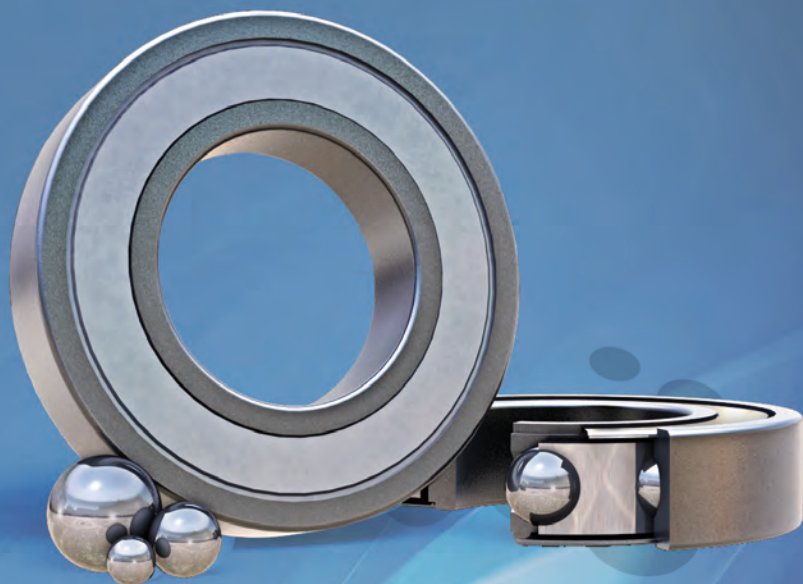


04/ Deep groove ball bearings Rodamientos radiales de bolas



Deep groove ball bearings

Rodamientos radiales de bolas

4.1/ Standard Ball Bearings

Rodamientos de Bolas Estándar

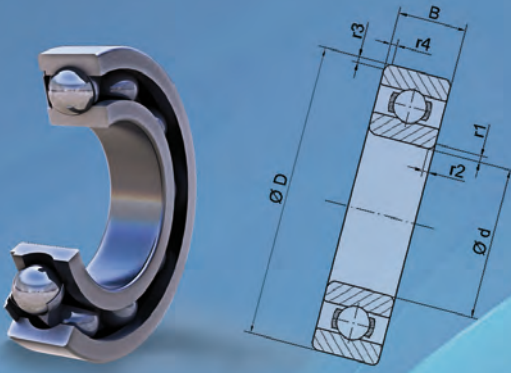
193

4.2/ Special Ball Bearings

Rodamientos de Bolas Especiales

221





4.1 Standard ball bearings

Rodamientos de bolas estándar

Product Overview

Introducción	194
Description / Descripción	194
Design / Diseño	194

Bearing Features

Características del Rodamiento	195
Tolerances / Tolerancias	195
Misalignment / Desalineación	196
Internal clearance / Juego Interno	196
Speed / Velocidad	197
Cages / Jaulas	198
Load rating / Cargas	198
Prefix/Suffix / Prefijos/Sufijo	199

Bearing Tables

Tablas de Rodamientos	200
------------------------------	------------

Product overview / Introducción

Description

Deep groove ball bearings are the most popular type of bearings and consequently, they are used for most of the applications. Deep groove ball bearings are non-separable.

Deep groove ball bearings can accommodate radial and thrust loads. Although they never reach the level of other types of bearings such as cylindrical roller bearings, tapered roller bearings or others, deep groove ball bearings are superior in speed rating to any other type of rolling element bearing.

Technical dimensions are in accordance with the ISO 15 norm and with the dimensions of the snap ring grooves detailed in the ISO 464 norm.

Sealed and Shielded Bearings

In addition to open deep groove ball bearings, Fersa supplies deep groove ball bearings with shields or seals on both sides (2RS or ZZ). They are supplied grease filled by the factory with approved high quality bearing grease, suitable for a temperature range of between -20°C to 110°C (-4°F to 230°F). The approximate amount of grease is from 20% to 50% of the free space in the bearing.

Design

Ball bearings are machine components consisting of an outer ring, inner ring, balls, retainers, shields and snap rings. Due to their low friction torque, deep groove ball bearings are suitable for high speeds.

Fersa also manufactures bearings with snap grooves and snap rings in the outer ring (N, NR) meant to facilitate the axial assembly in some cases. Snap rings fitted to deep groove ball bearings with a snap ring groove provide a simple and space-saving means of axially locating the bearing in the housing

Descripción

El rodamiento de bolas de una hilera es el rodamiento más popular y es el que interviene en la mayor parte de las aplicaciones. Los rodamientos de bolas no son separables.

Los rodamientos radiales de bolas pueden soportar cargas radiales y axiales. Aunque sin llegar nunca a los niveles de rodamientos como por ejemplo cilíndrico o cónico. La velocidad de giro de los rodamientos de bolas es superior a otros tipos de rodamientos.

Las dimensiones técnicas cumplen con la Normativa ISO 15 y con las dimensiones de ranura para anillo elástico detalladas en la Normativa ISO 464.

Rodamientos Protegidos y Sellados

Además de los rodamientos de bolas de una hilera sin protección, FERSA Bearings también suministra rodamientos de bolas de una hilera con placas de protección (ZZ) o con tapas de retén (2RS) en los dos extremos. Estos rodamientos se suministran lubricados de fábrica con la grasa de alta calidad autorizada para rodamientos y pueden utilizarse a temperaturas comprendidas entre -20°C to 110°C (-4°F a 230°F). Por regla general la cantidad de grasa oscila entre un 20% a un 50% del espacio libre en el rodamiento.

Diseño

Los rodamientos de bolas son componentes de maquinaria que tienen elementos como: aro exterior, aro interior, bolas, retenes, placas de protección, etc.

Fersa también fabrica rodamientos con ranura y anillos elásticos en el aro exterior (N, NR), para facilitar en algunos casos el montaje axial. Los anillos elásticos ajustados a los rodamientos de una hilera con ranura son un método sencillo, además de una forma de ahorrar espacio, para ubicar el rodamiento en su alojamiento correspondiente.



Bearing features / Características del rodamiento

Tolerances

Single row groove bearings are manufactured according to normal tolerances (ISO 492 and ISO 5753) and with normal radial internal clearance as standard.

Tolerancias

Los rodamientos de bolas de una hilera se fabrican según las tolerancias normales (ISO 492 y ISO 5753), y con el juego radial interno normal.

Normal tolerances for radial bearings / Tolerancias normales para rodamientos radiales

Bore diameter / Diámetro interno

d		Δ_{dmp}		V_{dp}			V_{dmp}	K_{ia}
over	incl	high	low	series 7,8,9 max	series 0,1 max	series 2,3,4 max	max	max
mm		μm		μm			μm	μm
-	2,5	0	-8	10	8	6	6	10
2,5	10	0	-8	10	8	6	6	10
10	18	0	-8	10	8	6	6	10
18	30	0	-10	13	10	8	8	13
30	50	0	-12	15	12	9	9	15
50	80	0	-15	19	19	11	11	20
80	120	0	-20	25	25	15	15	25
120	180	0	-25	31	31	19	19	30

Outer diameter / Diámetro externo

D		Δ_{dmp}		V_{Dp}			V_{dmp}	K_{ea}
over	incl	high	low	series 7,8,9 max	series 0,1 max	series 2,3,4 max	max	max
mm		μm		μm			μm	μm
6	18	0	-8	10	8	6	6	15
18	30	0	-9	12	9	7	7	15
30	50	0	-11	14	11	8	8	20
50	80	0	-13	16	13	10	10	25
80	120	0	-15	19	19	11	11	35
120	150	0	-18	23	23	14	14	40
150	180	0	-25	31	31	19	19	45
180	250	0	-30	38	38	23	23	50

Bearing width / Anchura de rodamiento

d		Δ_{Bs}		V_{bs}
over	incl	high	low	max
mm		μm		μm
-	2,5	0	-120	10
2,5	10	0	-120	10
10	18	0	-120	10
18	30	0	-120	13
30	50	0	-120	15
50	80	0	-150	19
80	120	0	-200	25
120	180	0	-250	31

Misalignment

Deep groove ball bearings allow only small misalignment between the inner and the outer rings, which requires a tight tolerance in the manufacturing of the housing. Under normal application conditions misalignment is usually between 2 and 10 minutes. It should be noted that when the bearing is running, misalignment of the bearing rings will cause a noticeable increase of the noise level.

Internal Clearance

Regarding the internal clearance, Fersa can supply deep groove ball bearings with normal radial clearance, as well as C3 and C4 radial clearance (as per ISO 5753 norm).

Desalineación

Los rodamientos radiales de bolas de una hilera admiten solo una pequeña desalineación entre los aros interior y exterior, y por lo tanto requieren una buena tolerancia en la mecanización de los alojamientos. En condiciones de aplicación normales la desalineación suele ser entre 2 a 10 minutos de ángulo. Debe tenerse en cuenta que la desalineación de los aros de los rodamientos causa un incremento considerable del nivel del ruido cuando el rodamiento está funcionando.

Juego Interno

En lo referente al juego radial interno, Fersa puede suministrar rodamientos de bolas de una hilera con juego radial normal, además de con juego radial C3 y C4 (según la Normativa ISO 5753).

Radial internal clearance / Juego radial interno

Bore diameter / Diámetro interior

d		C2		Normal		C3		C4	
over	incl	min	max	min	max	min	max	min	max
mm		µm		µm		µm		µm	
-	6	0	7	2	13	28	13	-	-
6	10	0	7	2	13	8	23	14	29
10	18	0	9	3	18	11	25	18	33
18	24	0	10	5	20	13	28	20	36
24	30	1	11	5	20	13	28	23	41
30	40	1	11	6	20	15	33	28	46
40	50	1	11	6	23	18	36	30	51
50	65	1	15	8	28	23	43	38	61
65	80	1	15	10	30	25	51	46	71
80	100	1	18	12	36	30	58	53	84
100	120	2	20	15	41	36	66	61	97
120	140	2	23	18	48	41	81	71	114
140	160	2	23	18	53	46	91	81	130
160	180	2	25	20	61	53	102	91	147
180	200	2	30	25	71	63	117	107	163
200	225	2	35	25	85	75	140	125	195
225	250	2	40	30	95	85	160	145	225

Speed

Depending on the lubrication agent, oil or grease, different speed ratings can be defined. When a bearing operates under a load, heat is generated internally as a result of rolling, sliding and fluid friction. As the bearing speed increases, the temperature of the bearing also increases. If the bearing temperature exceeds certain limits, the efficiency of the lubricant falls drastically and the bearing will no longer operate in a stable manner.

Therefore, the maximum speed at which the bearing can continuously operate without generating heat beyond a specified limit is called the speed limit or allowable speed. Under this value and at the manufacturers specified load condition, the generated heat will be dissipated as fast as it is created.

The actual allowable speed of a bearing depends primarily on: bearing type and size; lubricant type and quantity; bearing load; bearing cage; bearing precision; and ambient temperature.

Velocidad

Según el lubricante que se utilice, aceite o grasa, se pueden definir diferentes ratios de velocidad. Cuando un rodamiento funciona con una carga se genera calor interno como resultado del movimiento, deslizamiento y fricción del fluido. A medida que incrementa la velocidad del rodamiento, también incrementa el calor de éste. Si la temperatura del rodamiento sobrepasa ciertos límites, la eficiencia del lubricante decae radicalmente y el rodamiento no operará de una forma estable.

Por lo tanto la velocidad máxima para que un rodamiento funcione ininterrumpidamente sin generar calor más allá de un límite determinado, se llama el límite de velocidad o velocidad permitida. Por debajo de este valor y con la carga especificada por el fabricante, el calor generado se disipará tan rápido como se genera. La velocidad real permitida a un rodamiento depende principalmente de: tipo de rodamiento y tamaño; tipo de lubricante y cantidad; carga del rodamiento; jaula del rodamiento; precisión del rodamiento; temperatura ambiente.

Cages

Basic deep groove ball bearings are normally fitted with pressed steel cages as standard.

Other materials as copper alloy and polyamide can be supplied on demand.

Equivalent Dynamic Bearing Load

In the case of deep groove ball bearings, the axial load capacity and the X and Y factors are required for the calculation of the actual dynamic equivalent bearing load. The load capacity is calculated according to ISO 76 and ISO 281.

$$P = X Fr + Y Fa \text{ when } Fa/Fr > e$$

$$P = Fr \text{ when } Fa/Fr \leq e$$

The X and Y factors depend on the relationship of the axial load to the basic static load rating C_0 . They are also influenced by the radial internal clearance, where higher clearance enables heavier axial loads to be carried.

Equivalent Static Bearing Load

$$P_0 = 0,6 * Fr + 0,5 * Fa.$$

$$\text{If } P_0 < Fr, P_0 = Fr$$

When P_0 is smaller than Fr , the higher value must be used for the calculation of the equivalent static bearing load.

Jaulas

En general, los rodamientos de bolas de una hilera estándar se montan con jaulas de acero prensado. Pero se puede solicitar y suministrar otros materiales como el latón y la poliamida.

Carga Dinámica Equivalente del Rodamiento

En el caso de los rodamientos radiales de bolas de una hilera, para poder hacer el cálculo real de la carga dinámica equivalente del rodamiento se requiere la capacidad axial de carga y los factores X e Y. La capacidad de carga se calcula según la Normativa ISO 76 y la Normativa ISO 281.

$$P = X Fr + Y Fa \text{ cuando } Fa/Fr > e$$

$$P = Fr \text{ cuando } Fa/Fr \leq e$$

Los factores X e Y dependen de la relación de la carga axial con respecto al ratio C_0 de carga estática básica. Estos también se ven influenciados por el juego radial interno, donde un juego mayor permite soportar una carga axial más pesada.

Carga Estática Equivalente del Rodamiento

$$P_0 = 0,6 * Fr + 0,5 * Fa.$$

$$\text{Si } P_0 < Fr, P_0 = Fr$$

Cuando P_0 es menor que Fr , se debe usar el valor más alto para calcular el equivalente de la carga estática del rodamiento.

