DPI® GOLD

SUPER PRECISION BALL BEARINGS

CERTIFIED

TÜV NORD
ISO 9001:2000
REG. NO. 44 100 070525

INTRODUCTION

DPI® through our short history has achieved several milestones. We started our manufacturing activities in 1983 and today we are a fast growing regional bearing manufacturer. With more than 25 years of successful growth behind us we started international sales of DPI® in the year 1999. With satisfied customers in over 40 countries within a short span of time, we are now embarking on a journey to provide value and expertise to a growing network of satisfied customers.

DPI® received ISO certification at its manufacturing facilities starting in the year 1995. Since then our focus on quality led to great progress in our local market and furthermore as we expanded to overseas markets we have received excellent response.

With expanding markets requirements our range of DPI® bearings continues to grow every year as we accommodate new items for our customers. Our bearings are used for after market, replacement requirements and DPI® is also now integral part of several OEM applications.

Due to extraordinary demand from our customers' OEM clients for high precision ball bearings for electric motor applications, we are pleased to introduce DPI GOLD the range of super precision ball bearings.

DPI® GOLD

Today technological advances are very rapid and bearing requirements have become more complicated and varied with different working conditions and environments. At the same time several automotive, electric motor, power tool and home appliances which are now part of everyday life have become very competitive and OEMs and manufacturers worldwide are looking for economical options and the same quality level to have a competitive advantage.

To meet this rising demand, we have developed DPI GOLD super precision bearings. These super precision bearings are designed to deliver the highest levels of accuracy, rotational speed, and rigidity needed for demanding applications. DPI GOLD super precision bearings are manufactured with state-of-the-art equipment and extensive quality control procedures at each stage of the production process. With the highest quality material and supreme internal design, DPI GOLD offers several types of bearings.

DPI GOLD super precision bearings are designed to meet the following requirements:

- Outstanding accuracy and rigidity
- Extremely high rotational speed at high RPM's
- Silent and smooth running with low run out
- Minimum friction and high temperatures

Product Features and Benefits:

- High accuracy – P6 precision class tolerance is maintained with 100% quality checks at each stage of the production process.
- Long life – super precision grade balls, cages and raceway grinding along with highest quality of bearing steel materials ensures longer life.
- Low noise & vibration – silent, high speed running at lower temperatures.
- Customization: various sealing and lubrication option to suit customer requirements.

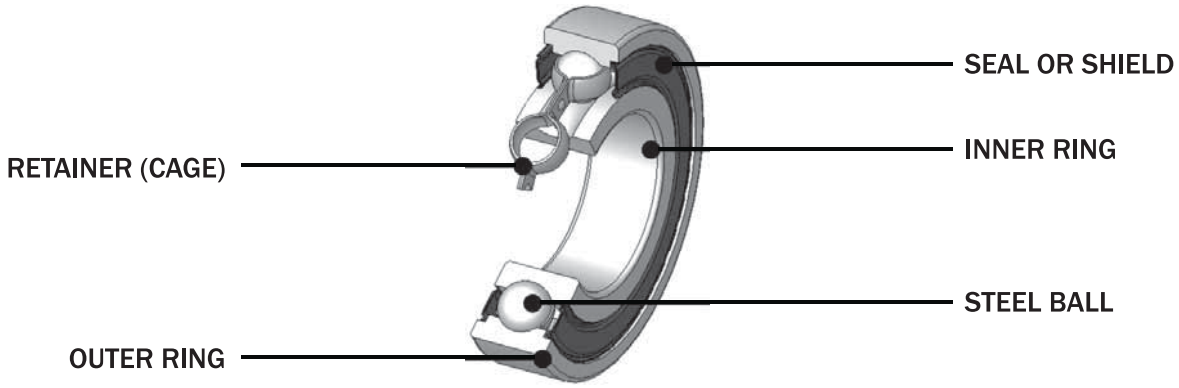
1. BEARING TYPES AND FEATURES

1.1 General Construction of Bearing

Most bearings consist of rings (inner and outer ring) with raceways, Rolling elements (balls or rollers) and a rolling element retainer (cage). The retainer separates the rolling elements within specific distance, holding them in place and allows them to rotate freely within the raceways of the bearings. The adjoining figures the relative positioning of the rings, rolling elements and the retainers for the various types of bearings.

