ZKL GROUP

NEW FORCE

ENG

NEWFORCE

– Switch over to New Force –

ZKL presents its new standard of roller bearings

Meeting the Demands of Technically Advanced Clients

ZKL pays proper attention to technical development of products and investments in new technologies in order to meet the demands of technically advanced clients. As a result of one of fundamental innovations in recent time is launching gradual production start of ZKL bearings of higher standard with **NEW FORCE** designation.

By introducing the production of New Force bearings ZKL thus follows up with the already materialized innovation phase of spherical roller bearings with steel sheet and brass machined cages. This initiated process will result in serial production representing approximately 50 percent of total assortment of ZKL roller bearings in category New Force in year 2010.

New Force bearings constitute a new generation of ZKL bearings. The application of these bearings brings longer service life of bearings, higher operation safety, prolongation of service intervals and thus a substantial reduction of operational cost for users. New Force bearings are designed for most challenging mountings in transmission boxes, in railway vehicles, presses, rolling mills, paper mill machines, pumps, machine tools, power units, in printing industry and similar.

As a first complex series of New Force bearings there are being introduced on the market radial spherical roller bearings for heavy duty operating conditions where use of standard bearings with steel sheet cage is not recommended. These new ZKL bearings are in execution with prong-type brass machined cage (EMH version).

NEW FORCE – Product of ZKL Technical Advancement

The attained parameters of New Force bearings represent the accomplishment of development activities of ZKL in the spheres of

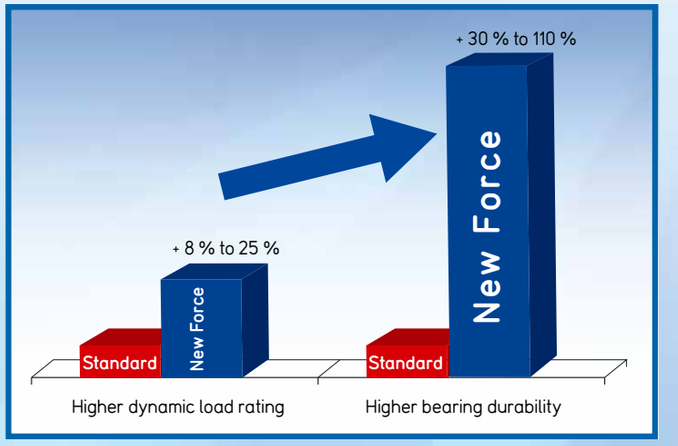
- **Materials of roller bearings components**
- **Cold rolling technology of bearing rings**
- **Inner design optimization**
- **Surface treatment of bearing components**

Thanks to achieved results ZKL is offering to its clients New Force roller bearings of high-level utility values:

- **High dynamic load rating**
- **Low friction rate**
- **Reliability in severest operating conditions**

High Durability of Bearings

Dynamic load rating increased by 8 to 25 percent brings durability of bearings higher by 30 to 110 percent compared with existing execution.



Higher dynamic load rating enables clients to lay out smaller dimensions designs to carry identical load. Thus ZKL brings them chances to reduce total costing of installation as well as energy savings in operation.

22313EW33J

C_r: 304 kN d × D × B ø 65 × ø 140 × 48 Mass 3,5 kg

22312EW33J NEW FORCE

C_r: 304 kN d × D × B ø 60 × ø 130 × 46 Mass 2,8 kg

NEW FORCE

Use of High Quality Bearing Materials

Steels for bearing production comply with parameters of international standards set forth in CSN EN ISO 683-17 Standard "Heat-Treated Steels, Alloy Steels and Free-Cutting Steels, Part 17: Ball and Roller Bearing Steels".

For production of bearing rings and rolling elements high quality materials of carefully selected iron works is being used. Long-standing collaboration with suppliers guarantees permanent amelioration process of evaluating parameters of incoming materials.

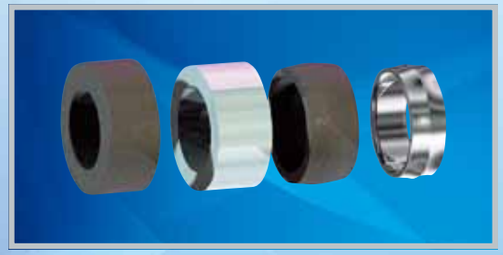
Bearings New Force are made of through-hardening bearing steel 100Cr6, 100MnSi6-4 or 100CrMo7.

Determinant quality parameters of steel and its processing have influence on bearing utility values, namely its resistance to fatigue damage, abrasion resistance and dimensional stability. They are:

- **Chemical composition and heat treatment:**
  Selection of bearing steel type and optimization of heat treatment conditions is being made in dependence on component dimension. Heat treatment technology of New Force bearings guarantees stable hardness values of bearing components in entire profile. Bearing components are heat treated to optimum material structure and hardness suitable for bearing use in service temperatures up to 200°C. Resulting material structure guarantees dimensional stability of bearing components throughout their service live.

- **Content of non-metallic inclusions – micro purity:**
  Reduction of non-metallic inclusions content is a decisive quality parameter in bearing steel metallurgy advancement. For production of New Force bearings ZKL is using bearing steel with minimum oxygen content (5 to 10 ppm).

- **Sort of semi-finished product**
  Bearing quality and its production economy is influenced by selection of semi-product. Forming degree and favorable contact angle of forming fibers toward raceway are parameters which positively influence resistance of New Force bearings against fatigue damage.



Smith forging

Machined forging or pipe

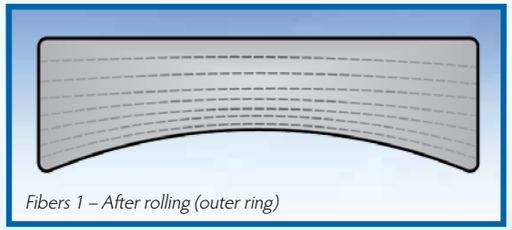
Die forging

Shaped cold rolled product

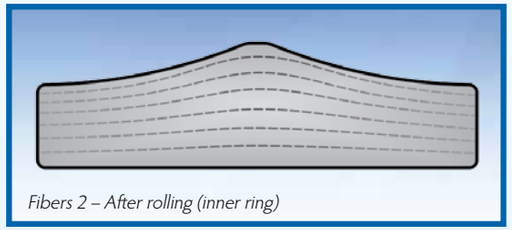
Technology of Cold Rolled Bearing Rings

Basic research demonstrated the influence of material fibers direction to the contact area in respect of bearing service life. The most suitable arrangement of fibers is such when their direction is parallel to contact area. With increasing angle of fibers direction toward the contact area the service life lessens. The cold rolling technology brought to New Force bearings optimum material structure for gaining higher bearing durability.

