

# **JK Pioneer**

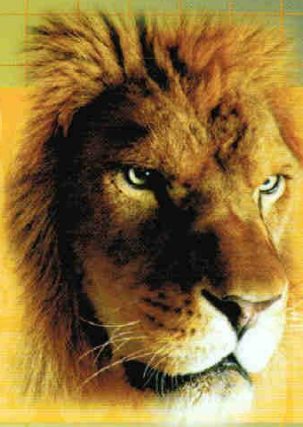
## **Industrial Bearings**



**Fenner (India) Limited**



JK Pioneer Industrial Bearing





**No 1**

**RELY ON THE LEADER** in India for over 50 years

**Total Power Transmission & Sealing Solutions**

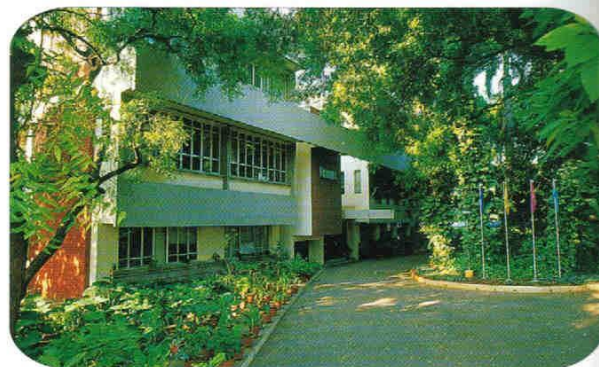
- State-of-the Art Manufacturing Facilities in five locations
- Most Modern R & D Facilities and Material Development Centre
- Wide distribution Network throughout the country
- Products Reaching to over 50 countries
- ISO 9001, TS 16949, ISO 14001 & OHSAS 18001 certifications for Quality, Environmental, Health & Safety management systems
- TPM Award winning Manufacturing Plants at Madurai & Patancheru



*The driving force*

**Industry • Agriculture • Automobiles • Appliances**

## World Class Infrastructure Facilities



Belts and Oil seals Plant  
Madurai, Tamilnadu



State of the art Speciality Belts Plant,  
Nilakottai, Tamilnadu

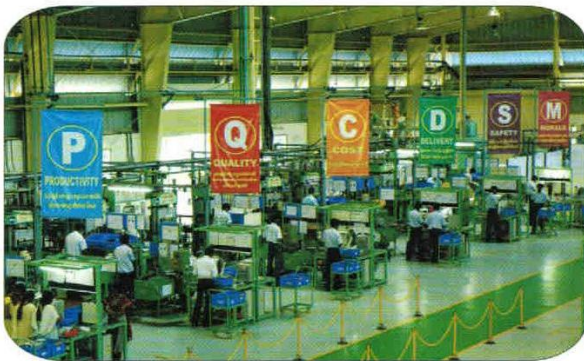




## JK Pioneer Industrial Bearing



Belts, Oil seals & Moulded Rubber Products  
Plant Patancheru, Andhra Pradesh



State-of-the-art Oil seals Plant  
Sriperumbudur, Tamilnadu



JK Pioneer Oil seals Plant,  
Patancheru, Andhra Pradesh



State-of-the-art R & D Centre,  
Sriperumbudur, Tamilnadu



Engineering Products Plant  
Pashamailaram, Andhra Pradesh



## JK Pioneer Industrial Bearings

Fenner has been creating History and setting standards for over 140 years in Mechanical Power Transmission product market globally. Industries, worldwide, stand testimony to an equally long saga of corporate loyalty, - based on trust and reliability. Enjoying a tremendous popularity, Fenner has now become a generic Brand Name all over the world in Mechanical Power Transmission Product segment.

Fenner's products stand Value for Money, and are part of the obsession with Customer service, which always exceeds Customer expectations. Fenner, with its vast experience has acquired the inherent ability to anticipate Technology shifts and innovate accordingly, which ensures Leadership without competition, Performance without parallel.

Fenner (India) Limited forges ahead with same spirit, enhancing its product basket for Mechanical Power Transmission Solutions with the introduction of **JK Pioneer** Heavy Duty Industrial Bearings to suit typical requirements of its wide range of Customers worldwide.

The product range of **JK Pioneer** Industrial Bearings are the outcome of the stringent manufacturing practices and Quality Parameters, designed and developed by its in-house R&D and Design Centre, backed with World's highest testing equipment to ensure each and every bearing reaching our Customers meet the highest level of Quality Standards.

Each and every JK Pioneer Bearings are passed through Frequency Spectrum Analysers to ensure a trouble free longer Bearing life. Bearings are also tested under Load & Stress

## *Accolades*







⊙ Miniature size deep groove ball bearing



⊙ Small size deep groove ball bearing



⊙ Medium size deep groove ball bearing



⊙ Tapered roller bearing

## PRODUCTS

Today, JK PIONEER is making a wide range of deep groove ball bearings and tapered roller bearings under JK PIONEER brand. They can be categorized as miniature size ball bearings, small and medium size ball bearings as well as inch sized and metric sized tapered roller bearings. Currently, there are more than 500 different types of bearings in its range and the range is fastly expanding.

# BEARING LIST

Ref.	<i>d</i> mm	<i>D</i> mm	<i>B,C</i> mm	Weight kg
6000	10	26	8	0.0190
6001	12	28	8	0.0206
6002	15	32	9	0.0300
6003	17	35	10	0.0390
6004	20	42	12	0.0690
6005	25	47	12	0.0800
6006	30	55	13	0.1140
6007	35	62	14	0.1480
6008	40	68	15	0.1890
6009	45	75	16	0.2360
6010	50	80	16	0.2540
6011	55	90	18	0.3660
6012	60	95	18	0.3890
6013	65	100	18	0.4400
6014	70	110	20	0.6000
6015	75	115	20	0.6400
6016	80	125	22	0.8540
6017	85	130	22	0.8900
6200	10	30	9	0.0300
6201	12	32	10	0.0360
6202	15	35	11	0.0360
6203	17	40	12	0.0650
6204	20	47	14	0.1070
6205	25	52	15	0.1250
6206	30	62	16	0.2010
6207	35	72	17	0.2870
6208	40	80	18	0.3650
6209	45	85	19	0.4200
6210	50	90	20	0.4660
6211	55	100	21	0.6060
6212	60	110	22	0.7930
6213	65	120	23	0.9900
6214	70	125	24	1.1000
6215	75	130	25	1.2000
6216	80	140	26	1.4000
6300	10	35	11	0.0540
6301	12	37	12	0.0590
6302	15	42	13	0.0820
6303	17	47	14	0.1130
6304	20	52	15	0.1420
6305	25	62	17	0.2260
6306	30	72	19	0.3490
6307	35	80	21	0.4600
6308	40	90	23	0.6450
6309	45	100	25	0.8420
6310	50	110	27	1.0860
6311	55	120	29	1.3500
6312	60	130	31	1.7000
6313	65	140	33	2.1000
6314	70	150	35	2.5000
6315	75	160	37	3.0000

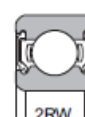
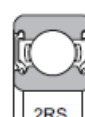
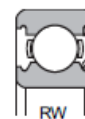
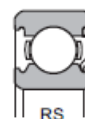
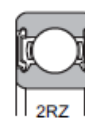
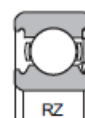
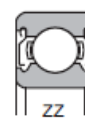
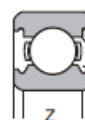
Ref.	<i>d</i> mm	<i>D</i> mm	<i>T</i> mm	<i>B</i> mm	<i>C</i> mm	Weight kg
30203	17	40	13.25	12	11	0.078
30204	20	47	15.25	14	12	0.124
30205	25	52	16.25	15	13	0.151
30206	30	62	17.25	16	14	0.229
30207	35	72	18.25	17	15	0.328
30208	40	80	19.25	18	16	0.419
30209	45	85	20.75	19	16	0.474
30210	50	90	21.75	20	17	0.529
30211	55	100	22.75	21	18	0.740
30212	60	110	23.75	22	19	0.490
30213	65	120	24.75	23	20	1.180
30214	70	125	26.50	24	21	1.260
30215	75	130	27.50	25	22	1.410
30216	80	140	28.25	26	22	1.720
30217	85	150	30.50	28	24	2.140
30302	15	42	14.25	13	11	0.094
30303	17	47	15.25	14	12	0.129
30304	20	52	16.25	15	13	0.165
30305	25	62	18.25	17	15	0.263
30306	30	72	20.75	19	16	0.387
30307	35	80	22.75	21	18	0.515
30308	40	90	25.25	23	20	0.747
30309	45	100	27.25	25	22	0.984
30310	50	110	29.25	27	23	1.310
30311	55	120	31.50	29	25	1.660
30312	60	130	33.50	31	26	2.060

Ref.	<i>d</i> mm	<i>D</i> mm	<i>T</i> mm	<i>B</i> mm	<i>C</i> mm	Weight kg
32004	20	42	15	15	12.0	0.097
32005	25	47	15	15	11.5	0.114
32006	30	55	17	17	13.0	0.166
32007	35	62	18	18	14.0	0.224
32008	40	68	19	19	14.5	0.273
32009	45	75	20	20	15.5	0.346
32010	50	80	20	20	15.5	0.366
32011	55	90	23	23	17.5	0.563
32012	60	95	23	23	17.5	0.576
32013	65	100	23	23	17.5	0.630
32014	70	110	25	25	19.0	0.848
32015	75	115	25	25	19.0	0.909

