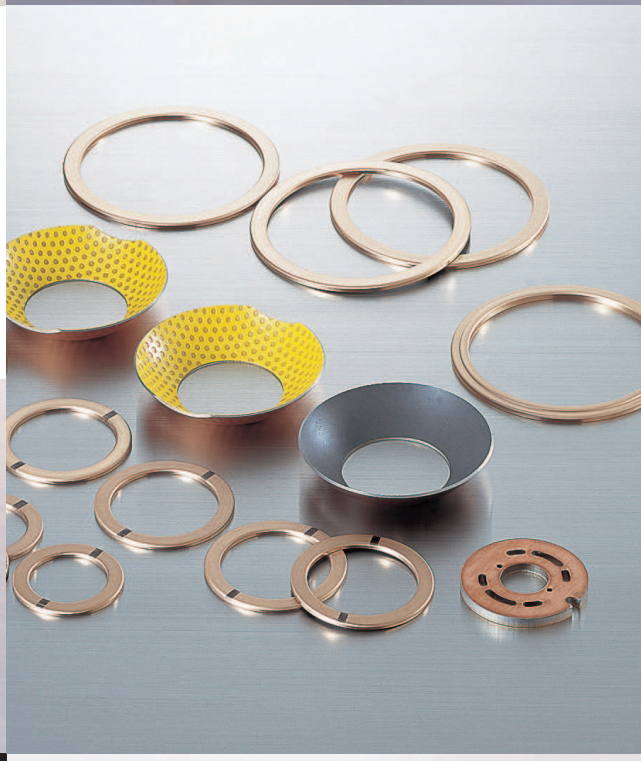
DAIDO METAL

General Catalog

2019▸2020 CAT NO.4001-04



This catalog contains information on various Daido dry bearings as well as on wet bearings and their design. Daido works constantly to develop and improve all its products, even those not included in this catalog, and we look forward to your continued patronage of all our products.

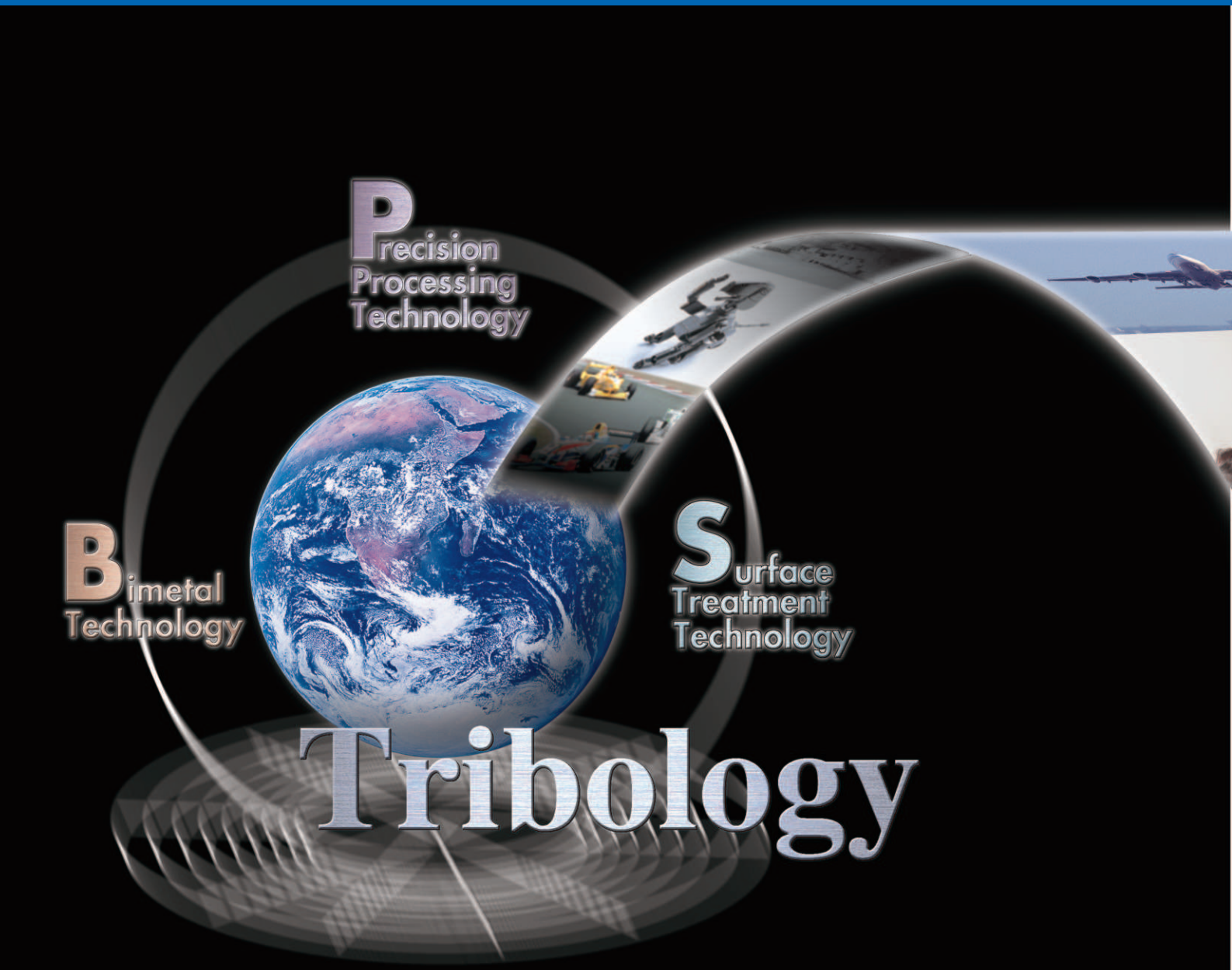
The technical information provided in this catalog is based on the results of our extensive and varied research as well as our many years of experience. This data, however, is neither exhaustive nor applicable to all circumstances, and selection of a suitable product will vary depending upon your specific application. We recommend that all product selection be verified through testing.