Fibers course in bearing rings section

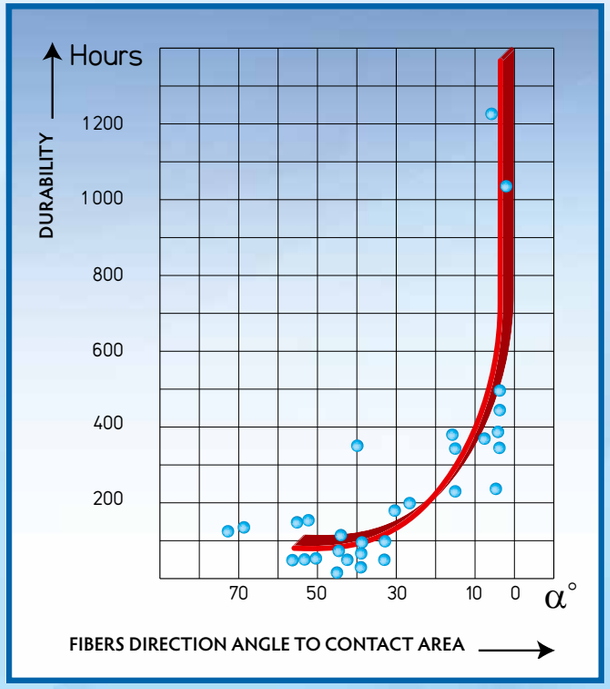


Fibers 1 – After rolling (outer ring)

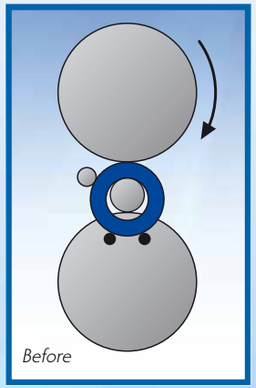


Fibers 2 – After rolling (inner ring)

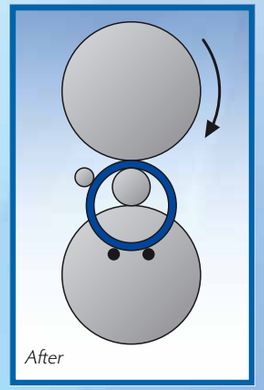
Influence of fibers direction to rolling direction in respect of bearing durability



Scheme of bearing rings cold rolling principle



Before

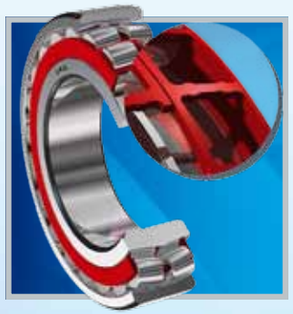


After

Optimized Design and Inner Geometry

The design and modern technology of production of ZKL bearings in New Force execution brings the following improvements in comparison with bearings in standard version:

- Higher quality of functional areas by characterized roughness, roundness and level of residual tension flow in bearing parts profile. It brings noise reduction and higher accuracy in bearing run.
- Adjusted parts shape in rolling contact characterized by abutment parameter. Thus the contact tension course is favorably influenced and adverse sliding tension caused by slippage is reduced.
- Spherical roller bearings are designed with inner ring without fixed center rib. This enables to use larger spherical rollers and progressive production technology. The standard serial production is further oriented to use steel sheet cages in EJ and CJ version as priority.



- For very challenging operating conditions the design of spherical roller bearings is based on CJ and EJ version where steel sheet cages are substituted by one-piece prong-type machined brass cage EMH, centered on inner ring. The catalogue utility values of bearings with steel sheet cage are observed.
- New Force radial spherical roller bearings in EMH version are being introduced on the market as the first, to be followed by radial spherical roller bearings in EJ and CJ version, spherical roller bearings of larger sizes and single row and double row ball bearings.

Special Surface Treatment of NEW FORCE Bearings Components

In frame of innovation programs a new design execution of steel sheet cages for spherical roller radial and thrust bearings has been established. Cages are manufactured of steel sheet with surface treatment for improved sliding properties and reduced cage wear. Cages design execution enables better lubrication and extended bearing service life.

Surface treatments of New Force bearing components represent proven method of improved bearing properties for specific mountings. The benefit of surface layers is a better lubricant retention in rolling contact, reduced friction, increased wear and corrosion resistance. We recommend to consult suitability of surface treatment for special running conditions with Technical and Consulting Services of ZKL.

Design Tests

The principal parameters of New Force bearings are designed in compliance with proven methodology of ZKL instituted on basis of international ISO standards and own know-how acquired by test results as well as by experiences in production and operation of ZKL bearings.

Basic dynamic load rating C is specified in conformity with ISO 281 1990. Numeric values in table section are stipulated for New Force bearings in view of improved material properties and modern industrial processes.

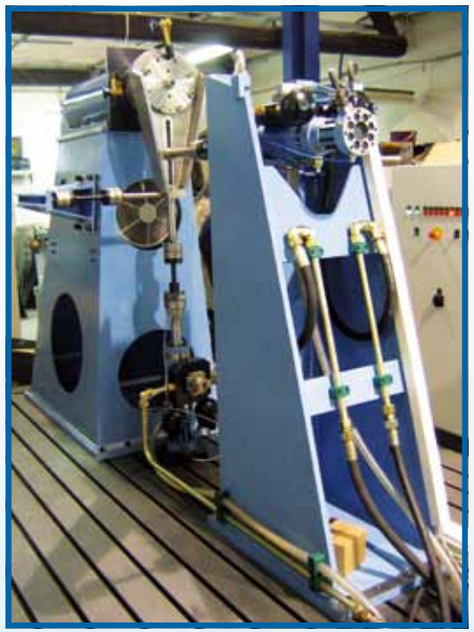
Basic static load rating C_0 is stipulated in conformity with ISO 76:1987 standard.

Limiting speed frequency is specified in compliance with internal ZKL methodology.

The designed parameters were verified by tests on ZKL testing stations.

ZKL Bearings Parameters Verification

The parameters of ZKL New Force bearings are being verified by tests in frame of their development as well as by periodical quality evaluation in course of serial production. The tests are performed according to own methodology on testing benches of bearing testing laboratory of ZKL-Výzkum a vývoj, a.s. company, the member of Czech Testing and Laboratories Association CTLA.



Tests results of bearings as well as of entering materials are analyzed and serve as basis for new design, technology and investment solutions.

Technical Support of ZKL Bearings Users

For solution of clients' needs the Technical and Consulting Services center (TCS) is fully at disposal. Its professionals are prepared to operatively solve requirements and questions of ZKL bearings users regarding rolling arrangement and mounting. TCS renders information to clients in the field of bearings, their accessories and tribology.

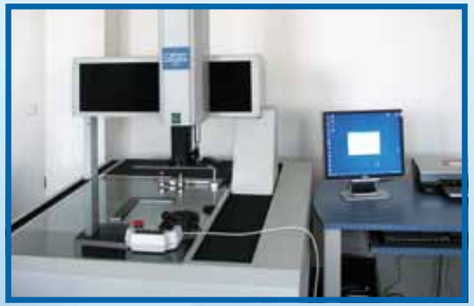
Upon user's request TCS performs technical supervision in mounting and dismounting of bearings at the client and gives special training courses for users' staff in newly built training center. TCS cooperates with manufacturers in development of rolling arrangement. It elaborates technical expertise of bearings break downs. It determines reasons of break downs and suggests measures for their prevention.