1.2 Characteristics of Bearings

Most bearings have very low friction coefficients. In general all bearings can carry radial and axial loads in varying capacities based on their type and construction. Ball bearings in general are used in application that have speed, high precision, low torque and lower vibration since they have lower frictional coefficient and lower face run out during rotation. Comparatively roller bearings are used in application that have lower speed, high loads and are subjected to torque and vibration forces.



Deep Groove Ball Bearing

1.3 Bearing Designation Structure

Bearing numbering is done as per the Bearing characteristic and the code is used to describe its characteristic as shown below:-

6204 ZZ NR C3 Z3 V3

Bearing Series Code

Bore Diameter Number

Shield/Seal Codes

Z	Single Shield
ZZ	Double Shield
RS, 2RS	Single Seal, Double Seals

Snap Ring Code

N	Groove without Ring
NR	Groove with Ring

Vibration Code

V4	Ultralow Vibration
V3	Low Vibration
V2	Electric Motor Quality
V1	Above Standard, Less than V2
V	Standard

Noise Code

Z4	Ultralow Vibration
Z3	Low Vibration
Z2	Electric Motor Quality
Z1	Above Standard, Less than Z2
Z	Standard

Internal Clearance Code

Blank	Normal Clearance (CN)
C2	Tight
C3	Loose
C4	Loose than C3
C5	Loose than C4

2. BEARING MATERIALS

2.1 Rings and Rolling Elements

The Performance and reliability of bearings depends on the bearing steel material properties. Bearing materials include steel for inner ring, outer ring, rolling elements and retainers. High Carbon Chrome alloy steel are used for the rings and rolling elements. Bearing material should possess high strength against repetitive rolling contact loads, strong hardness, good elasticity, abrasion resistance qualities, dimensional stability and toughness to withstand impact loads. The chemical composition of the materials used for rings and rolling elements are shown in Table 1

Table 1

Standard	Code	Chemical composition (%)						
		C	Si	Mn	P	S	Cr	Mo
				Not more	Not more	Not more		
JIS G 4805	SUJ 2	0.95 - 1.10	0.15 - 0.35	than 0.50	than 0.025	than 0.025	1.30 - 1.60	-
					Not more	Not more		Not more
SAEJ 404	52100	0.98 - 1.10	0.15 - 0.35	0.25 - 0.45	than 0.025	than 0.025	1.30 - 1.60	than 0.06
Gb307.1	GCr15	0.95-1.05	0.15-0.35	0.25-0.45	Max 0.025	Max 0.025	1.40-1.65	-

The International nomenclatures for standard bearing steel material are shown as per Table 2

Table 2

Country	China	ISO	U.S.A	Germany	Japan
Bearing Steel Number	GCr15	638/XVIII	(AISI) 52100	(DIN) 100Cr6	(JIS) SUJ2

2.2 Retainers, Seals and Shields

Retainers, seals and shields are made from materials such as Cold Rolled Carbon Steel Sheets. nitrile rubber material is the standard material used for seals. The material composition is as per Table 3

Table 3

Steel No.	Chemical Composition %				
JISG 3141	C	Si	Mn	P	S
SPCC	<0.12	-	<0.5	<0.04	<0.045

2.3 Steel Quality

All DPI® bearing races & rollers are produced from high quality SAE 52100 bearing steel. SAE 52100 steel is equivalent to 100Cr6, JIS G 4805, GCr15 steels. SAE 52100 steel is given a special treatment during its manufacturing in steel plant which guarantees all non metallic inclusions which are harmful to the bearing life, kept well within specifications confined to SAE 52100 International Standard for bearing steel.

3. BEARING LUBRICATION

3.1 Lubrication

There are literally hundreds of lubricants available for ball bearings; selecting the optimal one is critical. Each has a particular characteristic which makes it suitable for a specific working condition and environment. Unless torque is a problem, grease is preferred for pre-lubrication since it is less susceptible to migration and leakage. DPI GOLD bearing uses standard KYODO YUSHI – Multemp SRL Grease which is having excellent noise resistant property and giving high performance life. Other grease as per Table 4 can also be used as per customer requirement.