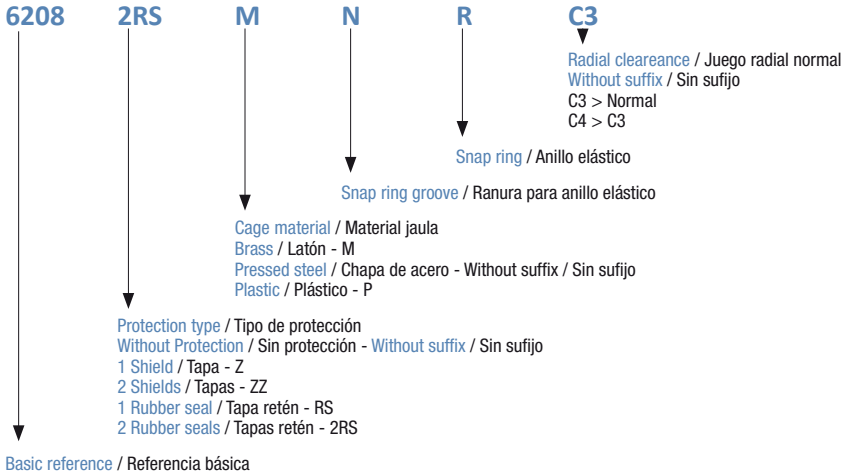
Calculation factors X and Y for deep groove ball bearings /

Calculo de los factores X e Y para los Rodamientos de bolas de una hilera juego axial

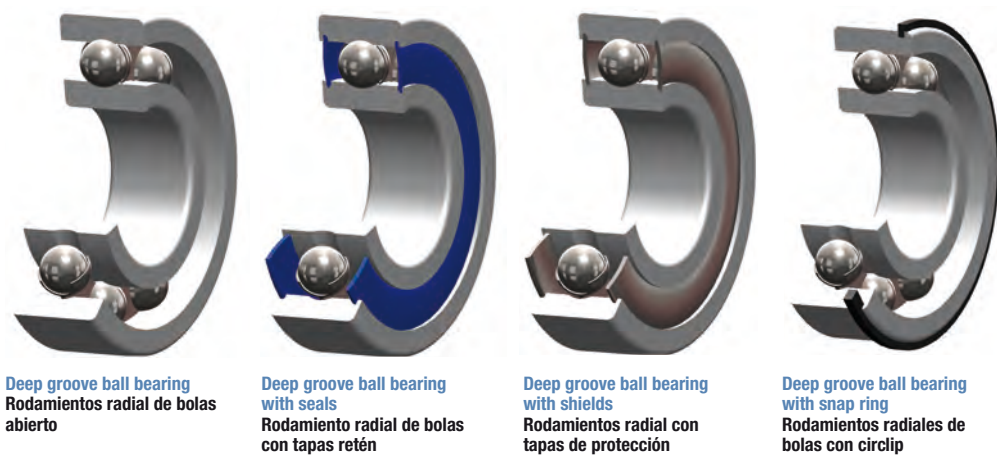
Normal clearance / Tolerancia normal						C3 clearance / Tolerancia C3						C4 clearance / Tolerancia C4					
		$F_a/F_r \leq e$		$F_a/F_r > e$				$F_a/F_r \leq e$		$F_a/F_r > e$				$F_a/F_r \leq e$		$F_a/F_r > e$	
Fa/Co	e	X	Y	X	Y	e	X	Y	X	Y	e	X	Y	X	Y		
0,025	0,22	1	0	0,56	2	0,31	1	0	0,46	1,75	0,4	1	0	0,44	1,042		
0,04	0,24	1	0	0,56	1,8	0,33	1	1	0,46	1,62	0,42	1	0	0,44	1,36		
0,07	0,27	1	1	0,56	1,6	0,36	1	1	0,46	1,46	0,44	1	0	0,44	1,27		
0,13	0,31	1	0	0,56	1,4	0,41	1	0	0,46	1,3	0,48	1	0	0,44	1,16		
0,25	0,37	1	0	0,56	1,2	0,46	1	0	0,46	1,14	0,53	1	0	0,44	1,05		
0,5	0,44	1	0	0,56	1	0,54	1	0	0,46	1	0,56	1	0	0,44	1		

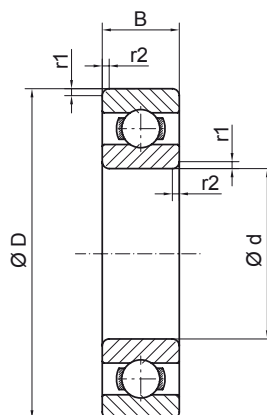
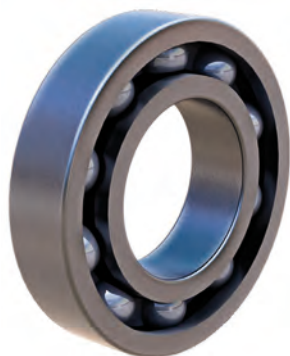
Prefixes/Suffixes

Suffix Designation Chart for Ball Bearings.



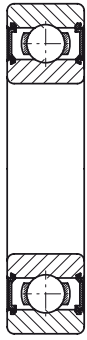
Basic reference / Referencia básica



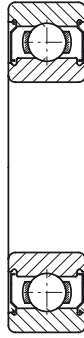


DIMENSIONS / DIMENSIONES						r1/r2 min	REFERENCES REFERENCIAS	WEIGHT / PESOS	
d		D		B				kg	lb
mm	inch	mm	inch	mm	inch				
8,000	0,315	22,000	0,866	7,000	0,276	0,3	608	0,010	0,022
		22,000	0,866	7,000	0,276	0,3	608 2RS	0,010	0,022
		22,000	0,866	7,000	0,276	0,3	608 ZZ	0,010	0,022
10,000	0,394	26,000	1,024	8,000	0,315	0,5	6000	0,019	0,042
		26,000	1,024	8,000	0,315	0,5	6000 2RS	0,019	0,042
		26,000	1,024	8,000	0,315	0,5	6000 ZZ	0,019	0,042
		30,000	1,181	9,000	0,354	1,0	6200	0,031	0,068
		30,000	1,181	9,000	0,354	1,0	6200 2RS	0,031	0,068
		30,000	1,181	9,000	0,354	1,0	6200 ZZ	0,031	0,068
		35,000	1,378	11,000	0,433	1,0	6300	0,053	0,117
35,000	1,378	11,000	0,433	1,0	6300 2RS	0,053	0,117		
35,000	1,378	11,000	0,433	1,0	6300 ZZ	0,053	0,117		
12,000	0,472	28,000	1,102	8,000	0,315	0,5	6001	0,022	0,048
		28,000	1,102	8,000	0,315	0,5	6001 2RS	0,022	0,048
		28,000	1,102	8,000	0,315	0,5	6001 ZZ	0,022	0,048
		32,000	1,260	10,000	0,394	1,0	6201	0,036	0,079
		32,000	1,260	10,000	0,394	1,0	6201 2RS	0,036	0,079
		32,000	1,260	10,000	0,394	1,0	6201 ZZ	0,036	0,079
		32,000	1,260	14,000	0,551	0,6	62201	0,052	0,114
		32,000	1,260	14,000	0,551	0,6	62201 2RS	0,052	0,114
		32,000	1,260	14,000	0,551	0,6	62201 ZZ	0,052	0,114
		37,000	1,457	12,000	0,472	1,5	6301	0,060	0,132
37,000	1,457	12,000	0,472	1,5	6301 2RS	0,060	0,132		
37,000	1,457	12,000	0,472	1,5	6301 ZZ	0,060	0,132		
40,000	1,575	12,000	0,472	0,6	6203/d12 2RS	0,075	0,165		
15,000	0,591	32,000	1,260	9,000	0,354	0,5	6002	0,029	0,064
		32,000	1,260	9,000	0,354	0,5	6002 2RS	0,029	0,064

Type / Tipo

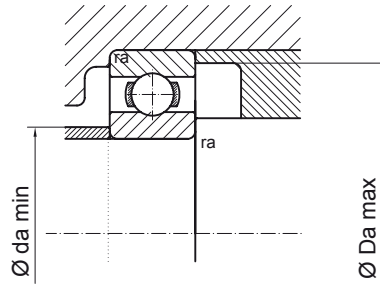


2RS

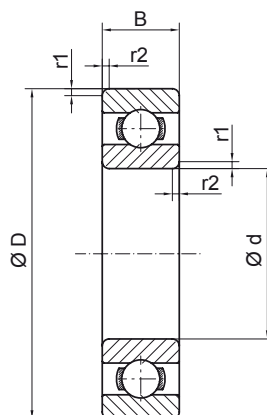
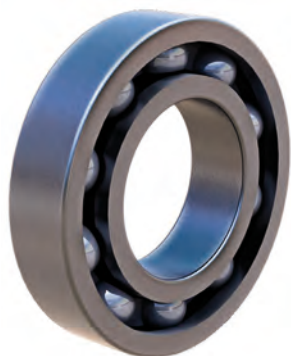


ZZ

Assembly / Montaje

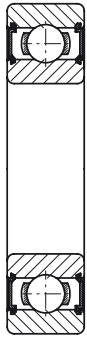


ASSEMBLY / MONTAJE			LOAD / CARGA (kN)		SPEED / VELOCIDAD (rpm)			REFERENCES
da min	Da max	ra max	DYNAMIC DINÁMICA	STATIC ESTÁTICA		OIL / ACEITE	GREASE / GRASA	REFERENCIAS
			C	Co	fo	na	ng	
10,0	20,0	0,3	3,5	1,4	12,4	42000	---	608
10,0	20,0	0,3	3,5	1,4	12,4	---	21000	608 2RS
10,0	20,0	0,3	3,5	1,4	12,4	---	35000	608 ZZ
12,0	24,0	0,5	4,7	1,9	12,4	36000	---	6000
12,0	24,0	0,5	4,7	1,9	12,4	---	18000	6000 2RS
12,0	24,0	0,5	4,7	1,9	12,4	---	30000	6000 ZZ
14,0	26,0	1,0	5,4	2,4	12,1	30000	---	6200
14,0	26,0	1,0	5,4	2,4	12,1	---	15000	6200 2RS
14,0	26,0	1,0	5,4	2,4	12,1	---	25000	6200 ZZ
14,0	31,0	1,0	7,9	3,4	11,3	27000	---	6300
14,0	31,0	1,0	7,9	3,4	11,3	---	13000	6300 2RS
14,0	31,0	1,0	7,9	3,4	11,3	---	22000	6300 ZZ
14,0	26,0	0,5	5,2	2,3	13,0	33000	---	6001
14,0	26,0	0,5	5,2	2,3	13,0	---	16000	6001 2RS
14,0	26,0	0,5	5,2	2,3	13,0	---	27000	6001 ZZ
16,0	28,0	1,0	7,1	3,1	12,3	27000	---	6201
16,0	28,0	1,0	7,1	3,1	12,3	---	14000	6201 2RS
16,0	28,0	1,0	7,1	3,1	12,3	---	23000	6201 ZZ
16,0	28,0	0,6	7,2	3,0	12,2	27000	---	62201
16,0	28,0	0,6	7,2	3,0	12,2	---	14000	62201 2RS
16,0	28,0	0,6	7,2	3,0	12,2	---	23000	62201 ZZ
17,5	31,5	1,5	9,8	4,2	11,1	25000	---	6301
17,5	31,5	1,5	9,8	4,2	11,1	---	12000	6301 2RS
17,5	31,5	1,5	9,8	4,2	11,1	---	20000	6301 ZZ
16,0	36,0	0,6	10,0	4,8	13,1	---	12000	6203/d12 2RS
17,0	30,0	0,5	5,9	2,8	13,9	28000	---	6002
17,0	30,0	0,5	5,9	2,8	13,9	---	14000	6002 2RS

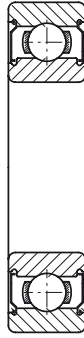


DIMENSIONS / DIMENSIONES						r1/r2 min	REFERENCES	WEIGHT / PESOS	
d		D		B			REFERENCIAS	kg	lb
mm	inch	mm	inch	mm	inch				
15,000	0,591	32,000	1,260	9,000	0,354	0,5	6002 ZZ	0,029	0,064
		35,000	1,378	11,000	0,433	1,0	6202	0,044	0,097
		35,000	1,378	11,000	0,433	1,0	6202 2RS	0,044	0,097
		35,000	1,378	11,000	0,433	1,0	6202 ZZ	0,044	0,097
		35,000	1,378	14,000	0,551	0,6	62202	0,057	0,125
		35,000	1,378	14,000	0,551	0,6	62202 2RS	0,057	0,125
		35,000	1,378	14,000	0,551	0,6	62202 ZZ	0,057	0,125
		42,000	1,654	13,000	0,512	1,5	6302	0,083	0,183
		42,000	1,654	13,000	0,512	1,5	6302 2RS	0,083	0,183
		42,000	1,654	13,000	0,512	1,5	6302 ZZ	0,083	0,183
47,000	1,850	14,000	0,551	1,5	6303/d15 2RS	0,12	0,26		
17,000	0,669	35,000	1,378	10,000	0,394	0,5	6003	0,038	0,084
		35,000	1,378	10,000	0,394	0,5	6003 2RS	0,038	0,084
		35,000	1,378	10,000	0,394	0,5	6003 ZZ	0,038	0,084
		40,000	1,575	12,000	0,472	1,0	6203	0,064	0,141
		40,000	1,575	12,000	0,472	1,0	6203 2RS	0,064	0,141
		40,000	1,575	12,000	0,472	1,0	6203 ZZ	0,064	0,141
		47,000	1,850	14,000	0,551	1,5	6303	0,12	0,25
		47,000	1,850	14,000	0,551	1,5	6303 2RS	0,12	0,25
		47,000	1,850	14,000	0,551	1,5	6303 ZZ	0,12	0,25
		52,000	2,047	15,000	0,591	1,1	6304/d17 2RS	0,15	0,33
		52,000	2,047	16,000	0,630	1,1	6304/d17 B16 2RS	0,16	0,35
		52,000	2,047	17,000	0,669	1,0	6304/d17 B17 2RS	0,17	0,37
		62,000	2,441	17,000	0,669	2,0	6403	0,027	0,059
62,000	2,441	17,000	0,669	2,0	6403 2RS	0,027	0,059		
62,000	2,441	17,000	0,669	2,0	6403 ZZ	0,027	0,059		
20,000	0,787	37,000	1,457	9,000	0,354	0,5	61904	0,038	0,084

Type / Tipo

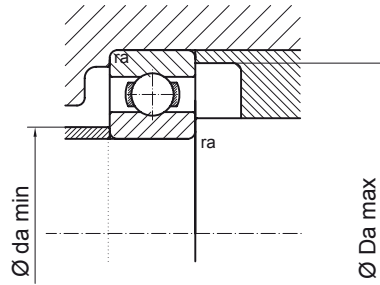


2RS

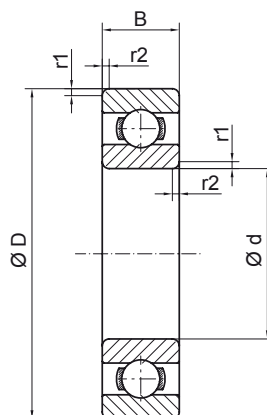
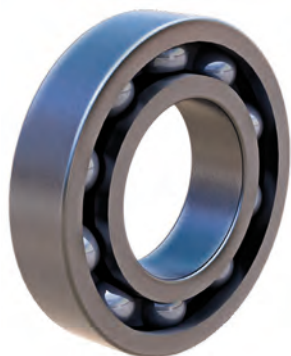


ZZ

Assembly / Montaje

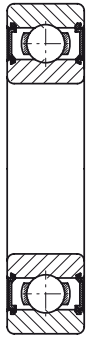


ASSEMBLY / MONTAJE			LOAD / CARGA (kN)		SPEED / VELOCIDAD (rpm)			REFERENCES REFERENCIAS
da min	Da max	ra max	DYNAMIC DINÁMICA	STATIC ESTÁTICA		OIL / ACEITE	GREASE / GRASA	
			C	Co	fo	na	ng	
17,0	30,0	0,5	5,9	2,8	13,9	---	23000	6002 ZZ
19,0	31,0	1,0	8,0	3,7	13,1	24000	---	6202
19,0	31,0	1,0	8,0	3,7	13,1	---	12000	6202 2RS
19,0	31,0	1,0	8,0	3,7	13,1	---	20000	6202 ZZ
19,0	31,0	0,6	8,1	3,8	12,1	24000	---	62202
19,0	31,0	0,6	8,1	3,8	12,1	---	12000	62202 2RS
19,0	31,0	0,6	8,1	3,8	12,1	---	20000	62202 ZZ
20,5	36,5	1,5	11,9	5,3	12,1	21000	---	6302
20,5	36,5	1,5	11,9	5,3	12,1	---	11000	6302 2RS
20,5	36,5	1,5	11,9	5,3	12,1	---	18000	6302 ZZ
20,5	41,5	1,5	14,2	6,5	12,3	---	10000	6303/d15 2RS
19,0	33,0	0,5	6,0	3,3	14,3	25000	---	6003
19,0	33,0	0,5	6,0	3,3	14,3	---	13000	6003 2RS
19,0	33,0	0,5	6,0	3,3	14,3	---	21000	6003 ZZ
21,0	36,0	1,0	10,0	4,8	13,1	21000	---	6203
21,0	36,0	1,0	10,0	4,8	13,1	---	11000	6203 2RS
21,0	36,0	1,0	10,0	4,8	13,1	---	18000	6203 ZZ
22,5	41,5	1,5	14,2	6,5	12,3	19000	---	6303
22,5	41,5	1,5	14,2	6,5	12,3	---	9000	6303 2RS
22,5	41,5	1,5	14,2	6,5	12,3	---	16000	6303 ZZ
24,0	45,0	1,1	16,7	7,9	12,4	---	9000	6304/d17 2RS
24,0	45,0	1,1	16,7	7,9	13,2	---	9000	6304/d17 B16 2RS
24,0	45,0	1,0	16,7	7,9	12,2	---	9000	6304/d17 B17 2RS
23,5	55,5	2,0	23,9	10,8	12,4	15000	---	6403
23,5	55,5	2,0	23,9	10,8	12,4	---	8000	6403 2RS
23,5	55,5	2,0	23,9	10,8	12,4	---	13000	6403 ZZ
22,0	35,0	0,5	6,4	3,7	14,8	23000	---	61904