Ref.	<i>d</i> mm	<i>D</i> mm	<i>T</i> mm	<i>B</i> mm	<i>C</i> mm	Weight kg
32203	17	40	17.25	16	14	0.102
32204	20	47	19.25	18	15	0.160
32205	25	52	19.25	18	16	0.187
32206	30	62	21.25	20	17	0.301
32207	35	72	24.25	23	19	0.457
32208	40	80	24.75	23	19	0.558
32209	45	85	24.75	23	19	0.607
32210	50	90	24.75	23	19	0.648
32211	55	100	26.75	25	21	0.876
32212	60	110	29.75	28	24	1.180
32213	65	120	32.75	31	27	1.580
32214	70	125	33.25	31	27	1.680
32215	75	130	33.25	31	27	1.740

Ref.	<i>d</i> mm	<i>D</i> mm	<i>T</i> mm	<i>B</i> mm	<i>C</i> mm	Weight kg
LM11749/10	0.6875	1.5700	0.5450	0.575	0.420	0.084
LM11949/10	0.7500	1.7810	0.6100	0.655	0.475	0.122
M12649/10	0.8437	1.9687	0.6900	0.720	0.550	0.169
M12649A/10	0.8437	1.9687	0.6703	0.700	0.530	0.163
LM12749/10	0.8656	1.7810	0.6100	0.655	0.475	0.123
LM12749/11	0.8656	1.8100	0.6100	0.655	0.475	0.123
L44643/10	1.0000	1.9800	0.5600	0.580	0.420	0.130

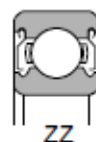
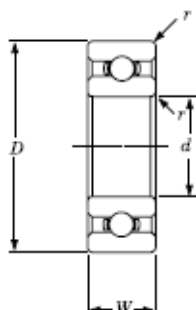
Ref.	<i>d</i> mm	<i>D</i> mm	<i>T</i> mm	<i>B</i> mm	<i>C</i> mm	Weight kg
L44649/10	1.0625	1.9800	0.5600	0.580	0.4200	0.120
L45449/10	1.1417	1.9800	0.5600	0.580	0.4200	0.114
LM67048/10	1.2500	2.3280	0.6250	0.660	0.4650	0.182
LM48548/10	1.3750	2.5625	0.7100	0.720	0.5500	0.249
L68149/10	1.3775	2.3280	0.6250	0.660	0.4700	0.175
L68149/11	1.3775	2.3612	0.6250	0.660	0.4700	0.183
JL69349/10	1.4961	2.4803	0.6693	0.6693	0.5315	0.198
LM78349/10	1.3775	2.4399	0.6575	0.6693	0.5354	0.274
JL68145/11	1.3774	2.3612	0.6250	0.7268	0.4700	0.184
329013	1.1417	1.9800	0.5600	0.6929	0.4200	0.116



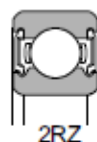
#### Common Options

Z	: One Shield
ZZ	: Two Shields
RZ	: One Non-Contact Seal
2RZ	: Two Non-Contact Seals
RS	: One Contact Seal
2RS	: Two Contact Seals
RW	: One Low Torque Seal
2RW	: Two Low Torque Seals
C0	: Normal Internal Clearance
C3	: Greater Than Normal
EMQ	: Electric Motor Quality

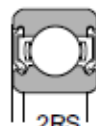
## BEARING SPECIFICATIONS 60 Series



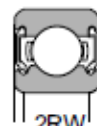
ZZ



2RZ



2RS



2RW

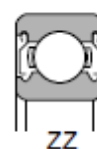
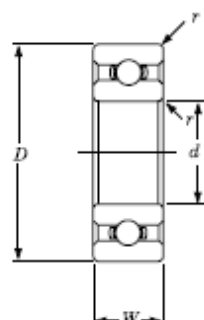
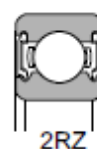
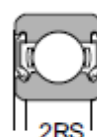
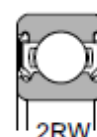
Any combination of closures is available

Basic Bearing No.	Bore $d$		Outer Diameter $D$		Width $W$		Radius $r$ min		Basic Load Rating KN		Ball Complement		Max Runout Speed		Weight kg
	mm	inch	mm	inch	mm	inch	mm	inch	Dynamic $C$	Static $C_0$	No.	Size mm	Grease r/min	Oil r/min	
604	4	.1575	12	.4724	4	.1575	0.2	.008	0.97	0.36	8	1.588	43000	51000	0.002
605	5	.1969	14	.5512	5	.1969	0.2	.008	1.33	0.505	8	2	39000	46000	0.0035
606	6	.2362	17	.6693	6	.2362	0.3	.012	2.19	0.865	8	2.831	30000	38000	0.006
607	7	.2756	19	.7480	6	.2362	0.3	.012	2.24	0.91	7	3.5	28000	36000	0.008
608	8	.3149	22	.8661	7	.2756	0.3	.012	3.35	1.40	7	3.969	26000	34000	0.012
609	9	.3543	24	.9449	7	.2756	0.3	.012	3.40	1.45	7	3.969	22000	30000	0.014
6000	10	.3937	26	1.0236	8	.3150	0.3	.012	4.55	1.96	7	4.763	20000	28000	0.019
6001	12	.4724	28	1.1024	8	.3150	0.3	.012	5.10	2.39	8	4.763	19000	26000	0.021
6002	15	.5906	32	1.2598	9	.3543	0.3	.012	5.60	2.84	9	4.763	18000	24000	0.030
6003	17	.6693	35	1.3780	10	.3937	0.3	.012	6.80	3.35	10	4.763	17000	22000	0.039
6004	20	.7874	42	1.6535	12	.4724	0.6	.024	9.40	5.05	9	6.35	15000	19000	0.069
6005	25	.9843	47	1.8504	12	.4724	0.6	.024	10.10	5.85	10	6.35	13000	17000	0.080
6006	30	1.1811	55	2.1654	13	.5118	1.0	.039	13.20	8.30	11	7.144	12000	15000	0.116
6007	35	1.3780	62	2.4409	14	.5512	1.0	.039	16.00	10.30	11	7.938	10000	13000	0.155
6008	40	1.5748	68	2.6772	15	.5906	1.0	.039	16.80	11.50	12	7.938	8000	11000	0.185
6009	45	1.7717	75	2.9528	16	.6299	1.0	.039	21.00	15.10	12	8.731	7200	9000	0.231
6010	50	1.9685	80	3.1496	16	.6299	1.0	.039	21.80	16.60	13	8.731	6400	7800	0.250
6011	55	2.1654	90	3.5433	18	.7087	1.1	.043	28.30	21.20	11	11.112	5700	7000	0.362
6012	60	2.3622	95	3.7402	18	.7087	1.1	.043	29.50	23.20	12	11.112	5000	6300	0.385



## BEARING SPECIFICATIONS

### 62 Series

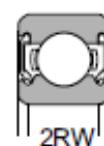
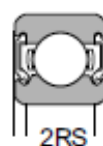
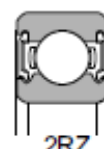
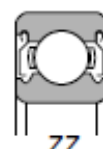
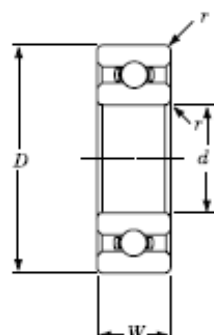

**ZZ**

**2RZ**

**2RS**

**2RW**

Any combination of closures is available

Basic Bearing No.	Bore <i>d</i>		Outer Diameter <i>D</i>		Width <i>W</i>		Radius <i>r</i> min		Basic Load Rating KN		Ball Complement		Max Runout Speed		Weight
	mm	inch	mm	inch	mm	inch	mm	inch	Dynamic	Static	No.	Size mm	Grease r/min	Oil r/min	
									<i>C</i>	<i>C</i> <sub>0</sub>					
624	4	.1575	13	.5118	5	.1968	0.2	.007	1.31	0.49	6	2.381	36000	45000	0.0032
625	5	.1968	16	.6299	5	.1968	0.3	.012	1.76	0.68	6	3.175	32000	40000	0.0048
626	6	.2362	19	.7480	6	.2362	0.3	.012	2.34	0.885	7	3.5	28000	36000	0.0081
627	7	.2756	22	.8661	7	.2756	0.3	.012	3.35	1.40	7	3.969	26000	34000	0.013
628	8	.3149	24	.9448	8	.3149	0.3	.012	4.00	1.59	7	3.969	24000	32000	0.017
629	9	.3543	26	1.0236	8	.3149	0.3	.012	4.55	1.96	7	4.763	22000	30000	0.020
6200	10	.3937	30	1.1811	9	.3543	0.6	.024	5.10	2.39	8	4.763	19000	26000	0.032
6201	12	.4724	32	1.2598	10	.3937	0.6	.024	6.10	2.75	7	5.953	18000	24000	0.037
6202	15	.5906	35	1.3780	11	.4331	0.6	.024	7.75	3.60	8	5.953	17000	22000	0.045
6203	17	.6693	40	1.5748	12	.4724	0.6	.024	9.60	4.60	8	6.747	16000	20000	0.066
6204	20	.7874	47	1.8504	14	.5512	1.0	.039	12.80	6.65	8	7.938	14000	18000	0.106
6205	25	.9843	52	2.0470	15	.5906	1.0	.039	14.00	7.85	9	7.938	12000	16000	0.128
6206	30	1.1811	62	2.4409	16	.6299	1.0	.039	19.50	11.30	9	9.525	10000	13000	0.199
6207	35	1.3780	72	2.8346	17	.6693	1.1	.043	25.70	15.30	9	11.112	8800	10000	0.287
6208	40	1.5748	80	3.1496	18	.7087	1.1	.043	29.10	17.80	9	12	7700	9200	0.367
6209	45	1.7717	85	3.3465	19	.7480	1.1	.043	32.50	20.40	10	12	6800	8200	0.416
6210	50	1.9685	90	3.5433	20	.7874	1.1	.043	35.00	23.20	10	12.7	6100	7300	0.462
6211	55	2.1654	100	3.9370	21	.8268	1.5	.059	43.50	29.20	10	14.288	5500	6600	0.602
6212	60	2.3622	110	4.3307	22	.8661	1.5	.059	52.50	36.00	10	15.081	5000	6000	0.789