Table 4

General Purpose Grease No and Function				
Company	Designation	Dropping temp °C	Work Penetration 25°C	Working temp °C
Kyodo Yushi	Multemp SRL	185	225 - 245	-185
	PS2	190	250 - 275	-200
	ET150	260	255 - 280	-170
Mobil	Mobil XHP22	280	281	-206
	Mobil 28	260	265 - 295	-230
	Mobil 48	260	265 - 295	60 - 170
Shell	Alvani R12	185	265 - 295	-155
	Alvani RLQ2	195	265 - 295	-145
	Alvani R3	185	220 - 250	-170
	Alvani Ep2	185	265 - 295	-135
Eseeo, Esso, Exxon	AndokC	260	190 - 210	-170
	Beacon 325	190	255 - 280	-174
	Polyrex EM	288	305 - 340	-210
	Polyrex Ep2	280	280 - 310	-220

4. BEARING INTERNAL CLEARANCE

4.1 Bearing Internal Clearance

Bearing Internal Clearance is the total distance that either the inner ring or outer ring can be moved while the other ring is fixed. According to the direction, it can be either radial clearance or axial clearance. The amount of clearance while the bearing rotates affects the rolling fatigue life, temperature rise, noise, vibration and other functions of the bearing.

The Radial Internal clearance of Deep Groove Ball Bearings (Cylindrical Bore) are shown in Table 5

Table 5

Nominal bore		Radial Internal Clearance (Unit -µm)									
d, mm		C2		CN		C3		C4		C5	
over	up to	min.	max.	min.	max.	min.	max	min.	max.	min.	max.
2.5	6	0	7	2	13	8	23	*14*	*29*	*20*	*37*
6	10	0	7	2	13	8	23	14	29	20	37
10	18	0	9	3	18	11	25	18	33	25	45
18	24	0	10	5	20	13	28	20	36	28	48
24	30	1	11	5	20	13	28	23	41	30	53
30	40	1	11	6	20	15	33	28	46	40	64
40	50	1	11	6	23	18	36	30	51	45	73
50	65	1	15	8	28	23	43	38	61	55	90
65	80	1	15	10	30	25	51	46	71	65	105
80	100	1	18	12	36	30	58	53	84	75	120
100	120	2	20	15	41	36	66	61	97	90	140
120	140	2	23	18	48	41	81	71	114	105	160
140	160	2	23	18	53	46	91	81	130	120	180
160	180	2	25	20	61	53	102	91	147	135	200
180	200	2	30	25	71	63	117	107	163	150	230
200	225	2	35	25	85	75	140	125	195	175	265
225	250	2	40	30	95	85	160	145	225	205	300
250	280	2	45	35	105	90	170	155	245	225	340
280	315	2	55	40	115	100	190	175	270	245	370
315	355	3	60	45	125	110	210	195	300	275	410
355	400	3	70	55	145	130	240	225	340	315	460

5. BEARING TOLERANCES

5.1 Bearing Tolerances

Bearings Tolerances and permissible values of inner ring and outer ring boundary dimensions and running accuracy are specified in 4 classes and in accordance with ISO 492. However in difference countries it is named differently. Applicable precision classes to all kinds of bearing types and comparisons among different countries are specified in Table 6

Table 6

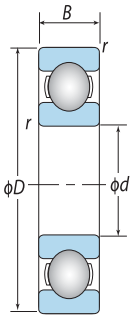
Organization	Standard Reference	Bearing Types	Standard No.	Tolerance Classes				
International Organization for Standardization (ISO)	ISO	Radial bearing	ISO 492	Normal Class (P0)	Class 6X	Class 6 (P6)	Class 5 (P5)	Class4 (P4)
Japanese Industrial Standards (JAPAN)	JIS	Radial bearing	JIS B 1514	Normal Class	Class 6X	Class 6	Class 5	Class4
Deutsches Institut Fur Normung (GERMANY)	DIN	Radial Bearing	DIN 620	Normal Class	Class 6X	Class 6	Class 5	Class4
British Standard Institution (EUROPE)	BS		BS 6170					
Association Francaise De Normalisation (FRANCE)	NF		NF E 22-335					
American National Standard Institute, Inc. (USA)	ABMA	Radial Bearing	ABMA std. 20	ABEC1	-	ABEC 3	ABEC 5	ABEC 7