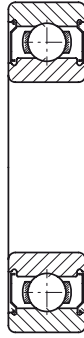


DIMENSIONS / DIMENSIONES						r1/r2 min	REFERENCES	WEIGHT / PESOS	
d		D		B			REFERENCIAS	kg	lb
mm	inch	mm	inch	mm	inch				
20,000	0,787	37,000	1,457	9,000	0,354	0,5	61904 2RS	0,038	0,084
		37,000	1,457	9,000	0,354	0,5	61904 ZZ	0,038	0,084
		42,000	1,654	12,000	0,472	1,0	6004	0,067	0,147
		42,000	1,654	12,000	0,472	1,0	6004 2RS	0,067	0,147
		42,000	1,654	12,000	0,472	1,0	6004 ZZ	0,067	0,147
		47,000	1,850	14,000	0,551	1,5	6204	0,11	0,24
		47,000	1,850	14,000	0,551	1,5	6204 2RS	0,11	0,24
		47,000	1,850	14,000	0,551	1,5	6204 ZZ	0,11	0,24
		47,000	1,850	18,000	0,709	1,0	62204	0,14	0,31
		47,000	1,850	18,000	0,709	1,0	62204 2RS	0,14	0,31
		47,000	1,850	18,000	0,709	1,0	62204 ZZ	0,14	0,31
		52,000	2,047	12,000	0,472	1,1	6304 B12	0,12	0,26
		52,000	2,047	15,000	0,591	2,0	6304	0,14	0,31
		52,000	2,047	15,000	0,591	2,0	6304 2RS	0,14	0,31
		52,000	2,047	15,000	0,591	2,0	6304 ZZ	0,14	0,31
		56,000	2,205	12,000	0,472	1,1	6304 B12 D56	0,17	0,36
56,000	2,205	12,000	0,472	1,1	6304 B12 D56	0,17	0,36		
56,000	2,205	12,000	0,472	1,1	6304 B12 D56	0,17	0,36		
72,000	2,835	19,000	0,748	2,0	6404	0,41	0,90		
72,000	2,835	19,000	0,748	2,0	6404 2RS	0,41	0,90		
72,000	2,835	19,000	0,748	2,0	6404 ZZ	0,41	0,90		
22,000	0,866	50,000	1,969	14,000	0,551	1,0	62/22	0,11	0,24
25,000	0,984	47,000	1,850	12,000	0,472	1,0	6005	0,078	0,172
		47,000	1,850	12,000	0,472	1,0	6005 2RS	0,078	0,172
		47,000	1,850	12,000	0,472	1,0	6005 ZZ	0,078	0,172
		52,000	2,047	15,000	0,591	1,5	6205	0,13	0,29
		52,000	2,047	15,000	0,591	1,5	6205 2RS	0,13	0,29

Type / Tipo

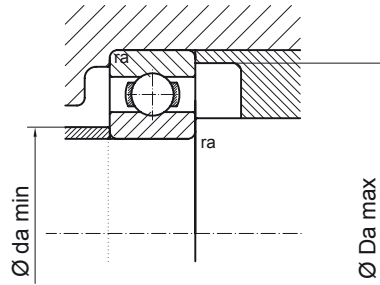


2RS

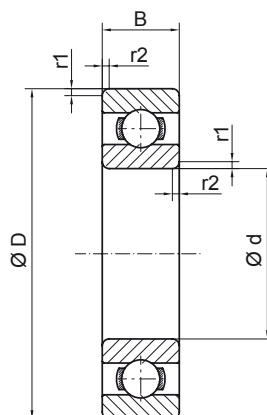
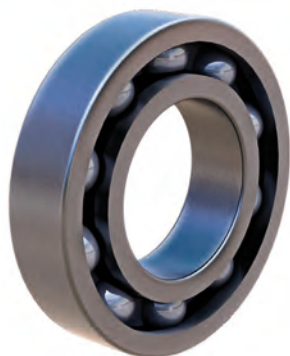


ZZ

Assembly / Montaje

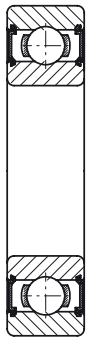


ASSEMBLY / MONTAJE			LOAD / CARGA (kN)		SPEED / VELOCIDAD (rpm)			REFERENCES REFERENCIAS
da min	Da max	ra max	DYNAMIC DINÁMICA	STATIC ESTÁTICA		OIL / ACEITE	GREASE / GRASA	
			C	Co	fo	na	ng	
22,0	35,0	0,5	6,4	3,7	14,8	---	11000	61904 2RS
22,0	35,0	0,5	6,4	3,7	14,8	---	19000	61904 ZZ
23,0	39,0	1,0	9,8	5,0	13,9	21000	---	6004
23,0	39,0	1,0	9,8	5,0	13,9	---	11000	6004 2RS
23,0	39,0	1,0	9,8	5,0	13,9	---	18000	6004 ZZ
25,5	41,5	1,5	13,4	6,6	13,1	18000	---	6204
25,5	41,5	1,5	13,4	6,6	13,1	---	9000	6204 2RS
25,5	41,5	1,5	13,4	6,6	13,1	---	15000	6204 ZZ
25,5	41,5	1,0	13,3	7,7	13,1	18000	---	62204
25,5	41,5	1,0	13,3	7,7	13,1	---	9000	62204 2RS
25,5	41,5	1,0	13,3	7,7	13,1	---	15000	62204 ZZ
27,0	45,0	1,1	14,7	7,7	12,4	17000	---	6304 B12
27,0	45,0	2,0	16,7	7,9	12,4	17000	---	6304
27,0	45,0	2,0	16,7	7,9	12,4	---	8000	6304 2RS
27,0	45,0	2,0	16,7	7,9	12,4	---	14000	6304 ZZ
27,0	49,0	1,1	10,5	5,9	14,8	16000	---	6304 B12 D56
27,0	49,0	1,1	10,5	5,9	14,8	16000	---	6304 B12 D56
27,0	49,0	1,1	10,5	5,9	14,8	16000	---	6304 B12 D56
29,0	63,0	2,0	32,1	15,0	13,0	13000	---	6404
29,0	63,0	2,0	32,1	15,0	13,0	---	6000	6404 2RS
29,0	63,0	2,0	32,1	15,0	13,0	---	11000	6404 ZZ
27,5	44,5	1,0	14,5	7,5	14,0	---	8000	62/22 2RS
28,0	44,0	1,0	10,6	5,8	14,5	18000	---	6005
28,0	44,0	1,0	10,6	5,8	14,5	---	9000	6005 2RS
28,0	44,0	1,0	10,6	5,8	14,5	---	15000	6005 ZZ
30,5	46,5	1,5	14,7	7,8	13,8	16000	---	6205
30,5	46,5	1,5	14,7	7,8	13,8	---	8000	6205 2RS



DIMENSIONS / DIMENSIONES						r1/r2 min	REFERENCES	WEIGHT / PESOS	
d		D		B			REFERENCIAS	kg	lb
mm	inch	mm	inch	mm	inch				
25,000	0,984	52,000	2,047	15,000	0,591	1,5	6205 ZZ	0,13	0,29
		56,000	2,205	12,000	0,472	1,1	6205 B12 D56	0,12	0,25
		62,000	2,441	17,000	0,669	2,0	6305	0,23	0,51
		62,000	2,441	17,000	0,669	2,0	6305 2RS	0,23	0,51
		62,000	2,441	17,000	0,669	2,0	6305 ZZ	0,23	0,51
		62,000	2,441	24,000	0,945	1,1	62305	0,32	0,70
		62,000	2,441	24,000	0,945	1,1	62305 2RS	0,32	0,70
		62,000	2,441	24,000	0,945	1,1	62305 ZZ	0,32	0,70
		80,000	3,150	21,000	0,827	2,5	6405	0,54	1,19
80,000	3,150	21,000	0,827	2,5	6405 2RS	0,54	1,19		
80,000	3,150	21,000	0,827	2,5	6405 ZZ	0,54	1,19		
28,575	1,125	71,438	2,813	20,638	0,813	2,3	RMS 9	0,37	0,81
30,000	1,181	55,000	2,165	13,000	0,512	1,5	6006	0,12	0,26
		55,000	2,165	13,000	0,512	1,5	6006 2RS	0,12	0,26
		55,000	2,165	13,000	0,512	1,5	6006 ZZ	0,12	0,26
		62,000	2,441	16,000	0,630	1,5	6206	0,20	0,44
		62,000	2,441	16,000	0,630	1,5	6206 2RS	0,20	0,44
		62,000	2,441	16,000	0,630	1,5	6206 ZZ	0,20	0,44
		62,000	2,441	20,000	0,787	1,0	62206	0,24	0,53
		62,000	2,441	20,000	0,787	1,0	62206 2RS	0,24	0,53
		62,000	2,441	20,000	0,787	1,0	62206 ZZ	0,24	0,53
		72,000	2,835	19,000	0,748	2,0	6306	0,35	0,77
		72,000	2,835	19,000	0,748	2,0	6306 2RS	0,35	0,77
		72,000	2,835	19,000	0,748	2,0	6306 ZZ	0,35	0,77
		72,000	2,835	27,000	1,063	1,1	62306	0,50	1,10
		72,000	2,835	27,000	1,063	1,1	62306 2RS	0,50	1,10
		72,000	2,835	27,000	1,063	1,1	62306 ZZ	0,50	1,10

Type / Tipo

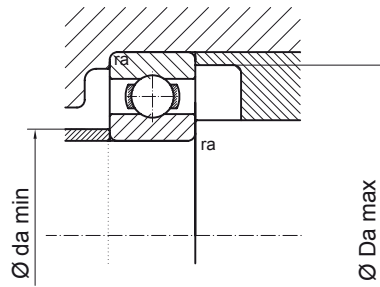


2RS

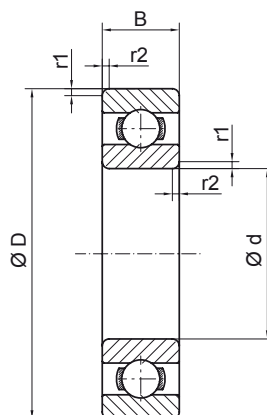
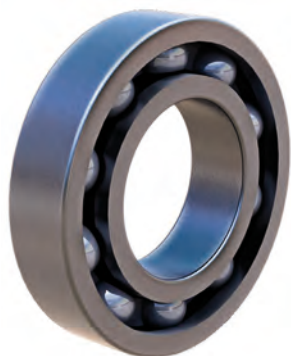


ZZ

Assembly / Montaje

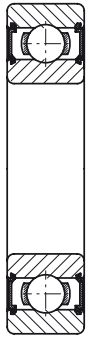


ASSEMBLY / MONTAJE			LOAD / CARGA (kN)		SPEED / VELOCIDAD (rpm)			REFERENCES
da min	Da max	ra max	DYNAMIC DINÁMICA	STATIC ESTÁTICA		OIL / ACEITE	GREASE / GRASA	REFERENCIAS
			C	Co	fo	na	ng	
30,5	46,5	1,5	14,7	7,8	13,8	---	13000	6205 ZZ
30,5	51,5	1,1	14,7	7,8	14,1	16000	---	6205 B12 D56
32,0	55,0	2,0	23,5	11,5	12,4	14000	---	6305
32,0	55,0	2,0	23,5	11,5	12,4	---	7000	6305 2RS
32,0	55,0	2,0	23,5	11,5	12,4	---	12000	6305 ZZ
32,0	55,0	1,1	23,5	11,5	12,5	14000	---	62305
32,0	55,0	1,1	23,5	11,5	12,5	---	7000	62305 2RS
32,0	55,0	1,1	23,5	11,5	12,5	---	12000	62305 ZZ
34,0	71,0	2,5	39,1	18,7	13,1	11000	---	6405
34,0	71,0	2,5	39,1	18,7	13,1	---	6000	6405 2RS
34,0	71,0	2,5	39,1	18,7	13,1	---	9000	6405 ZZ
38,0	62,0	2,3	28,1	16,0	13,0	---	6000	RMS 9 2RS
34,5	50,5	1,5	13,9	8,3	14,8	15000	---	6006
34,5	50,5	1,5	13,9	8,3	14,8	---	8000	6006 2RS
34,5	50,5	1,5	13,9	8,3	14,8	---	13000	6006 ZZ
35,5	56,5	1,5	20,4	11,3	13,8	13000	---	6206
35,5	56,5	1,5	20,4	11,3	13,8	---	7000	6206 2RS
35,5	56,5	1,5	20,4	11,3	13,8	---	11000	6206 ZZ
35,5	56,5	1,0	20,4	11,0	13,8	13000	---	62206
35,5	56,5	1,0	20,4	11,0	13,8	---	7000	62206 2RS
35,5	56,5	1,0	20,4	11,0	13,8	---	11000	62206 ZZ
37,0	65,0	2,0	28,3	15,1	13,0	12000	---	6306
37,0	65,0	2,0	28,3	15,1	13,0	---	6000	6306 2RS
37,0	65,0	2,0	28,3	15,1	13,0	---	10000	6306 ZZ
37,0	65,0	1,1	29,5	15,9	13,0	12000	---	62306
37,0	65,0	1,1	29,5	15,9	13,0	---	6000	62306 2RS
37,0	65,0	1,1	29,5	15,9	13,0	---	10000	62306 ZZ



DIMENSIONS / DIMENSIONES						r1/r2 min	REFERENCES	WEIGHT / PESOS	
d		D		B			REFERENCIAS	kg	lb
mm	inch	mm	inch	mm	inch				
30,000	1,181	90,000	3,543	23,000	0,906	2,5	6406	0,74	1,63
		90,000	3,543	23,000	0,906	2,5	6406 2RS	0,74	1,63
		90,000	3,543	23,000	0,906	2,5	6406 ZZ	0,74	1,63
33,000	1,299	72,000	2,835	17,000	0,669	2,0	6207/d33	0,35	0,77
35,000	1,378	62,000	2,441	14,000	0,551	1,5	6007	0,16	0,34
		62,000	2,441	14,000	0,551	1,5	6007 2RS	0,16	0,34
		62,000	2,441	14,000	0,551	1,5	6007 ZZ	0,16	0,34
		72,000	2,835	17,000	0,669	2,0	6207	0,29	0,64
		72,000	2,835	17,000	0,669	2,0	6207 2RS	0,29	0,64
		72,000	2,835	17,000	0,669	2,0	6207 ZZ	0,29	0,64
		72,000	2,835	23,000	0,906	1,1	62207	0,39	0,85
		72,000	2,835	23,000	0,906	1,1	62207 2RS	0,39	0,85
		72,000	2,835	23,000	0,906	1,1	62207 ZZ	0,39	0,85
		80,000	3,150	21,000	0,827	2,0	6307	0,46	1,01
		80,000	3,150	21,000	0,827	2,0	6307 2RS	0,46	1,01
		80,000	3,150	21,000	0,827	2,0	6307 ZZ	0,46	1,01
		80,000	3,150	23,000	0,906	1,5	6307 B23	0,50	1,10
		100,000	3,937	25,000	0,984	2,5	6407	0,96	2,11
		100,000	3,937	25,000	0,984	2,5	6407 2RS	0,96	2,11
		100,000	3,937	25,000	0,984	2,5	6407 ZZ	0,96	2,11
40,000	1,575	68,000	2,677	15,000	0,591	1,5	6008	0,19	0,42
		68,000	2,677	15,000	0,591	1,5	6008 2RS	0,19	0,42
		68,000	2,677	15,000	0,591	1,5	6008 ZZ	0,19	0,42
		80,000	3,150	18,000	0,709	2,0	6208	0,37	0,81
		80,000	3,150	18,000	0,709	2,0	6208 2RS	0,37	0,81
		80,000	3,150	18,000	0,709	2,0	6208 ZZ	0,37	0,81
		80,000	3,150	23,000	0,906	1,1	62208	0,47	1,03