Practical experiences in ZKL bearings operation became relevant inducement in New Force bearings design.

ZKL Training Center – Support of Technical Advancement

ZKL training center performs a wide spectrum of educational and training programs both for employees of ZKL companies as well as for technicians of important clients. Permanent education and qualification growth of own professionals and technicians of roller bearings users is fundamental prerequisite for practical utilization of new bearings benefits.

First of all the contemporarily equipped lecture rooms permit to practically implement modern technology and metrology processes for production of new and more accurate bearings ZKL New Force.



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Designation of NEW FORCE Bearings

ZKL Bearings in New Force execution bear designation of the following system:

ISO dimensional plan

Bore diameter:
Figure quintuple = bore dia (from 04)
(such as 5 x 26 = 130 mm)

For bearings of bore ø d ≥ 500 mm
last three or four digits indicate bore
ø d straight in mm (such as 230/560)

Cage design variation:
MH - one-piece prong-type brass machined cage centered by spherical rollers
J - steel sheet cage centered by inner ring

22326CKW33J

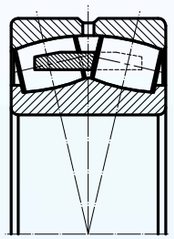
Rings design variation:
K - tapered bore (taper ratio 1:12)
K30 - tapered bore (taper ratio 1:30)
N - snap ring groove
W20 - lubrication holes on outer ring perimeter
W33 - groove with lube holes on outer ring perimeter

Design differences:
C – execution with symmetrical spherical rollers
E – execution with symmetrical spherical rollers of higher load rating

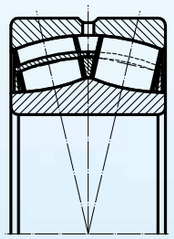
This system will be further completed by a pair of ZKL Group trademarks. In its resulting appearance the system of New Force bearings designation will be as follows:

22326EKW33MH NEW FORCE

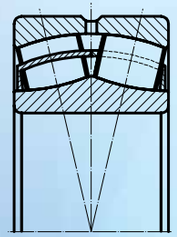
Spherical Roller Bearings NEW FORCE



EMH Design
Bearings with one-piece prong-type machined brass cage for use in extreme operating conditions (impacts actions, high contamination rate ...)



CJ Design
Bearing with symmetrical spherical rollers and with steel sheet cage centered on floating center rib.



EJ Design
Bearing of higher basic load rating with symmetrical spherical rollers, steel sheet cage centered on inner rings and rollers.

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Spherical Roller Bearings:

Boundary Dimensions				Basic Load Rating		Fatique load limit	Limiting Speed Frequency for Lubrication by		Mass		Cylindrical Bore Bearing Designation
				Dynamic	Static				Cylindrical Bore	Tapered Bore	
d	D	B	r_s min	C_r	C_{or}	Pu	Grease	Oil			
mm				kN			min^{-1}		kg		
25	52	18	1	51.1	46,1	5,62	8500	11000	0.16	0.155	**22205EW33J**
30	62	20	1	68.1	64,5	7,87	7500	9500	0.25	0.245	**22206EW33J**
35	72	23	1.1	89.1	92	11,22	6300	8000	0.42	0.41	**22207EW33J**
40	80	23	1.1	104	105	12,80	6000	7500	0.51	0.5	**22208EW33J**
40	90	33	1.5	147	160	18,17	4100	5100	1.07	1.05	**22308EW33J**
40	90	33	1.5	147	160	18,17	4100	5100	1.07	1.05	**22308EW33MH**
45	85	23	1.1	108	113	13,78	5300	6700	0.55	0.53	**22209EW33J**
45	100	36	1.5	174	194	22,20	3700	4600	1.43	1.4	**22309EW33J**
45	100	36	1.5	174	194	22,20	3700	4600	1.43	1.4	**22309EW33MH**
50	90	23	1.1	117	124	15,12	5000	6300	0.59	0.57	**22210EW33J**
50	110	40	2	211	238	27,44	3300	4000	1.92	1.88	**22310EW33J**
50	110	40	2	211	238	27,44	3300	4000	1.92	1.88	**22310EW33MH**
55	100	25	1.5	139	147	18,05	4500	5600	0.78	0.76	**22211EW33J**
55	100	25	1.5	139	147	18,05	4500	5600	0.81	0.79	**22211EW33MH**
55	120	43	2	256	279	34,02	3000	3800	2.4	2.3	**22311EW33J**
55	120	43	2	256	279	32,20	3000	3800	2.45	2.4	**22311EW33MH**
60	110	28	1.5	155	174	21,22	4000	5000	1.07	1.05	**22212EW33J**
60	110	28	1.5	155	174	21,22	4000	5000	1.11	1.08	**22212EW33MH**
60	130	46	2.1	304	315	38,41	2800	3600	2.9	2.8	**22312EW33J**
60	130	46	2.1	304	315	38,41	2800	3600	2,95	2,88	**22312EW33MH**
65	120	31	1.5	196	224	26,34	3800	4800	1.45	1.42	**22213EW33J**
65	120	31	1.5	196	224	26,34	3800	4800	1.51	1.46	**22213EW33MH**
65	140	48	2.1	335	351	42,80	2600	3400	3.5	3.4	**22313EW33J**
65	140	48	2.1	335	351	42,80	2600	3400	3.54	3.46	**22313EW33MH**
70	125	31	1.5	211	239	29,15	3600	4500	1.61	1.57	**22214EW33J**
70	125	31	1.5	211	239	29,15	3600	4500	1.73	1.61	**22214EW33MH**
70	150	51	2.1	383	402	47,64	2400	3100	4.2	4.1	**22314EW33J**
70	150	51	2.1	383	402	47,64	2400	3100	4.38	4.29	**22314EW33MH**
75	130	31	1.5	215	255	30,87	3400	4300	1.7	1.66	**22215EW33J**
75	130	31	1.5	215	255	30,87	3400	4300	1.85	1.72	**22215EW33MH**
75	160	55	2.1	438	489	56,82	2300	3000	5.3	5.2	**22315EW33J**
75	160	55	2.1	438	489	56,82	2300	3000	5.36	5.24	**22315EW33MH**
80	140	33	2	246	295	34,96	3200	4000	2.11	2.07	**22216EW33J**
80	140	33	2	246	295	34,96	3200	4000	2.22	2.09	**22216EW33MH**