5.2 Radial Bearing Tolerance (ISO 492)

1. Inner Ring (Bore Diameter) (Table 7)

Table 7

Nominal bore diameter		Single plane mean bore diameter deviation (Unit -μm)								Single radial plane bore diameter variation Vdp (Unit -μm)											
d		Δdmp								Diameter series 7,8,8				Diameter series 0,0				Diameter series 2,3,3			
		ABEC 1		ABEC 3		ABEC 5		ABEC 7		ABEC 1	ABEC 3	ABEC 5	ABEC 7	ABEC 1	ABEC 3	ABEC 5	ABEC 7	ABEC 1	ABEC 3	ABEC 5	ABEC 7
		Class 0		class 6		Class 5		Class 4		Class 0	Class 6	Class 5	Class 4	Class 0	Class 6	Class 5	Class 4	Class 0	Class 6	Class 5	Class 4
mm		P0		P6		P5		P4		P0	P6	P5	P4	P0	P6	P5	P4	P0	P6	P5	P4
over	up to	upper	lower	upper	lower	upper	lower	upper	lower	max.				max.				max.			
0.6	2.5	0	-8	0	-7	0	-5	0	-4	10	9	5	4	8	7	4	3	6	5	4	3
2.5	10	0	-8	0	-7	0	-5	0	-4	10	9	5	4	8	7	4	3	6	5	4	3
10	18	0	-8	0	-7	0	-5	0	-4	10	9	5	4	8	7	4	3	6	5	4	3
18	30	0	-10	0	-8	0	-6	0	-5	13	10	6	5	10	8	5	4	8	6	5	4
30	50	0	-12	0	-10	0	-8	0	-6	15	13	8	6	12	10	6	5	9	8	6	5
50	80	0	-15	0	-12	0	-9	0	-7	19	15	9	7	19	15	7	5	11	9	7	5
80	120	0	-20	0	-15	0	-10	0	-8	25	19	10	8	25	19	8	6	15	11	8	6
120	150	0	-25	0	-18	0	-13	0	-10	31	23	13	10	31	23	10	8	19	14	10	8
150	180	0	-25	0	-18	0	-13	0	-10	31	23	13	10	31	23	10	8	19	14	10	8
180	250	0	-30	0	-22	0	-15	0	-12	38	28	15	12	38	28	12	9	23	17	12	9
250	315	0	-35	0	-25	0	-18	0	-15	44	31	18	15	44	31	14	11	26	19	14	11
315	400	0	-40	0	-30	0	-23	0	-18	50	38	23	18	50	38	18	14	30	23	18	14
400	500	0	-45	0	-35	0	-28	0	-23	56	44	28	23	56	44	21	17	34	26	21	17
500	630	0	-50	0	-40	0	-35	-	-	63	50	35	-	63	50	26	-	38	30	26	-
630	800	0	-75	0	-50	0	-45	-	-	94	63	45	-	94	63	34	-	56	38	34	-
800	1000	0	-100	0	-60	0	-60	-	-	125	75	60	-	125	75	45	-	75	45	45	-
1000	1250	0	-125	0	-75	0	-75	-	-	156	94	75	-	156	94	56	-	94	56	56	-
1250	1600	0	-160	-	-	-	-	-	-	200	-	-	-	200	-	-	-	120	-	-	-
1600	2000	0	-200	-	-	-	-	-	-	250	-	-	-	250	-	-	-	150	-	-	-

