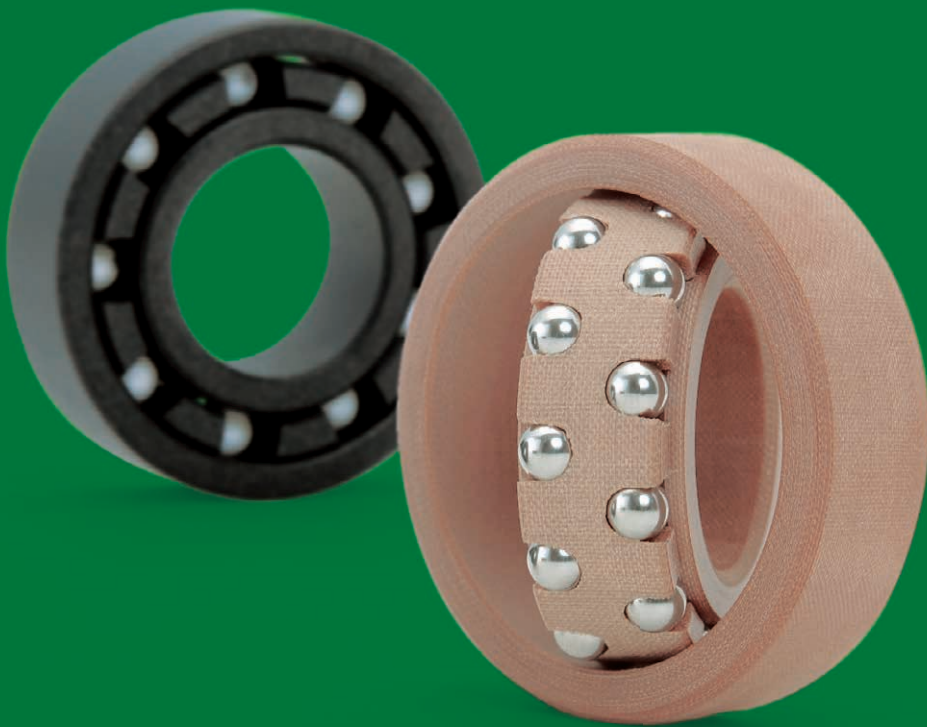
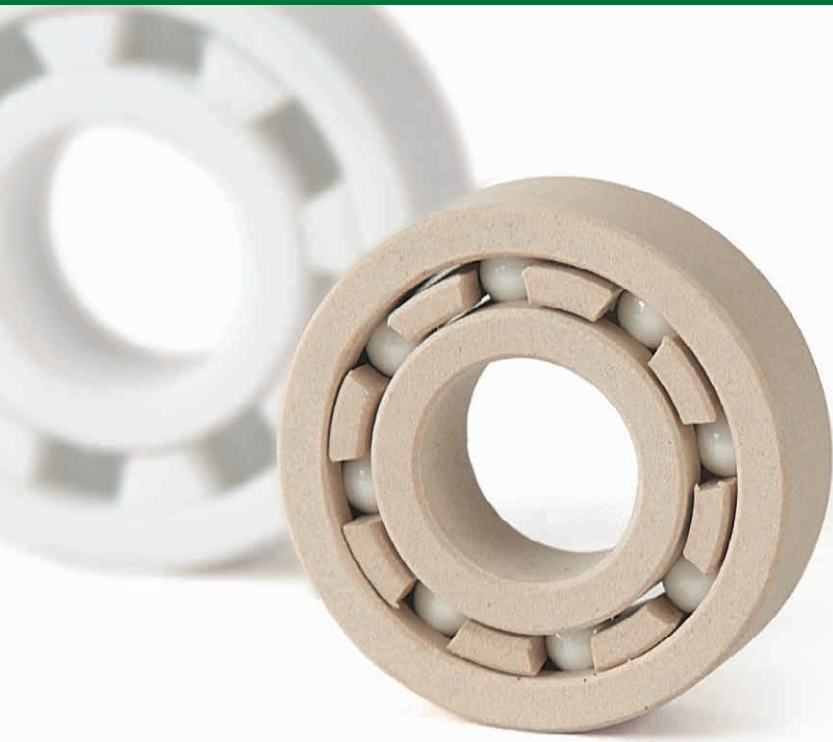


For Dry, Water-lubricated, Chemical and
High Temperature Environments.

UKB Ball Bearings



Kashima Bearings Corporation



Kashima bearings Corporation started as a plastic manufacturer and has always strived to identify and satisfy customers' needs. Today we are proud of our clients' trust and satisfaction as we stay committed to providing them with the highest quality and highest value products.

General Characteristics of Plastic Bearings:

- Grease lubricants are not necessary.
- No degradation risk when used in water or salt water for extended periods of time.
- Outstanding performance in chemical environments due to chemical resistance.
- Suitable for chemical, medical food-related applications.
- Can be used in a wide range of temperatures – from low to high.
- Compatible with magnetic devices – no risk of device error.
- Electrical non-conductivity - can act as insulator between the housing and shaft.
- Component weight reduction.
- High machinability, more design freedom.
- A wide range of materials to suit your requirements.

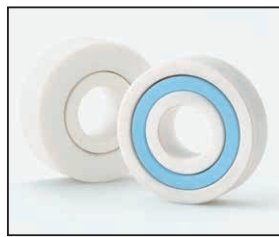
Basic deep groove model

One side shielded bearing



Specific deep groove model

Double shielded bearings



Flange bearings

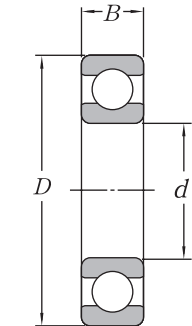


Note: The shields are a design concept and do not provide actual protection.

Note: We also offer double shielded flange bearings.

Product Selection and Dimensions

① Deep groove ball bearing



Main dimensions

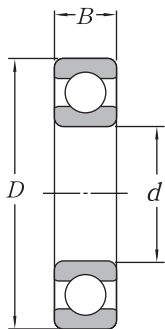
Dimensions in mm			Product code
d	D	B	
10	19	5	6800
	22	6	6900
	26	8	6000
	30	9	6200
	35	11	6300
12	21	5	6801
	24	6	6901
	28	7	16001
	28	8	6001
	32	10	6201
15	37	12	6301
	24	5	6802
	28	7	6902
	32	8	16002
	32	9	6002
17	35	11	6202
	42	13	6302
	26	5	6803
	30	7	6903
	35	8	16003
20	35	10	6003
	40	12	6203
	47	14	6303
	32	7	6804
	37	9	6904
22	42	8	16004
	42	12	6004
	47	14	6204
	52	15	6304
	44	12	60/22
	50	14	62/22

Dimensions in mm			Product code
d	D	B	
25	37	7	6805
	42	9	6905
	47	8	16005
	47	12	6005
	52	15	6205
28	62	17	6305
	52	12	60/28
	58	16	62/28
	42	7	6806
	47	9	6906
30	55	9	16006
	55	13	6006
	62	16	6206
	72	19	6306
	58	13	60/32
32	65	17	62/32
	47	7	6807
	55	10	6907
	62	9	16007
	62	14	6007
35	62	17	6207
	72	17	6207
	80	21	6307
	52	7	6808
	62	12	6908
40	68	9	16008
	68	15	6008
	80	18	6208
	90	23	6308

Dimensions in mm			Product code
d	D	B	
45	58	7	6809
	68	12	6909
	75	10	16009
	75	16	6009
	85	19	6209
50	100	25	6309
	65	7	6810
	72	12	6910
	80	16	6010
	90	20	6210
55	110	27	6310
	72	9	6811
	80	13	6911
	90	18	6011
	100	21	6211
60	120	29	6311
	78	10	6812
	85	13	6912
	95	18	6012
	110	22	6212
65	130	31	6312
	85	10	6813
	90	13	6913
	100	18	6013

- These can also be manufactured as flange bearings (product code: NR).
- Custom size orders are welcome.