The content of this manual is subject to revision without prior notice.

Contents

HOISI PRECISION 凱獅精密 ISO 7312 9830

The Ultimate Tribology that Expands our Horizons



"Tribology"- the word is derived from the Greek "tribos" meaning "friction" and refers to the basic technology of bearings: the physical and scientific analysis of friction, wear and lubrication when physical objects move. Machines always have parts that are subject to friction, making them susceptible to wear and other problems. In order to provide solutions to these problems Daido Metal established a tribological approach using a combination of bimetal, surface treatment and precision machining technologies. We now have a global reputation as a manufacturer of plain bearings for all fields with a strong focus on the automotive industry. The knowledge of bearings we have fostered has opened up new fields and is expanding the dreams and possibilities for 21st century society. Where there are moving parts you will find Daido products. Our aim is to build on our position as Japan's leader in Tribology to become the World's leader in Tribology.

DAIDO METAL

The “D” of this symbol stands for “Daido Metal Company.”
It also stands for “Development,”
“Dream”and“Dynamic.”
The design also includes the “I”of“Innovation,”
“Invention”and“Intellectual excitement.”
The shape represents “bimetal”and “half bearing”
and the curve is also an allusion to a bridge.
The blue color is the blue of the sky and the sea, meaning the Earth.

Environmental Responsibility

Meeting the Challenges of Ecology Through Technology

Daido Metal is also actively undertaking the development of ecological products that are not harmful to people or the environment.

The restriction on products containing materials such as lead, hexavalent chromium and other chemical substances that have an adverse impact on humans and the eco system on a global scale are becoming stricter as shown in the Restriction on Hazardous Substances (RoHS) and End-of-Life Vehicles (ELV) directives. As a company dealing with all types of bearings, from development through to scrapping, we rigorously control the chemical substances in our products and approach this issue with stress on completely eliminating such substances from use.

Pb Free

Instead of using lead which is the predominant bearing material, we are developing lead-free materials whose properties are equivalent to those of lead. We are doing this out of concern for the impact of lead on the environment. This is demonstrated in fields such as bearings for automotive use and bearings for dam gates where high ecological performance is a concern.

RoHS 2

This mark appears on products compliant with the RoHS2 Directive (Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment).
Products bearing this mark do not exceed the RoHS2 Directive-regulated quantities of the following 10 substances: Cd, Pb, Hg, Cr+6, PBB, PBDE, DEHP, BBP, DBP, DIBP.

ELV

Products bearing this mark contain levels of cadmium, lead, mercury and hexavalent chromium that are within the restrictions of the ELV Directive.