## BEARING SPECIFICATIONS

### 63 Series

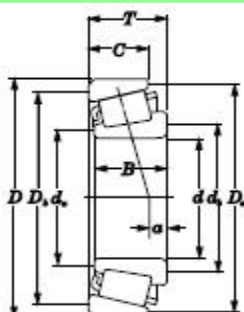


Any combination of closures is available

Basic Bearing No.	Bore $d$		Outer Diameter $D$		Width $W$		Radius $r$		Basic Load Rating KN		Ball Complement		Max Runout Speed		Weight kg
	mm	inch	mm	inch	mm	inch	mm	inch	Dynamic $C$	Static $C_0$	No.	Size mm	Grease r/min	Oil r/min	
635	5	.1969	19	.7480	6	.2362	0.3	.012	2.34	0.885	9	2.381	34000	40000	0.008
6300	10	.3937	35	1.3780	11	.4331	0.6	.024	8.20	3.50	7	6.35	15000	21000	0.053
6301	12	.4724	37	1.4567	12	.4724	1.0	.039	9.70	4.20	7	6.35	14000	20000	0.060
6302	15	.5906	42	1.6535	13	.5118	1.0	.039	11.40	5.45	7	7.938	13000	18000	0.082
6303	17	.6693	47	1.8504	14	.5512	1.0	.039	13.50	6.55	7	8.731	12000	17000	0.115
6304	20	.7874	52	2.0472	15	.5906	1.1	.043	15.90	7.90	7	9.525	11000	15000	0.144
6305	25	.9843	62	2.4409	17	.6693	1.1	.043	21.20	10.90	7	11.5	10000	13000	0.2193
6306	30	1.1811	72	2.8346	19	.7480	1.1	.043	26.70	15.00	8	12	8000	10000	0.3498
6307	35	1.3780	80	3.1496	21	.8268	1.5	.059	33.50	19.10	8	13.494	6800	8000	0.4542
6308	40	1.5748	90	3.5433	23	.9055	1.5	.059	40.50	24.00	8	15.081	5800	7200	0.6394
6309	45	1.7717	100	3.9370	25	.9843	1.5	.059	53.00	32.00	8	17.462	5000	6200	0.8363
6310	50	1.9685	110	4.3307	27	1.0630	2	.079	62.00	38.50	8	19.05	4400	5500	1.0822

## BEARING SPECIFICATIONS

### Metric Taper Roller Bearings



Bore  <i>d</i>	Outside Diameter  <i>D</i>	Width  <i>T</i>	Basic Rating		Eff Load Center <i>a</i>	Basic Bearing NO.	Min Shaft Fillet <i>R</i>	Width  <i>B</i>	Min Housing Fillet <i>r</i>	Width  <i>C</i>	Weight  <i>kg</i>
			Dynamic  <i>Cr</i>	Load KN Static  <i>Cor</i>							
0.6693 17	1.5748 40	0.5217 13.25	20.7	21.9	9.9	30203	0.039 1.0	0.4724 12	0.039 1.0	0.4331 11	0.079
0.7874 20	1.8504 47	0.6004 15.25	28.2	30.6	11.2	30204	0.039 1.0	0.5512 14	0.039 1.0	0.4724 12	0.126
0.9843 25	2.0470 52	0.6398 16.25	32.2	37.0	12.5	30205	0.039 1.0	0.5906 15	0.039 1.0	0.5118 13	0.154
1.1811 30	2.4409 62	0.6791 17.25	43.3	50.5	13.8	30206	0.039 1.0	0.6299 16	0.039 1.0	0.5512 14	0.231
1.3780 35	2.8346 72	0.7185 18.25	54.2	63.5	15.3	30207	0.059 1.5	0.6693 17	0.059 1.5	0.5906 15	0.331
1.5748 40	3.1496 80	0.7776 19.75	63.0	74.0	16.9	30208	0.059 1.5	0.7087 18	0.059 1.5	0.6299 16	0.422
1.7717 45	3.3465 85	0.8169 20.75	67.9	83.6	18.6	30209	0.059 1.5	0.7480 19	0.059 1.5	0.6299 16	0.474
1.9685 50	3.5433 90	0.8563 21.75	73.3	92.1	20.0	30210	0.059 1.5	0.7874 20	0.059 1.5	0.6693 17	0.529
0.5906 15	1.6535 42	0.5610 14.25	22.9	21.6	9.6	30302	0.039 1.0	0.5118 13	0.039 1.0	0.4331 11	0.094
0.6693 17	1.8504 47	0.6004 15.25	28.3	27.2	10.4	30303	0.039 1.0	0.5512 14	0.039 1.0	0.4724 12	0.129
0.7874 20	2.0472 52	0.6398 16.25	33.1	33.2	11.1	30304	0.059 1.5	0.5906 15	0.059 1.5	0.5118 13	0.165
0.9843 25	2.4409 62	0.7185 18.25	46.9	48.1	13.0	30305	0.059 1.5	0.6693 17	0.059 1.5	0.5906 15	0.263
1.1811 30	2.8346 72	0.8169 20.75	59.0	63.1	15.3	30306	0.059 1.5	0.7480 19	0.059 1.5	0.6299 16	0.387
1.3780 35	3.1496 80	0.8957 22.75	75.3	82.6	16.8	30307	0.079 2.0	0.8268 21	0.059 1.5	0.7087 18	0.515
1.5748 40	3.5433 90	0.9941 25.25	90.9	107.6	19.5	30308	0.079 2.0	0.9055 23	0.059 1.5	0.7874 20	0.747
1.7717 45	3.9370 100	1.0728 27.25	108.9	129.8	21.3	30309	0.079 2.0	0.9843 25	0.059 1.5	0.8661 22	0.984



# 1. BEARING HANDLING

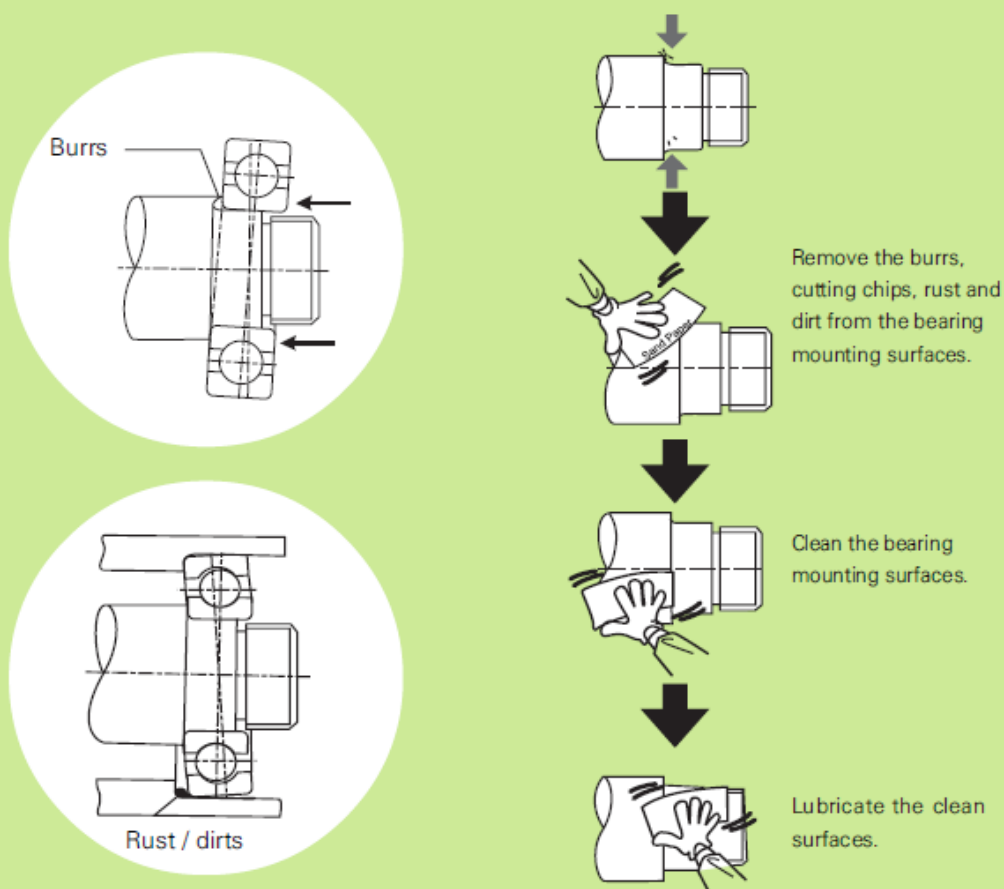
## 1.1 Installation prepare

Bearings are precision parts and in order to preserve their accuracy and reliability, special care must be taken before their installation:

- ① Do not unwrap the packing before using, and do not lay it aside after unwrapping.
- ② Keep the working area clean.
- ③ Use proper fitting tools, and keep them clean.
- ④ Do not use cloth which may produce scraps, and do not use dirty cloth.
- ⑤ Clean the components all around before installing.
- ⑥ Do not touch the bearing with bare hand directly.

Any burrs, cutting chips, rust or dirt that infiltrate the bearing before installation should first be removed from the bearing mounting surfaces. Mounting can then be simplified if the clean surfaces are lubricated with spindle oil.