② Miniature bearings.



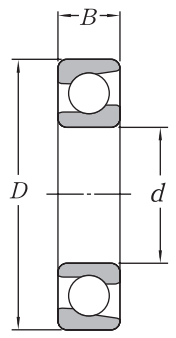
Main dimensions

Dimensions in mm			Product code
d	D	B	
3	10	4	623
4	11	4	694
	12	4	604
	13	5	624
	16	5	634
	13	4	695
5	14	5	605
	16	5	625
	19	6	635
	15	5	696
6	17	6	606
	19	6	626
	22	7	636

Dimensions in mm			Product code
d	D	B	
7	17	5	697
	19	6	607
	22	7	627
	26	9	637
8	* 16	4 or 5	688
	19	6	698
	22	7	608
	24	8	628
	28	9	638
9	* 17	4 or 5	689
	20	6	699
	24	7	609
	26	8	629
	30	10	639

- These can also be manufactured as flange bearings (product code: NR).
- Custom size orders are welcome.
- * Please specify the B value for models 688 and 699.

③ Angular contact bearings

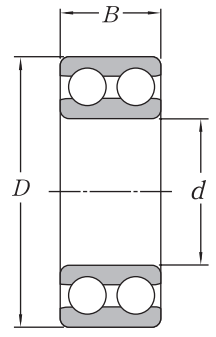


Main dimensions

Dimensions in mm			
d	D	B	Product code
10	26	8	7000
	30	9	7200
	35	11	7300
12	28	8	7001
	32	10	7201
	37	12	7301
15	32	9	7002
	35	11	7202
	42	13	7302
17	35	10	7003
	40	12	7203
	47	14	7303
20	42	12	7004
	47	14	7204
	52	15	7304
25	47	12	7005
	52	15	7205
	62	17	7305

Dimensions in mm			
d	D	B	Product code
30	55	13	7006
	62	16	7206
	72	19	7306
35	62	14	7007
	72	17	7207
	80	21	7307
40	68	15	7008
	80	18	7208
	90	23	7308
45	75	16	7009
	85	19	7209
	100	25	7309
50	80	16	7010
	90	20	7210
	110	27	7310

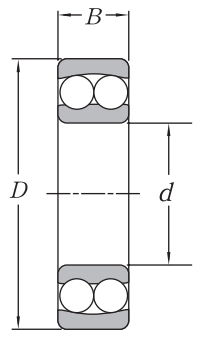
- These can also be manufactured as flange bearings (product code: NR).
- Custom size orders are welcome.



Main dimensions

Dimensions in mm			
d	D	B	Product code
10	30	14.3	5200
12	32	15.9	5201
15	35	15.9	5202
	42	19	5302
17	40	17.5	5203
	47	22.2	5303
20	47	20.6	5204
	52	22.2	5304
25	52	20.6	5205
	62	25.4	5305
30	62	23.8	5206
	72	30.2	5306
35	72	27	5207
	80	34.9	5307
40	80	30.2	5208
	90	36.5	5308
45	85	30.2	5209
	100	39.7	5309
50	90	30.2	5210
	110	44.4	5310

④ Self aligning bearings.



Double row self-aligning bearings are also available.

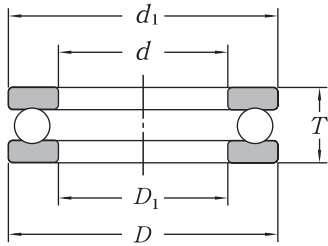
Main dimensions

Dimensions in mm			
d	D	B	Product code
10	30	9	1200
	30	14	2200
	35	11	1300
	35	17	2300
12	32	10	1201
	32	14	2201
	37	12	1301
	37	17	2301
15	35	11	1202
	35	14	2202
	42	13	1302
	42	17	2302
17	40	12	1203
	40	16	2203
	47	14	1303
	47	19	2303
20	47	14	1204
	47	18	2204
	52	15	1304
	52	21	2304

Dimensions in mm			
d	D	B	Product code
25	52	15	1205
	52	18	2205
	62	17	1305
	62	24	2305
30	62	16	1206
	62	20	2206
	72	19	1306
	72	27	2306
35	72	17	1207
	72	23	2207
	80	21	1307
	80	31	2307
40	80	18	1208
	80	23	2208
	90	23	1308
	90	33	2308

- Custom size orders are welcome.

⑤ Thrust bearings



Main dimensions

Dimensions in mm					
d	D	T	d ₁	D ₁	Product code
10	24	9	24	11	51100
	26	11	26	12	51200
12	26	9	26	13	51101
	28	11	28	14	51201
15	28	9	28	16	51102
	32	12	32	17	51202
17	30	9	30	18	51103
	35	12	35	19	51203
20	35	10	35	21	51104
	40	14	40	22	51204
25	42	11	42	26	51105
	47	15	47	27	51205
	52	18	52	27	51305
30	47	11	47	32	51106
	52	16	52	32	51206
	60	21	60	32	51306

Dimensions in mm					
d	D	T	d ₁	D ₁	Product code
35	52	12	52	37	51107
	62	18	62	37	51207
	68	24	68	37	51307
40	60	13	60	42	51108
	68	19	68	42	51208
	78	26	78	42	51308
45	65	14	65	47	51109
	73	20	73	47	51209
	85	28	85	47	51309
50	70	14	70	52	51110
	78	22	78	52	51210
	95	31	95	52	51310

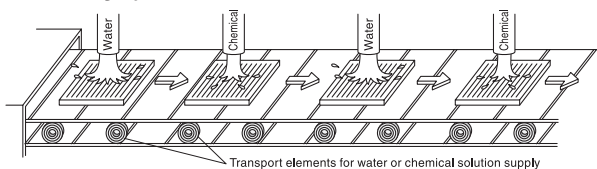
- Custom size orders are welcome.
- The "D" and "d" dimensions are equal, however their dimensional tolerance is different.

⑥ Various designs.