Tapered Bore Bearing Designation	Connecting Dimensions			Adapter Sleeve	Withdrawal Sleeve	Withdrawal Nut	Calculation Coefficients			
	d_a	D_a	r_a							
	min	max	max				e	Y_1	Y_2	Y_0
	mm									
22205EKW33J	30	47	1	H305	AH305	KM6	0.34	2	3	2
22206EKW33J	35	57	1	H306	AH306	KM7	0.31	2.1	3.2	2.1
22207EKW33J	42	65	1	H307	AH307	KM8	0.31	2.2	3.3	2.1
22208EKW33J	47	73	1	H308	AH308	KM9	0.27	2.5	3.7	2.4
22308EKW33J	47	81	1.5	H2308	AH2308	KM9	0.36	1.8	2.6	1.8
22308EKW33MH	47	81	1.5	H2308	AH2308	KM9	0.36	1.8	2.6	1.8
22209EKW33J	52	78	1	H309	AH309	KM10	0.26	2.6	3.9	2.6
22309EKW33J	52	91	1.5	H2309	AH2309	KM10	0.35	1.7	2.7	1.8
22309EKW33MH	52	91	1.5	H2309	AH2309	KM10	0.35	1.7	2.7	1.8
22210EKW33J	57	83	1.2	H310	AH310X	KM11	0.24	2.8	4.2	2.8
22310EKW33J	60	100	2	H2310	AH2310X	KM11	0.36	1.9	2.7	1.8
22310EKW33MH	60	100	2	H2310	AH2310X	KM11	0.36	1.9	2.7	1.8
22211EKW33J	62	91	1.5	H311	AH311X	KM12	0.23	2.9	4.4	2.9
22211EKW33MH	62	91	1.5	H311	AH311X	KM12	0.23	2.9	4.4	2.9
22311EKW33J	65	110	2	H2311	AH2311X	KM12	0.35	1.9	2.8	1.9
22311EKW33MH	65	110	2	H2311	AH2311X	KM12	0.35	1.9	2.7	1.8
22212EKW33J	67	101	1.5	H312	AH312X	KM13	0.24	2.8	4.2	2.8
22212EKW33MH	67	101	1.5	H312	AH312X	KM13	0.24	2.8	4.2	2.8
22312EKW33J	72	118	2	H2312	AH2312X	KM13	0.35	1.9	2.9	1.9
22312EKW33MH	72	118	2	H2312	AH2312X	KM13	0.35	1.9	2.9	1.9
22213EKW33J	72	111	1.5	H313	AH313	KM15	0.24	2.9	4.2	2.8
22213EKW33MH	72	111	1.5	H313	AH313	KM15	0.24	2.9	4.2	2.8
22313EKW33J	76	128	2	H2313	AH2313	KM15	0.34	2	3,00	2,00
22313EKW33MH	76	128	2	H2313	AH2313	KM15	0.34	2	3,00	2,00
22214EKW33J	77	116	1.5	H314	AH314	KM16	0.23	2.9	4.2	2.8
22214EKW33MH	77	116	1.5	H314	AH314	KM16	0.23	2.9	4.2	2.8
22314EKW33J	82	138	2	H2314	AH2314X	KM16	0.37	1.8	2.6	1.7
22314EKW33MH	82	138	2	H2314	AH2314X	KM16	0,34	2,00	3,00	2,00
22215EKW33J	82	121	1.5	H315	AH315	KM17	0.22	3.1	4.5	2.9
22215EKW33MH	82	121	1.5	H315	AH315	KM17	0.22	3.1	4.5	2.9
22315EKW33J	86	148	2	H2315	AH2315X	KM17	0.38	1.8	2.5	1.7
22315EKW33MH	86	148	2	H2315	AH2315X	KM17	0.38	1.8	2.5	1.7
22216EKW33J	90	130	2	H316	AH316	KM18	0.22	3.1	4.5	3
22216EKW33MH	90	130	2	H316	AH316	KM18	0.22	3.1	4.5	3

NEW FORCE

Boundary Dimensions				Basic Load Rating		Fatique load limit	Limiting Speed Frequency for Lubrication by		Mass		Cylindrical Bore Bearing Designation
				Dynamic	Static				Cylindrical Bore	Tapered Bore	
d	D	B	r_s min	C_r	C_{or}	Pu	Grease	Oil			
mm				kN			min^{-1}		kg		
80	170	58	2.1	492	551	62,84	2200	2800	6.3	6.1	**22316EW33J**
80	170	58	2.1	492	551	62,84	2200	2800	6.34	6.2	**22316EW33MH**
85	150	36	2	290	337	39,16	3000	3800	2.61	2.6	**22217EW33J**
85	150	36	2	290	337	39,16	3000	3800	2.79	2.64	**22217EW33MH**
85	180	60	3	531	603	67,58	2000	2600	7.2	7	**22317EW33J**
85	180	60	3	531	603	67,58	2000	2600	7.3	7.15	**22317EW33MH**
90	160	40	2	341	406	46,31	2600	3400	3.4	3.3	**22218EW33J**
90	160	40	2	341	406	46,31	2600	3400	3.42	3.35	**22218EW33MH**
90	160	52,4	2	414	522	59,54	1900	2600	4.52	4.4	**23218CW33J**
90	160	52,4	2	414	522	59,54	1900	2600	4.61	4.49	**23218EW33MH**
90	190	64	3	596	673	74,19	1900	2400	8.5	8.3	**22318EW33J**
90	190	64	3	596	673	74,19	1900	2400	8.62	8.38	**22318EW33MH**
95	170	43	2.1	383	464	52,00	2400	3200	4.17	4.1	**22219EW33J**
95	170	43	2.1	383	464	52,00	2400	3200	4.25	4.16	**22219EW33MH**
95	200	67	3	656	744	80,75	1800	2300	9.8	9.6	**22319EW33J**
95	200	67	3	656	744	80,75	1800	2300	9.94	9.71	**22319EW33MH**
100	180	46	2.1	422	510	56,22	2200	3000	5	4.9	**22220EW33J**
100	180	46	2.1	422	510	56,22	2200	3000	5.03	4.92	**22220EW33MH**
100	180	60.3	2.1	511	667	73,53	1700	2200	6.67	6.49	**23220CW33J**
100	180	60.3	2.1	511	667	73,53	1700	2200	6.77	6.53	**23220EW33MH**
100	215	73	3	750	842	89,60	1700	2200	12.3	12.1	**22320EW33J**
100	215	73	3	750	842	89,60	1700	2200	12.5	12.3	**22320EW33MH**
110	170	60	2	447	717	79,04	1800	2200	6	5.8	**24022CW33J**
110	170	60	2	447	717	79,04	1800	2200	6.3	5.95	**24022EW33MH**
110	180	56	2	414	585	63,82	1900	2600	6	5.32	**23122CW33J**
110	180	56	2	414	585	63,82	1900	2600	6.28	5.46	**23122EW33MH**
110	180	69	2	552	849	92,62	1000	1400	6.9	6.7	**24122CW33J**
110	180	69	2	552	849	92,62	1000	1400	7.05	6.83	**24122EW33MH**
110	200	53	2.1	541	653	69,82	2000	2800	7.2	6.94	**22222EW33J**
110	200	53	2.1	541	653	69,82	2000	2800	7.32	7.08	**22222EW33MH**
110	200	69.8	2.1	656	867	92,71	1600	2000	9.65	9.38	**23222CW33J**
110	200	69.8	2.1	656	867	92,71	1600	2000	9.67	9.4	**23222EW33MH**
110	240	80	3	891	1000	103,10	1500	1900	17.2	16.8	**22322EW33J**
110	240	80	3	891	1000	103,10	1500	1900	17.5	17.1	**22322EW33MH**
120	180	46	2	383	572	61,77	2000	2800	4.1	3.97	**23024CW33J**
120	180	46	2	383	572	61,77	2000	2800	4.32	4.07	**23024EW33MH**
120	180	60	2	455	770	83,15	1600	2000	5.5	5.4	**24024CW33J**
120	180	60	2	455	770	83,15	1600	2000	5.71	5.58	**24024EW33MH**
120	200	80	2	708	1080	114,39	950	1300	10.2	10.0	**24124CW33J**
120	200	80	2	708	1080	114,39	950	1300	10.49	10.18	**24124EW33MH**
120	215	58	2.1	619	775	80,96	1900	2600	9	8.8	**22224EW33J**
120	215	58	2.1	619	775	80,96	1900	2600	9.07	8.87	**22224EW33MH**