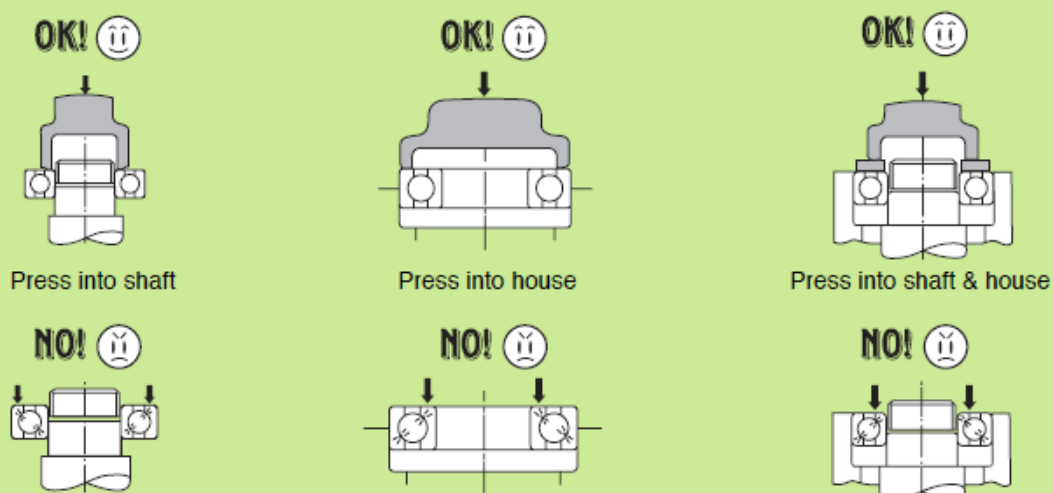
### ● Preparation procedure



## 1.2 Bearing mounting

Around 16% of all premature bearing failures are a result of poor fitting or using incorrect mounting methods. When bearings are being installed on shafts or in houses, the bearing ring should never be struck directly with a hammer or a drift. Please see the illustration as following pictures:

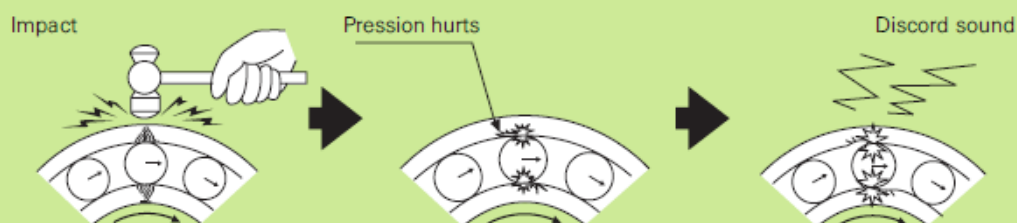
### ● Bearing installing



### ● Warning in installation

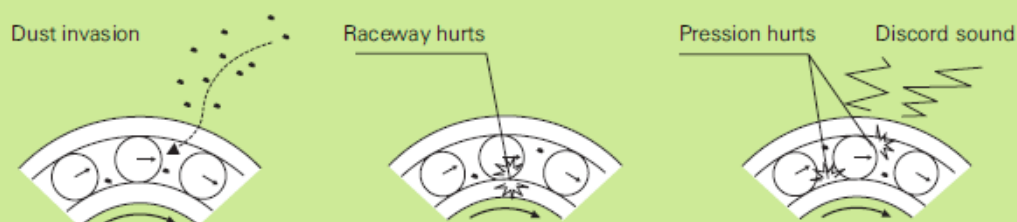
#### ① To avoid severe impact

The gap between raceway surface and balls is approximate to zero contact, so excessive impact may cause dents on the raceway surface. Hammering or dropping must be avoided.







#### ② To avoid any dust entry

When using bearings, if the interior suffers from dust invasion, raceway surface and rolling elements surface can be hurt, which will cause discord sound or bad rotation.


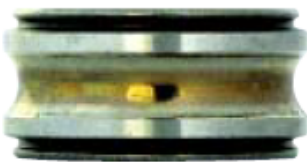




## 2. TROUBLE-SHOOTING BEARING PROBLEMS

The bearing normally can be used up to the end of the rolling fatigue life if handled properly. If it fails earlier, it may be caused by improper mounting, mishandling, poor lubrication, entry of foreign matter or abnormal heat generation. Considering possible causes of bearing failure and damages according to the condition of the machine on which the bearings failed and taking countermeasures is very important to prevent the recurrence of similar problems. Following types of damage typically encountered are presented in the table below.

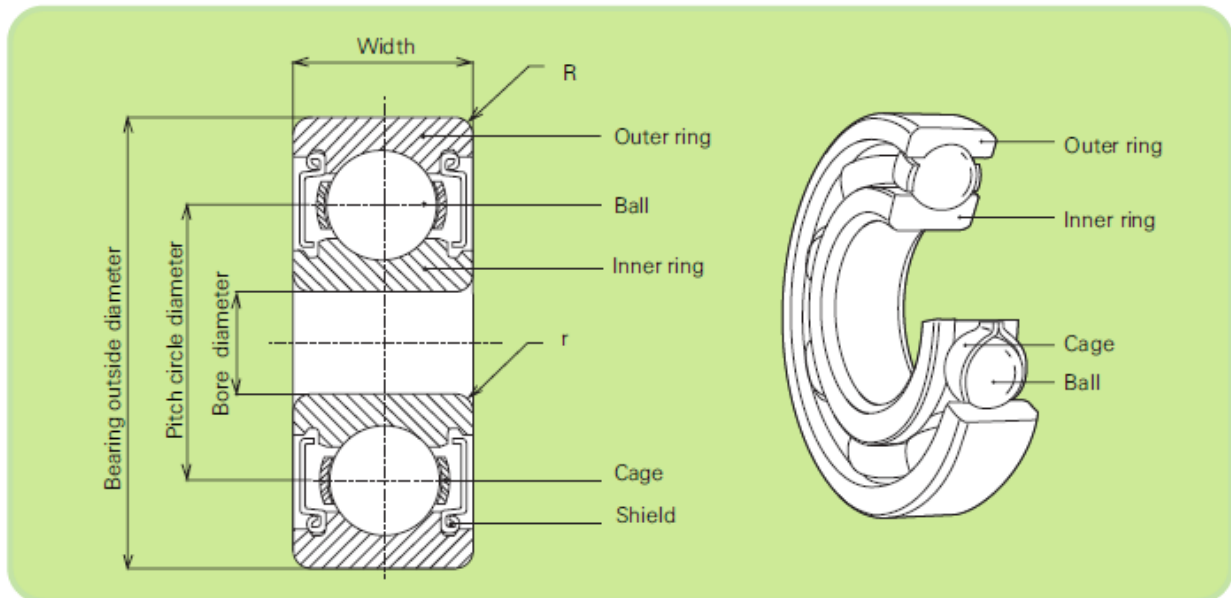
Damage type	Illustration of damage conditions	Possible causes	Solutions
<b>Flaking</b>		<ul style="list-style-type: none"> <li>• Over and excessive load</li> <li>• Improper handling and mounting</li> <li>• Poor shaft or housing accuracy etc.</li> <li>• Unsuitable bearing clearance</li> <li>• Installation error etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Find out the cause of the heavy load</li> <li>• Examine operating conditions</li> <li>• Improve the mounting method</li> <li>• Check the precision of shaft and housing</li> <li>• Check the bearing internal clearance</li> </ul>
<b>Speckles</b>		<ul style="list-style-type: none"> <li>• Ingress of foreign particles</li> </ul>	<ul style="list-style-type: none"> <li>• Improvement in sealing</li> <li>• Improvement of the operating environment if possible</li> <li>• Filtration of the oil or grease</li> </ul>
<b>Cracking</b>		<ul style="list-style-type: none"> <li>• Excessive load</li> <li>• Excessive impacts</li> <li>• Rapid cooling</li> <li>• Excessive interference</li> <li>• Overheating by creeping</li> <li>• Very loose fit</li> <li>• Large flaking etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Find out the cause of very large load</li> <li>• Improve the installation process</li> <li>• Correct the interference</li> <li>• Prevent the creep</li> </ul>
<b>Rust and Corrosion</b>		<ul style="list-style-type: none"> <li>• Ingress of water or corrosive material (such as acid)</li> <li>• Condensation of moisture contained in the air</li> <li>• Poor packaging and storing conditions</li> <li>• Handling with bare hands etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Do not use bad quality varnish</li> <li>• Dry the varnish properly with sufficient time</li> <li>• Improvement in sealing effect</li> <li>• Careful handling of bearing</li> </ul>



Damage type	Illustration of damage conditions	Possible causes	Solutions
Electrical Corrosion		<ul style="list-style-type: none"> <li>• Electrical potential difference between inner and outer rings</li> <li>• Electrical potential difference of a high frequency that is generated by instruments or substrates when used near a bearing</li> </ul>	<ul style="list-style-type: none"> <li>• Design electric circuits which prevent current flow through the bearings</li> <li>• Insulation of the bearing</li> </ul>
Seizure		<ul style="list-style-type: none"> <li>• The grease's maximum working temperature is lower than the actual temperature and the grease get failure</li> <li>• Excessive rotational speed</li> <li>• Dissipation of heat generated by bearing is not enough</li> <li>• Clearance too small</li> <li>• Excessive load (or preload)</li> <li>• Installation error etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Selection of suitable lubricant grease</li> <li>• Improve dissipation of heat from the bearing</li> <li>• Improvement in clearance and preload</li> <li>• Improvement in operating conditions</li> </ul>
Fracture		<ul style="list-style-type: none"> <li>• Impact during mounting</li> <li>• Excessive load</li> <li>• Poor handling such as dropping</li> </ul>	<ul style="list-style-type: none"> <li>• Improve the mounting method (shrink fit, use proper tools)</li> <li>• Reconsider the load conditions</li> <li>• Provide enough back-up and support for the bearing rib</li> </ul>
Fretting		<ul style="list-style-type: none"> <li>• Poor lubrication</li> <li>• Vibration with a small amplitude</li> <li>• Insufficient interference</li> </ul>	<ul style="list-style-type: none"> <li>• Use a proper lubricant</li> <li>• Apply a preload</li> <li>• Check the interference fit</li> <li>• Apply a film of lubricant to the fitting surface</li> </ul>