Reduced availability of metal-backed PTFE bearings

Daido has been manufacturing and selling metal-backed PTFE bearings for more than 30 years, but environmental issues have forced us to discontinue sales of some these products.

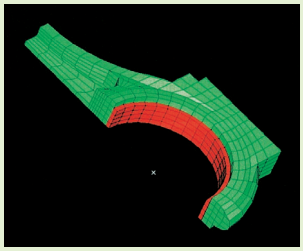
Affected material (discontinued)		Replacement material
DDU01	→	DDK05
DDK01	→	DDK05
DDU31	→	DDK35
DDD01	→	DDK02
DDD02	→	DDK06

In the future, when requesting the use of metal-backed PTFE in the design of a new bearing, please specify a material from the list of replacement materials. Also, for customers using existing products, we request that any follow-up orders include the use of a replacement material at your earliest convenience.

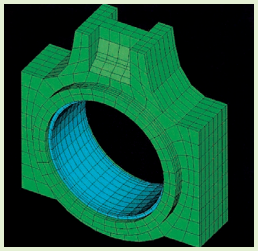
New Product Development

Cementing our Reputation as the Leading Company for Bearings through comprehensive Tribology Research and Development

Daido Metal has Tribology in its genes. Accordingly, we have established a central research laboratory that is one of the few comprehensive Tribology research and development bodies in the world. It deals with everything from theoretical research to development of new materials and composite materials, development and design of bearing products, and development of production technology. Its scope extends as far as the development of products that utilize technology relating to Tribology. By linking from the central research laboratory to the development teams in each production department, we can respond accurately to sophisticated requirements. Through joint development and technology exchange with our clients, who are world leaders in their fields, we can also make a contribution to improving the standard of technology. We are also contributing to international standardization through our participation in the "ISO/TC123 Japan Plain Bearing Committee" of the Japan Society of Mechanical Engineers.

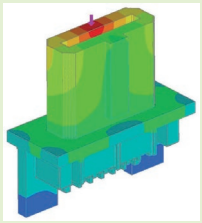


FEM analysis of connecting rod

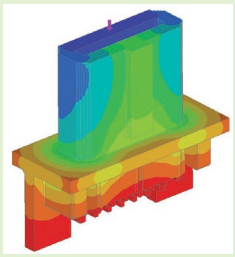


EHL Analysis

Distribution of oil film pressure



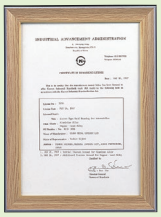
Analysis of plastic-resin flow (pressure at start of dwell)



Analysis of plastic-resin flow (temperature at completion of filling)

Quality Assurance Recognized Worldwide

Daido Metal is promoting production activity based on supplying products to the user from our nearest production location. This is done through our global management system. In doing so we are able to not only acquire international quality standards such as ISO9001 and ISO/TS16949, but also to meet specific customer requirements and certification such as Ford Q1.



JQA-AU0023

Permanent Environmental Management System

Daido Metal considers the global environment to be mankind's common asset. We actively work to protect the environment as it is an important issue. We perceive environmental management systems such as ISO 14001 as an effective tool to continuously reduce our impact on the environment.