Tapered Bore Bearing Designation	Connecting Dimensions			Adapter Sleeve	Withdrawal Sleeve	Withdrawal Nut	Calculation Coefficients			
	d_a	D_a	r_a							
	min	max	max				e	Y_1	Y_2	Y_0
	mm									
22316EKW33J	91	158	2	H2316	AH2316X	KM18	0.33	2	3	2
22316EKW33MH	91	158	2	H2316	AH2316X	KM18	0.33	2	3	2
22217EKW33J	95	140	2	H317	AH317X	KM19	0.22	3	4.4	2.9
22217EKW33MH	95	140	2	H317	AH317X	KM19	0.22	3	4.4	2.9
22317EKW33J	98	166	2.5	H2317	AH2317X	KM19	0.32	2.1	3.1	2
22317EKW33MH	98	166	2.5	H2317	AH2317X	KM19	0.32	2.1	3.1	2
22218EKW33J	100	150	2	H318	AH318X	KM20	0.23	2.9	4.2	2.8
22218EKW33MH	100	150	2	H318	AH318X	KM20	0.23	2.9	4.2	2.8
23218CKW33J	100	150	2	H2318	AH3218X	KM20	0.31	2.2	3.3	2.2
23218EKW33MH	100	150	2	H2318	AH3218X	KM20	0.31	2.2	3.3	2.2
22318EKW33J	104	176	2.5	H2318	AH2318X	KM20	0.33	2.1	3.1	2
22318EKW33MH	104	176	2.5	H2318	AH2318X	KM20	0.33	2.1	3.1	2
22219EKW33J	107	158	2	H319	AH319X	KM21	0.23	2.9	4.2	2.7
22219EKW33MH	107	158	2	H319	AH319X	KM21	0.23	2.9	4.2	2.7
22319EKW33J	109	186	2.5	H2319	AH2319	KM21	0.33	2.1	3.1	2
22319EKW33MH	109	186	2.5	H2319	AH2319	KM21	0.33	2.1	3.1	2
22220EKW33J	112	168	2	H320	AH320X	KM22	0.24	2.9	4.1	2.7
22220EKW33MH	112	168	2	H320	AH320X	KM22	0.24	2.9	4.1	2.7
23220CKW33J	112	168	2	H2320	AH3220X	KM22	0.31	2.2	3.2	2.1
23220EKW33MH	112	168	2	H2320	AH3220X	KM22	0.31	2.2	3.2	2.1
22320EKW33J	114	201	2.5	H2320	AH2320X	KM22	0.33	2.0	3.0	2.0
22320EKW33MH	114	201	2.5	H2320	AH2320X	KM22	0.33	2.0	3.0	2.0
24022CK30W33J	120	170	2	-	-	-	0.32	2.1	3.2	2.1
24022EK30W33MH	120	170	2	-	-	-	0.32	2.1	3.2	2.1
23122CKW33J	120	170	2	H3122	AH3122X	KM24	0.3	2.3	3.4	2.2
23122EKW33MH	120	170	2	H3122	AH3122X	KM24	0.3	2.3	3.4	2.2
24122CK30W33J	120	170	2	-	AH24122	KM23	0.35	1.9	2.8	1.9
24122EK30W33MH	120	170	2	-	AH24122	KM23	0.35	1.9	2.8	1.9
22222EKW33J	122	188	2	H3222	AH3120X	KM24	0.25	2.7	4	2.6
22222EKW33MH	122	188	2	H3222	AH3120X	KM24	0.25	2.7	4	2.6
23222CKW33J	122	188	2	H2322	AH3222X	KM25	0.33	2.1	3.1	2
23222EKW33MH	122	188	2	H2322	AH3222X	KM25	0.33	2.1	3.1	2
22322EKW33J	124	226	2.5	H2322	AH2322X	KM25	0.33	2.1	3.1	2
22322EKW33MH	124	226	2.5	H2322	AH2322X	KM25	0.33	2.1	3.1	2
23024CKW33J	128	171	2	H3024	AH3024X	KM26	0.23	3	4.5	2.9
23024EKW33MH	128	171	2	H3024	AH3024X	KM26	0.23	3	4.5	2.9
24024CK30W33J	128	171	2	-	AH24024	KM25	0.3	2.3	3.4	2.2
24024EK30W33MH	128	171	2	-	AH24024	KM25	0.3	2.3	3.4	2.2
24124CK30W33J	131	189	2	-	AH24124	KM26	0.37	1.8	2.7	1.8
24124EK30W33MH	131	189	2	-	AH24124	KM26	0.37	1.8	2.7	1.8
22224EKW33J	132	203	2	H3124	AH3124X	KM26	0.25	2.7	3.9	2.5
22224EKW33MH	132	203	2	H3124	AH3124X	KM26	0.25	2.7	3.9	2.5