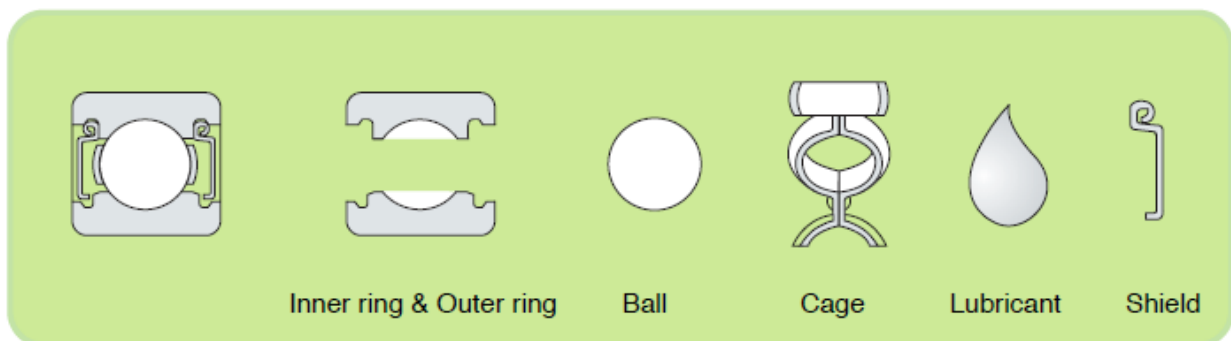
### 3. CONSTRUCTION & COMPONENTS

#### 3.1 Deep groove ball bearing



JK PIONEER rolling bearing basically consists of two rings, rolling elements and a cage, which keeps the rolling elements at equal intervals. Seals and shields are applied to prevent the bearing from outside affect such as dust or oil invasion. The main purpose of lubricants in rolling bearing is to reduce friction and wear of each element.

#### ● Deep groove ball bearing components ( ZZ type )



#### Notes:

The above bearing construction drawing only lists one type of inner ring construction (V-groove), which is applied usually in EMQ quality bearings. But there are other two types of inner ring constructions applied in JK PIONEER open, shielded and sealed deep groove ball bearings as below chart.

#### Inner ring seal groove types

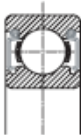



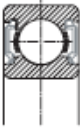


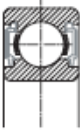

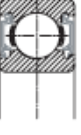
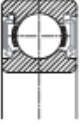
V-groove	Plain	L-groove

## ● Internal sealing arrangements

The performance of sealing is vital to the cleanliness of the lubricant and the overall service life of the bearing arrangement. Integral bearing seals must be able to keep contaminants out and lubricant in the bearing cavity. Sealed bearings are generally used for arrangements where a sufficiently effective external seal cannot be provided because there is inadequate space.

When selecting a seal, the following factors need to be taken into consideration: the type of lubricant (oil or grease), seal peripheral speed, shaft fitting errors, space limitations, seal friction, resultant heat increase, as well as the cost.

### Shields and seals

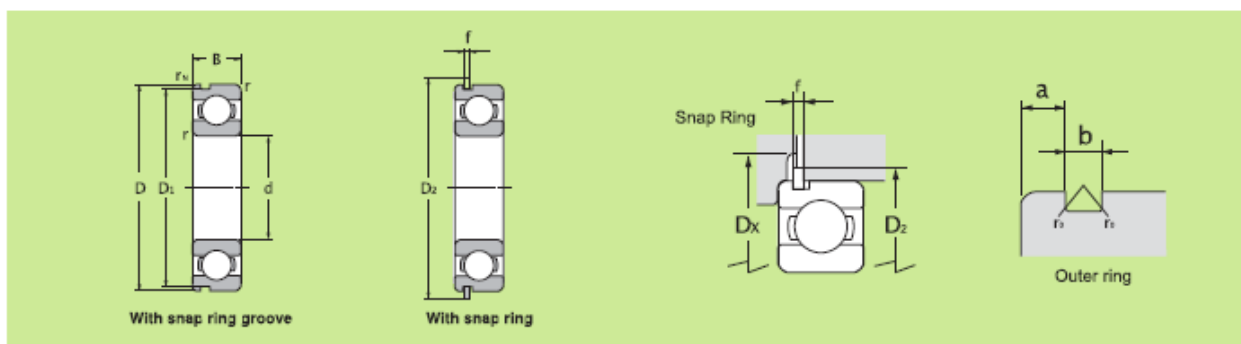
"V" sealing groove (inner ring)	"L" sealing groove (inner ring)	No sealing groove (inner ring)
 <p>Metal shields (ZZ) Non-contact High temperature Very high speed For small and medium size bearings</p>	 <p>Metal shields (ZZ) Non-contact High temperature Very high speed For miniature size bearings</p>	 <p>Metal shields (ZZ) Non-contact High temperature Very high speed Applicable due to assembly requirement</p>
"V" sealing groove (inner ring)	"L" sealing groove (inner ring)	No sealing groove (inner ring)
 <p>Rubber seals (2RS) Multi-lips contact Excellent dust and water proofing For small and medium size bearings</p>	 <p>Rubber seals (2RS) Multi-lips contact Excellent dust and water proofing For miniature size bearings</p>	 <p>Rubber seals (2RS) Tight contact Good dust and water proofing Applicable due to assembly requirement</p>
"V" sealing groove (inner ring)	"L" sealing groove (inner ring)	No sealing groove (inner ring)
 <p>Rubber seals (2RZ) Non-contact Very high speed Good dust proofing For small and medium size ball bearings</p>	 <p>Rubber seals (2RZ) Non-contact Very high speed Good dust proofing For miniature size bearings</p>	 <p>Rubber seals (2RZ) Non-contact Very high speed Good dust proofing Applicable due to assembly requirement</p>
"V" sealing groove (inner ring)	"L" sealing groove (inner ring)	
 <p>Rubber seals (2RW) Low torque contact High speed Good dust proofing For small and medium size bearings</p>	 <p>Rubber seals (2RW) Low torque contact High speed Good dust proofing For miniature size bearings</p>	

### Notes:

- 1) This chart lists double shielded and double sealed bearings, but single shielded (Z) and single sealed (RZ, RS, RW) are also available.
- 2) The above sealing structures are only for reference. We reserve the right to change specifications and other information included in this catalogue without notice.
- 3) JK PIONEER also could provide bearings with other sealing designs including customized sealing design. Please con-sult JK PIONEER engineers for more information.



