use suitable mounting device for guiding rollers on inner bearing ring. Outer and inner bearings ring with rollers and cage (assembly semi-units) of

appropriate bearings are put into axle box by un-marked face to one another. In case this condition isn't kept, it may lead to destruction of plastic cage (see a picture below).

Exercise of bearing: Bearings are assembled mainly on axles of railway's wheel set. Bearing must be lubricated by authorized plastic lubricant. Kinds of lubricants are approved and can be recommend by producer of bearing.

Assembly Configuration



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Cylindrical Roller Bearings for Traction Motors

The bearings are designed to meet the criteria for economic operation with long service life and reliability. The traction motors bearings operate at running conditions of high loads and speed frequencies. Therefore they are designed in higher tolerance class (P5) and greater radial clearance (C3, C4). Heat treatment of bearing rings guarantees dimensional stabilization of components for operation at higher temperatures (S1). The inner design of bearings ensures their high axial load capability in operation. The bearings are manufactured with machined brass cage centered by cylindrical rollers (M). The execution of cage and guiding surfaces is designed to obtain optimum lubrication and low heat generation. Boundary dimensions of bearings are given in table data section.

Certificates



Jednořadá válečková ložiska

Bearing Designation	Angle Ring	Boundary Dimensions												
		d	D	B	r _r min	r _{r1} min	a	b	E	F	H	J	n	s
NU309EM		45	100	25	1,5	1,5			88,5	58,5	82,5			2,9
NJ315EM	HJ315E	75	160	37	2,1	2,1	16,5	11	143	95	133,4	104,6		
NJ2216EM		80	140	33	2	2			128,3	94,3	121,5	101,1		
NJP2216EM		80	140	33	2	2			128,3	94,3	121,5	101,1	4,5	
NJ318EM	HJ318E	90	190	43	3	3	18,5	12	169,5	113,5	158,3	124,7		
NU2220EM		100	180	46	2,1	2,1			163	119	154,2			3
NJ320EM	HJ320E	100	215	47	3	3	20,5	13	191,5	127,5	178,7	140,3		
NU322EM		110	240	50	3	3			213	141	198,6			4
NJ324EM	HJ324E	120	260	55	3	3	22,5	14	230	154	214,8	169,2		
NJ326EM	HJ326E	130	280	58	4	4	23	14	247	167	230,2	183,8		
NU330EM		150	320	65	4	4			286	190	266,8			5,5

Special Single Row Cylindrical Roller Bearings for Railway Rolling Stock Axles

Bearing Designation	Boundary Dimensions							Basic Load Rating		Fatigue Load Limit	
	d	D	B	r _r min	r _{r1} min	d ₁	d ₂	F	C _r	C _{or}	Pu
	mm							kN		kN	
PLC 410-13	120	240	80	3	7,5	160,8		150	553	742	75,86
PLC 410-13-2	120	240	80	3	7,5	160,8		150	553	742	75,86
PLC 410-14	120	240	80	3	7,5		160,8	150	553	742	75,86
PLC 410-14-2	120	240	80	3	7,5		160,8	150	553	742	75,86
PLC 410-15	130	240	80	3	7,5	170,5		159	517	752	76,25
PLC 410-15-2	130	240	80	3	7,5	170,5		159	517	752	76,25
PLC 410-16	130	240	80	3	7,5		170,5	159	517	752	76,25
PLC 410-16-2	130	240	80	3	7,5		170,5	159	517	752	76,25
PLC 410-33-2	130	240	80	3	7,5	170,5		157	540	775	78,58
PLC 410-34-2	130	240	80	3	7,5		170,5	157	540	775	78,58

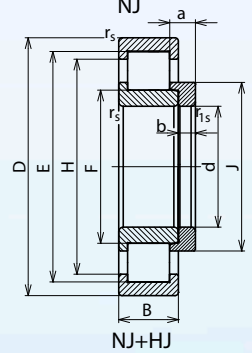
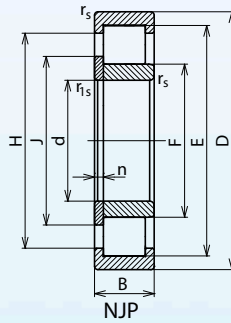
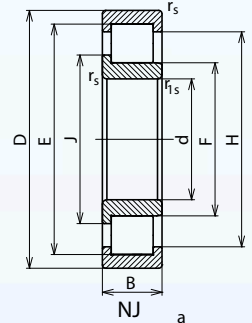
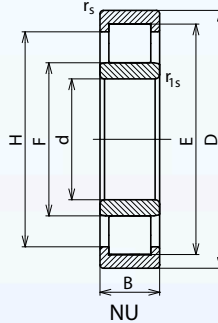
Inner ring can be supplied separately

Bearings comply with requirements of Czech CSN Standards, international ISO and EN Standards, UIC regulations and rules of Czech Railways.