NEW FORCE

Boundary Dimensions				Basic Load Rating		Fatique load limit	Limiting Speed Frequency for Lubrication by		Mass		Cylindrical Bore Bearing Designation
				Dynamic	Static				Cylindrical Bore	Tapered Bore	
d	D	B	r_s min	C_r	C_{or}	Pu	Grease	Oil			
mm				kN			min^{-1}		kg		
120	215	76	2.1	750	1020	106,56	1500	1900	11.8	11.5	**23224CW33J**
120	215	76	2.1	750	1020	106,56	1500	1900	12.1	11.8	**23224EW33MH**
120	260	86	3	1040	1180	118,70	1400	1800	21.5	21.1	**22324EW33J**
120	260	86	3	1040	1180	118,70	1400	1800	22.1	21.62	**22324EW33MH**
130	200	52	2	492	711	74,61	1900	2600	5.94	5.76	**23026CW33J**
130	200	52	2	492	711	74,61	1900	2600	6.05	5.88	**23026EW33MH**
130	200	69	2	596	978	102,63	1500	1900	8	7.9	**24026CW33J**
130	200	69	2	596	978	102,63	1500	1900	8.26	8.09	**24026EW33MH**
130	210	80	2	722	1160	120,65	900	1200	10.9	10.7	**24126CW33J**
130	210	80	2	722	1160	120,65	900	1200	11.23	10.92	**24126EW33MH**
130	230	64	3	708	948	96,92	1800	2400	11.2	11	**22226EW33J**
130	230	64	3	708	948	96,92	1800	2400	11.58	11.32	**22226EW33MH**
130	230	80	3	841	1180	120,64	1300	1700	13.9	13.5	**23226CW33J**
130	230	80	3	841	1180	120,64	1300	1700	14.3	13.8	**23226EW33MH**
130	280	93	4	1210	1380	135,69	1500	1900	26.8	26.2	**22326EW33J**
130	280	93	4	1210	1380	135,69	1500	1900	27.4	26.8	**22326EW33MH**
140	210	53	2	511	781	80,52	1800	2400	6.45	6.25	**23028CW33J**
140	210	53	2	511	781	80,52	1800	2400	6.58	6.38	**23028EW33MH**
140	210	69	2	607	1040	107,23	1400	1800	8.6	8.4	**24028CW33J**
140	210	69	2	607	1040	107,23	1400	1800	8.88	8.49	**24028EW33MH**
140	225	85	2.1	825	1330	135,41	850	1100	13.2	13.0	**24128CW33J**
140	225	85	2.1	825	1330	135,41	850	1100	13.57	13.22	**24128EW33MH**
140	250	68	3	825	1080	107,80	1700	2200	14.1	13.8	**22228EW33J**
140	250	68	3	825	1080	107,80	1700	2200	14.3	14	**22228EW33MH**
150	225	56	2.1	573	881	88,97	1700	2200	7.86	7.62	**23030CW33J**
150	225	56	2.1	573	881	88,97	1700	2200	7.99	7.75	**23030EW33MH**
150	225	75	2.1	708	1220	123,21	1300	1700	10.7	10.5	**24030CW33J**
150	225	75	2.1	708	1220	123,21	1300	1700	10.98	10.74	**24030EW33MH**
150	250	100	2.1	1080	1690	167,40	800	1000	19.9	19.6	**24130CW33J**
150	250	100	2.1	1080	1690	167,40	800	1000	20.2	19.9	**24130EW33MH**
150	270	73	3	962	1260	123,00	1600	2000	17.9	17.5	**22230EW33J**
150	270	73	3	962	1260	123,00	1600	2000	18.1	17.7	**22230EW33MH**
160	240	60	2.1	656	1010	100,05	1700	2200	9.4	9.1	**23032CW33J**
160	240	60	2.1	656	1010	100,05	1700	2200	9.55	9.25	**23032EW33MH**
160	240	80	2.1	794	1400	138,68	1100	1500	12.9	12.7	**24032CW33J**
160	240	80	2.1	794	1400	138,68	1100	1500	13.21	12.89	**24032EW33MH**
160	270	109	2.1	1260	1980	191,92	700	900	25.7	25.3	**24132CW33J**
160	270	109	2.1	1260	1980	191,92	700	900	26.3	25.9	**24132EW33MH**
160	290	80	3	1080	1440	137,69	1500	1900	22.7	22.2	**22232EW33J**
160	290	80	3	1080	1440	137,69	1500	1900	22.95	22.37	**22232EW33MH**
170	260	90	2.1	981	1660	160,90	1000	1400	17.4	17.2	**24034CW33J**
170	260	90	2.1	981	1660	160,90	1000	1400	17.85	17.38	**24034EW33MH**
170	280	109	2.1	1280	2090	199,84	670	850	27.0	26.6	**24134CW33J**

Tapered Bore Bearing Designation	Connecting Dimensions			Adapter Sleeve	Withdrawal Sleeve	Withdrawal Nut	Calculation Coefficients			
	d_a	D_a	r_a							
	min	max	max				e	Y_1	Y_2	Y_0
	mm									
23224CKW33J	132	203	2	H2324	AH3224X	KM27	0.33	2	3	2
23224EKW33MH	132	203	2	H2324	AH3224X	KM27	0.33	2	3	2
22324EKW33J	132	203	2.5	H2324	AH2324X	KM27	0.33	2.1	3.1	2
22324EKW33MH	132	203	2.5	H2324	AH2324X	KM27	0.33	2.1	3.1	2
23026CKW33J	138	191	2	H3026	AH3026X	KM28	0.23	2.9	4.3	2.9
23026EKW33MH	138	191	2	H3026	AH3026X	KM28	0.23	2.9	4.3	2.9
24026CK30W33J	138	191	2	-	AH24026	KM27	0.31	2.2	3.2	2.1
24026EK30W33MH	138	191	2	-	AH24026	KM27	0.31	2.2	3.2	2.1
24126CK30W33J	141	199	2	-	AH24126	KM28	0.35	1.9	2.9	1.9
24126EK30W33MH	141	199	2	-	AH24126	KM28	0.35	1.9	2.9	1.9
22226EKW33J	144	216	2.5	H3126	AH3126X	KM28	0.26	2.6	3.8	2.5
22226EKW33MH	144	216	2.5	H3126	AH3126X	KM28	0.26	2.6	3.8	2.5
23226CKW33J	144	216	2.5	H2326	AH3226X	KM29	0.33	2.1	3.1	2
23226EKW33MH	144	216	2.5	H2326	AH3226X	KM29	0.33	2.1	3.1	2
22326EKW33J	148	262	3	H2326	AH2326X	KM29	0.33	2.1	3.1	2
22326EKW33MH	148	262	3	H2326	AH2326X	KM29	0.33	2.1	3.1	2
23028CKW33J	148	200	2	H3028	AH3028X	KM30	0.22	3	4.5	3
23028EKW33MH	148	200	2	H3028	AH3028X	KM30	0.22	3	4.5	3
24028CK30W33J	148	200	2	-	AH24028	KM29	0.29	2.3	3.4	2.3
24028EK30W33MH	148	200	2	-	AH24028	KM29	0.29	2.3	3.4	2.3
24128CK30W33J	152	213	2	-	AH24128	KM30	0.35	1.9	2.9	1.9
24128EK30W33MH	152	213	2	-	AH24128	KM30	0.35	1.9	2.9	1.9
22228EKW33J	154	236	2.5	H3128	AH3128X	KM30	0.25	2.7	3.9	2.5
22228EKW33MH	154	236	2.5	H3128	AH3128X	KM30	0.25	2.7	3.9	2.5
23030CKW33J	159	213	2	H3030	AH3030X	KM32	0.22	3.1	4.6	3
23030EKW33MH	159	213	2	H3030	AH3030X	KM32	0.22	3.1	4.6	3
24030CK30W33J	159	213	2	-	AH24030	KM31	0.3	2.3	3.4	2.2
24030EK30W33MH	159	213	2	-	AH24030	KM31	0.3	2.3	3.4	2.2
24130CK30W33J	162	238	2	-	AH24130	KM32	0.37	1.8	2.7	1.8
24130EK30W33MH	162	238	2	-	AH24130	KM32	0.37	1.8	2.7	1.8
22230EKW33J	164	256	2.5	H3130	AH3130X	KM33	0.25	2.7	3.9	2.5
22230EKW33MH	164	256	2.5	H3130	AH3130X	KM33	0.25	2.7	3.9	2.5
23032CKW33J	171	229	2	H3032	AH3032	KM34	0.22	3.1	4.6	3
23032EKW33MH	171	229	2	H3032	AH3032	KM34	0.22	3.1	4.6	3
24032CK30W33J	171	229	2	-	AH24032	KM34	0.30	2.3	3.4	2.2
24032EK30W33MH	171	229	2	-	AH24032	KM34	0.30	2.3	3.4	2.2
24132CK30W33J	172	258	2	-	AH24132	KM34	0.38	1.8	2.7	1.8
24132EK30W33MH	172	258	2	-	AH24132	KM34	0.38	1.8	2.7	1.8
22232EKW33J	174	276	2.5	H3132	AH3132	KM36	0.26	2.6	3.8	2.5
22232EKW33MH	174	276	2.5	H3132	AH3132	KM36	0.26	2.6	3.8	2.5
24034CK30W33J	181	249	2	-	AH24034	KM36	0.31	2.2	3.2	2.1
24034EK30W33MH	181	249	2	-	AH24034	KM36	0.31	2.2	3.2	2.1
24134CK30W33J	182	268	2	-	AH24134	KM36	0.36	1.9	2.8	1.8