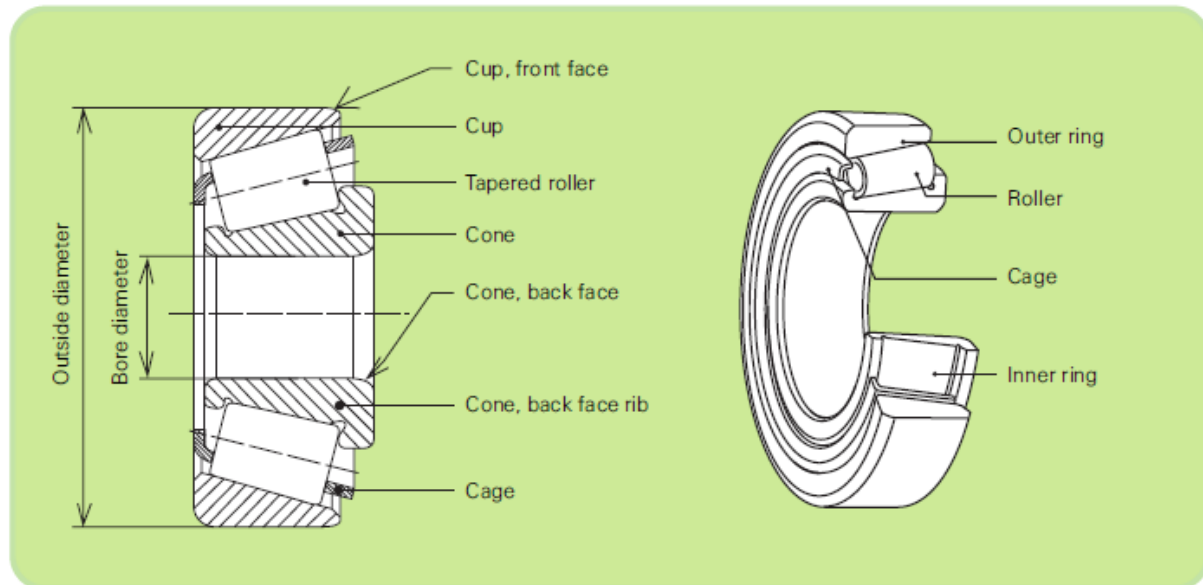
● Snap ring and groove dimensions



Bearing Bore Dimension Series d(mm)			Outside Diameter D	Groove Diameter D <sub>1</sub>		Snap Ring Groove Position a		Groove Width b	Groove Chamfer r <sub>0</sub>	Snap Ring Thickness f	Snap Ring O.D. D <sub>2</sub>	Housing Bore D <sub>x</sub>
0	2	3		max.	min.	0	2, 3	med.	max.	med.	max.	min.
25	20	17	47	44.6	44.35	2.06	2.46	1.35	0.4	1.12	52.7	53.5
—	22	—	50	47.6	47.35	—	2.46	1.35	0.4	1.12	55.7	56.5
28	25	20	52	49.73	49.48	2.06	2.46	1.35	0.4	1.12	57.9	58.5
30	—	—	55	52.6	52.35	2.06	—	1.35	0.4	1.12	60.7	61.5
—	—	22	56	53.6	53.35	—	2.46	1.35	0.4	1.12	61.7	62.5
32	28	—	58	55.6	55.35	2.08	2.46	1.35	0.4	1.12	63.7	64.5
35	30	25	62	59.61	59.11	2.08	3.28	1.90	0.6	1.70	67.7	68.5
—	32	—	65	62.6	62.1	—	3.28	1.90	0.6	1.70	70.7	71.5
40	—	28	68	64.82	64.31	2.49	3.28	1.90	0.6	1.70	74.6	76.0
—	35	30	72	68.81	68.3	—	3.28	1.90	0.6	1.70	78.6	80.0
45	—	32	75	71.83	71.32	2.49	3.28	1.90	0.6	1.70	81.6	83.0
50	40	35	80	76.81	76.3	2.49	3.28	1.90	0.6	1.70	86.6	88.0
—	45	—	85	81.81	81.31	—	3.28	1.90	0.6	1.70	91.6	93.0
55	50	40	90	86.79	86.28	2.87	3.28	2.70	0.6	2.46	96.5	98.0
60	—	—	95	91.82	91.31	2.87	—	2.70	0.6	2.46	101.6	103.0
65	55	45	100	96.8	96.29	2.87	3.28	2.70	0.6	2.46	106.5	108.0
70	60	50	110	106.81	106.3	2.87	3.28	2.70	0.6	2.46	116.6	118.0
75	—	—	115	111.81	111.3	2.87	—	2.70	0.6	2.46	121.6	123.0
—	65	55	120	115.21	114.71	—	4.06	3.10	0.6	2.82	129.7	131.0
80	70	—	125	120.22	119.71	2.87	4.06	3.10	0.6	2.82	134.7	136.0
85	75	60	130	125.22	124.71	2.87	4.06	3.10	0.6	2.82	139.7	141.0
90	80	65	140	135.23	134.72	3.71	4.90	3.10	0.6	2.82	149.7	151.0
95	—	—	145	140.23	139.73	3.71	—	3.10	0.6	2.82	154.7	157.0
100	85	70	150	145.24	144.73	3.71	4.90	3.10	0.6	2.82	159.7	162.0
105	90	75	160	155.22	154.71	3.71	4.90	3.10	0.6	2.82	169.7	172.0
110	95	80	170	163.65	163.14	3.71	5.69	3.50	0.6	3.10	182.9	185.0
120	100	85	180	173.66	173.15	3.71	5.69	3.50	0.6	3.10	192.9	195.0

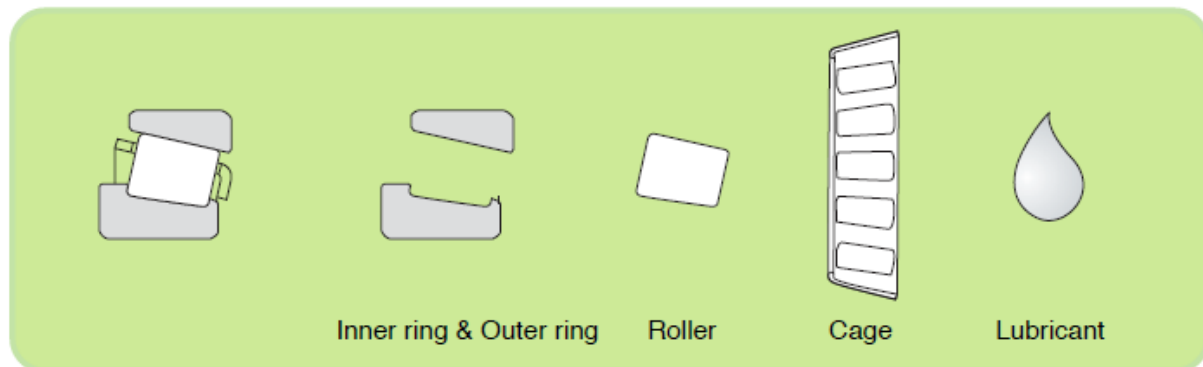
**Notes:** We reserve the right to change specification and other information included in this table without notice.

### 3.2 Tapered roller bearing



Tapered roller bearings can be disassembled into parts – the inner ring, rollers, and cage (collectively known as the "cone") – and the outer ring (known as the "cup"). These are the bearing's "sub-units". Sub-unit dimensions are standardized under ISO or ABMA standards.

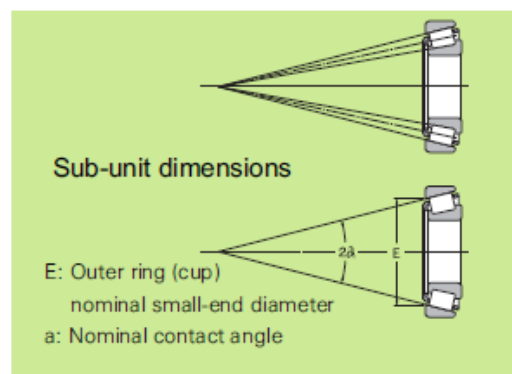
#### ● Tapered roller bearing components



#### Notes:

Tapered roller bearings are designed so that the center lines of the raceways and rollers all converge at a single point as shown in the right diagram. Due to this design feature, rollers move along the center of the raceway surfaces.

Aside from any cautionary notes that may appear, the single row tapered roller bearings have sub-units standardized for both metric and inch systems (including J series).



## 4. GREASE BRANDS AND THEIR NATURE

It should be noted that even for the same type of grease composition, different brands of grease may have different properties. There are hundreds of types of grease can be found in JK PIONEER for a specific application. Following are common types in JK PIONEER for your choice. Further information please consult JK PIONEER engineers.

- Frequently used grease brands and properties:

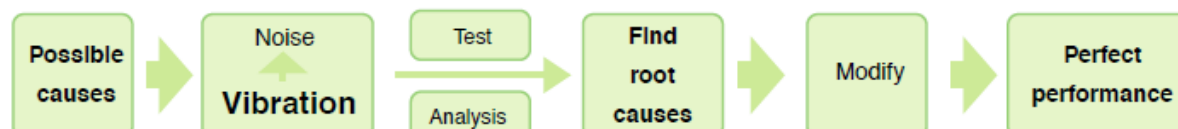
Manufacturer	Product	Base Oil	Thickener	Viscosity	
				40°C	100°C
kyodo Yushi	Multemp SRL	Polyol ester+Diester	Lithium hydroxy Stearate	26	5.1
	Multemp SB-M	Synthetic hydrocarbon	Diurea	47.6	8.9
	Multemp ET-K	Synthetic ether+Polyol ester	Aromatic diurea	95.1	12.3
	Multemp PS2	Diester oil + mineral oil	Lithium	15.3	4.7
	Raremax SUPER N	Mineral oil +Synthetic	Diurea	95.9	10.5
Shell	RLQ2	Mineral oil	Lithium	75.16	8.3
	RL2	Mineral oil	Lithium	75	8
	RL3	Mineral oil	Lithium	75	8
	AV2	Mineral oil	Lithium	130	12.2
Kluber	BEP72-82	PAO, Ester oil	Polyurea	70	9.4
	BQH72-102	PAO, Ester oil	Polyurea	100	12
	ASONIC GLY32	PAO, Ester oil	Lithium	25	5
	ASONIC Q74-73	PAO, Ester oil	Polyurea	67.5	10
	PETAMO GHY133	Mineral oil, PAO	Polyurea	150	18
Exxon Mobil	BEACON325	Diester	Lithium	12	4
	Polyrex EM	Mineral	Diurea	115	21
Cosmo	EMQ2(SBR)	Mineral oil	Lithium	110	11.98
	PNG	Mineral oil	Lithium	73.5	6.88
Dupont	Krytox240	Fluorinated	PTFE	200	25
Lubcon	N2	PAO, Ester oil	Polyurea	150	22
Chevron	SRI 2	ISOSYN	Polyurea	100	11
Jinzhi	Hangu 2	Mineral oil	Lithium	150	12



Working temperature range	0.1 mm Worked Penetration	Dropping point	Remark
-50°C~+150°C	250	190°C	Low noise, Long life, High temperature
-40°C~+200°C	220	260°C	High temperature, High speed operation, Low noise property
-40°C~+200°C	300	230°C	High temperature, Long life, Anti-radiation
-50°C~+130°C	275	195°C	Heat resistance, Oxidation stability
-40°C~+200°C	260	255°C	Heat resistance, Oxidation stability
-20°C~+120°C	266	195°C	Wide applications available
-20°C~+120°C	275	180°C	Low noise, High temperature, Corrosion resistance
-20°C~+120°C	235	180°C	Not good for transmission
-25°C~+120°C	275	185°C	Wide applications available
-40°C~+180°C	250~280	> 250°C	High temperature, Available for auto generator bearings
-40°C~+180°C	250~280	> 250°C	Low noise, Long life, High temperature
-50°C~+140°C	265~295	> 190°C	Low noise, Long life, High temperature
-40°C~+160°C	220~250	> 190°C	Low noise, Long life, High temperature
-30°C~+160°C	265~295	> 250°C	High temperature, Available for auto generator bearings
-25°C~+120°C	285	180°C	High speed, Low noise, Corrosion resistance
-40°C~+180°C	305	288°C	Low temperature
-30°C~+130°C	265	195°C	Water resistance, Prominent oxidation stability
-30°C~+130°C	265	197°C	Low noise, Long life
-34°C~+288°C	285	—	High temperature
-40°C~+180°C	265~295	> 250°C	High temperature, Low noise
-30°C~+150°C	280	243°C	Water resistance, Corrosion resistance, High temperature
-20°C~+120°C	265~295	198°C	Wide applications available

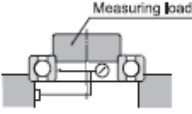
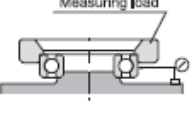
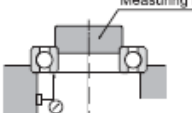
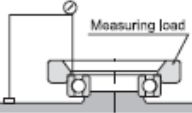
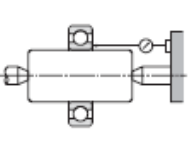
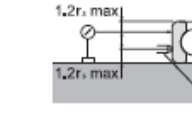
## 5. NOISE AND VIBRATION

In addition to the basic requirements on a bearing like load capacity, speed limit and life time; low noise and vibration is becoming more and more important in most applications. Vibrations in bearings are caused by time varying forces in bearings. To find out the root causes of noise & vibration and prevent potential from the beginning is critical to perfect performance of the bearings.