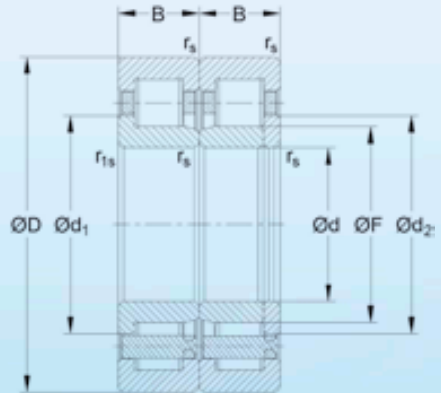
Double Row Spherical Roller Bearings for Railway Rolling Stock Axles

Bearing Designation	Boundary Dimensions						Basic Load Rating		Fatigue Load Limit
	d	D	B	r _r min	a	b	Dynamic	Static	Pu
	mm						kN		kN
23220W33M	100	180	60,3	2,1	4,5	8,3	390	532	66,96
23222W33M	110	200	69,8	2,1	4,5	8,3	502	706	75,49
23226W33M	130	280	93	4	7,5	13,9	904	1130	111,11
22228W33M	140	250	68	3	6	11,1	605	822	82,04
23234W33M	170	310	110	4	7,5	13,9	1280	1880	176,31
23238CW33M	190	340	120	4	9	16,7	1550	2420	220,31

Basic Load Rating		Limiting Speed for Lubrication With		Weight	
Dynamic C_r	Static C_{or}	Grease	Oil	Bearing	Angle Ring
kN		min^{-1}		kg	
103	99		7100	0,88	
242	267		4200	3,33	0,41
196	246		5000	2,01	
196	246		5000	2,01	
315	352		3500	5,5	0,65
340	445		4000	4,77	
385	430		3200	7,8	0,9
447	492		2800	10,3	
525	600		2600	13,5	1,4
570	670		2100	16,7	1,65
765	930		2000	26,9	

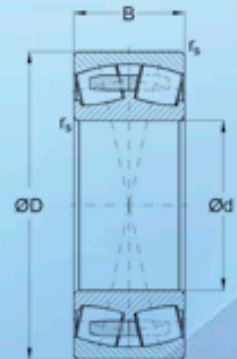


Rolling Stock Velocity	Radial Clearance		Axial Clearance		Weight	Tolerance Class
	mm		mm			
$\text{km}\cdot\text{h}^{-1}$					kg	
160	0,12	0,16	0,3	0,9	16,8	P0
160	0,12	0,16	0,3	0,9	16,0	P0
160	0,12	0,16	0,3	0,9	16,8	P0
160	0,12	0,16	0,3	0,9	16,0	P0
160	0,135	0,18	0,3	0,9	15,2	P0
160	0,135	0,18	0,3	0,9	14,5	P0
160	0,135	0,18	0,3	0,9	15,2	P0
160	0,135	0,18	0,3	0,9	14,5	P0
200	0,135	0,18	0,3	0,9	15,1	P6
200	0,135	0,18	0,3	0,9	15,1	P6



For deliveries to Czech Railways the technical conditions TPF ZKL 11 466 are authorized.

Limiting Speed Frequency for Lubrication by		Connecting Dimensions			Weight	Coefficients			
Grease	Oil	d_2	D_2	r_2		e	Y_1	Y_2	Y_0
min^{-1}		min	max	max	~				
		mm			kg				
1700	2000	112	168	2	6,9	0,34	2	2,8	1,9
1500	1800	122	188	2	9,9	0,36	1,9	2,7	1,8
1300	1600	148	262	3	28,6	0,36	1,8	2,7	1,8
1400	1700	154	236	2,5	15	0,28	2,4	3,4	2,2
950	1300	188	292	3	37,7	0,36	1,9	2,8	1,8
850	1100	208	322	3	47,7	0,36	1,9	2,8	1,9





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