NEW FORCE

Boundary Dimensions				Basic Load Rating		Fatique load limit	Limiting Speed Frequency for Lubrication by		Mass		Cylindrical Bore Bearing Designation
				Dynamic	Static				Cylindrical Bore	Tapered Bore	
d	D	B	r_s min	C_r	C_{or}	Pu	Grease	Oil			
mm				kN			min^{-1}		kg		
170	280	109	2.1	1280	2090	199,84	670	850	27.64	26.82	**24134EW33MH**
180	280	100	2.1	1170	1980	188,08	950	1300	22.9	22.6	**24036CW33J**
180	280	100	2.1	1170	1980	188,08	950	1300	23.4	22.8	**24036EW33MH**
180	300	118	3	1390	2080	225,08	700	850	32.9	32.4	**24136CW33J**
180	300	118	3	1390	2080	225,08	700	850	33.3	32.7	**24136EW33MH**
190	260	52	2	551	966	92,37	1700	2200	8,05	7,79	**23938EW33MH**
200	280	80	2,1	692	1160	108,79	1600	2000	11,3	11	**23940EW33MH**
200	310	109	2.1	1390	2370	218,26	900	1200	30.8	30.3	**24040EW33MH**
200	340	140	3	1920	3160	286,06	560	700	53.4	52.6	**24140EW33MH**
220	300	80	2,1	730	1330	109,87	1500	1900	12,3	12	**23944EW33MH**
220	340	90	3	1320	2090	187,15	1100	1500	29,6	28,7	**23044EW33MH**
220	340	118	3	1650	2830	253,41	850	1100	39.7	39	**24044EW33MH**
220	370	150	4	2200	3690	325,29	500	630	67.1	66.1	**24144EW33MH**
240	320	60	2,1	750	1450	115,51	1300	1700	13,3	13	**23948EW33MH**
240	360	92	3	1390	2310	202,61	1000	1400	32,4	31,4	**23048EW33MH**
240	360	118	3	1690	3060	268,39	800	1000	42,8	42,1	**24048EW33MH**
240	400	160	4	2510	4260	366,48	480	600	82.5	81.3	**24148EW33MH**
260	360	75	2,1	1070	1930	167,62	1100	1500	22,9	22,2	**23952EW33MH**
260	400	140	4	2190	4020	342,66	700	900	65	63,9	**24052EW33MH**
260	440	180	4	3100	5320	445,53	430	530	115	113	**24152EW33MH**
280	380	75	2,1	1120	2100	179,00	1000	1400	25	24,2	**23956EW33MH**
280	420	106	4	1820	3060	256,26	850	1100	51,5	49,9	**23056EW33MH**
280	420	140	4	2240	4280	358,43	670	850	69,7	68,6	**24056EW33MH**
280	460	146	5	2650	4370	359,92	750	950	95	91	**23156EW33MH**
280	460	180	5	3220	5630	463,70	400	500	121	119	**24156EW33MH**
300	460	118	4	2220	3720	303,94	800	1000	71,5	69,4	**23060EW33MH**
300	460	160	4	2800	5230	427,32	600	750	97,7	96,2	**24060EW33MH**
300	500	200	5	3830	6790	546,31	360	450	163	160	**24160EW33MH**
320	420	90	3	1500	2690	221,55	950	1300	38,3	37	**23960EW33MH**
320	480	160	4	2885	5500	442,52	560	700	103	101,5	**24064EW33MH**
320	540	176	5	3780	6150	484,20	630	800	162	157	**23164EW33MH**
320	540	218	5	4470	7870	619,61	340	430	208	205	**24164EW33MH**
340	520	180	5	3550	6710	528,28	530	670	141	139	**24068EW33MH**
340	580	190	5	4240	6950	536,22	600	750	206	199	**23168EW33MH**
360	600	243	5	5360	9970	759,47	300	380	284	279	**24172EW33MH**
380	560	180	5	3690	7420	568,80	480	600	154	152	**24076EW33MH**