Type / Tipo

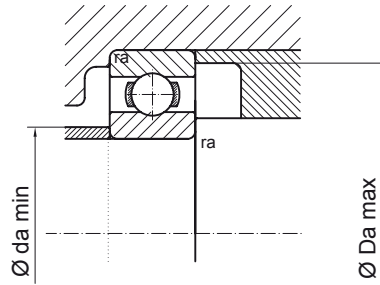


2RS

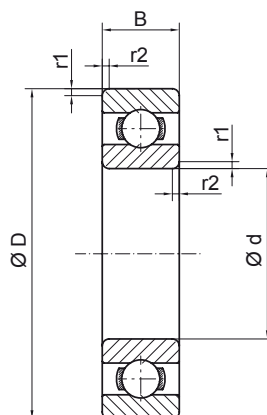
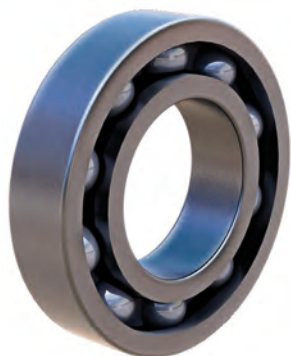


ZZ

Assembly / Montaje



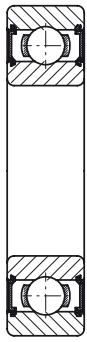
ASSEMBLY / MONTAJE			LOAD / CARGA (kN)		SPEED / VELOCIDAD (rpm)			REFERENCES REFERENCIAS
da min	Da max	ra max	DYNAMIC DINÁMICA	STATIC ESTÁTICA		OIL / ACEITE	GREASE / GRASA	
			C	Co	fo	na	ng	
41,0	79,0	2,5	49,7	24,4	12,2	10000	---	6406
41,0	79,0	2,5	49,7	24,4	12,2	---	5000	6406 2RS
41,0	79,0	2,5	49,7	24,4	12,2	---	8000	6406 ZZ
40,0	65,0	2,0	26,9	15,3	13,8	11000	---	6207/d33
39,5	57,5	1,5	16,8	10,3	14,8	13000	---	6007
39,5	57,5	1,5	16,8	10,3	14,8	---	7000	6007 2RS
39,5	57,5	1,5	16,8	10,3	14,8	---	11000	6007 ZZ
42,0	65,0	2,0	26,9	15,3	13,8	11000	---	6207
42,0	65,0	2,0	26,9	15,3	13,8	---	6000	6207 2RS
42,0	65,0	2,0	26,9	15,3	13,8	---	9000	6207 ZZ
42,0	65,0	1,1	26,9	15,0	13,8	11000	---	62207
42,0	65,0	1,1	26,9	15,0	13,8	---	6000	62207 2RS
42,0	65,0	1,1	26,9	15,0	13,8	---	9000	62207 ZZ
44,0	71,0	2,0	35,4	18,7	13,1	10000	---	6307
44,0	71,0	2,0	35,4	18,7	13,1	---	5000	6307 2RS
44,0	71,0	2,0	35,4	18,7	13,1	---	9000	6307 ZZ
44,0	71,0	1,5	34,9	19,1	13,1	10000	---	6307 B23
46,0	89,0	2,5	58,3	29,4	12,1	9000	---	6407
46,0	89,0	2,5	58,3	29,4	12,1	---	4000	6407 2RS
46,0	89,0	2,5	58,3	29,4	12,1	---	7000	6407 ZZ
44,5	63,5	1,5	17,7	11,6	15,3	12000	---	6008
44,5	63,5	1,5	17,7	11,6	15,3	---	6000	6008 2RS
44,5	63,5	1,5	17,7	11,6	15,3	---	10000	6008 ZZ
47,0	73,0	2,0	31,0	18,1	14,0	10000	---	6208
47,0	73,0	2,0	31,0	18,1	14,0	---	5000	6208 2RS
47,0	73,0	2,0	31,0	18,1	14,0	---	8000	6208 ZZ
47,0	73,0	1,1	30,6	17,5	14,0	10000	---	62208



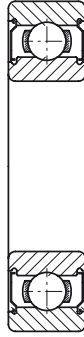
DIMENSIONS / DIMENSIONES							REFERENCES REFERENCIAS	WEIGHT / PESOS	
d		D		B		r1/r2 min		kg	lb
mm	inch	mm	inch	mm	inch				
40,000	1,575	80,000	3,150	23,000	0,906	1,1	62208 2RS	0,47	1,03
		80,000	3,150	23,000	0,906	1,1	62208 ZZ	0,47	1,03
		90,000	3,543	23,000	0,906	2,5	6308	0,63	1,39
		90,000	3,543	23,000	0,906	2,5	6308 2RS	0,63	1,39
		90,000	3,543	23,000	0,906	2,5	6308 ZZ	0,63	1,39
		110,000	4,331	27,000	1,063	3,0	6408	1,26	2,76
		110,000	4,331	27,000	1,063	3,0	6408 2RS	1,26	2,76
44,400	1,748	58,000	2,283	7,000	0,276	0,3	61809*	0,040	0,09
		58,000	2,283	7,000	0,276	0,3	61809 2RS*	0,040	0,09
		58,000	2,283	7,000	0,276	0,3	61809 ZZ*	0,040	0,09
45,000	1,772	68,000	2,677	12,000	0,472	0,8	61909	0,14	0,31
		68,000	2,677	12,000	0,472	0,8	61909 2RS	0,14	0,31
		68,000	2,677	12,000	0,472	0,8	61909 ZZ	0,14	0,31
		75,000	2,953	16,000	0,630	1,5	6009	0,24	0,53
		75,000	2,953	16,000	0,630	1,5	6009 2RS	0,24	0,53
		75,000	2,953	16,000	0,630	1,5	6009 ZZ	0,24	0,53
		85,000	3,346	19,000	0,748	2,0	6209	0,41	0,90
		85,000	3,346	19,000	0,748	2,0	6209 2RS	0,41	0,90
		85,000	3,346	19,000	0,748	2,0	6209 ZZ	0,41	0,90
		100,000	3,937	25,000	0,984	2,5	6309	0,84	1,85
		100,000	3,937	25,000	0,984	2,5	6309 2RS	0,84	1,85
		100,000	3,937	25,000	0,984	2,5	6309 ZZ	0,84	1,85
120,000	4,724	29,000	1,142	3,0	6409	1,56	3,43		
		29,000	1,142	3,0	6409 2RS	1,56	3,43		
		29,000	1,142	3,0	6409 ZZ	1,56	3,43		
50,000	1,969	80,000	3,150	16,000	0,630	1,5	6010	0,26	0,57

* Special inner ring diameter "d". / * Diámetro del aro interior "d" especial.

Type / Tipo

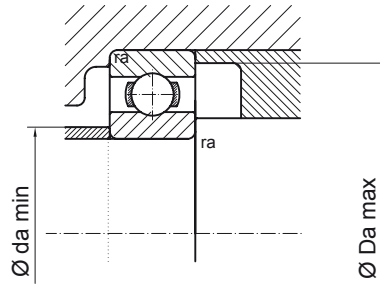


2RS

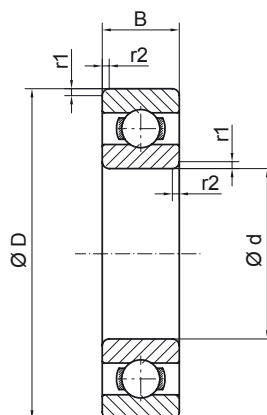
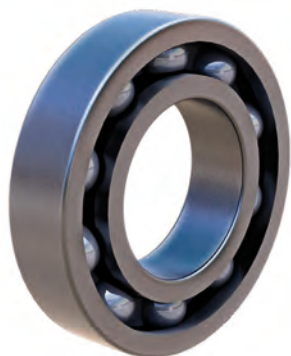


ZZ

Assembly / Montaje

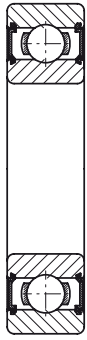


ASSEMBLY / MONTAJE			LOAD / CARGA (kN)		SPEED / VELOCIDAD (rpm)			REFERENCES
da min	Da max	ra max	DYNAMIC DINÁMICA	STATIC ESTÁTICA		OIL / ACEITE	GREASE / GRASA	REFERENCIAS
			C	Co	fo	na	ng	
47,0	73,0	1,1	30,6	17,5	14,0	---	5000	62208 2RS
47,0	73,0	1,1	30,6	17,5	14,0	---	8000	62208 ZZ
49,0	81,0	2,5	42,7	24,0	13,0	9000	---	6308
49,0	81,0	2,5	42,7	24,0	13,0	---	5000	6308 2RS
49,0	81,0	2,5	42,7	24,0	13,0	---	8000	6308 ZZ
53,0	97,0	3,0	66,6	36,5	12,2	8000	---	6408
53,0	97,0	3,0	66,6	36,5	12,2	---	4000	6408 2RS
53,0	97,0	3,0	66,6	36,5	12,2	---	7000	6408 ZZ
47,0	56,0	0,3	6,9	5,4	16,2	13000	---	61809
47,0	56,0	0,3	6,9	5,4	16,2	---	6000	61809 2RS
47,0	56,0	0,3	6,9	5,4	16,2	---	11000	61809 ZZ
48,0	65,0	0,8	14,3	9,9	15,7	12000	---	61909
48,0	65,0	0,8	14,3	9,9	15,7	---	6000	61909 2RS
48,0	65,0	0,8	14,3	9,9	15,7	---	10000	61909 ZZ
51,0	69,0	1,5	22,1	14,8	15,4	11000	---	6009
51,0	69,0	1,5	22,1	14,8	15,4	---	5000	6009 2RS
51,0	69,0	1,5	22,1	14,8	15,4	---	9000	6009 ZZ
52,0	78,0	2,0	33,2	20,6	14,3	9000	---	6209
52,0	78,0	2,0	33,2	20,6	14,3	---	5000	6209 2RS
52,0	78,0	2,0	33,2	20,6	14,3	---	8000	6209 ZZ
54,0	91,0	2,5	50,7	27,7	13,0	8000	---	6309
54,0	91,0	2,5	50,7	27,7	13,0	---	4000	6309 2RS
54,0	91,0	2,5	50,7	27,7	13,0	---	7000	6309 ZZ
58,0	107,0	3,0	80,2	45,0	12,1	7000	---	6409
58,0	107,0	3,0	80,2	45,0	12,1	---	4000	6409 2RS
58,0	107,0	3,0	80,2	45,0	12,1	---	6000	6409 ZZ
54,5	75,5	1,5	23,1	16,2	15,6	10000	---	6010

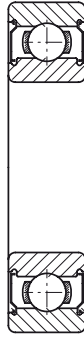


DIMENSIONS / DIMENSIONES						r1/r2 min	REFERENCES	WEIGHT / PESOS	
d		D		B			REFERENCIAS	kg	lb
mm	inch	mm	inch	mm	inch				
50,000	1,969	80,000	3,150	16,000	0,630	1,5	6010 2RS	0,26	0,57
		80,000	3,150	16,000	0,630	1,5	6010 ZZ	0,26	0,57
		80,000	3,150	23,000	0,906	1,0	63010	0,37	0,81
		80,000	3,150	23,000	0,906	1,0	63010 2RS	0,37	0,81
		80,000	3,150	23,000	0,906	1,0	63010 ZZ	0,37	0,81
		90,000	3,543	20,000	0,787	2,0	6210	0,46	1,01
		90,000	3,543	20,000	0,787	2,0	6210 2RS	0,46	1,01
		90,000	3,543	20,000	0,787	2,0	6210 ZZ	0,46	1,01
		110,000	4,331	27,000	1,063	3,0	6310	1,08	2,37
		110,000	4,331	27,000	1,063	3,0	6310 2RS	1,08	2,37
		110,000	4,331	27,000	1,063	3,0	6310 ZZ	1,08	2,37
		55,000	2,165	90,000	3,543	18,000	0,709	2,0	6011
90,000	3,543			18,000	0,709	2,0	6011 2RS	0,39	0,86
90,000	3,543			18,000	0,709	2,0	6011 ZZ	0,39	0,86
100,000	3,937			21,000	0,827	2,5	6211	0,61	1,34
100,000	3,937			21,000	0,827	2,5	6211 2RS	0,61	1,34
100,000	3,937			21,000	0,827	2,5	6211 ZZ	0,61	1,34
60,000	2,362	120,000	4,724	29,000	1,142	3,0	6311	1,37	3,01
		120,000	4,724	29,000	1,142	3,0	6311 2RS	1,37	3,01
		120,000	4,724	29,000	1,142	3,0	6311 ZZ	1,37	3,01
		140,000	5,512	33,000	1,299	3,5	6411	2,33	5,13
		140,000	5,512	33,000	1,299	3,5	6411 2RS	2,33	5,13
		140,000	5,512	33,000	1,299	3,5	6411 ZZ	2,33	5,13
60,000	2,362	95,000	3,740	18,000	0,709	2,0	6012	0,42	0,92

Type / Tipo

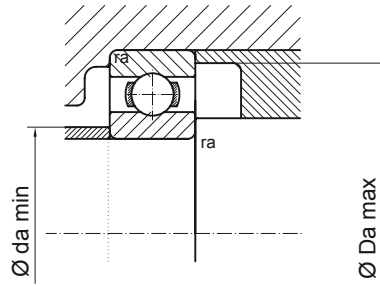


2RS

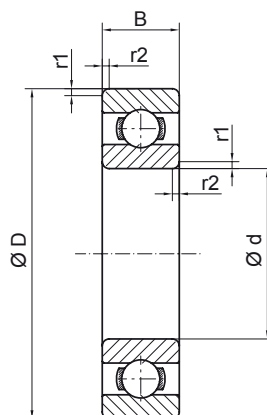
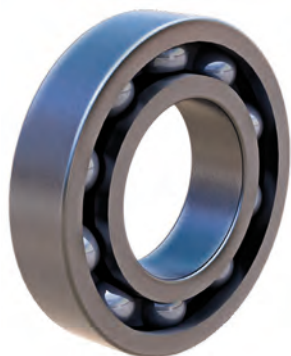