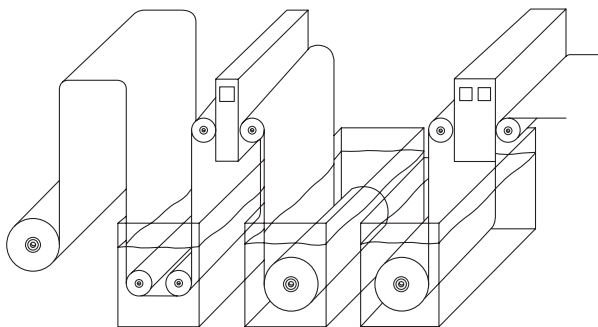
Order the design of your choice - starting from 1 piece.



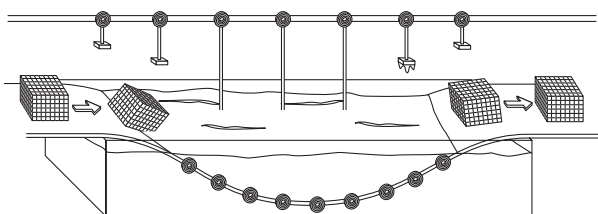
Cleaning systems



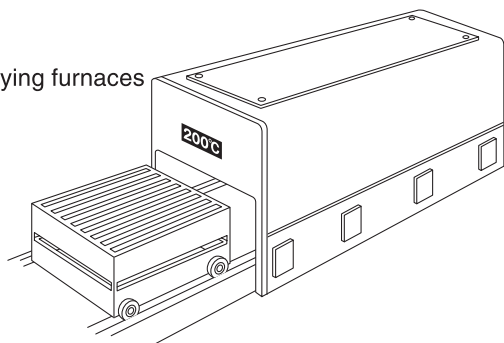
Film surface treatment devices



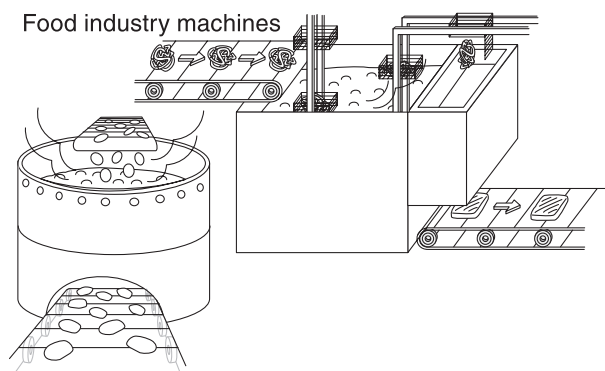
Plating equipment



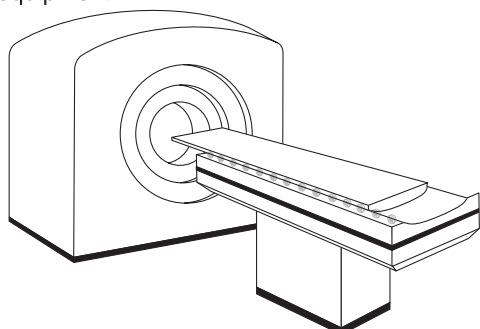
Drying furnaces



Food industry machines



Medical equipment



Application Examples:

- Glass substrate cleaning devices
 - Wafer cleaning machine
 - Etching devices
 - Cleaning and coating systems for electronic parts
 - Surface treatment devices
 - Plating equipment
 - Cleanroom equipment
 - Film cleaning
 - Devices for the chemical treatment of films
 - Conveyors
 - Analysis equipment
 - Testing equipment
 - NC devices and control systems
 - Medical equipment
 - Medical parts
 - Spray diffusers
 - Robots
 - Driers
 - Pump systems
 - Stirring equipment for the food industry
 - Kneading equipment for the food industry
 - Transport elements for the food industry
 - Refrigeration equipment
 - Food processing machinery
- ...and many other.

Product Overview - Materials



Product Overview - Types



Other types



(The standard material for the retainers is PK or PT)
* Please contact us for other material options.

(The standard material for the retainers is PK or PT)
* Please contact us for other material options.

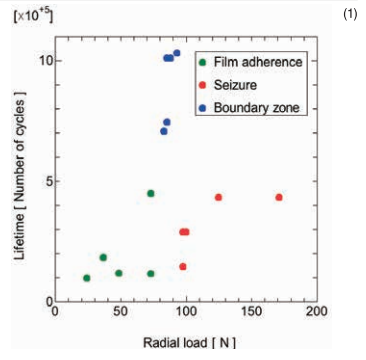
Research data – Wear (dry conditions)

PEEK Bearings

According to dry-conditions tests performed by our company, coupling PEEK bearing races with PTFE retainers helps reduce wear and consequently – enhance bearing life.
 It also allows a much wider range of working conditions.
 Here you can read a few excerpts from articles published and presented at international scientific conferences.

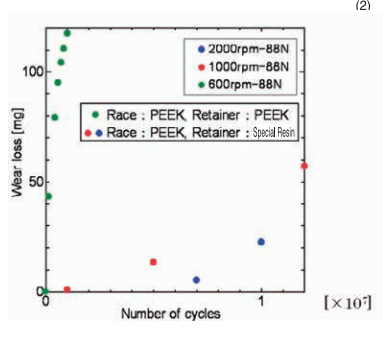


PEEK-only Radial Bearings (1)



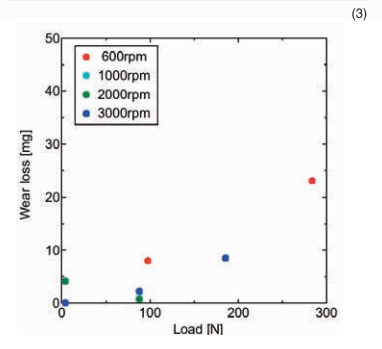
Rotation speed : 600rpm,
 Total number of rotation: 1.0×10^6
 Bearings used for tests: 6205
 Bearing races / Retainer: PEEK
 Bearing balls: Alumina
 This graph shows PEEK wear at steady speed 600rpm and at different loads. Under the conditions marked green wear and debris adhesion to bearing balls occurs, leading to poor performance. Under the conditions marked red wear increases due to high loading. Blue colour represents a "boundary region", where the material wear is minimal. It was found that employed under conditions from within this region the wear amount in PEEK bearings will be very inconsiderable.
 < From : >
 Hitonobu Koike, Yuji Kashima et. al. Tribology International, Vol. 49, pp. 30-38, (2012, May) doi: 10.1016/j.triboint.2011.12.005.
 Hitonobu Koike, Yuji Kashima et. al. Advanced Materials Research, Vols. 154-155 (2010) pp. 1288-1291. doi: 10.4028/www.scientific.net/AMR.154-155.1288.