ISO/TS16949

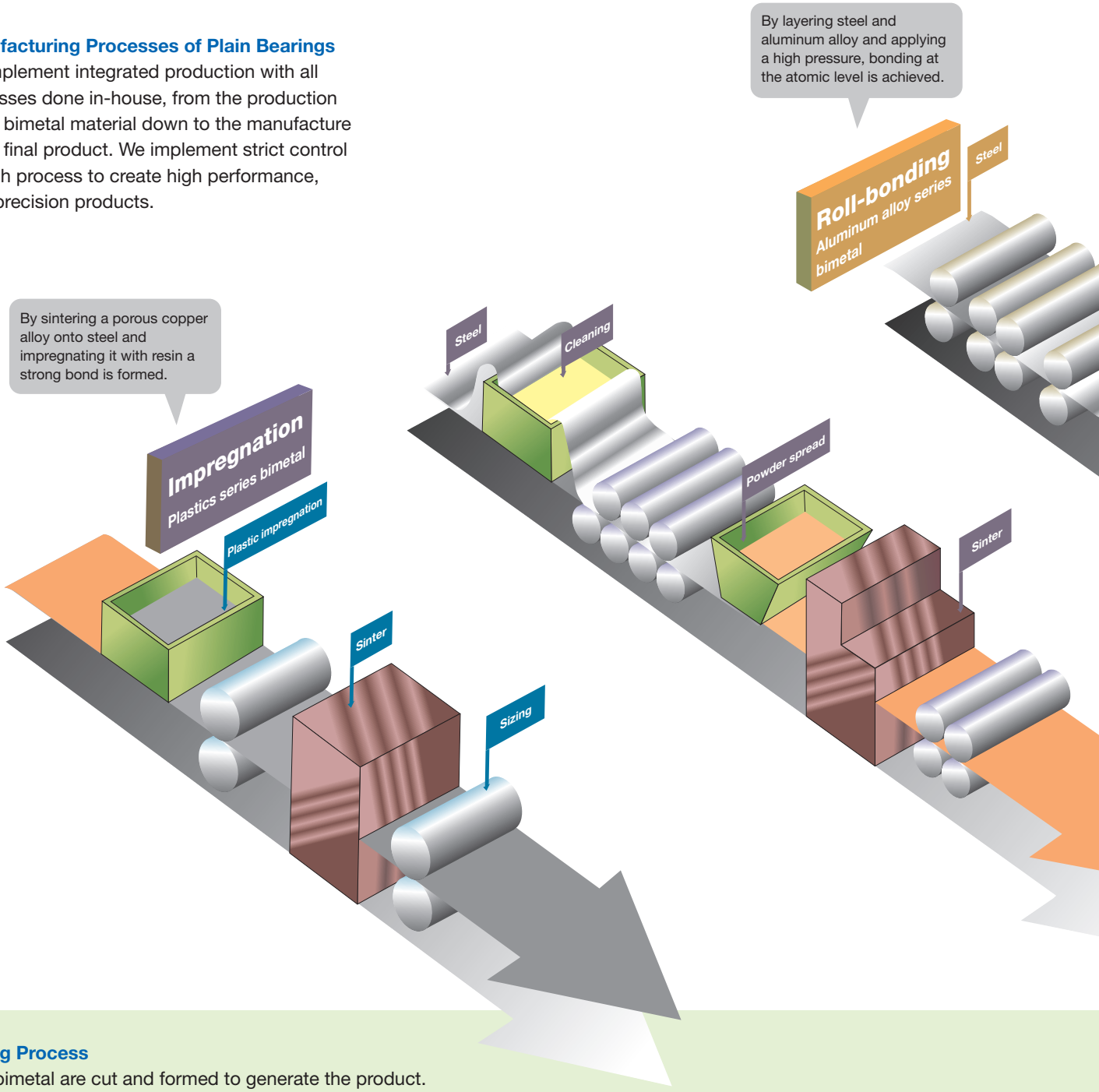
ISO9000/QS9000

ISO14001

System for Total In-house Integrated Production, Harnessing Technology at the Atomic Level

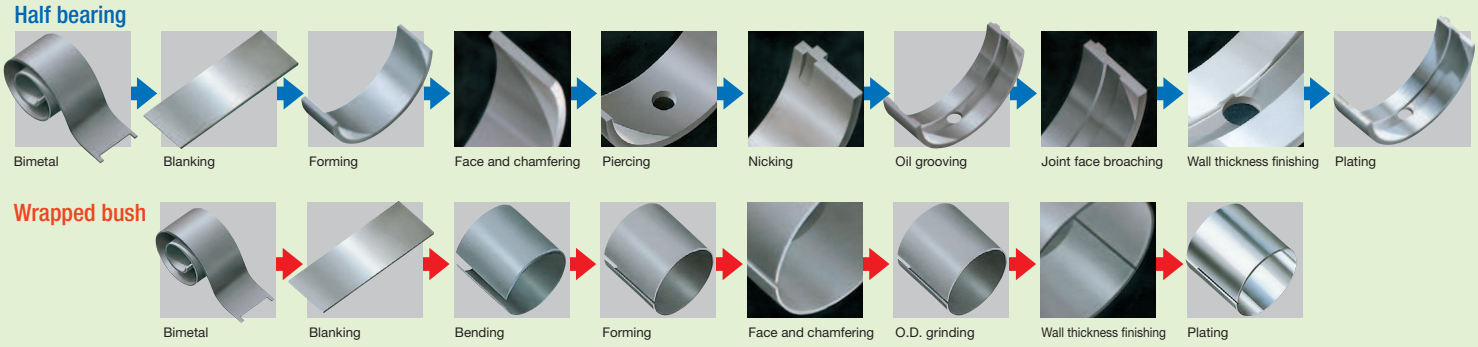
Manufacturing Processes of Plain Bearings

We implement integrated production with all processes done in-house, from the production of the bimetal material down to the manufacture of the final product. We implement strict control in each process to create high performance, high-precision products.