ZZ

Assembly / Montaje

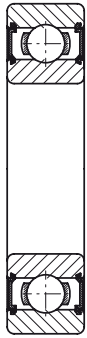


ASSEMBLY / MONTAJE			LOAD / CARGA (kN)		SPEED / VELOCIDAD (rpm)			REFERENCES
da min	Da max	ra max	DYNAMIC DINÁMICA	STATIC ESTÁTICA	fo	OIL / ACEITE	GREASE / GRASA	REFERENCIAS
			C	Co		na	ng	
54,5	75,5	1,5	23,1	16,2	15,6	---	5000	6010 2RS
54,5	75,5	1,5	23,1	16,2	15,6	---	8000	6010 ZZ
57,0	73,0	1,0	21,5	16,0	15,4	9000	---	63010
57,0	73,0	1,0	21,5	16,0	15,4	---	5000	63010 2RS
57,0	73,0	1,0	21,5	16,0	15,4	---	8000	63010 ZZ
57,0	83,0	2,0	36,8	23,2	14,3	9000	---	6210
57,0	83,0	2,0	36,8	23,2	14,3	---	4000	6210 2RS
57,0	83,0	2,0	36,8	23,2	14,3	---	7000	6210 ZZ
59,0	101,0	3,0	65,0	37,7	13,0	8000	---	6310
59,0	101,0	3,0	65,0	37,7	13,0	---	4000	6310 2RS
59,0	101,0	3,0	65,0	37,7	13,0	---	6000	6310 ZZ
64,0	116,0	3,5	96,2	54,2	13,1	7000	---	6410
64,0	116,0	3,5	96,2	54,2	13,1	---	3000	6410 2RS
64,0	116,0	3,5	96,2	54,2	13,1	---	6000	6410 ZZ
61,0	84,0	2,0	31,8	21,9	15,4	9000	---	6011
61,0	84,0	2,0	31,8	21,9	15,4	---	5000	6011 2RS
61,0	84,0	2,0	31,8	21,9	15,4	---	8000	6011 ZZ
64,0	91,0	2,5	45,5	29,2	14,3	8000	---	6211
64,0	91,0	2,5	45,5	29,2	14,3	---	4000	6211 2RS
64,0	91,0	2,5	45,5	29,2	14,3	---	7000	6211 ZZ
66,0	109,0	3,0	75,0	44,6	12,9	7000	---	6311
66,0	109,0	3,0	75,0	44,6	12,9	---	3000	6311 2RS
66,0	109,0	3,0	75,0	44,6	12,9	---	6000	6311 ZZ
69,0	126,0	3,5	104,8	62,0	13,2	6000	---	6411
69,0	126,0	3,5	104,8	62,0	13,2	---	3000	6411 2RS
69,0	126,0	3,5	104,8	62,0	13,2	---	5000	6411 ZZ
66,0	89,0	2,0	33,0	24,4	15,5	8000	---	6012



DIMENSIONS / DIMENSIONES						r1/r2 min	REFERENCES	WEIGHT / PESOS	
d		D		B			REFERENCIAS	kg	lb
mm	inch	mm	inch	mm	inch				
60,000	2,362	95,000	3,740	18,000	0,709	2,0	6012 2RS	0,42	0,92
		95,000	3,740	18,000	0,709	2,0	6012 ZZ	0,42	0,92
		110,000	4,331	22,000	0,866	2,5	6212	0,78	1,72
		110,000	4,331	22,000	0,866	2,5	6212 2RS	0,78	1,72
		110,000	4,331	22,000	0,866	2,5	6212 ZZ	0,78	1,72
		130,000	5,118	31,000	1,220	3,5	6312	1,71	3,76
		130,000	5,118	31,000	1,220	3,5	6312 2RS	1,71	3,76
		130,000	5,118	31,000	1,220	3,5	6312 ZZ	1,71	3,76
		150,000	5,906	35,000	1,378	3,5	6412	2,77	6,09
		150,000	5,906	35,000	1,378	3,5	6412 2RS	2,77	6,09
150,000	5,906	35,000	1,378	3,5	6412 ZZ	2,77	6,09		
65,000	2,559	100,000	3,937	18,000	0,709	2,0	6013	0,44	0,97
		100,000	3,937	18,000	0,709	2,0	6013 2RS	0,44	0,97
		100,000	3,937	18,000	0,709	2,0	6013 ZZ	0,44	0,97
		120,000	4,724	23,000	0,906	2,5	6213	0,99	2,18
		120,000	4,724	23,000	0,906	2,5	6213 2RS	0,99	2,18
		120,000	4,724	23,000	0,906	2,5	6213 ZZ	0,99	2,18
		140,000	5,512	33,000	1,299	3,5	6313	2,12	4,65
		140,000	5,512	33,000	1,299	3,5	6313 2RS	2,12	4,65
		140,000	5,512	33,000	1,299	3,5	6313 ZZ	2,12	4,65
		160,000	6,299	37,000	1,457	3,5	6413	3,30	7,26
160,000	6,299	37,000	1,457	3,5	6413 2RS	3,30	7,26		
160,000	6,299	37,000	1,457	3,5	6413 ZZ	3,30	7,26		
70,000	2,756	110,000	4,331	20,000	0,787	2,0	6014	0,60	1,32
		110,000	4,331	20,000	0,787	2,0	6014 2RS	0,60	1,32
		110,000	4,331	20,000	0,787	2,0	6014 ZZ	0,60	1,32
		125,000	4,921	24,000	0,945	2,5	6214	1,06	2,33

Type / Tipo

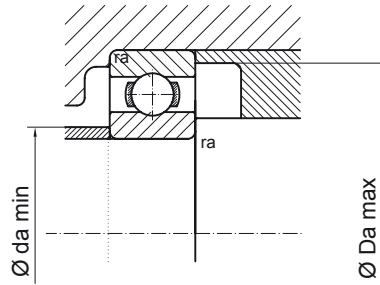


2RS

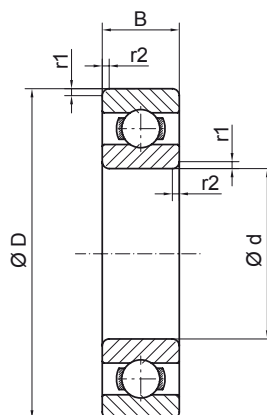
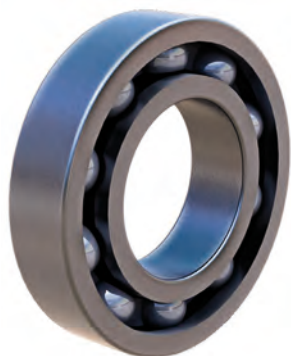


ZZ

Assembly / Montaje

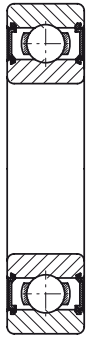


ASSEMBLY / MONTAJE			LOAD / CARGA (kN)		SPEED / VELOCIDAD (rpm)			REFERENCES REFERENCIAS
da min	Da max	ra max	DYNAMIC DINÁMICA	STATIC ESTÁTICA		OIL / ACEITE	GREASE / GRASA	
			C	Co	fo	na	ng	
66,0	89,0	2,0	33,0	24,4	15,5	---	4000	6012 2RS
66,0	89,0	2,0	33,0	24,4	15,5	---	7000	6012 ZZ
69,0	101,0	2,5	50,2	33,0	14,3	7000	---	6212
69,0	101,0	2,5	50,2	33,0	14,3	---	4000	6212 2RS
69,0	101,0	2,5	50,2	33,0	14,3	---	6000	6212 ZZ
72,0	118,0	3,5	85,9	51,8	13,1	6000	---	6312
72,0	118,0	3,5	85,9	51,8	13,1	---	3000	6312 2RS
72,0	118,0	3,5	85,9	51,8	13,1	---	5000	6312 ZZ
74,0	136,0	3,5	115,5	69,5	13,2	6000	---	6412
74,0	136,0	3,5	115,5	69,5	13,2	---	3000	6412 2RS
74,0	136,0	3,5	115,5	69,5	13,2	---	5000	6412 ZZ
71,0	94,0	2,0	33,3	24,2	15,7	8000	---	6013
71,0	94,0	2,0	33,3	24,2	15,7	---	4000	6013 2RS
71,0	94,0	2,0	33,3	24,2	15,7	---	7000	6013 ZZ
74,0	111,0	2,5	60,1	40,0	14,3	7000	---	6213
74,0	111,0	2,5	60,1	40,0	14,3	---	3000	6213 2RS
74,0	111,0	2,5	60,1	40,0	14,3	---	5000	6213 ZZ
77,0	128,0	3,5	97,2	59,9	13,2	6000	---	6313
77,0	128,0	3,5	97,2	59,9	13,2	---	3000	6313 2RS
77,0	128,0	3,5	97,2	59,9	13,2	---	5000	6313 ZZ
79,0	146,0	3,5	124,4	78,0	13,2	5000	---	6413
79,0	146,0	3,5	124,4	78,0	13,2	---	3000	6413 2RS
79,0	146,0	3,5	124,4	78,0	13,2	---	4000	6413 ZZ
76,0	104,0	2,0	40,5	30,5	15,5	7000	---	6014
76,0	104,0	2,0	40,5	30,5	15,5	---	4000	6014 2RS
76,0	104,0	2,0	40,5	30,5	15,5	---	6000	6014 ZZ
79,0	116,0	2,5	63,9	44,9	14,3	6000	---	6214

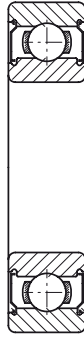


DIMENSIONS / DIMENSIONES						r1/r2 min	REFERENCES	WEIGHT / PESOS	
d		D		B			REFERENCIAS	kg	lb
mm	inch	mm	inch	mm	inch				
70,000	2,756	125,000	4,921	24,000	0,945	2,5	6214 2RS	1,06	2,33
		125,000	4,921	24,000	0,945	2,5	6214 ZZ	1,06	2,33
		150,000	5,906	35,000	1,378	3,5	6314	2,52	5,54
		150,000	5,906	35,000	1,378	3,5	6314 2RS	2,52	5,54
		150,000	5,906	35,000	1,378	3,5	6314 ZZ	2,52	5,54
		180,000	7,087	42,000	1,654	4,0	6414	4,83	10,63
		180,000	7,087	42,000	1,654	4,0	6414 2RS	4,83	10,63
		180,000	7,087	42,000	1,654	4,0	6414 ZZ	4,83	10,63
75,000	2,953	115,000	4,528	20,000	0,787	2,0	6015	0,64	1,41
		115,000	4,528	20,000	0,787	2,0	6015 2RS	0,64	1,41
		115,000	4,528	20,000	0,787	2,0	6015 ZZ	0,64	1,41
		130,000	5,118	25,000	0,984	2,5	6215	1,20	2,64
		130,000	5,118	25,000	0,984	2,5	6215 2RS	1,20	2,64
		130,000	5,118	25,000	0,984	2,5	6215 ZZ	1,20	2,64
		160,000	6,299	37,000	1,457	3,5	6315	3,06	6,73
		160,000	6,299	37,000	1,457	3,5	6315 2RS	3,06	6,73
160,000	6,299	37,000	1,457	3,5	6315 ZZ	3,06	6,73		
80,000	3,150	125,000	4,921	22,000	0,866	1,1	6016	0,88	1,94
		125,000	4,921	22,000	0,866	1,1	6016 2RS	0,88	1,94
		125,000	4,921	22,000	0,866	1,1	6016 ZZ	0,88	1,94
		140,000	5,512	26,000	1,024	3,0	6216	1,40	3,08
		140,000	5,512	26,000	1,024	3,0	6216 2RS	1,40	3,08
		140,000	5,512	26,000	1,024	3,0	6216 ZZ	1,40	3,08
85,000	3,346	150,000	5,906	28,000	1,102	2,0	6217	1,80	3,96
		150,000	5,906	28,000	1,102	2,0	6217 2RS	1,80	3,96
		150,000	5,906	28,000	1,102	2,0	6217 ZZ	1,80	3,96
90,000	3,543	160,000	6,299	30,000	1,181	2,0	6218	2,15	4,73

Type / Tipo

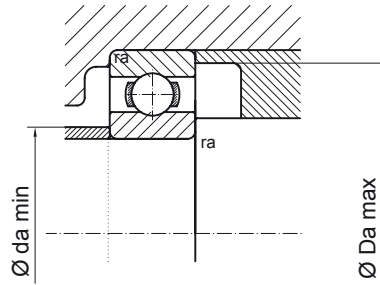


2RS

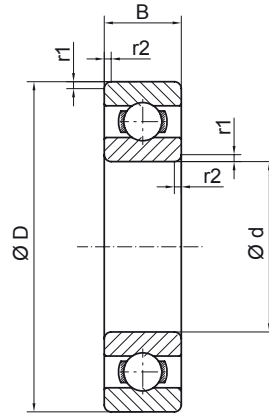


ZZ

Assembly / Montaje

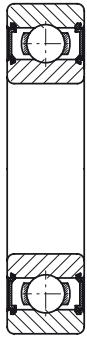


ASSEMBLY / MONTAJE			LOAD / CARGA (kN)		SPEED / VELOCIDAD (rpm)			REFERENCES REFERENCIAS
da min	Da max	ra max	DYNAMIC DINÁMICA	STATIC ESTÁTICA		OIL / ACEITE	GREASE / GRASA	
			C	Co	fo	na	ng	
79,0	116,0	2,5	63,9	44,9	14,3	---	3000	6214 2RS
79,0	116,0	2,5	63,9	44,9	14,3	---	5000	6214 ZZ
82,0	138,0	3,5	109,4	68,1	13,2	5000	---	6314
82,0	138,0	3,5	109,4	68,1	13,2	---	3000	6314 2RS
82,0	138,0	3,5	109,4	68,1	13,2	---	5000	6314 ZZ
86,0	164,0	4,0	150,2	104,0	13,3	5000	---	6414
86,0	164,0	4,0	150,2	104,0	13,3	---	2000	6414 2RS
86,0	164,0	4,0	150,2	104,0	13,3	---	4000	6414 ZZ
81,0	109,0	2,0	42,3	33,1	15,7	7000	---	6015
81,0	109,0	2,0	42,3	33,1	15,7	---	3000	6015 2RS
81,0	109,0	2,0	42,3	33,1	15,7	---	6000	6015 ZZ
84,0	121,0	2,5	69,5	49,3	14,7	6000	---	6215
84,0	121,0	2,5	69,5	49,3	14,7	---	3000	6215 2RS
84,0	121,0	2,5	69,5	49,3	14,7	---	5000	6215 ZZ
87,0	148,0	3,5	119,7	76,5	13,2	5000	---	6315
87,0	148,0	3,5	119,7	76,5	13,2	---	3000	6315 2RS
87,0	148,0	3,5	119,7	76,5	13,2	---	4000	6315 ZZ
86,0	119,0	1,1	50,0	39,8	15,6	6000	---	6016
86,0	119,0	1,1	50,0	39,8	15,6	---	3000	6016 2RS
86,0	119,0	1,1	50,0	39,8	15,6	---	5000	6016 ZZ
91,0	129,0	3,0	75,1	54,3	14,6	5000	---	6216
91,0	129,0	3,0	75,1	54,3	14,6	---	3000	6216 2RS
91,0	129,0	3,0	75,1	54,3	14,6	---	5000	6216 ZZ
94,0	141,0	2,0	87,5	63,7	14,7	5000	---	6217
94,0	141,0	2,0	87,5	63,7	14,7	---	3000	6217 2RS
94,0	141,0	2,0	87,5	63,7	14,7	---	4000	6217 ZZ
101,0	149,0	2,0	100,8	71,6	14,5	5000	---	6218

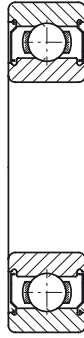


DIMENSIONS / DIMENSIONES							REFERENCES REFERENCIAS	WEIGHT / PESOS	
d		D		B		r1/r2 min		kg	lb
mm	inch	mm	inch	mm	inch				
90,000	3,543	160,000	6,299	30,000	1,181	2,0	6218 2RS	2,15	4,73
		160,000	6,299	30,000	1,181	2,0	6218 ZZ	2,15	4,73