PEEK-only and PEEK Hybrid Radial Bearings (2)



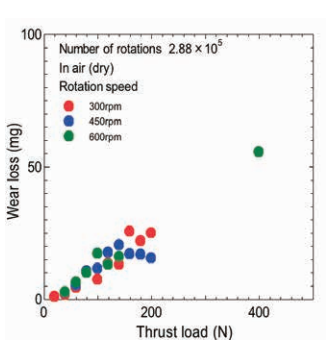
Bearings used for tests: 6205
 Marked green:
 Bearing races / Retainer: PEEK
 Bearing balls: Alumina
 Marked blue and red:
 Bearing races: PEEK
 Retainer: Special Resin
 Bearing balls: Alumina
 This graph shows wear at steady load and at different speeds. When compared to PEEK-only bearing, PEEK Hybrid components achieved lower wear and longer life, even at high speeds. At low speeds, seizure markings were observed on the PEEK-only bearing surfaces. Replacing the retainer with a Special Resin one eliminated this problem and enhanced service life.
 < From : >
 Hitonobu KOIKE, Yuji KASHIMA et. al. Advanced Materials Research (2013 inpress)

PEEK Hybrid Radial Bearings (3)



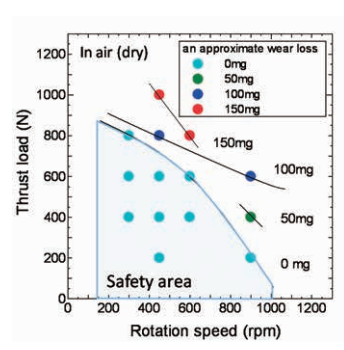
Bearings used for tests: 6205
 Bearing races: PEEK
 Retainer: Special Resin
 Bearing balls: Alumina
 This graph shows wear at different loads and speeds - the amount of wear in PEEK Hybrid bearings was insignificant. In long-running tests the hybrid bearings showed much better wear resistance compared to the PEEK-only components under all conditions.
 < From : >
 Hitonobu KOIKE, Yuji KASHIMA et. al. Advanced Materials Research (2013 inpress)

PEEK-only Radial Bearings (4)



Bearings used for tests: 6205
 Bearing races / Retainer: PEEK
 Bearing balls: Alumina
 This graph shows wear at different loads and speeds. It was concluded that wear depends on speed rather than load (for comparison with PPS data, see data in point (8)).
 < From : >
 Koshiro Mizobe, Yuji Kashima et. al. Applied Mechanics and Materials Journal Vol. 567, pp. 66-70. (2012).

PEEK Hybrid Thrust Bearings - PV diagram (5)



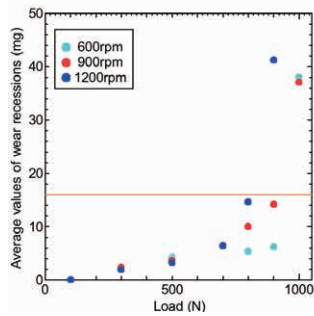
Bearings used for tests: 51305
 Bearing races: PEEK
 Retainer: Special Resin
 Bearing balls: Alumina
 The graph shows the range of use for the tested component. Almost no wear was observed under the conditions marked blue.
 < From : >
 Koshiro Mizobe, Yuji Kashima et. al. Applied Mechanics and Materials Journal Vol. 567, pp. 66-70. (2012).

PTFE w. Filler Thrust Bearings

(6)



Bearings used for tests: 51305
 Bearing races / Retainer:
 PTFE with filler
 Bearing balls: Alumina



Under dry conditions and at low speeds, the wear amount as well as the dependence of wear on the operational were low. Inconsistent wear data was obtained from tests at different speeds and at higher loads. It was concluded that the components provide the best performance at loads under 800N.

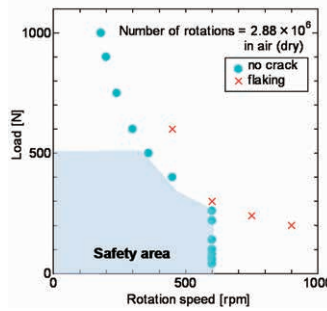
< From: >
 Takashi Honda, Yuji Kashima et. al., 52nd Meeting of the Science Council of Japan on Material Engineering, Vol. 52, pp. 295-296 (22.10.2009)

UHMWPE Thrust Bearings – PV diagram

(7)



Bearings used for tests: 51305
 Bearing races / Retainer :
 UHMWPE
 Bearing balls: Soda-lime glass



Heat generation is a factor that must be taken under careful consideration in UHMWPE bearing applications. The graph on the left is the material's PV diagram. Marked blue are load and speed conditions most adequate for safe operation. Although minimal wear amount does occur, from the tests performed by our company it was concluded that the optimal working speed is up to 600rpm and load – up to 500N.

< From: >
 Shintaro HAZEYAMA, Yuji KASHIMA et. al. (2013, in press)

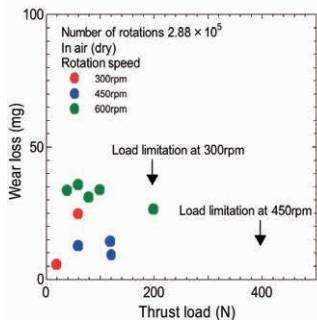
PPS Thrust Bearings

The graph on the left shows wear loss in PPS bearings during the performed tests.
 No consistent tendencies in speed or weight dependence could be established, however it was concluded that the range of use under dry conditions is wider for hybrid components, as it can be seen in the graph on the right.
 (For comparison with PEEK data, see point (4))



PPS wear amount

(8)

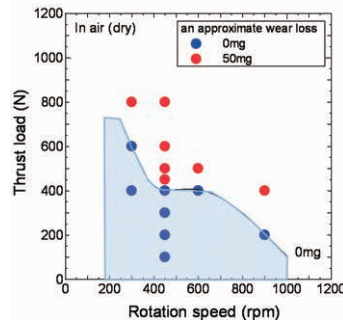


Bearings used for tests: 51305
 Bearing races / Retainer: PPS
 Bearing balls: Alumina
 Wear test were performed at different speeds and loads. Peeling occurred at 300rpm/200N and at 450rpm/200N.
 (For comparison with PEEK data, see point (4))

< From: >
 Koshiro Mizobe, Yuji Kashima et. al. Advanced Materials Research Vol. 566, pp. 157-161. (2012). doi: 10.4028/www.scientific.net/AMR.566.157)

Hybrid PPS bearings PV Diagram

(9)



Bearing used for tests: 51305
 Bearing races: PPS
 Retainer: Special Resin
 Bearing balls: Alumina
 Wear was very low in bearings tested under the conditions within range marked blue. The performance of the hybrid PPS components was highly superior compared to PPS-only components. From the PV graph it can be concluded that 400N is the load capacity limit for this type of bearing.

Research data – Wear (water lubricated conditions)

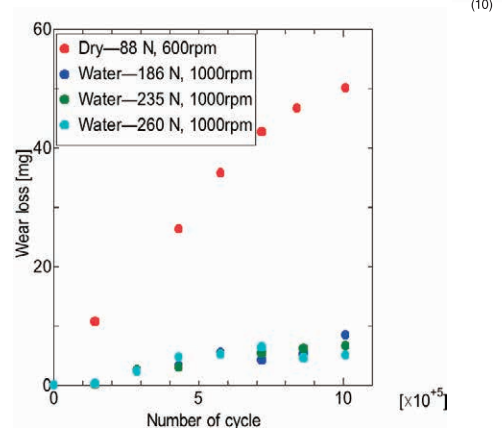
PEEK Bearings

Load and speed must be carefully considered in under-water PEEK bearings applications. The graph on the left is wear data obtained from tests performed at a steady speed and different loads. No cracking could be observed at loads up to 260N. For comparison, data from a dry condition test at 88N is given.