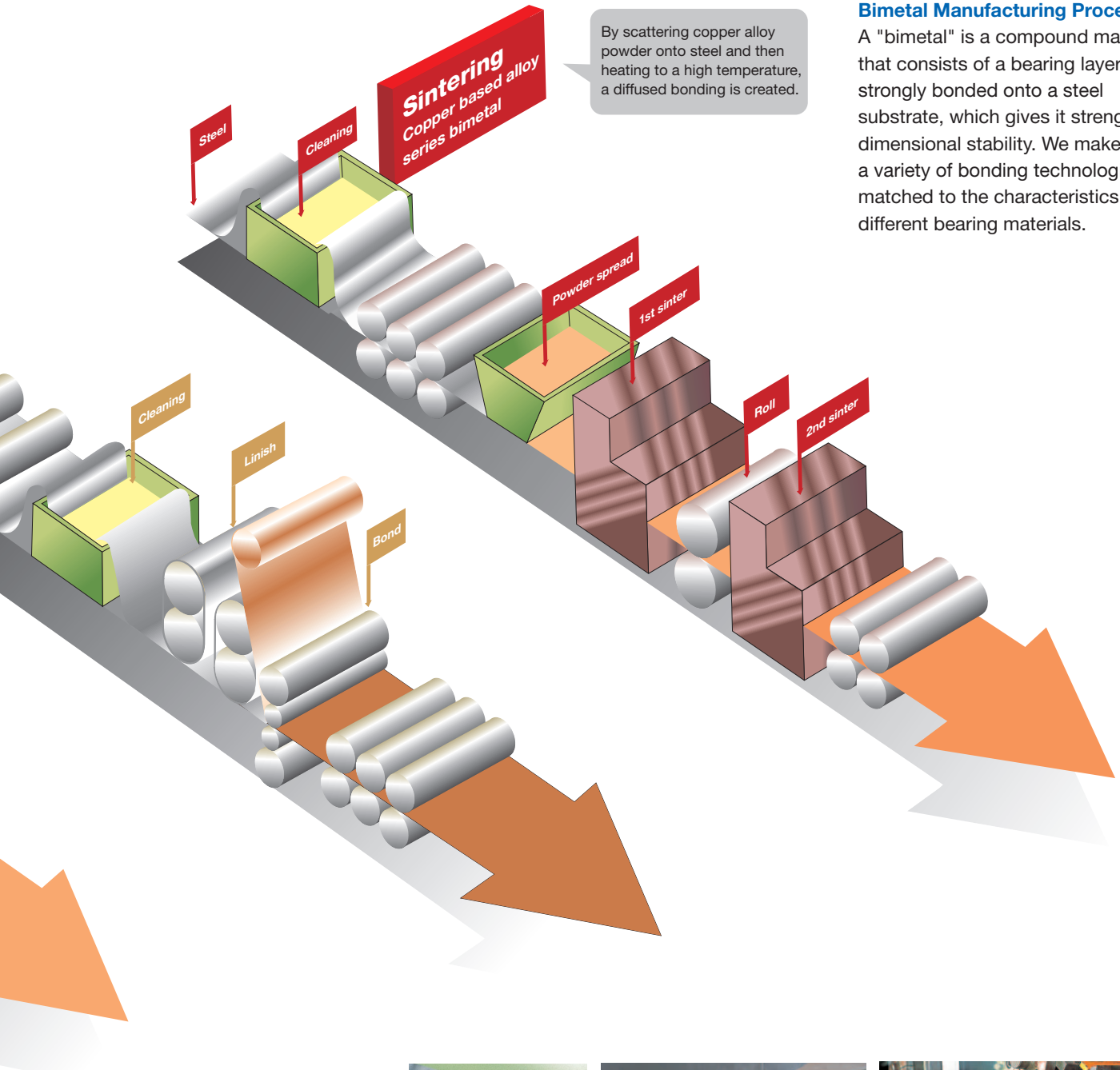
Machining Process

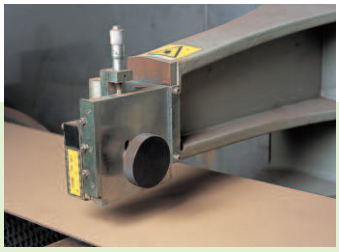
Strips of bimetal are cut and formed to generate the product.
Micron level accuracy is required in all processes.