Type / Tipo

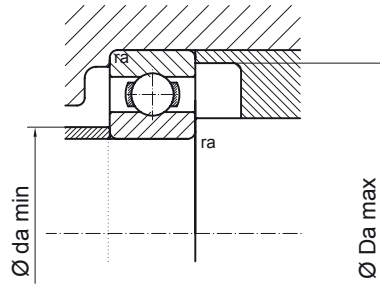


2RS

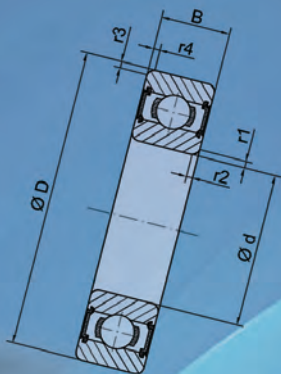
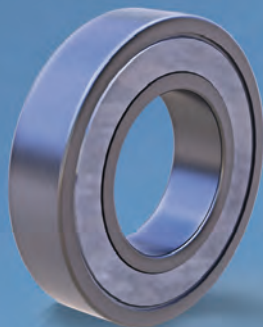


ZZ

Assembly / Montaje



ASSEMBLY / MONTAJE			LOAD / CARGA (kN)		SPEED / VELOCIDAD (rpm)			REFERENCES REFERENCIAS
da min	Da max	ra max	DYNAMIC DINÁMICA	STATIC ESTÁTICA		OIL / ACEITE	GREASE / GRASA	
			C	Co	fo	na	ng	
101,0	149,0	2,0	100,8	71,6	14,5	---	2000	6218 2RS
101,0	149,0	2,0	100,8	71,6	14,5	---	4000	6218 ZZ

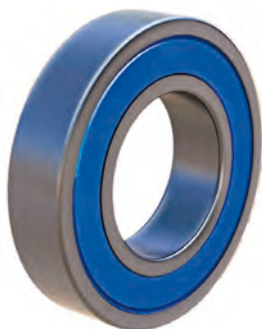


4.2 Special ball bearings

Rodamientos de bolas especiales

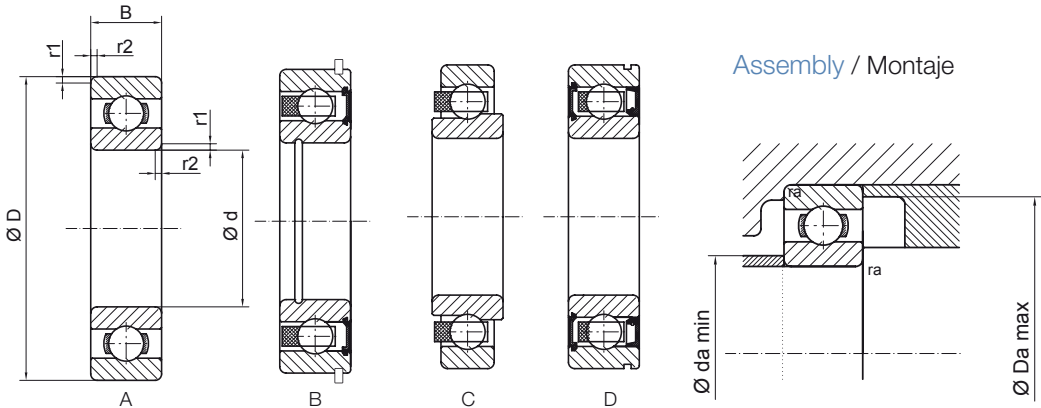
Fersa has the chance to develop bearings in according with specific dimensions of drawing and we can even manufacture ball bearings to meet the special design request of the customer.

Fersa dispone de capacidad de diseño para fabricar rodamientos de acuerdo a especificaciones de plano y así mismo se puede adaptar el diseño a los requerimientos de cliente.

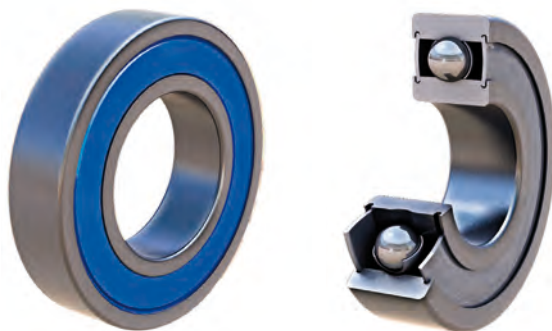


DIMENSIONS / DIMENSIONES							REFERENCES REFERENCIAS	WEIGHT / PESOS	
d		D		B		r1/r2 min		kg	lb
mm	inch	mm	inch	mm	inch				
15,000	0,591	35,000	1,378	13,000	0,512	0,6	F 18015	0,50	1,10
		40,000	1,575	11,000	0,433	0,6	F 18026	0,07	0,15
17,000	0,669	52,000	2,047	17,000	0,669	1,5	F 18014	0,18	0,39
		62,000	2,441	17,000	0,669	1,5	F 18020	0,28	0,61
25,000	0,984	59,000	2,323	17,500	0,689	0,6	F 18019	0,19	0,42
		62,020	2,442	17,500	0,689	0,6	F 18018	0,22	0,47
		69,000	2,717	20,000	0,787	0,8	F 18022	0,35	0,77
25,995	1,023	68,000	2,677	21,550	0,848	1,0	F 18024	0,29	0,63
28,000	1,102	66,000	2,598	18,000	0,709	0,6	F 18021	0,24	0,53
30,000	1,181	65,000	2,559	21,000	0,827	1,5	F 18011	0,27	0,59
35,000	1,378	67,000	2,638	22,500	0,886	1,1	F 18025	0,29	0,64
		75,000	2,953	20,000	0,787	1,5	F 18023	0,35	0,76
36,487	1,436	68,000	2,677	15,000	0,591	1,0	F 18038	0,21	0,46
36,513	1,438	68,000	2,677	15,000	0,591	1,0	F 18039	0,20	0,44
45,000	1,772	85,000	3,346	23,000	0,906	1,5	F 18009	0,54	1,18
50,000	1,969	90,000	3,543	20,000	0,787	1,1	F 18032	0,48	1,06
		90,000	3,543	20,000	0,787	1,1	F 18033	0,48	1,06
		90,000	3,543	20,000	0,787	1,1	F 18041	0,51	1,12
55,000	2,165	120,000	4,724	29,000	1,142	1,0	F 18042	1,38	3,03
63,500	2,500	100,000	3,937	23,000	0,906	ESP	F 18040	0,49	1,08
		102,000	4,016	19,500	0,768	1,0	F 18031	0,55	1,21

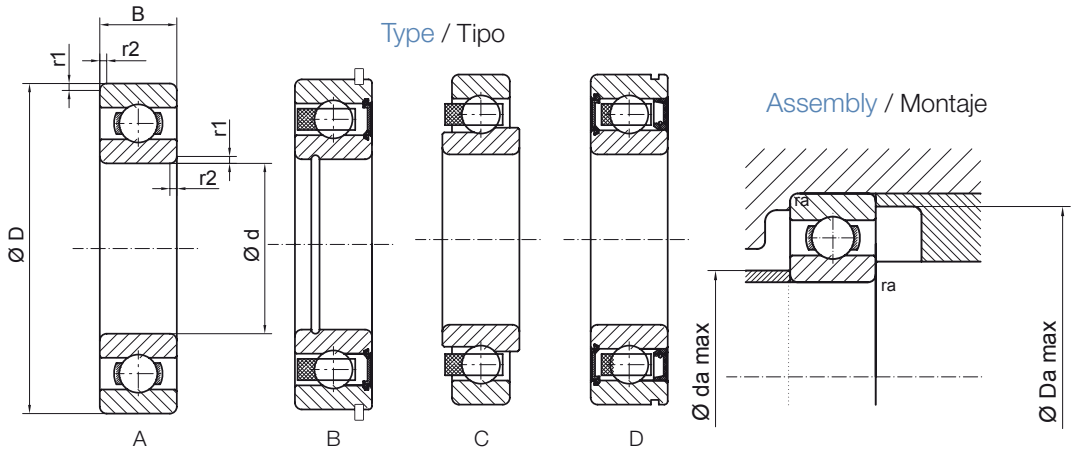
Type / Tipo



ASSEMBLY / MONTAJE			LOAD / CARGA (kN)		SPEED / VELOCIDAD (rpm)			REFERENCES	REMARK / NOTA	TYPE TIPO
da min	Da max	ra max	DYNAMIC DINÁMICA	STATIC ESTÁTICA	fo	OIL / ACEITE	GREASE / GRASA	REFERENCIAS		
			C	Co		na	ng			
19,0	31,0	0,6	8,1	3,8	13,0	---	13850	F 18015	-	A
17,5	32,5	0,6	8,1	3,5	13,2	---	10550	F 18026	High Temperature / Alta Temperatura	A
24,0	45,0	1,5	18,8	8,7	11,6	---	8700	F 18014	-	A
23,5	55,5	1,5	23,0	11,9	12,0	---	7550	F 18020	-	A
29,0	53,5	0,6	25,0	12,3	12,0	---	6900	F 18019	Snap in Outer Diameter/ Ranura en el Aro Exterior	B
32,0	55,0	0,6	27,6	13,5	11,8	---	6900	F 18018	Snap in Outer Diameter/ Ranura en el Aro Exterior	B
35,0	63,5	0,8	31,2	15,7	12,0	---	6000	F 18022	-	A
ESP	62,5	1,0	31,4	15,8	12,0	13800	---	F 18024	Outer Ring Width = 14,5 mm / Altura Aro Exterior = 14,5	C
36,0	61,0	0,6	30,8	15,4	12,0	12000	---	F 18021	Snap in Outer Diameter/ Ranura en el Aro Exterior	B
35,5	57,0	1,5	24,7	13,0	12,9	---	6500	F 18011	-	A
41,0	63,0	1,1	24,0	14,1	14,1	---	5600	F 18025	Snap in Outer Diameter + Special Seal / Ranura en el Aro exterior + Retén Especial	D
42,0	66,0	1,5	31,3	17,0	13,2	10400	---	F 18023	Snap in Outer Diameter/ Ranura en el Aro Exterior	B
41,5	63,0	1,0	17,7	11,6	15,2	11200	---	F 18038	-	A
41,5	63,0	1,0	17,7	11,6	15,2	11200	---	F 18039	Snap in Outer Diameter/ Ranura en el Aro Exterior	B
51,5	78,5	1,5	35,8	29,3	---	---	---	F 18009	Double row ball bearing / Rodamiento de Bolas Doble hilera	-
57,0	83,0	1,1	36,8	23,2	14,4	8600	---	F 18032	Circlip in Outer Ring / Anillo Elástico en el Aro Exterior	A
57,0	83,0	1,1	36,8	23,2	14,4	8600	---	F 18033	Circlip in Outer Ring / Anillo Elástico en el Aro Exterior	A
57,0	83,0	1,1	48,2	34,8	14,4	8600	---	F 18041	Circlip in Outer Ring / Anillo Elástico en el Aro Exterior	A
66,0	109,0	1,0	75,0	44,6	13,1	---	3450	F 18042	-	A
ESP	ESP	ESP	17,9	15,9	16,4	---	3550	F 18040	Special Construction / Construcción especial	-
ESP	ESP	1,0	32,0	25,2	15,8	---	3950	F 18031	Special Outer Ring / Aro Exterior Especial	-



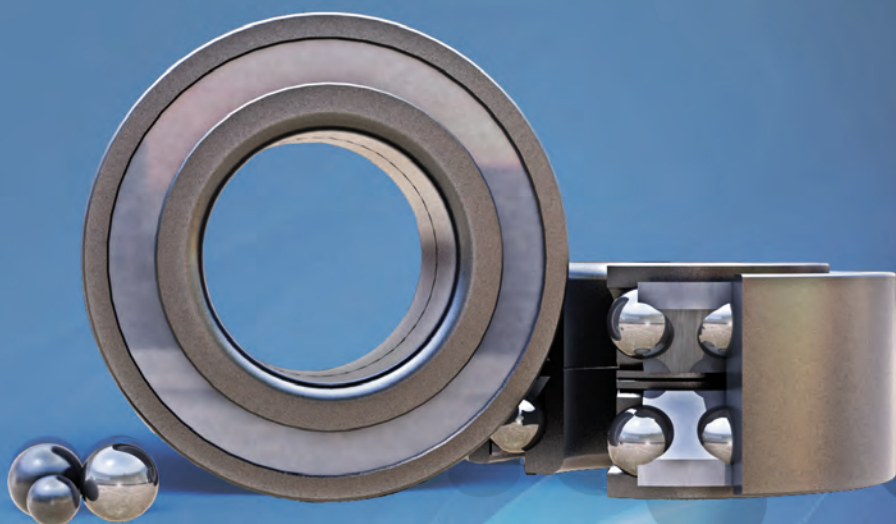
DIMENSIONS / DIMENSIONES							REFERENCES REFERENCIAS	WEIGHT / PESOS	
d		D		B		r1/r2 min		kg	lb
mm	inch	mm	inch	mm	inch				
85,000	3,346	150,000	5,906	28,000	1,102	2,0	F 18036	1,81	3,98
		160,000	6,299	33,000	1,299	2,0	F 18037	2,55	5,60
106,000	4,173	140,000	5,512	21,000	0,827	ESP	F 18028	0,70	1,53



ASSEMBLY / MONTAJE			LOAD / CARGA (kN)		SPEED / VELOCIDAD (rpm)			REFERENCES	REMARK / NOTA	TYPE TIPO
da min	Da max	ra max	DYNAMIC DINÁMICA	STATIC ESTÁTICA		OIL / ACEITE	GREASE / GRASA	REFERENCIAS		
			C	Co	fo	na	ng			
94,0	141,0	2,0	94,1	63,1	14,2	5100	---	F 18036	Special Raceway + circlip in Outer Ring / Pista Especial + Anillo Elástico en el Aro Exterior	B
94,0	151,0	2,0	119,3	80,1	13,8	5100	---	F 18037	Special Raceway + circlip in Outer Ring / Pista Especial + Anillo Elástico en el Aro Exterior	B
ESP	ESP	ESP	31,3	17,0	---	4300	---	F 18028	Special Construction / Construcción Especial	-

05/ Angular contact ball bearings

Rodamientos de bolas
de contacto angular



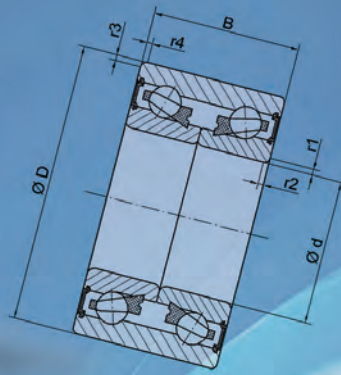


Angular contact ball bearings

Rodamientos de bolas de contacto angular

5.1/ Double row angular contact ball bearings	
Rodamientos de bolas de doble hilera de contacto angular	229
<hr/>	
5.2/ Four point angular contact ball bearings	
Rodamientos de bolas de contacto angular de cuatro puntos	241





5.1 Double row angular contact ball bearings

Rodamientos de bolas de doble hilera de contacto angular

Product Overview

Introducción	230
Description / Descripción	230
Design / Diseño	230

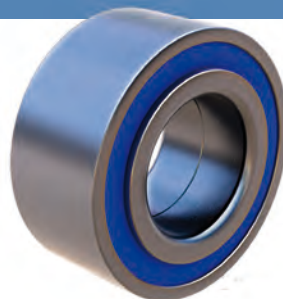
Bearing Features

Características del Rodamiento	232
Tolerances / Tolerancias	232
Internal clearance / Juego Interno	233
Misalignment / Desalineación	234
Internal clearance / Juego Interno	234
Speed / Velocidad	234
Cages / Jaulas	234
Load rating / Cargas	234

Bearing Tables

Tablas de Rodamientos	236
------------------------------	------------

Product overview / Introducción



Description

Double row angular contact ball bearings can accommodate high radial loads as well as high axial loads, in both directions. They provide stiff bearing arrangements, are able to accommodate tilting moments and are suitable for bearings arrangements where rigid axial guidance is required.