### 5.1 Running tolerance and vibration

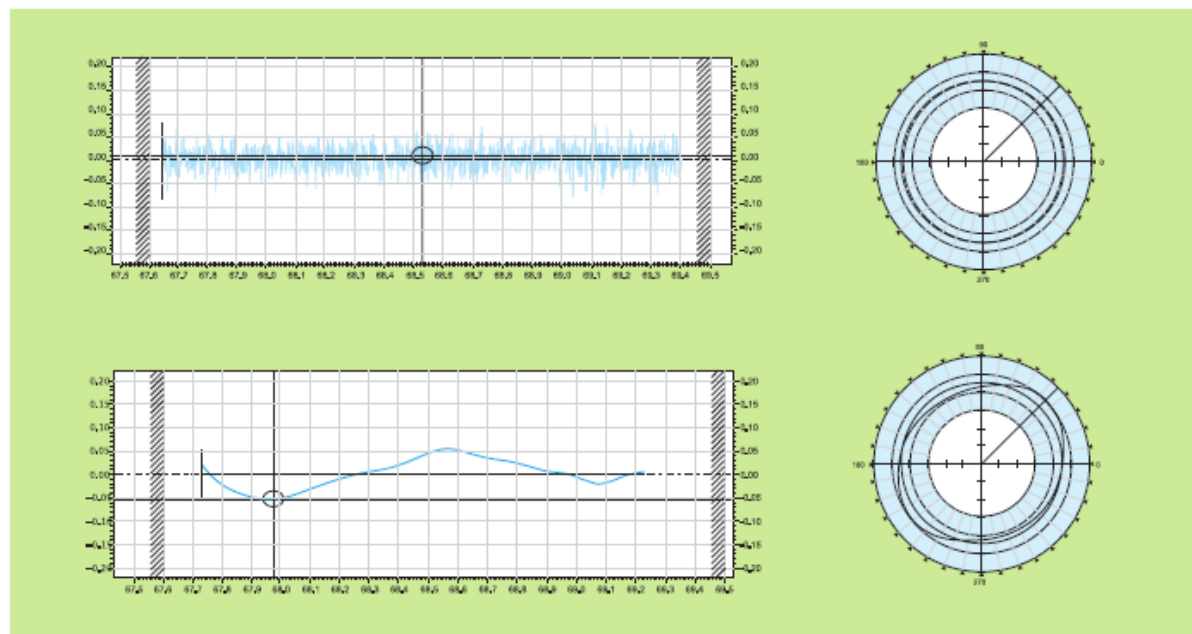
Running tolerance constitutes the acceptable values for runout of inner ring and outer ring. It reflects the vibration. Theoretically, high accuracy tolerance comes out low vibration of the bearing.

Characteristic tolerance	Measurement method	
Inner ring radial runout (Kia)		For inner ring radial runout, record the total indicator reading (TIR).
Outer ring radial runout (Kea)		For outer ring radial runout, record the total indicator reading (TIR) after one revolution.
Inner ring axial runout (Sia)		For inner ring axial runout, record the total indicator reading (TIR) after rotating the inner ring one revolution.
Outer ring axial runout (Sea)		For outer ring axial runout, record the total indicator reading (TIR) after rotating the inner ring one revolution.
Inner ring side runout with bore (Sd)		For inner ring side runout with bore, record the total indicator reading (TIR) after rotating the inner ring one revolution with a tapered mandrel.
Outer ring outside surface inclination (SD)		For outer ring outside surface inclination, record the total indicator reading (TIR) after aligning the ring with the reinforcing plate and rotating it one revolution.

Note: Since the wide application of direct noise and vibration measuring by frequency spectrum analyzers (5.3), running tolerance are measured less.

## 5.2 Waviness, roundness and form analyser

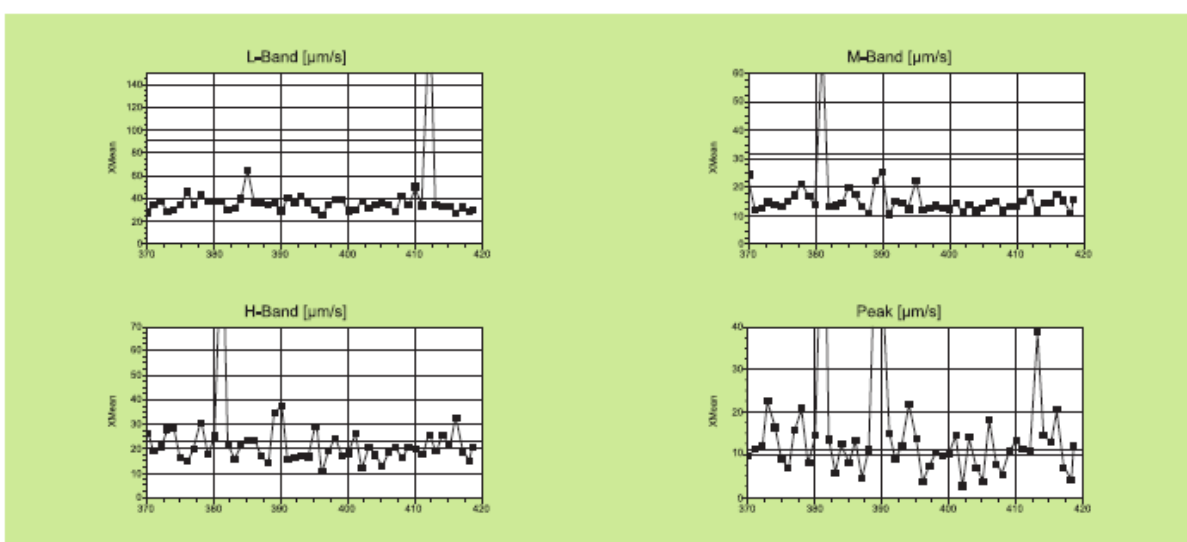
Another reason for high vibration levels is waviness on the bearing components. The Taylor Hobson waviness testers used in JK PIONEER allow analysis of the waviness on the components and thus give the production engineer a powerful tool to improve the production process. As the amplitude of these waves are as small as some nanometers, you can understand the high demand on the measuring accuracy and resolution.



## 5.3 Noise and vibration testing by frequency spectrum analyzers

JK PIONEER bearings are 100% checked by frequency spectrum analyzers. When the rotating speed of bearing reaches 1800 rpm, the frequency between 50Hz~10000Hz could be divided into three bands as following form:

Frequency Bands	Low Band	Medium Band	High Band
Frequency Range	50~300Hz	300~1800Hz	1800~10000Hz





## 6. BEARING INTERNAL CLEARANCE

Typical clearance groups for the deep groove ball bearings are C2, CN, C3, C4, and C5. CN(Normal) internal clearance is determined so that appropriate clearance will remain after the bearing is mounted to the shaft with an interference fit, but with no fit (no interference) between the outer ring and housing and the temperature difference between inner and outer ring is 10°C or less.

C2: less than Normal clearance

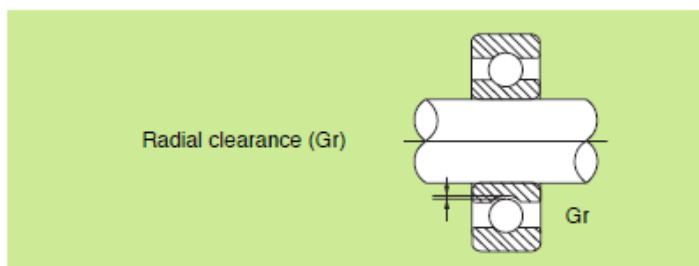
C3: more than Normal clearance

C4: more than C3

C5: more than C4

CM: clearance for EMQ Bearings

MC: clearance for Miniature Bearings



### ● Data of standard radial clearances for bearings under no load

Tolerance in  $\mu\text{m}$ .

Bore				C2		Normal		C3		C4		C5	
Over		Including											
mm	Inch	mm	Inch	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
2.5	0.0984	10	0.3937	0	7	2	13	8	23	14	29	20	37
10	0.3937	18	0.7087	0	9	3	18	11	25	18	33	25	45
18	0.7887	24	0.9449	0	10	5	20	13	28	20	36	28	48
24	0.9449	30	1.1811	1	11	5	20	13	28	23	41	30	53
30	1.1811	40	1.5748	1	11	6	20	15	33	28	46	40	64
40	1.5748	50	1.9685	1	11	6	23	18	36	30	51	45	73
50	1.9685	65	2.5591	1	15	8	28	23	43	38	61	55	90

### ● The radial clearances of bearings with electric motor quality

Tolerance in  $\mu\text{m}$ .