The graph on the right is wear data obtained from tests at different speeds and loads. The wear amount was very low, however peeling occurred at high loads and high speeds. The bearing life of PEEK components employed in water lubricated environments tends to depend on load and the range of use conditions is much wider than in the case of dry working environment.



PEEK Radial Bearings

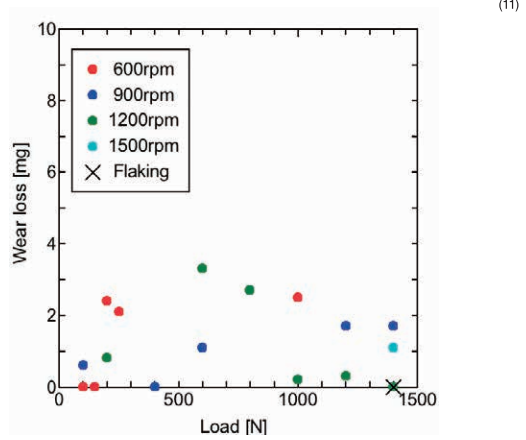


Bearings used for tests: 6205
 Bearing races / Retainer: PEEK
 Bearing balls: Alumina

Tests showed that failure of PEEK bearings working under water occurs due to cracking. From tests ran until 1.0×10^6 cycles it was however concluded that no cracking occurs at loads up to 260N. The amount of wear under such load is low – below 10mg. Total number of rotation: 1.0×10^6

< From: >
 Hitonobu Koike, Yuji Kashima et. al. Advanced Materials Research Vols. 217-218 (2011) pp. 1260-1265. doi: 10.4028/www.scientific.net/AMR.217-218.1260.
 Advanced Materials Research Vol. 566 (2012) pp. 109-114, doi: 10.4028/www.scientific.net/AMR.566.109.

PEEK Thrust Bearings

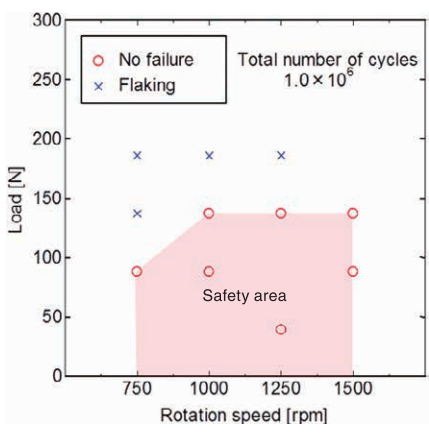


Bearings used for tests: 51305
 Bearing races / Retainer: PEEK
 Bearing balls: Alumina

After 1.0×10^6 cycles, the wear amount was lower than 5mg for all conditions. At high loads and high speed the risk of peeling occurs.

< From: >
 Takashi Honda, Yuji Kashima et. al., Tribology Congress of the Japanese Society of Tribologists (18.05.2009)
 Shunsuke OYAMA, Yuji KASHIMA et. al. (Advanced Materials Research, Vol. 566, (2012), pp. 197-202. doi: 10.4028)
 Takashi HONDA, Yuji KASHIMA, Advanced Materials Research Vols. 154-155 (2011) pp. 1713-1716, doi: 10.4028/www.scientific.net/AMR.154-155.1713

PPS Radial Bearings



Bearings used for tests: 6205
 Bearing races / Retainer: PPS
 Bearing balls: Alumina

PPS bearings life is determined by the occurrence of peeling rather than wear. In the graph the load/speed conditions for operation with low wear are marked blue.

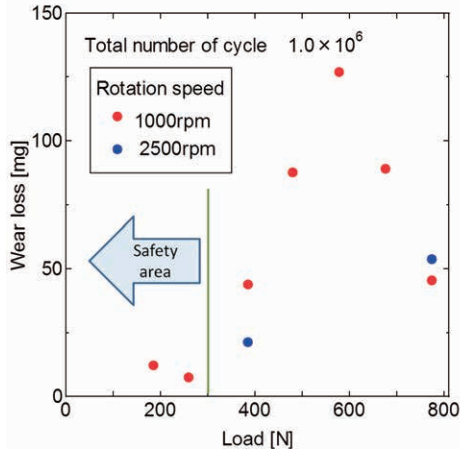
< From: >
 Oyama, Kida, Kashima et. al. (2013 in press)
 Data presented at an international conference in Shanghai.



PTFE with filler

PTFE w. Filler Radial Bearings

(13)



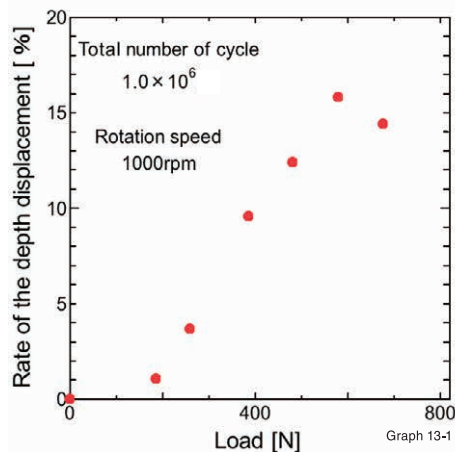
Bearings used for tests: 6205
 Bearing races / Retainer:
 PTFE with filler
 Bearing balls: Alumina

In these tests the wear amount was 10mg for loads up to 300N and exceeds this amount for higher loads 500-700N. No dependence on rotational speed could be observed.

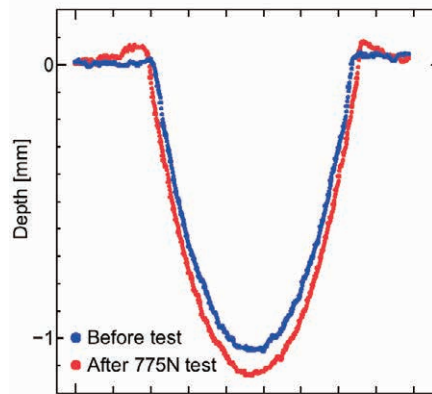
< From: >
 Shunsuke Oyama, Yuji Kashima et. al. (2013 in press)
 Data presented at an international conference in Dubai.



At 300N the amount of wear was low independently of rotational speed and it started increasing rapidly at loads over 500N. At higher loads race deformation occurred due to creep, PTFE with filler being the material that deformed the most. Graph 13-1 shows the rate of the race groove changes and 13-2 is the visual image of the groove before and after testing.