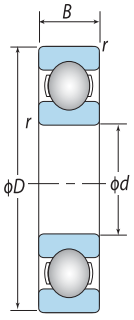


5.3 Radial Bearing Tolerance (ISO 492)

2. Inner Ring (Running Accuracy and Width) (Table 8)

Table 8

Nominal bore diameter		Mean bore diameter variation (Unit -μm)				Radial runout of assembled bearing inner ring (Unit -μm)				Face runout with bore (Unit -μm)		Face runout with raceway (Unit -μm)		Single inner ring width deviation (Unit -μm)								Inner ring width variation (Unit -μm)			
d		Vdmp				Kia				Sd		Sia2)		ΔBs								VBs			
		ABEC 1	ABEC 3	ABEC 5	ABEC 7	ABEC 1	ABEC 3	ABEC 5	ABEC 7	ABEC 5	ABEC 7	ABEC 5	ABEC 7	ABEC 1		ABEC 3		ABEC 5		ABEC 7		ABEC 1	ABEC 3	ABEC 5	ABEC 7
		Class 0	Class 6	Class 5	Class 4	Class 0	Class 6	Class 5	Class 4	Class 5	Class 4	Class 5	Class 4	Class 0		class 6		Class 5		Class 4		Class 0	Class 6	Class 5	Class 4
mm		P0	P6	P5	P4	P0	P6	P5	P4	P0	P6	P5	P4	P0		P6		P5		P4		P0	P6	P5	P4
over	up to	max.	max.	max.	max.					max.		max.		upper	lower	upper	lower	upper	lower	upper	lower	max.			
0.6	2.5	6	5	3	2	10	5	4	2.5	7	3	7	3	0	-40	0	-40	0	-40	0	-40	12	12	5	2.5
2.5	10	6	5	3	2	10	6	4	2.5	7	3	7	3	0	-120	0	-120	0	-40	0	-40	15	15	5	2.5
10	18	6	5	3	2	10	7	4	2.5	7	3	7	3	0	-120	0	-120	0	-80	0	-80	20	20	5	2.5
18	30	8	6	3	2.5	13	8	4	3	8	4	8	4	0	-120	0	-120	0	-120	0	-120	20	20	5	2.5
30	50	9	8	4	3	15	10	5	4	8	4	8	4	0	-120	0	-120	0	-120	0	-120	20	20	5	3
50	80	11	9	5	3.5	20	10	5	4	8	5	8	5	0	-150	0	-150	0	-150	0	-150	25	25	6	4
80	120	15	11	5	4	25	13	6	5	9	5	9	5	0	-200	0	-200	0	-200	0	-200	25	25	7	4
120	150	19	14	7	5	30	18	8	6	10	6	10	7	0	-250	0	-250	0	-250	0	-250	30	30	8	5
150	180	19	14	7	5	30	18	8	6	10	6	10	7	0	-250	0	-250	0	-250	0	-250	30	30	8	5
180	250	23	17	8	6	40	20	10	8	11	7	13	8	0	-300	0	-300	0	-300	0	-300	30	30	10	6
250	315	26	19	9	8	50	25	13	10	13	8	15	9	0	-350	0	-350	0	-350	0	-350	35	35	13	8
315	400	30	23	12	9	60	30	15	13	15	9	20	12	0	-400	0	-400	0	-400	0	-400	40	40	15	9
400	500	34	26	14	12	65	35	20	15	18	11	25	15	0	-450	0	-450	0	-450	0	-450	50	45	18	11
500	630	38	30	18	-	70	40	25	-	25	-	30	-	0	-500	0	-500	0	-500	-	-	60	50	20	-
630	800	56	38	23	-	80	50	30	-	30	-	35	-	0	-750	0	-750	0	-750	-	-	70	60	23	-
800	1000	75	45	30	-	90	60	40	-	40	-	45	-	0	-1000	0	-1000	0	-1000	-	-	80	60	35	-
1000	1250	94	56	38	-	100	70	50	-	50	-	60	-	0	-1250	0	-1250	0	-1250	-	-	100	60	45	-
1250	1600	120	-	-	-	120	-	-	-	-	-	-	-	0	-1600	-	-	-	-	-	-	120	-	-	-
1600	2000	150	-	-	-	140	-	-	-	-	-	-	-	0	-2000	-	-	-	-	-	-	140	-	-	-