Tapered Bore Bearing Designation	Connecting Dimensions			Adapter Sleeve	Withdrawal Sleeve	Withdrawal Nut	Calculation Coefficients			
	d_a	D_a	r_a							
	min	max	max				e	Y_1	Y_2	Y_0
	mm									
24134EK30W33MH	182	268	2	-	AH24134	KM36	0.36	1.9	2.8	1.8
24036CK30W33J	191	269	2	-	AH24036	KM38	0.32	2.1	3.1	2.0
24036EK30W33MH	191	269	2	-	AH24036	KM38	0.32	2.1	3.1	2.0
24136CK30W33J	194	286	2.5	-	AH24136	KM38	0.37	1.8	2.7	1.8
24136EK30W33MH	194	286	2.5	-	AH24136	KM38	0.37	1.8	2.7	1.8
23938EKW33MH	200	250	2	H3938	-	-	0,17	3,90	5,80	3,80
23940EKW33MH	212	268	2	H3940	-	-	0,19	3,60	5,40	3,50
24040EK30W33MH	212	298	2	-	AOH24040	HM42	0.32	2.1	3.1	2.1
24140EK30W33MH	214	326	2.5	-	AOH24140	HM42	0.39	1.9	2.6	1.7
23944EKW33MH	232	288	2	H3944	-	-	0,16	4,20	6,30	4,00
23044EKW33MH	234	326	2,5	H3044	AH3044	HML47T	0,24	2,00	4,30	2,80
24044EK30W33MH	234	326	2.5	-	AOH24044	HM46	0.32	2.3	3.1	2.1
24144EK30W33MH	238	352	3	-	AOH24144	HM46	0.38	1.8	2.6	1.7
23948EKW33MH	252	308	2	H3948	-	-	0,15	4,50	6,70	4,50
23048EKW33MH	254	346	2,5	H3048	AH3048	HML52T	0,23	3,00	4,50	2,90
24048EK30W33MH	254	346	2,5	-	AOH24048	HM50	0,30	2,30	3,40	2,20
24148EK30W33MH	258	422	3	-	AOH24148	HM50	0.38	1.8	2.7	1.8
239EKW33MH	272	348	2	H3952	-	-	0,18	3,70	5,50	3,70
24052EK30W33MH	278	385	3	-	AOH24052	HM54T	0,32	2,10	3,10	2,10
24152EK30W33MH	278	422	3	-	AOH24152	HM54	0.32	2	3.1	2
23956EKW33MH	292	368	2	H3956	-	-	0,16	4,20	6,30	4,00
23056EKW33MH	298	402	3	H3056	AH3056	HML60T	0,22	3,00	4,50	3,00
24056EK30W33MH	298	402	3	-	AOH24056	HM52T	0,30	2,20	3,30	2,20
23156EKW33MH	322	478	4	H3156	AH3156	HM62T	0,29	2,30	3,30	2,20
24156EK30W33MH	300	440	4	-	AOH24156	HM3160	0.37	1.8	2.7	1.8
23060EKW33MH	318	442	3	H3060	AH3060	HML64T	0,23	3,00	4,40	2,90
24060EK30W33MH	318	442	3	-	AOH24060	HM62T	0,32	2,10	3,20	2,10
24160EK30W33MH	320	480	4	-	AOH24160	HM3164	0.37	1.8	2.7	1.8
23960EKW33MH	314	406	2,5	H3960	-	-	0,19	3,60	5,40	3,50
24064EK30W33MH	338	462	3	-	AOH24064	HM66T	0,30	2,20	3,30	2,20
23164EKW33MH	342	518	4	H3164	AH3164	HM70T	0,30	2,20	3,30	2,20
24164EK30W33MH	342	518	4	-	AOH24164	HM3168	0.38	1.8	2.6	1.7
24068EKW33MH	358	502	4	-	AH24068-H	HM3072	0.33	2	3	2
23168EKW33MH	362	558	4	-	AH3168	HM74T	0,30	2,20	3,30	2,20
24172EK30W33MH	382	578	4	-	AOH24172	HM3176	0,38	1,80	2,60	1,70
24076EK30W33MH	398	542	4	-	AOH24076	HM3080	0.29	2.3	3.5	2.3

NEW FORCE

Boundary Dimensions				Basic Load Rating		Fatique load limit	Limiting Speed Frequency for Lubrication by		Mass		Cylindrical Bore Bearing Designation
				Dynamic	Static				Cylindrical Bore	Tapered Bore	
d	D	B	r_s min	C_r	C_{or}	Pu	Grease	Oil			
mm				kN			min^{-1}		kg		
380	620	243	5	5500	10490	789,35	280	360	296	291	**24176EW33MH**
400	650	250	6	5960	11150	826,82	180	240	334	329	**24180EW33MH**
420	700	280	6	7220	13480	980,44	170	220	445	438	**24184EW33MH**
460	760	300	7.5	8250	15530	1100,93	160	200	556	547	**24192EW33MH**
500	720	167	6	4140	7970	551,53	300	350	236	228	**230/500W33M**
500	830	264	7.5	7500	13040	890,42	280	330	570	550	**231/500W33M**
530	780	185	6	4965	9310	641,19	280	330	322.9	313.5	**230/530W33M**
560	820	195	6	5675	10690	823,22	320	400	356.7	346	**230/560CW33M**
600	870	200	6	6070	11420	864,75	260	300	405	400	**230/600CW33M**
630	920	212	7.5	6940	13360	881,46	240	300	485	470	**230/630W33M**
670	980	230	7.5	7640	14690	951,20	200	280	715	698	**230/670W33M**
750	1360	475	7.5	22000	44000	2646,45	150	190	3070	2990	**232/750CW33M**
800	1150	258	7.5	9620	19650	1210,17	180	220	939	911	**230/800W33M**
850	1220	272	7.5	10600	22080	1335,68	160	200	1110	1080	**230/850W33M**

Tapered Bore Bearing Designation	Connecting Dimensions			Adapter Sleeve	Withdrawal Sleeve	Withdrawal Nut	Calculation Coefficients			
	d_a	D_a	r_a							
	min	max	max				e	Y_1	Y_2	Y_0
	mm									
24176EK30W33MH	402	598	4	-	AOH24176	HM3180	0,36	1,90	2,80	1,80
24180EK30W33MH	428	622	5	-	AH24180	HM3184	0.35	1.9	2.8	1.9
24184EK30W33MH	446	674	5	-	AOH24184	HM3188	0.37	1.8	2.7	1.8
24192EK30W33MH	492	728	6				0.37	1.8	2.7	1.8
230/500KW33M	528	692	5	H30/500	AH30/500X	HML108T	0.22	3	4.3	2.9
231/500KW33M	536	794	6	H31/500	AH31/500X	HM110T	0.31	2.1	3	2
230/530KW33M	558	752	5	H30/530	AH30/530	HML112T	0.22	3	4.3	2.9
230/560CKW33M	588	792	5	H30/560	AH30/560	HML118T	0.22	3.1	4.6	3
230/600CKW33M	633	838	5	H30/600	AH30/600	HM30/630	0.22	2.9	4.2	2.8
230/630KW33M	666	884	6	H30/630	AH30/630	HM30/670	0.21	3.1	4.5	2.9
230/670KW33M	706	944	6	H30/670	AH30/670	HM30/710	0.23	3	4.4	2.9
232/750CKW33M	860	1200	6	H32/750	AH32/750	HM31/800	0.31	1.9	3.6	2.4
230/800KW33M	836	1114	6	H30/800	AH30/800	HM30/850	0.21	3.1	4.5	3
230/850KW33M	886	1184	6	-	AH30/850	HM30/900	0.21	3.1	4.5	3

The following design groups are further available in NEW FORCE execution:

- Single row angular contact ball bearings
- Single row angular contact ball bearings for high speed frequencies
- Double row angular contact ball bearings
- Double row self aligning ball bearings
- Single direction thrust ball bearings
- Double direction thrust ball bearings

(For more detailed information and technical specifications see ZKL Catalogue 2009-03.)

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