Graph 13-1

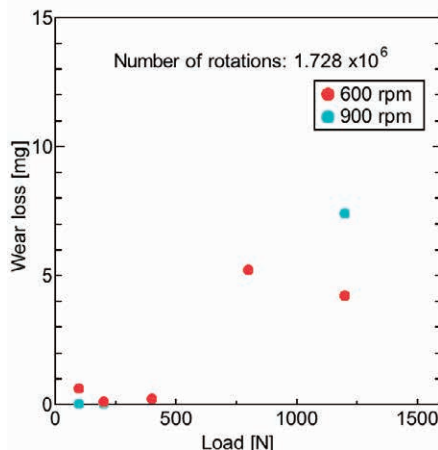
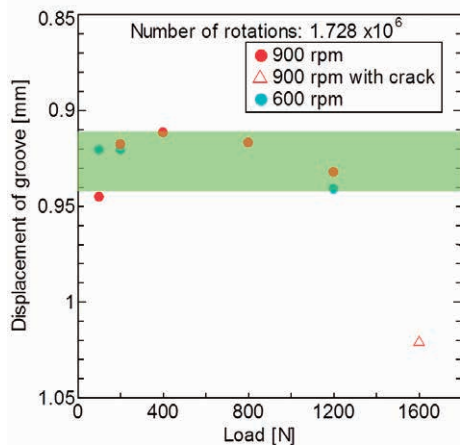


Graph 13-2

At 400N the race deformation occurred and wear loss was significant: over 50mg and at around 600N it reaches a plateau. Safe working conditions can be determined basing on graph 13-1.

Thrust bearings – PTFE with filler

(14, 15)



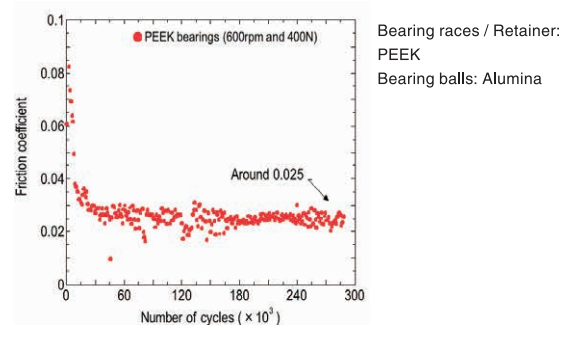
Bearing used for tests: 51305
 The graph on the left shows changes in the race groove shape at 600rpm, 900rpm and different loads. On the right – relevant wear loss.

It is possible to use this type of bearing for loads until 1200N as the deformation as well as wear were extremely low (below 10mg at 1200N).

< From: >
 Kiyoto Itakura, Yuji Kashima et. al. (2013 in press)
 Data presented at an international conference in Shanghai.

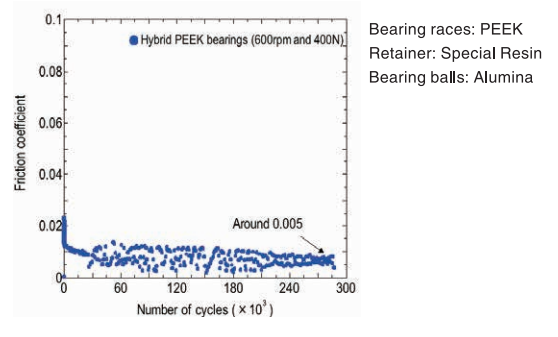
Research data – Coefficient of friction

PEEK-only Bearings



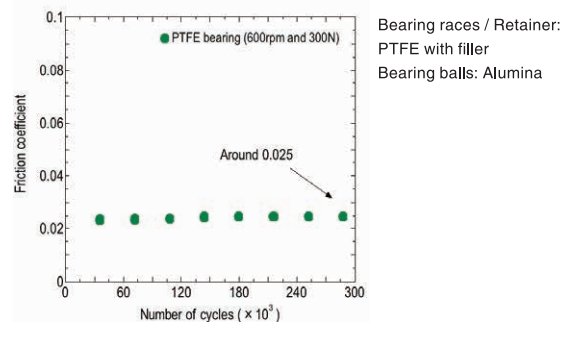
< From: >
Koshiro MIZOBE, Yuji KASHIMA et. al. (in press)

PEEK Hybrid Thrust Bearings



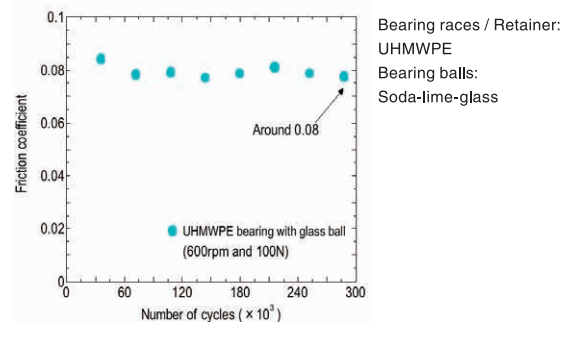
< From: >
Koshiro MIZOBE, Yuji KASHIMA et. al. (in press)

PTFE w. Filler Thrust Bearings



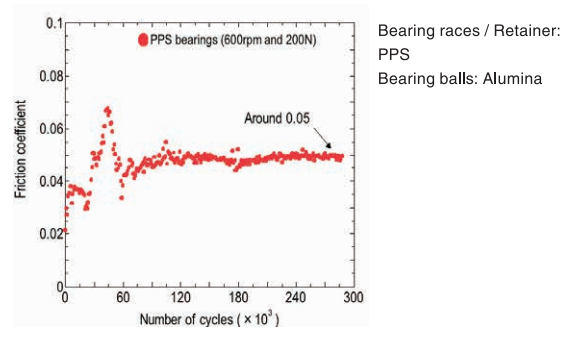
< From: >
Takashi Honda, Yuji Kashima et. al., 52nd Meeting of the Science Council of Japan on Material Engineering, Vol. 52, pp. 295-296 (22.10.2009)

UHMWPE Thrust Bearings



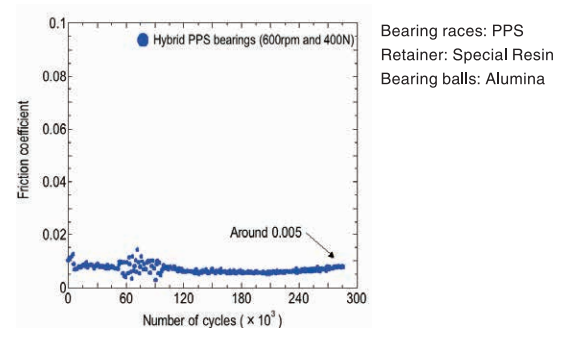
< From: >
Takashi Honda, Yuji Kashima et. al., 52nd Meeting of the Science Council of Japan on Material Engineering, Vol. 52, pp. 295-296 (22.10.2009)

PPS Thrust Bearings



< From: >
Koshiro MIZOBE, Yuji KASHIMA, Advanced Materials Research (Trance Tech Publications, ISSN: 1022-6680), (in press)

PPS Hybrid Thrust Bearings



< From: >
Koshiro MIZOBE, Yuji KASHIMA, Advanced Materials Research (Trance Tech Publications, ISSN: 1022-6680), (in press)

Data presented on this page were obtained from tests performed by a bearing endurance tester developed in our company. The objective was to compare the performance of bearings where all components are made from the same polymer ("PEEK-only" and "PPS-only") against hybrid pieces. Tests carried out in air until 2.88×10^5 showed the Coefficient of friction was lower in case of the hybrid bearings. Load and speed information is given in each graph.