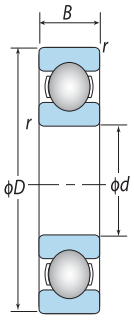


5.4 Radial Bearing Tolerance (ISO 492)

1. Outer Ring (Outer Diameter) (Table 9)

Table 9

Nominal bore diameter		Single plane mean bore diameter deviation (Unit -μm)								Single radial plane bore diameter variation VDp (Unit -μm)											
D		ΔDmp								Diameter series 7,8,8				Diameter series 0,0				Diameter series 2,3,3			
		ABEC 1		ABEC 3		ABEC 5		ABEC 7		ABEC 1	ABEC 3	ABEC 5	ABEC 7	ABEC 1	ABEC 3	ABEC 5	ABEC 7	ABEC 1	ABEC 3	ABEC 5	ABEC 7
		Class 0		class 6		Class 5		Class 4		Class 0	Class 6	Class 5	Class 4	Class 0	Class 6	Class 5	Class 4	Class 0	Class 6	Class 5	Class 4
mm		P0		P6		P5		P4		P0	P6	P5	P4	P0	P6	P5	P4	P0	P6	P5	P4
over	up to	upper	lower	upper	lower	upper	lower	upper	lower	max.				max.				max.			
2.5	6	0	-8	0	-7	0	-5	0	-4	10	9	5	4	8	7	4	3	6	5	4	3
6	18	0	-8	0	-7	0	-5	0	-4	10	9	5	4	8	7	4	3	6	5	4	3
18	30	0	-9	0	-8	0	-6	0	-5	12	10	6	5	9	8	5	4	7	6	5	4
30	50	0	-11	0	-9	0	-7	0	-6	14	11	7	6	11	9	5	5	8	7	5	5
50	80	0	-13	0	-11	0	-9	0	-7	16	14	9	7	13	11	7	5	10	8	7	5
80	120	0	-15	0	-13	0	-10	0	-8	19	16	10	8	19	16	8	6	11	10	8	6
120	150	0	-18	0	-15	0	-11	0	-9	23	19	11	9	23	19	8	7	14	11	8	7
150	180	0	-25	0	-18	0	-13	0	-10	31	23	13	10	31	23	10	8	19	14	10	8
180	250	0	-30	0	-20	0	-15	0	-11	38	25	15	11	38	25	11	8	23	15	11	8
250	315	0	-35	0	-25	0	-18	0	-13	44	31	18	13	44	31	14	10	26	19	14	10
315	400	0	-40	0	-28	0	-20	0	-15	50	35	20	15	50	35	15	11	30	21	15	11
400	500	0	-45	0	-33	0	-23	0	-17	56	41	23	17	56	41	17	13	34	25	17	13
500	630	0	-50	0	-38	0	-28	0	-20	63	48	28	20	63	48	21	15	38	29	21	15
630	800	0	-75	0	-45	0	-35	-	-	94	56	35	-	94	56	26	-	55	34	26	-
800	1000	0	-100	0	-60	0	-50	-	-	125	75	50	-	125	75	38	-	75	45	38	-
1000	1250	0	-125	0	-75	0	-63	-	-	156	94	63	-	156	94	47	-	94	56	47	-
1250	1600	0	-160	0	-90	0	-80	-	-	200	113	80	-	200	113	60	-	120	68	60	-
1600	2000	0	-200	0	-120	-	-	-	-	250	150	-	-	250	150	-	-	150	90	-	-
2000	2500	0	-250	-	-	-	-	-	-	313	-	-	-	313	-	-	-	188	-	-	-

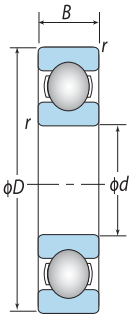


5.5 Radial Bearing Tolerance (ISO 492)

2. Outer Ring (Running Accuracy and Width) (Table 10)

Table 10

Nominal bore diameter		Mean bore diameter variation (Unit - μm)				Radial runout of assembled bearing outer ring (Unit -μm)				Variation of outside surface generatrix inclination with face		Assembled bearing outer ring face runout with raceway		Deviation of a single outer ring width (Unit -		Ring width variation (Unit -μm)			
D		VDmp				Kea				SD		Sea2)		ΔCs		VCs			
		ABEC 1	ABEC 3	ABEC 5	ABEC 7	ABEC 1	ABEC 3	ABEC 5	ABEC 7	ABEC 5	ABEC 7	ABEC 5	ABEC 7	ABEC 1, 3, 5, 7		ABEC 1, 3	ABEC 5	ABEC 7	
		Class 0	Class 6	Class 5	Class 4	Class 0	Class 6	Class 5	Class 4	Class 5	Class 4	Class 5	Class 4	Class 0, 6, 5, 4,		Class 0, 6	Class 5	Class 4	
mm		P0	P6	P5	P4	P0	P6	P5	P4	P5	P4	P5	P4	P0, P6, P5, P4		P0, P6	P5	P4	
over	up to	max.				max.				max.				upper	lower	max.			
2.5	6	6	5	3	2	15	8	5	3	8	4	8	5	Shall conform to the tolerance Bs on d of the same bearing		Shall conform to the tolerance VBs on d of the same bearing	5	2.5	
6	18	6	5	3	2	15	8	5	3	8	4	8	5				5	2.5	
18	30	7	6	3	2.5	15	9	6	4	8	4	8	5				5	2.5	
30	50	8	7	4	3	20	10	7	5	8	4	8	5				5	2.5	
50	80	10	8	5	3.5	25	13	8	5	8	4	10	5				6	3	
80	120	11	10	5	4	35	18	10	6	9	5	11	6				8	4	
120	150	14	11	6	5	40	20	11	7	10	5	13	7				8	5	
150	180	19	14	7	5	45	23	13	8	10	5	14	8				8	5	
180	250	23	15	8	6	50	25	15	10	11	7	15	10				10	7	
250	315	26	19	9	7	60	30	18	11	13	8	18	10				11	7	
315	400	30	21	10	8	70	35	20	13	13	10	20	13				13	8	
400	500	34	25	12	9	80	40	23	15	15	12	23	15				15	9	
500	630	38	29	14	10	100	50	25	18	18	13	25	18				18	11	
630	800	55	34	18	-	120	60	30	-	20	-	30	-				20	-	
800	1000	75	45	25	-	140	75	40	-	23	-	40	-				23	-	
1000	1250	94	56	32		160	85	45		30		45					30		
1250	1600	120	68	40		190	95	60		45		60					45		
1600	2000	150	90	-		220	110	-		-		-					-		
2000	2500	188	-	-		250	-	-		-		-					-		