Advantages:

- Universal applicability
- High radial and axial load carrying capacity in both direction
- Quiet operation

Double row angular contact ball bearings as well as other Fersa are designed to comply with the highest working standards, since bearing counts on totality of production process that enables us to offer highest quality bearings for European and worldwide automotive market.

Design

Double row angular contact ball bearings are units with robust inner and outer rings, balls and plastic cages, steel cages or brass cages.

Descripción

Los rodamientos de bolas de contacto angular doble hilera pueden soportar cargas radiales grandes en ambos sentidos. Permiten disposiciones rígidas, se adaptan a momentos de vuelco, y son indicados para disposiciones de rodamientos donde se requiere una guía radial rígida.

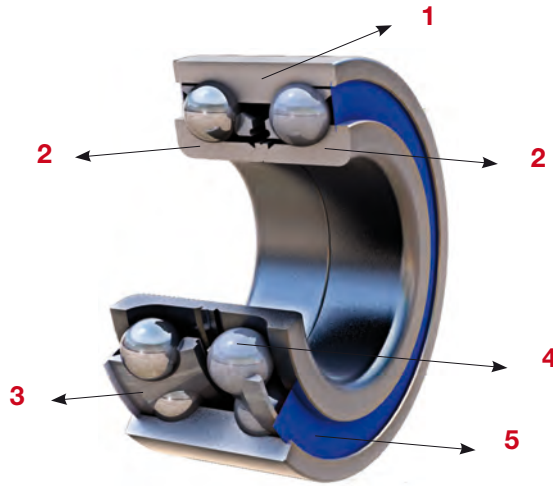
Ventajas:

- Aplicaciones universales
- Alta capacidad de carga radial y axial en ambos sentidos
- Funcionamiento silencioso

Los rodamientos de bolas de contacto angular de doble hilera, así como otros rodamientos de Fersa están diseñados para soportar condiciones extremas de trabajo, siendo los rodamientos ensamblados en los principales fabricantes del mercado del automóvil Europeo y mundial.

Diseño

Los rodamientos de bolas de contacto angular son unidades con aros interiores y exteriores robustos, bolas, y jaulas de plástico, acero o latón.



1. Outer Ring
2. Inner Ring
3. Cage
4. Ball
5. Seal

1. Aro exterior
2. Aro interior
3. Jaula
4. Bola
5. Retén

Double row angular contact ball bearings correspond to a pair of single row contact ball bearing in "O" arrangement, but take up less space.

These bearings have 32°-36° contact angle and are available in open and sealed designs. Sealed bearings are lubricated for life, are maintenance-free and permit particularly bearing arrangements.

Double row angular contact ball bearings from Fersa are special bearings and belong to series F16000.

Los rodamientos de bolas de contacto angular de doble hilera corresponden a un par de rodamientos de bolas de contacto de una hilera en disposición "O", pero ocupan menos espacio.

Estos rodamientos tienen un ángulo de contacto de 32° -36° y están disponibles con o sin retenes. Los rodamientos con retén están lubricados durante toda la vida del rodamiento, no requieren mantenimiento y permiten disposiciones particulares de rodamientos.

Los rodamientos de bolas de contacto angular de doble hilera de Fersa, son rodamientos especiales y corresponden a la serie F16000.

Bearing features / Características del rodamiento

Bearing Tolerances

Double row angular contact ball bearings are produced according to normal tolerances. The values for tolerances correspond to ISO 492:2002.

Tolerancia del rodamiento

Los rodamientos de bolas de contacto angular de doble hilera se fabrican según las tolerancias normales. Los valores corresponden a la Normativa ISO 492:2002.

Normal tolerances for radial bearings / Tolerancias normales para rodamientos radiales de bolas

Bore diameter / Diámetro interno

d		Δ_{dmp}		V_{dp}			V_{dmp}	K_{ia}
over	incl	high	low	series 7,8,9	series 0,1	series 2,3,4		
mm		μm		max	max	max	max	max
-	2,5	0	-8	10	8	6	6	10
2,5	10	0	-8	10	8	6	6	10
10	18	0	-8	10	8	6	6	10
18	30	0	-10	13	10	8	8	13
30	50	0	-12	15	12	9	9	15
50	80	0	-15	19	19	11	11	20
80	120	0	-20	25	25	15	15	25
120	180	0	-25	31	31	19	19	30

Outer diameter / Diámetro externo

D		Δ_{dmp}		V_{Dp}			V_{dmp}	K_{ea}
over	incl	high	low	series 7,8,9	series 0,1	series 2,3,4		
mm		μm		max	max	max	max	max
6	18	0	-8	10	8	6	6	15
18	30	0	-9	12	9	7	7	15
30	50	0	-11	14	11	8	8	20
50	80	0	-13	16	13	10	10	25
80	120	0	-15	19	19	11	11	35
120	150	0	-18	23	23	14	14	40
150	180	0	-25	31	31	19	19	45
180	250	0	-30	38	38	23	23	50

Bearings width / Anchura del rodamiento

d		Δ_{Bs}		V_{bs}
over	incl	high	low	max
mm		μm		μm
-	2,5	0	-120	10
2,5	10	0	-120	10
10	18	0	-120	10
18	30	0	-120	13
30	50	0	-150	15
50	80	0	-200	19
80	120	0	-250	25
120	180	0	-300	31

Double row angular contact ball bearings can be also produced with non-standard tolerances, according to its specific application.

Internal clearance

Bearing clearance is the measurement by which one bearing ring can be displaced in relation to the other in radial or axial direction from one end position to the other.

Internal clearance for non standard double row angular contact ball bearings is normally defined according to application. Depending on the application the internal clearance could be between 30 and 150 μm .

Variables as fitting tolerances and mounting torque during assembly are essential to assure that the bearing will reach the best performance under operation.

Los rodamientos de bola de contacto angular también se fabrican con tolerancias especiales, de acuerdo con la aplicación específica del rodamiento.

Juego Interno

El juego del rodamiento es la distancia a través de la cual un rodamiento puede desplazarse en relación al otro en el sentido axial o radial desde la posición en un extremo al otro.

El juego interno para los rodamientos de bolas de contacto angular de doble hilera fuera del estándar se define de acuerdo a la aplicación. En función de la aplicación el juego interno puede estar entre 30 and 150 μm .

Variables como tolerancias de ajuste y torsión durante el montaje son esenciales para asegurar que el rodamiento funcionará al máximo cuando este operativo.

Speed

The maximum operating speed of double row angular contact ball bearings may be limited by several criteria. Most frequently, the decisive criteria is the operating temperature, which rises with increasing speed. Other criteria for permissible operating speed may be a unreliable lubricant supply of rolling and sliding contact areas due to strong centrifugal forces or greatly changed rolling kinematics of rolling elements.

Misalignment

Inaccuracies in the alignment of bearing locations must be taken into account. Misalignment arises when housing bores are not machined in one set. Angular misalignment of inner ring and outer ring axles are caused by larger shaft deflections and housing deformations.

Misalignment of the inner ring in relation to the outer ring of a double row angular contact ball bearing can only be adjusted by a force, which leads to an increase of ball loads and also to a reduction of the bearing service life. Any other misalignment of the bearing rings will result in a higher noise during operation.

Cages

Double row angular contact ball bearings are fitted with two injection molded snap-type cages of glass fibre reinforced polyamide 66 and are heat-stabilized. They are suitable for operating temperatures of up to 120°C.

Equivalent dynamic bearing load

$$P = F_r + 0.66 \times F_a \quad [\text{N}] \quad \text{when } F_a/F_r \leq 0,95$$

$$P = 0,6 \times F_r + 1,07 \times F_a \quad [\text{N}] \quad \text{when } F_a/F_r > 0,95$$

$$P = \text{equivalent dynamic bearing load} \quad [\text{N}]$$

$$F_r = \text{radial dynamic bearing load} \quad [\text{N}]$$

$$F_a = \text{axial dynamic bearing load} \quad [\text{N}]$$

Velocidad

La velocidad máxima operativa de los rodamientos de bolas de contacto angular de doble hilera se puede ver limitada por varios criterios. Por regla general el factor decisivo es la temperatura funcional, que aumenta con la velocidad. Otros criterios de velocidad pueden ser una cantidad de lubricante de rotación y de deslizamiento incierta debido a importantes fuerzas centrífugas o cambios significativos de rotación de la viscosidad cinemática de los elementos de rotación.

Desalineación

Las imprecisiones de alineación de la posición del rodamiento deben tenerse en cuenta. La desalineación ocurre cuando los calibres de las cajas no están mecanizados en un conjunto. La desalineación angular de los ejes del aro interior y exterior se debe a desviaciones de ejes mayores y a las deformaciones de las cajas.

La desalineación del aro interior en relación al aro exterior de un rodamiento de bolas de contacto angular de doble hilera solo puede ajustarse por fuerza, lo que conlleva un incremento de la carga de las bolas, además de un desgaste de la vida operativa del rodamiento. Cualquier otra desalineación de los aros del rodamiento producirá un aumento del ruido durante el funcionamiento.

Jaulas

Los rodamientos de bolas de contacto angular se ajustan con dos jaulas de poliamida 66 reforzada de fibra de vidrio moldeada por inyección, y están estabilizados con calor. Son indicadas para ser utilizados en temperaturas de hasta 120°C.

Carga dinámica equivalente del rodamiento

$$P = F_r + 0.66 \times F_a \quad [\text{N}] \quad \text{cuando } F_a/F_r \leq 0,95$$

$$P = 0,6 \times F_r + 1,07 \times F_a \quad [\text{N}] \quad \text{cuando } F_a/F_r > 0,95$$

$$P = \text{carga dinámica equivalente del rodamiento} \quad [\text{N}]$$

$$F_r = \text{carga radial dinámica del rodamiento} \quad [\text{N}]$$

$$F_a = \text{carga axial dinámica del rodamiento} \quad [\text{N}]$$

Equivalent static bearing load

$$P_o = F_{or} + 0,58 \times F_{oa}$$

P = equivalent static bearing load [N]

F_r = radial static bearing load [N]

F_a = axial static bearing load [N]

Carga estática equivalente del rodamiento

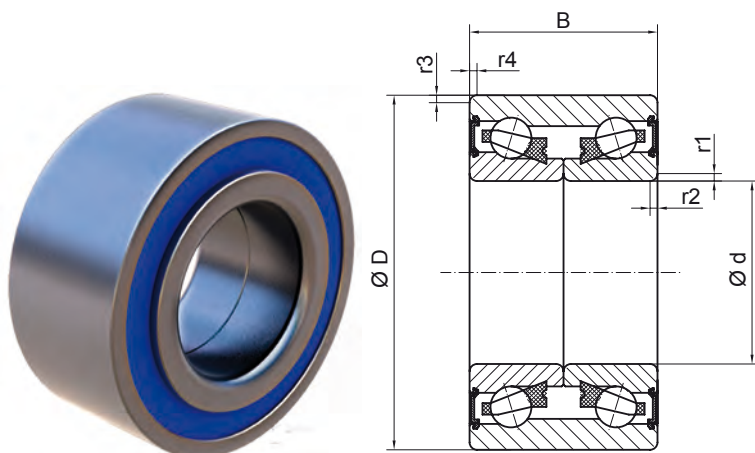
$$P_o = F_{or} + 0,58 \times F_{oa}$$

P = carga estática equivalente del rodamiento [N]

F_r = carga radial estática del rodamiento [N]

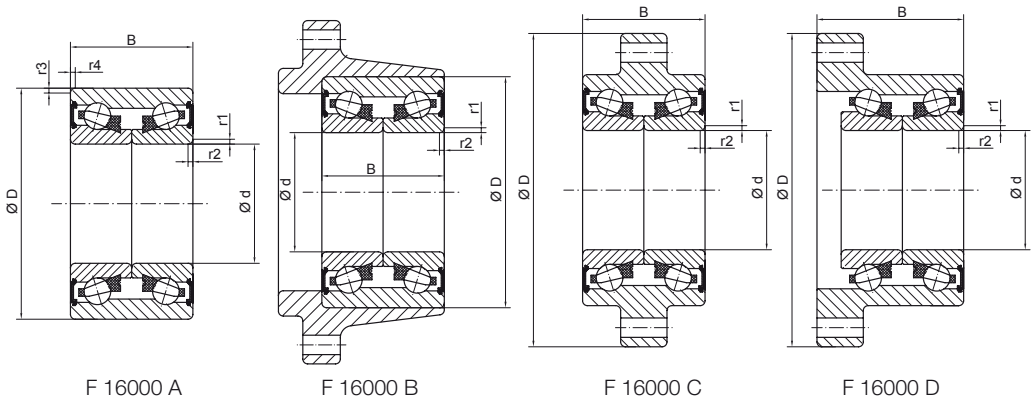
F_a = carga axial estática del rodamiento [N]



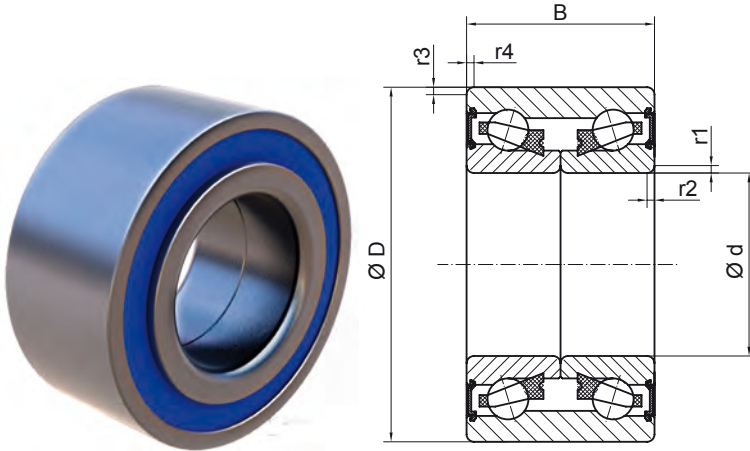


DIMENSIONS / DIMENSIONES								r1/r2 min	r3/r4 min	REFERENCES REFERENCIAS
d		D		B		C				
mm	inch	mm	inch	mm	inch	mm	inch			
27,000	1,063	---	---	25,000	0,984	50,000	1,969	3,0	---	F 16094
28,000	1,102	61,000	2,402	21,000	0,827	42,000	1,654	3,5	0,8	F 16077
		---	---	21,000	0,827	42,000	1,654	3,5	---	F 16095
30,000	1,181	60,030	2,363	18,500	0,728	37,000	1,457	2,8	0,3	F 16001
		60,030	2,363	18,500	0,728	37,000	1,457	2,8	---	F 16010
34,000	1,339	62,000	2,441	18,500	0,728	37,000	1,457	2,5	0,6	F 16018
		64,000	2,520	18,500	0,728	37,000	1,457	2,5	0,3	F 16019
		66,000	2,598	18,500	0,728	37,000	1,457	2,8	0,3	F 16020
		67,000	2,638	18,500	0,728	37,000	1,457	2,5	0,5	F 16083
35,000	1,378	65,000	2,559	17,500	0,689	35,000	1,378	2,8	0,6	F 16021
		66,000	2,598	16,000	0,630	32,000	1,260	2,8	0,3	F 16022
		66,000	2,598	18,500	0,728	37,000	1,457	2,8	0,3	F 16023
		68,000	2,677	18,500	0,728	37,000	1,457	2,8	0,6	F 16002
		72,000	2,835	16,500	0,650	33,000	1,299	3,4	0,3	F 16026
37,000	1,457	72,000	2,835	16,500	0,650	33,000	1,299	2,0	0,8	F 16029
		72,000	2,835	18,500	0,728	37,000	1,457	2,4	0,3	F 16030
		72,040	2,836	18,500	0,728	37,000	1,457	2,4	0,3	F 16031
		74,000	2,913	22,500	0,886	45,000	1,772	3,0	0,3	F 16032
		---	---	22,500	0,886	45,000	1,772	2,8	---	F 16033
37,990	1,496	74,020	2,914	18,000	0,709	33,000	1,299	3,0	0,6	F 16034
38,000	1,496	72,020	2,835	18,000	0,709	33,000	1,299	3,0	1,0	F 16068
38,100	1,500	70,000	2,756	18,500	0,728	37,000	1,457	3,0	0,8	F 16057
39,000	1,535	68,000	2,677	18,500	0,728	37,000	1,457	3,3	0,3	F 16035
		72,000	2,835	18,500	0,728	37,000	1,457	2,4	0,3	F 16036
		74,000	2,913	19,500	0,768	39,000	1,535	3,0	0,3	F 16037
39,000/41,000	1,5354/1,6142	75,000	2,953	13,500/23,500	0,531/0,925	37,000	1,457	3,6	0,3	F 16038
39,980	1,574	108,000	4,252	16,000	0,630	17,000	0,669	3,5	1,0	F 16044