Materials and their typical applications

< For dry conditions >



PEEK
UKB○○○○PKPT-A
UKB○○○○PKPT-S



PTFE with filler
UKB○○○○PT-A
UKB○○○○PT-S



PPS
UKB○○○○PSPT-A
UKB○○○○PSPT-S

Clean and smooth work for long periods is possible without any grease or oil lubrication.

< For water-lubricated conditions >



PEEK
UKB○○○○PK-S



Ultrahigh molecular weight polyethylene
UKB○○○○PE-S
UKB○○○○PE-G



PP
UKB○○○○PP-S
UKB○○○○PP-G

Suitable for work in frequent contact with water or in under-water conditions. For mist environment – please contact us for further information.

< For chemical environments >



PTFE with Special Filler
UKB○○○○PT-A



PPS
UKB○○○○PS-A



UKB○○○○PE-G
(Glass balls cannot be used in alkaline environments.)

These materials are compatible with most chemicals. For details as well as ball material compatibility information, please contact us.

< For other applications >

As insulator



UKB○○○○SD-G
UKB○○○○SD-A

For work in high temperatures 1



UKB○○○○PK-A

For work in high temperatures 2



UKB○○○○SDH-A
(SDH cannot be used in mist environment.)

Plastic materials are perfect for conditions, where the use of metal components is limited or impossible due to insulation or temperature issues.

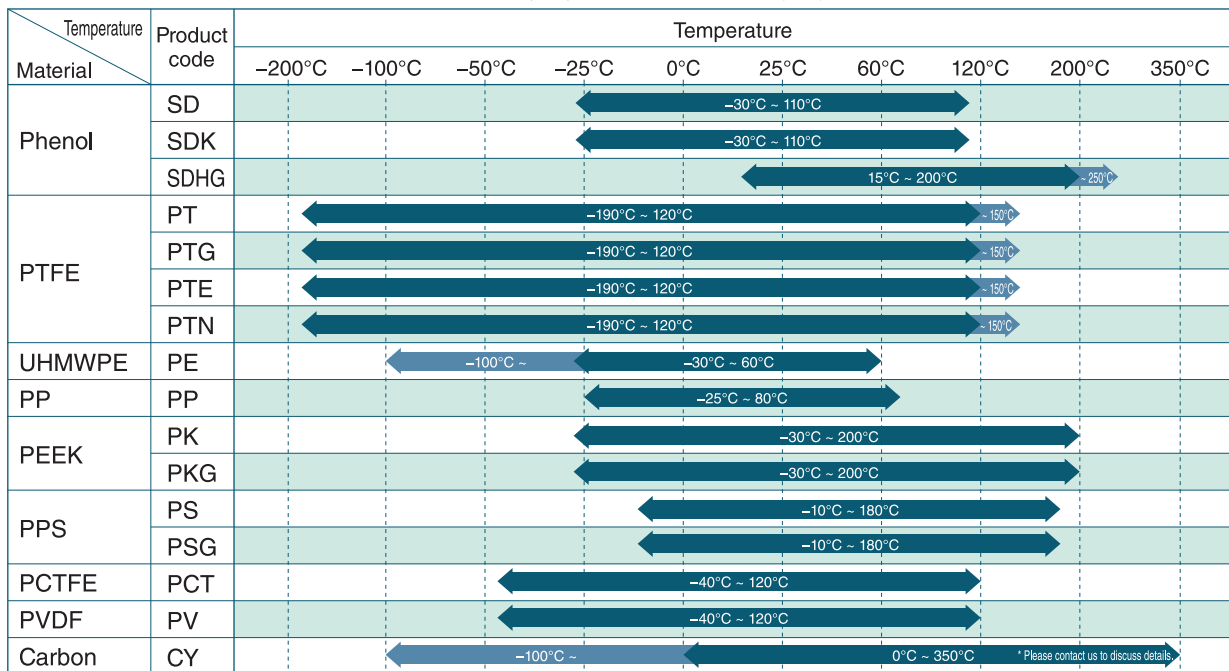
Material Selection and Application Guide Material — Outer race · Inner race · Retainer

○ Recommended ○ Satisfactory △ Possible to use, but not recommended × Not compatible

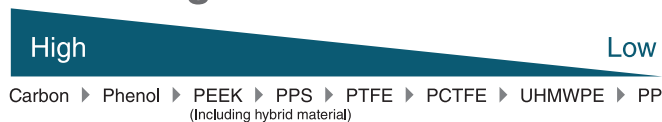
Application Material	Product code	Dry	Water (extended periods of time)	Water / seawater	Steam	Chemical environment				Magnetic environment	As insulator
						Acids	Alkaline	Organic liquids	Oil		
Phenol	SD	○	○	○	○	○	×	○	○	○	○
	SDK	○	○	○	○	○	×	○	○	×	×
	SDHG	○	△	△	×	○	×	○	○	×	×
PTFE	PT	○	○	○	○	○	○	○	○	○	×
	PTG	○	○	○	○	○	×	○	○	○	○
	PTE	○	○	○	○	○	○	○	○	○	○
	PTN	○	○	○	○	○	○	○	○	○	○
UHMWPE	PE	○	○	○	×	○	○	○	○	○	○
PP	PP	△	○	○	△	○	○	○	○	○	○
PEEK	PK	○	○	○	○	○	○	○	○	○	○
	PKG	○	○	○	○	○	○	○	○	○	×
PPS	PS	○	○	○	○	○	○	○	○	○	○
	PSG	○	○	○	○	○	○	○	○	○	×
PCTFE	PCT	○	○	○	○	○	○	○	○	○	○
PVDF	PV	○	○	○	○	○	○	○	○	○	○
Carbon	CY	○	○	○	○	○	○	○	○	○	×

Note: For details on compatibility with specific chemicals, please feel free to contact us.

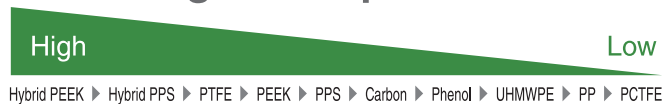
↔ Full compatibility ↔ Please contact us for compatibility details.



[Material guide - Load]



[Material guide - Speed]



[Materials suitable for food-related applications]

- PTFE (PT, PTG, PTE, PTN)
- UHMWPE
- PP
- PEEK
- PPS
- PCTFE
- PVDF
- Carbon

Ball Material Selection and Application Guide

⊙Recommended ○Satisfactory △Please contact us to discuss details. ×Not compatible

Application		Product code	Environment					Remarks
			Dry	Water	Chemical environment	High temperatures	As insulator	
Ceramic	Alumina Al ₂ O ₃	A	⊙	○	⊙	⊙	⊙	Some chemicals may affect the components, please consult us before placing your order.
	Zirconium dioxide ZrO ₂	Z	⊙	○	⊙	⊙	⊙	
	Silicon nitride Si ₃ N ₄	N	⊙	○	⊙	⊙	⊙	
	Silicon carbide SiC	C	⊙	○	⊙	⊙	⊙	
Stainless steel	SUS304	S	⊙	⊙	△	⊙	×	Compatibility varies depending on the type of chemical solution.
	SUS316	S6						
Soda-lime glass		G	⊙	○	△	○	⊙	Not to be used in rapidly changing temperatures.
Plastic	PP	PP	×	⊙	○	See page 13	⊙	To be used ideally with liquids or at low speeds.
	PE	PE	×	⊙	○		⊙	
	PVDF	PV	×	⊙	○		⊙	
	PTFE	PTN	○	⊙	⊙		⊙	
	PEEK	PK	○	○	⊙		⊙	

When placing an order, please quote the Product code as in the example below:

UKB 6002 PT — A (–BL)

<p>Model number</p>	<p>Outer & inner race material</p> <p>SD PP SDK PK SDHG PKG PT PS PTG PSG PTE PCT PTN PV PE CY Etc.</p>	<p>Retainer material</p> <p>Leave blank if same as outer & inner race material. *1</p>	<p>Ball material</p> <p>A G Z PP N PE C PV S PTN S6 PK Etc.</p>	<p>Double shielded bearings: BL Flange bearings: NR Leave blank for basic model (one side shielded bearing)</p>
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(See page 13 for the product code list.)