6. NOISE AND VIBRATION LEVELS

6.1 Noise

The Noise Levels for bearing acceleration are classified in 5 Classes namely Z, Z1, Z2, Z3 and Z4. They are measured by Noise Testing Machine No S0910-**III**.

Permissible Values of Noise Levels for Bearing Acceleration (Units in dB) (Table 11)

Table 11

Bearing Noise Standard														
Bore Diameter in mm	Diameter Series (0)				Diameter Series (2)					Diameter Series (3)				
	Z	Z_1	Z_2	Z_3	Z	Z_1	Z_2	Z_3	Z_4	Z	Z_1	Z_2	Z_3	Z_4
3	35	34	32	28	36	35	32	30	-	37	36	33	31	-
4	35	34	32	28	36	35	32	30	-	37	36	33	31	-
5	37	36	34	30	38	37	34	32	-	39	37	35	33	-
6	37	36	34	30	38	37	34	32	-	39	37	35	33	-
7	39	38	35	31	40	38	36	34	-	-	-	-	-	-
8	39	38	35	31	40	38	36	34	-	-	-	-	-	-
9	41	40	36	32	42	40	37	35	-	-	-	-	-	-
10	43	42	38	33	44	42	39	35	30	46	44	40	37	32
12	44	43	39	34	45	43	39	35	30	47	45	40	37	32
15	45	44	40	35	46	44	41	36	31	48	46	42	38	33
17	46	44	40	35	47	45	41	36	31	49	47	42	38	33
20	47	45	41	36	48	46	42	38	33	50	48	43	39	34
22	47	45	41	36	48	46	42	38	33	50	48	43	39	34
25	48	46	42	38	49	47	43	40	36	51	49	44	41	37
28	49	47	43	39	50	48	44	41	37	52	50	45	42	38
30	49	47	43	39	50	48	44	41	37	52	50	45	42	38
32	50	48	44	40	51	49	45	42	38	53	51	46	43	39
35	51	49	45	41	52	50	46	43	39	54	52	47	44	40
40	53	51	46	42	54	52	47	44	40	56	54	49	45	41
45	55	53	48	45	56	54	49	46	43	58	56	51	47	44
50	57	54	50	47	58	55	51	48	45	60	57	53	49	46
55	59	56	52	49	60	57	53	50	47	62	59	54	51	48
60	61	58	54	51	62	59	54	51	48	64	61	56	53	50

6.2 Vibration

The Vibration Levels for Bearings are classified in 5 Classes namely V, V1, V2, V3, and V4. They are measured by Vibration Testing Machine No. BVT-1

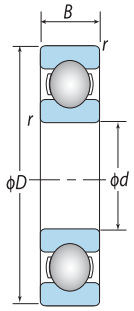
Permissible Values of Vibration Levels for Bearings (Units in μm/s) (Table 12)