Type / Tipo

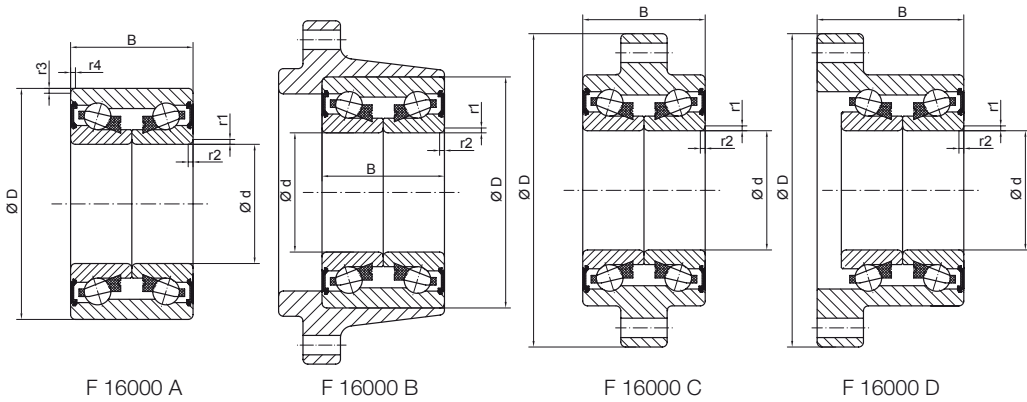


WEIGHT / PESOS		TYPE TIPO	SEALED RETÉN	FLANGE Ø Ø VALONA	TOTAL HEIGHT ALTURA TOTAL	LOAD / CARGA (kN)		SPEED / VELOCIDAD (rpm)		REFERENCES REFERENCIAS
kg	lb					DYNAMIC / DINÁMICA	STATIC / ESTÁTICA	OIL / ACEITE	GREASE / GRASA	
						C	Co	na	ng	
1,365	3,003	D	SEALED	134,0	67,6	41,1	29,7	---	13000	F 16094
0,525	1,155	A	---	---	---	38,2	29,5	9000	7000	F 16077
1,025	2,255	D	SEALED	ESP	52,0	38,2	29,3	---	12000	F 16095
0,410	0,902	A	SEALED	---	---	36,6	31,0	---	7000	F 16001
1,385	3,047	B	SEALED	117,0	61,3	38,1	29,9	---	7000	F 16010
0,405	0,891	A	SEALED	---	---	27,0	24,0	---	6000	F 16018
0,432	0,950	A	SEALED	---	---	40,0	33,0	---	6000	F 16019
0,475	1,045	A	SEALED	---	---	42,2	35,7	---	6000	F 16020
0,500	1,100	A	SEALED	---	---	46,0	37,6	---	6000	F 16083
0,440	0,968	A	SEALED	---	---	39,8	33,7	---	6000	F 16021
0,425	0,935	A	SEALED	---	---	42,0	36,0	---	6000	F 16022
0,510	1,122	A	SEALED	---	---	42,0	36,0	---	6000	F 16023
0,545	1,199	A	SEALED	---	---	42,0	36,0	---	5000	F 16002
0,545	1,199	A	SEALED	---	---	48,0	41,0	---	5000	F 16026
0,560	1,232	A	SEALED	---	---	48,0	41,5	---	5000	F 16029
0,610	1,342	A	SEALED	---	---	48,5	41,5	---	5000	F 16030
0,575	1,265	A	SEALED	---	---	48,0	41,0	---	5000	F 16031
0,745	1,639	A	SEALED	---	---	48,0	41,0	---	5000	F 16032
2,000	4,400	B	SEALED	139,0	54,0	58,5	49,2	---	10000	F 16033
0,590	1,298	A	---	---	---	48,2	41,7	7000	5000	F 16034
0,565	1,243	A	---	---	---	48,2	41,7	7000	5000	F 16068
0,550	1,210	A	SEALED	---	---	43,9	39,0	---	5000	F 16057
0,475	1,045	A	SEALED	---	---	39,5	36,0	---	5000	F 16035
0,545	1,199	A	SEALED	---	---	48,0	41,5	---	5000	F 16036
0,650	1,430	A	SEALED	---	---	48,1	41,7	---	5000	F 16037
0,670	1,474	A	SEALED	---	---	50,2	45,2	---	5000	F 16038
1,095	2,409	C	SEALED	108,0	32,0	50,6	43,2	---	4000	F 16044

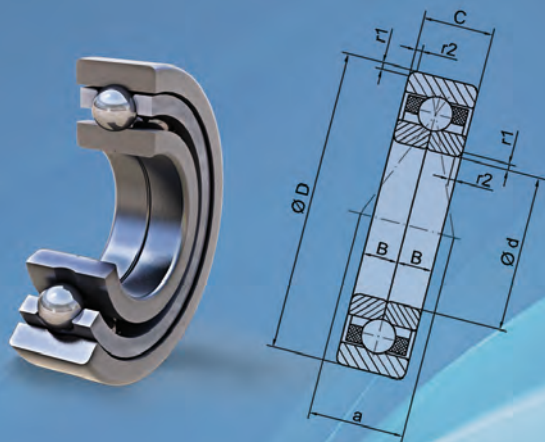


DIMENSIONS / DIMENSIONES								r1/r2 min	r3/r4 min	REFERENCES REFERENCIAS		
d		D		B		C						
mm	inch	mm	inch	mm	inch	mm	inch					
40,000	1,575	72,000	2,835	18,500	0,728	37,000	1,457	2,4	0,3	F 16039		
		74,000	2,913	18,000	0,709	36,000	1,417	3,5	0,8	F 16080		
		74,000	2,913	20,000	0,787	40,000	1,575	3,8	0,3	F 16040		
		74,000	2,913	21,000	0,827	42,000	1,654	3,0	0,8	F 16079		
		75,000	2,953	18,500	0,728	37,000	1,457	4,5	0,6	F 16055		
42,000	1,654	80,000	3,150	15,100	0,595	30,200	1,189	4,0	1,2	F 16042		
		75,000	2,953	18,500	0,728	37,000	1,457	3,6	0,5	F 16046		
		76,000	2,992	19,000	0,748	35,000	1,378	3,5	0,5	F 16081		
		80,030	3,151	21,000	0,827	42,000	1,654	3,5	1,0	F 16074		
		82,000	3,228	18,000	0,709	36,000	1,417	3,5	1,0	F 16048		
43,000	1,693	84,000	3,307	19,500	0,768	39,000	1,535	3,5	1,0	F 16051		
		82,000	3,228	22,500	0,886	45,000	1,772	3,0	0,8	F 16078		
		43,000/45,000	1,6929/1,7717	82,000	3,228	18,500	0,728	37,000	1,457	3,5	1,0	F 16054
		44,000	1,732	82,500	3,248	18,500	0,728	37,000	1,457	3,5	0,6	F 16056
		44,990	1,771	84,070	3,310	19,500	0,768	39,000	1,535	3,5	0,8	F 16084
45,000	1,772	84,000	3,307	19,500	0,768	39,000	1,535	3,5	1,0	F 16059		
		84,000	3,307	19,500	0,768	39,000	1,535	3,5	0,3	F 16082		
		85,000	3,347	15,100	0,595	30,200	1,189	1,5	1,0	F 16063		
50,000	1,969	90,000	3,543	20,000	0,787	40,000	1,575	1,0	0,5	F 16092		
51,000	2,008	91,000	3,583	22,000	0,866	44,000	1,732	4,0	1,0	F 16076		

Type / Tipo



WEIGHT / PESOS		TYPE TIPO	SEALED RETÉN	FLANGE Ø Ø VALONA	TOTAL HEIGHT ALTURA TOTAL	LOAD / CARGA (kN)		SPEED / VELOCIDAD (rpm)		REFERENCES REFERENCIAS
kg	lb					DYNAMIC / DINÁMICA	STATIC / ESTÁTICA	OIL / ACEITE	GREASE / GRASA	
						C	Co	na	ng	
0,545	1,199	A	SEALED	---	---	48,0	42,0	---	5000	F 16039
0,615	1,353	A	SEALED	---	---	47,3	43,3	---	5000	F 16080
0,640	1,408	A	SEALED	---	---	48,0	42,0	---	5000	F 16040
0,710	1,562	A	SEALED	---	---	47,3	43,3	---	5000	F 16079
0,640	1,408	A	SEALED	---	---	50,0	45,0	---	5000	F 16055
0,610	1,342	A	---	---	---	49,0	45,0	6000	4000	F 16042
0,595	1,309	A	SEALED	---	---	50,0	45,0	---	5000	F 16046
0,640	1,408	A	---	---	---	50,1	45,2	7000	5000	F 16081
0,804	1,769	A	SEALED	---	---	50,6	43,1	---	4000	F 16074
0,774	1,703	A	SEALED	---	---	52,0	49,0	---	4000	F 16048
0,895	1,969	A	SEALED	---	---	50,0	46,0	---	4000	F 16051
0,965	2,123	A	SEALED	---	---	60,6	55,9	---	4000	F 16078
0,795	1,749	A	SEALED	---	---	50,0	46,0	---	4000	F 16054
0,780	1,716	A	SEALED	---	---	52,0	49,0	---	4000	F 16056
0,850	1,870	A	SEALED	---	---	61,2	54,4	---	4000	F 16084
0,820	1,804	A	SEALED	---	---	51,9	49,2	---	4000	F 16059
0,830	1,826	A	SEALED	---	---	61,2	54,4	---	4000	F 16082
0,625	1,375	A	SEALED	---	---	52,0	49,0	---	4000	F 16063
0,930	2,046	A	SEALED	---	---	71,3	66,2	---	4000	F 16092
1,030	2,266	A	SEALED	---	---	70,7	67,6	---	4000	F 16076



5.2 Four point angular contact ball bearings

Rodamientos de bolas de contacto angular de cuatro puntos

Product Overview

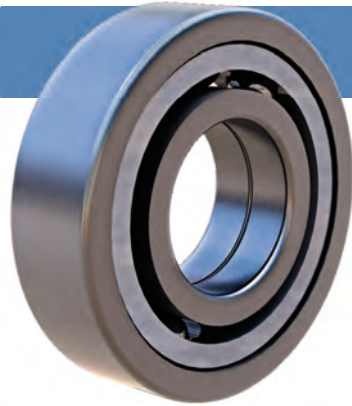
Introducción	243
Description / Descripción	243
Design / Diseño	243

Bearing Tables

Tablas de Rodamientos	244
------------------------------	------------



Product overview / Introducción



Description

Four-point angular contact ball bearings are designed to support predominantly axial loads in both directions. Radial loads can also be accommodated up to a certain level of axial load.

Since these bearings require less axial space, they become an attractive choice in case of room constraints.

Design

The inner ring is split, thus the bearing features a higher load carrying capacity, incorporating a large amount of balls.

The outer ring with ball and cage assembly can be fitted separately from the two inner ring halves.

Descripción

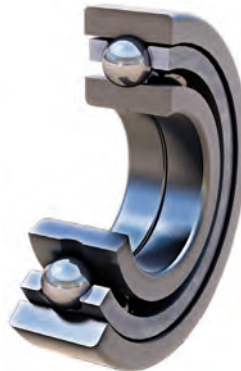
Los rodamientos de bolas de cuatro puntos de contacto angular están diseñados principalmente para soportar carga axial en ambos sentidos. La carga radial puede adaptarse hasta un determinado nivel de carga axial.

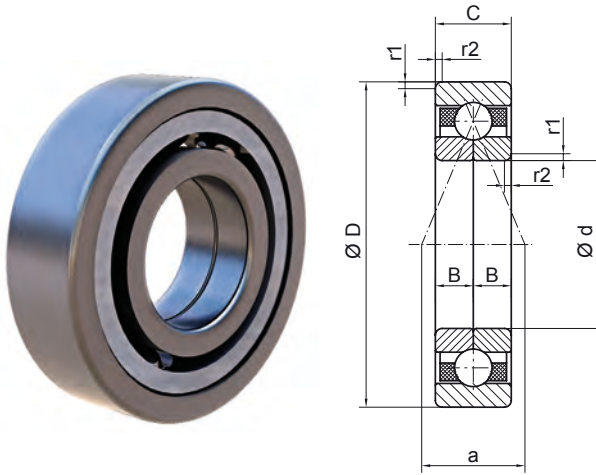
Ya que estos rodamientos requieren menos espacio axial, son una elección muy atractiva en el caso de tener un espacio limitado.

Diseño

El aro interior está partido, lo que permite una mayor incorporación de bolas y por lo tanto tiene una capacidad de carga mayor.

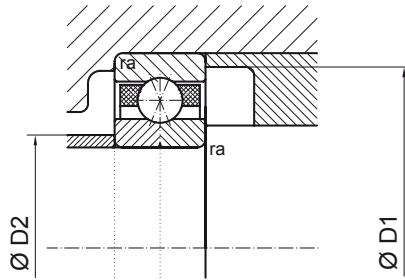
El aro exterior con bola y jaula pueden montarse por separado de las dos mitades del aro interior.





DIMENSIONS / DIMENSIONES								r1 min	r2 min	a mm	REFERENCES
d		D		B		C					REFERENCIAS
mm	inch	mm	inch	mm	inch	mm	inch				
40,000	1,575	80,000	3,150	9,000	0,354	18,000	0,709	1,1	1,1	42	QJ 208 FM
45,000	1,772	85,000	3,346	9,500	0,374	19,000	0,748	1,1	1,1	46	QJ 209 FM
		100,000	3,937	12,500	0,492	25,000	0,984	1,5	1,5	51	QJ 309 FM
55,000	2,165	100,000	3,937	10,500	0,413	21,000	0,827	1,5	1,5	54	QJ 211 FM
60,000	2,362	110,000	4,331	11,000	0,433	22,000	0,866	1,5	1,5	60	QJ 212 FM

Assembly / Montaje



WEIGHT / PESOS		ASSEMBLY / MONTAJE			LOAD / CARGA (kN)		SPEED / VELOCIDAD (rpm)		REFERENCES
kg	lb	da min	Da max	ra max	DYNAMIC / DINÁMICA	STATIC / ESTÁTICA	OIL / ACEITE	GREASE / GRASA	REFERENCIAS
					C	Co	na	ng	
0,450	0,990	73,0	47,0	1,0	41	27,8	9500	---	QJ 208 FM
0,520	1,144	78,0	52,0	1,0	46,2	32,3	8500	---	QJ 209 FM
0,770	1,694	91,0	54,0	1,5	68,6	43,6	7500	---	QJ 309 FM
0,990	2,178	91,0	64,0	1,5	53,7	39,9	7000	---	QJ 211 FM
1,050	2,310	101,0	69,0	1,5	65,7	49,5	6300	---	QJ 212 FM