(See page 14 for the product code list.)

*1 All bearing components are normally manufactured from the same type of material. For hybrid bearing solutions - please specify your choice.

Order the design of your choice - starting from 1 piece

Material properties

Outer ring · Inner ring · Retainer material properties

Material Property	Phenol			PTFE				UHMWPE	PP	PEEK		PPS		PCTFE	PVDF	Carbon
	SD	SDK	SDHG	PT (black)	PTG (white)	PTE (beige)	PTN (white)			PK	PKG (black)	PS	PSG (black)			
Specific gravity	1.4	1.5	1.8	2.1	2.27	1.87	2.14 ~ 2.20	0.94	0.9	1.3	1.48	1.35	1.45	2.2	1.79	1.77
Compressive strength (MPa)	127 ~ 167	118 ~ 226	147 ~ 334	6.0 ~ 6.3 (1% deformation)	6.6 ~ 7.0	8.2 ~ 8.8	11.8 max. 23°C	-	-	119 5% deformation	150	107 5% deformation	-	31 ~ 51 10% deformation	62 10% deformation	185
Bend strength (MPa)	137 ~ 196	98	147 ~ 166	-	-	-	-	-	-	170	193	147	279	-	81	60
Tensile strength (MPa)	68 ~ 108	147	-	17.8	16.8	13.7	20 ~ 34	44.1	29.4 ~ 47.1	98	140	93	211	31 ~ 41	50	-
Elongation (%)	-	-	-	100	305	270	200 ~ 400	300 ~ 450	200 ~ 700	20	2.2	19	-	80 ~ 250	30	-
Hardness *1	36 ~ 40 (Brinell)	35 ~ 38 (Brinell)	111 (Rockwell M)	67 (Shore)	64 (Shore)	65 (Shore)	54 ~ 58 (Durometer)	67 ~ 69 (Shore)	90 (Rockwell M)	105 (Rockwell M)	99 (Rockwell M)	97 (Rockwell M)	104 (Rockwell M)	75 ~ 80 (Shore)	75 (Shore)	70 (Shore)
Linear thermal expansion coefficient ($\times 10^{-5}/^{\circ}\text{C}$)	3.0 ~ 4.5	3.0 ~ 5.0	1.8 ~ 3.59	7.2 ~ 10.6	9.5 ~ 11.4	8.8 ~ 10.8	12.2 ~ 13.7	10 ~ 19	5.8 ~ 10	5.0	3.0	5.0	4.3	4.5 ~ 7.0	13.0	0.35
Water absorption (%)	0.6 ~ 1.0	0.2 ~ 0.9	0.5 ~ 1.0	0	<0.015	0	0	<0.01	<0.03	0.14 ~ 0.5	0.1	0.01	0.024	0.01	0.01	-

*1 Currently we are unable to perform hardness tests using all methods for data comparison purposes.

Note: Typical data

Ball material properties

	Alumina (Al_2O_3)	Zirconium dioxide (ZrO_2)	Silicon nitride (Si_3N_4)	Silicon carbide (SiC)
Density	3.6 ~ 3.9	6.0	3.2	3.1 ~ 3.3
Compressive strength (MPa)	2100 ~ 2300	6700	2400	2800
Young's modulus (GPa)	280 ~ 380	200 ~ 210	290 ~ 330	370 ~ 440
Poisson's ratio	0.23	0.31	0.28	0.16
Vickers hardness (MPa)	15 ~ 18	10 ~ 13	15 ~ 20	24
Thermal conductivity 20°C W/(m·K)	36	3	20 ~ 29	60 ~ 300

The above figures are typical values. The physical properties of ceramics vary greatly depending on the manufacturing process.

Soda-lime glass

	Soda-lime glass
Density	2.5
Compressive strength (MPa)	590 ~ 1200
Young's modulus (GPa)	0.7
Poisson's ratio	0.25

The above figures are typical values

Stainless steel

	SUS304	SUS316
Specific gravity	7.93	7.98
Tensile strength (N/mm ²)	over 520	over 520
Elongation (%)	over 40	over 40
Brinell hardness	below 187	below 187
Thermal conductivity (100°C) (cal/cm·°C)	0.039	0.039
Thermal expansion coefficient (0 ~ 100°C×10 ⁻⁶)	17.3	15.9

About plastic ball bearings

Calculating service life and performance limitations

Methods for estimating bearing life and performance limitations for plastic components are different from those for metals.

Metal bearings have a long history of application and their performance has been studied extensively.

This is not the case when it comes to plastic bearings.

That's why our company puts a lot of effort into research and establishing formulas specific to each polymer. When thinking of load limitations, we consider each plastic's mechanical strength; wear and friction characteristics are the starting point to calculate speed limitations.

Service life estimation methods are based upon testing under specific working conditions and material's wear properties.

For specific data - please contact us.

Engineering tolerance and gaps

All products are manufactured according to H7 standard tolerance and checked for accuracy in temperature $24^{\circ}\text{C} \pm 2^{\circ}\text{C}$.

However, minor discrepancies may occur over time or due to the material's linear thermal expansion coefficient or water absorption, especially in materials prone to volume changes (please contact us for details. We are sure we can meet your dimensional precision requirements).

Also, due to the factors mentioned above gaps of the size ranging between several tens to several hundreds of microns will be present between bearing parts. However, these can be adjusted according to your needs, so please don't hesitate to contact us!

Shaft and housing

The H7 tolerance is generally recommended for plastic ball bearings-shaft fit.

Our housings are typically produced under pressure input according to this standard. Should you require components with light interference fit or loose fit, we advise using stoppers.

Lubrication

While plastic bearings do not require any grease or oil lubrication, they are suitable for work in contact with these substances.

Shielding

The flange type bearings are equipped in double shielding, however although water and low viscosity liquids compatible these do not act as protection against debris.

Non-magnetic properties

Plastic is a non-magnetic material, therefore plastic bearings are a perfect match for non-magnetic applications.

Pre-compression

Applied to metal bearings pre-compression ensures better accuracy and fitting, resulting in e.g. noise reduction.

In plastic bearings it can lead to shape deformation, therefore it is generally not recommended.

www.kashima-kagaku.com/english



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