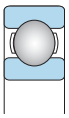
Table 12

Bearing Vibration Standard															
Bore in mm	V			V1			V2			V3			V4		
	Low Band	Medium Band	High Band	Low Band	Medium Band	High Band	Low Band	Medium Band	High Band	Low Band	Medium Band	High Band	Low Band	Medium Band	High Band
3~4	80	44	44	60	35	32	48	26	22	31	16	15	28	10	10
4~6	110	72	60	74	48	40	58	36	30	35	21	18	32	11	11
6~9	130	96	80	92	66	54	72	48	40	44	28	24	38	12	12
9~12	160	120	100	120	80	70	90	60	50	55	35	30	45	14	15
12~15														18	18
15~17	210	150	120	150	100	85	110	78	60	65	46	35	52		
20														25	25
20~25														30	32
28	260	190	150	180	125	100	130	100	75	80	60	45	60		
28~32														35	40
35	300	240	190	200	150	130	150	120	100	90	75	60	70	42	45
40														50	50
45	360	300	260	240	180	160	180	150	130	110	90	80	82	60	60
50	420	320	320	280	200	200	210	160	160	125	100	100	95	70	70
55	420	360	360	280	220	200	210	180	180	125	110	110	95	70	70
60	480	360	440	320	220	240	240	180	200	145	110	130	100	80	80

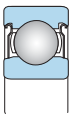
DPI® GOLD BEARINGS

DEEP GROOVE BALL BEARINGS





ZZ



2RS

Miniature & Extra Small Ball Bearing

DPI	Nominal Dimension (mm)				Load Rating (kN)		Limiting Speed (RPM)		Weight (in gms)
					Dynamic	Static	Grease Lub	Oil Lub	
	d	D	B	r	C_r	C_{0r}			
604	4	12	4	0.2	0.97	0.36	53000	63000	1.8
605	5	14	5	0.2	1.3	0.48	50000	60000	3.5
606	6	17	6	0.3	2.6	1.05	35000	43000	5.8
607	7	19	6	0.3	2.6	1.05	40000	47000	7.6
608	8	22	7	0.3	3.35	1.4	28000	35000	12
609	9	24	7	0.3	3.35	1.4	33000	40000	15
626	6	19	6	0.3	2.6	1.05	35000	43000	8.9
627	7	22	7	0.3	3.3	1.35	31000	37000	13
628	8	24	8	0.3	3.35	1.4	28000	35000	18
629	9	26	8	0.6	4.55	1.95	27000	33000	20
686	6	13	3.5	0.15	1.1	0.44	48000	57000	1.8
687	7	14	3.5	0.15	1.5	0.51	45000	54000	2
689	9	17	4	0.2	1.35	0.66	39000	46000	3.5
695	5	13	4	0.2	1.1	0.43	50000	60000	2.2
696	6	15	5	2	1.75	0.67	45000	54000	3.9
697	7	17	5	3	1.6	0.71	42800	50000	5.3
698	8	19	6	3	2.25	0.91	39000	46000	7.2
699	9	20	6	0.3	2.45	1.05	35000	42000	7.5

Deep Groove Ball Bearing

DPI	Nominal Dimension (mm)				Load Rating (kN)		Limiting Speed (RPM)		Weight (in kgs)
					Dynamic	Static	Grease Lub	Oil Lub	
	d	D	B	r	C_r	C_{0r}			
6000	10	26	8	0.3	4.55	1.95	31000	36000	0.019
6001	12	28	8	0.3	5.1	2.4	27000	32000	0.022
6002	15	32	9	0.3	5.6	2.85	23000	27000	0.03
6003	17	35	10	0.3	6	3.25	21000	25000	0.039
6004	20	42	12	0.6	9.4	5.05	17000	21000	0.069
6005	25	47	12	0.6	10.1	5.85	15000	18000	0.08
6006	30	55	13	1	13.2	8.25	13000	15000	0.116
6007	35	62	14	1	15.9	10.3	11000	13000	0.155
6200	10	30	9	0.6	5.1	2.4	24000	29000	0.032
6201	12	32	10	0.6	6.8	3.8	22000	27000	0.037
6202	15	35	11	0.6	7.65	3.75	20000	24000	0.045
6203	17	40	12	0.6	9.55	4.8	17000	21000	0.065
6204	20	47	14	1	12.8	6.65	15000	17000	0.106
6205	25	52	15	1	14	7.85	13000	15000	0.128
6206	30	62	16	1.00	19.50	11.30	11000	13000	0.1990
6300	10	35	11	0.6	8.1	3.4	22000	27000	0.053
6301	12	37	12	1	9.7	4.2	20000	25000	0.06
6302	15	42	13	1	11.4	5.45	17000	20000	0.082
6303	17	47	14	1	13.6	6.65	15000	18000	0.115
6304	20	52	15	1	15.8	7.85	14000	17000	0.144
6305	25	62	17	1	20.6	11.3	11000	13000	0.232

Estd. 1983

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