Bore				CM	
Over		Including		Min.	Max.
mm	Inch	mm	Inch	$\mu\text{m}$	$\mu\text{m}$
10	0.3937	18	0.7087	4	11
18	0.7087	24	0.9449	5	12
24	0.9449	30	1.1811	5	12
30	1.1811	40	1.5748	9	17
40	1.5748	50	1.9685	9	17
50	1.9685	65	2.5591	12	22

### ● Data of the mini-deep groove ball bearing under no load

Tolerance in  $\mu\text{m}$ .

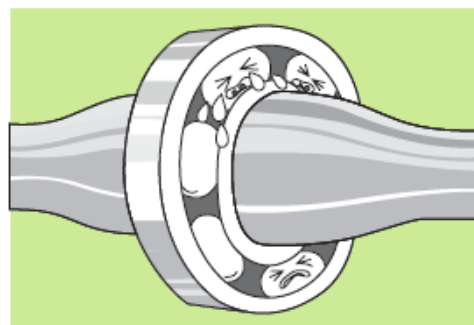
Clearance Code	MC1		MC2		MC3		MC4		MC5		MC6	
Clearance	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
	0	5	3	8	5	10	8	13	14	21	21	29

## 7. FIT

### 7.1 The necessity of a proper fit

Generally speaking, satisfactory radial location and adequate support can only be obtained when the rings are mounted with an appropriate degree of interference. Inadequately or incorrectly secured bearing rings generally cause damage to the bearings and associated components. Therefore it is necessary to make a careful investigation in selecting a proper fit. Some of the bearing failure caused by improper fit is listed below:

- Raceway cracking, early flaking and displacement of raceway
- Raceway and shaft or housing abrasion caused by creeping
- Seizing caused by negative internal clearances
- Increased noise and deteriorated rotational accuracy due to raceway groove deformation



### 7.2 Conditions of rotation and fit

Conditions of rotation refer to the bearing ring being considered in relation to the direction of the load. Essentially, there are "rotating load" and "stationary load". For bearing parts that under rotating loads, interference fit is usually used to prevent bearing from slipping or "creep". Meanwhile, clearance fit may be used in "stationary load" condition to accommodate certain operating conditions or to facilitate bearing mounting and dismounting.

#### ● Radial load and bearing fit

Illustration	Bearing rotation	Ring load	Fit
Static load 	Inner ring : Rotating Outer ring : Stationary	Rotating inner ring load  Static outer ring load	Inner ring : Tight fit  Outer ring : Loose fit
Unbalanced load 	Inner ring : Stationary Outer ring : Rotating	Static inner ring load  Rotating outer ring load	Inner ring : Loose fit  Outer ring : Tight fit
Static load 	Inner ring : Stationary Outer ring : Rotating	Static inner ring load  Rotating outer ring load	Inner ring : Loose fit  Outer ring : Tight fit
Unbalanced load 	Inner ring : Rotating Outer ring : Stationary	Rotating inner ring load  Static outer ring load	Inner ring : Tight fit  Outer ring : Loose fit

## 8. STANDARD BEARING MATERIAL

The materials from which the bearing components are made determine to a large extent the performance and reliability of rolling bearings.

- For the bearing rings and rolling elements, typical considerations include hardness for load carrying capacity, fatigue resistance under rolling contact conditions, under clean or contaminated lubrication conditions, and the dimensional stability of the bearing components.
- For the cage, considerations include friction, strain, inertia forces, and in some cases, the chemical action of certain lubricants, solvents, coolants and refrigerants.
- Contact seals integrated in rolling bearings can also have a considerable impact on the performance and reliability of the bearings. The materials they are made of have to offer excellent oxidation, thermal or chemical resistance.

The relative importance of these considerations can be affected by other operational parameters such as corrosion, elevated temperatures, shock loads or combinations of these and other conditions.

### Rings & rolling elements

Because of high, repetitive stress to the rolling contact areas, fatigue phenomenon will occur to the bearing material after a duration of operation. Loading stress ultimately dislodges a surface section and the bearing fails. To delay the advent of material fatigue, bearing ring and rolling element materials should have the following properties:

- High level of hardness
- High rolling contact fatigue resistance
- Good wear resistance
- Dimensional stability
- Good mechanical strength

Today, carbon chromium steel is one of the oldest and most intensively investigated steels; due to the continuously increasing demands for extended bearing service life. The composition of this rolling bearing steel provides an optimum balance between manufacturing and application performance. This steel is normally given a martensitic or bainitic heat treatment during which it is hardened to the range of 58 to 65 HRC. Vacuum degassed, chromium-bearing steel GCr15 is the standard material for precision bearing rings and rolling elements. The material has uniform specification as AISI52100 (America), DIN100 Cr6 (German), JISSUJ2 (Japan).

### Chemical composition of representative carbon chrome bearing steels

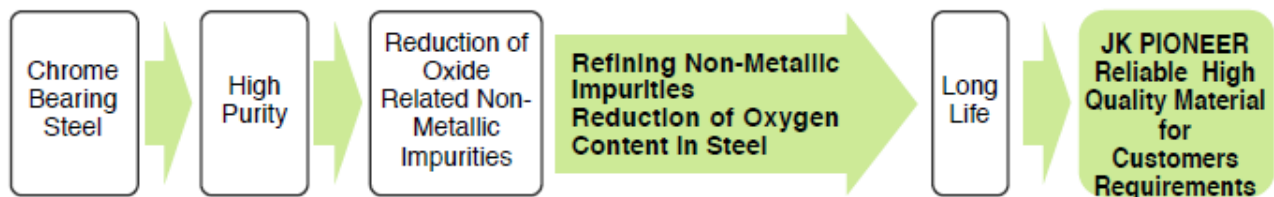
Steel No.	Chemical Composition %								
	C	Si	Mn	P	S	Cr	Mo	Cu	Ni
GCr 15 SAE52100	0.95-1.05	0.15-0.35	0.25-0.45	≤0.025	≤0.025	1.40-1.65	—	≤0.25	≤0.30

Because JK PIONEER has the competence and facilities to provide a variety of materials, processes and coatings, JK PIONEER application engineers can assist in selecting those bearings that will provide superior performance for particular applications.



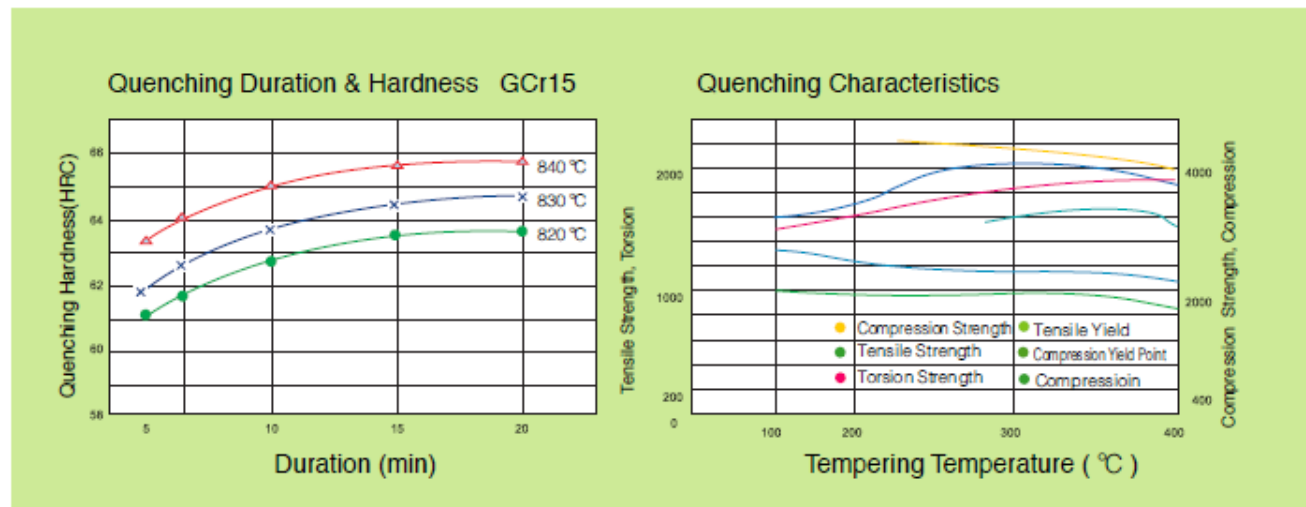
Within the last few years process developments have enabled more stringent cleanliness specifications to be realized, which has had a significant impact on the consistency and quality of JK PIONEER's bearing steel. The reduction of oxygen and harmful non-metallic inclusions has led to significantly improved properties of rolling bearing steels - the steels from which the JK PIONEER bearings are made.

## Reliable high-quality material achievement in JK PIONEER



As a world renowned bearing manufacturer, JK PIONEER takes special care of its raw material used in its bearings. The raw material applied in the bearing rings and rolling elements is from the companies that sell the same quality material to world top class bearing manufacturers in Japan and Europe. Also, JK PIONEER's latest computerized heat treatment system and technology distinguish JK PIONEER brand bearings from others. It helps the bearing material to reach the characteristics of high level of hardness, high rolling contact fatigue resistance, excellent wear resistance, dimensional stability and excellent mechanical strength which is essential to delay the advent of material fatigue.

## Quenching duration, characteristics & tempering temperature



## OUR PRODUCT RANGE

### Belts for every application



### Taper Lock Bush Pulley



### Couplings Shaft fixing & Locking Assemblies



### Gear Boxes & Geared Motors Worm, Helical & Bevel



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