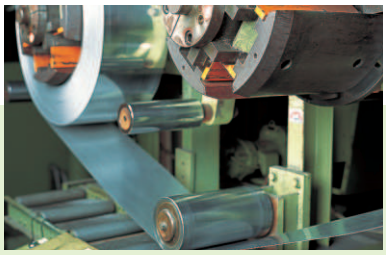


Bimetal Manufacturing Process

A "bimetal" is a compound material that consists of a bearing layer strongly bonded onto a steel substrate, which gives it strength and dimensional stability. We make use of a variety of bonding technologies matched to the characteristics of different bearing materials.

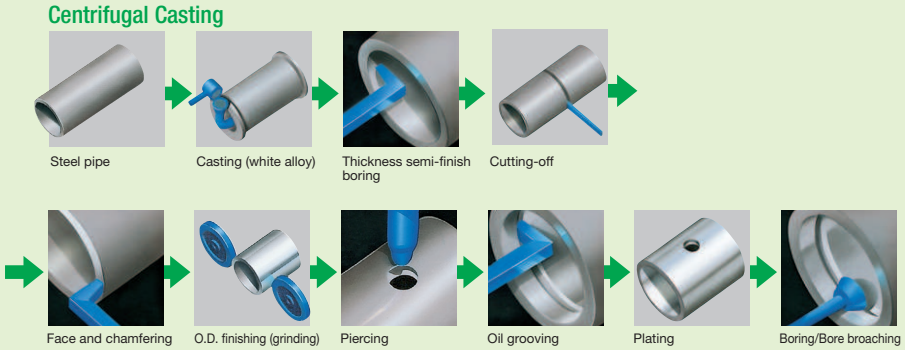






Centrifugal Casting Manufacturing Process

This is the technology for making cylindrical bearings of uniform strength, with no joints. The bearing alloy is cast by utilizing the centrifugal force generated by rotating a steel pipe. All processes are integrated, from working to finishing.



Polymer bearing materials — Dry bearings

Construction	Bearing series	Primary bearing material		Model No.	
BIMETAL	DAIDYNE	PTFE	1	DDK05	P.54
			2	DDK35	P.66
			3	DDK02	P.68
			4	DDK06	P.69
	DAIBEST	POM	5	DBB01	P.70
			7	DBX01	P.82
METAL MESH	DAIMESH	PTFE	8	DMM01	P.88
SOLID	DAIFORCE	PTFE	9	DFA01	P.92
			10	DFG01	P.94
	DAIBEST	POM	6	DBS02	P.76
	DAIHILON	PA	11	DHA	P.96
		ELASTOMER	12	DHR	P.97
	DAITHERMO	PPS	13	DTP	P.98
		PEEK	14	DTK	P.99

Polymer bearing materials — Lubricated metal bearings

Construction	Bearing series	Primary bearing material		Model No.	
BIMETAL	DAIDYNE	PTFE	1	DDK05	P.54
			2	DDK35	P.66
			3	DDK02	P.68
			4	DDK06	P.69
	DAIBEST	POM	9	DBX01	P.82

Metallic bearing materials — Dry Bearings

Construction	Bearing series	Primary bearing material	Model No.		
BIMETAL	THERMALLOY	High-density, sintered bronze with embedded solid lubricant	18	BB type	* P.111
			19	PV plate	P.115
SOLID	THERMALLOY	High-density, sintered with embedded solid lubricant	15	D type	P.102
			16	T type	* P.108
			17	TM series	P.110
	DAISLIDE	Embedded solid lubricant	21	HA, BA, KA, HK	* P.122
	DAILUBO	Oil-impregnated sintered copper	22	DLC series	P.144
		Oil-impregnated sintered steel	22	DLF series	P.144

* indicates that some products are excluded.

Metallic bearing materials — Lubricated metal bearings

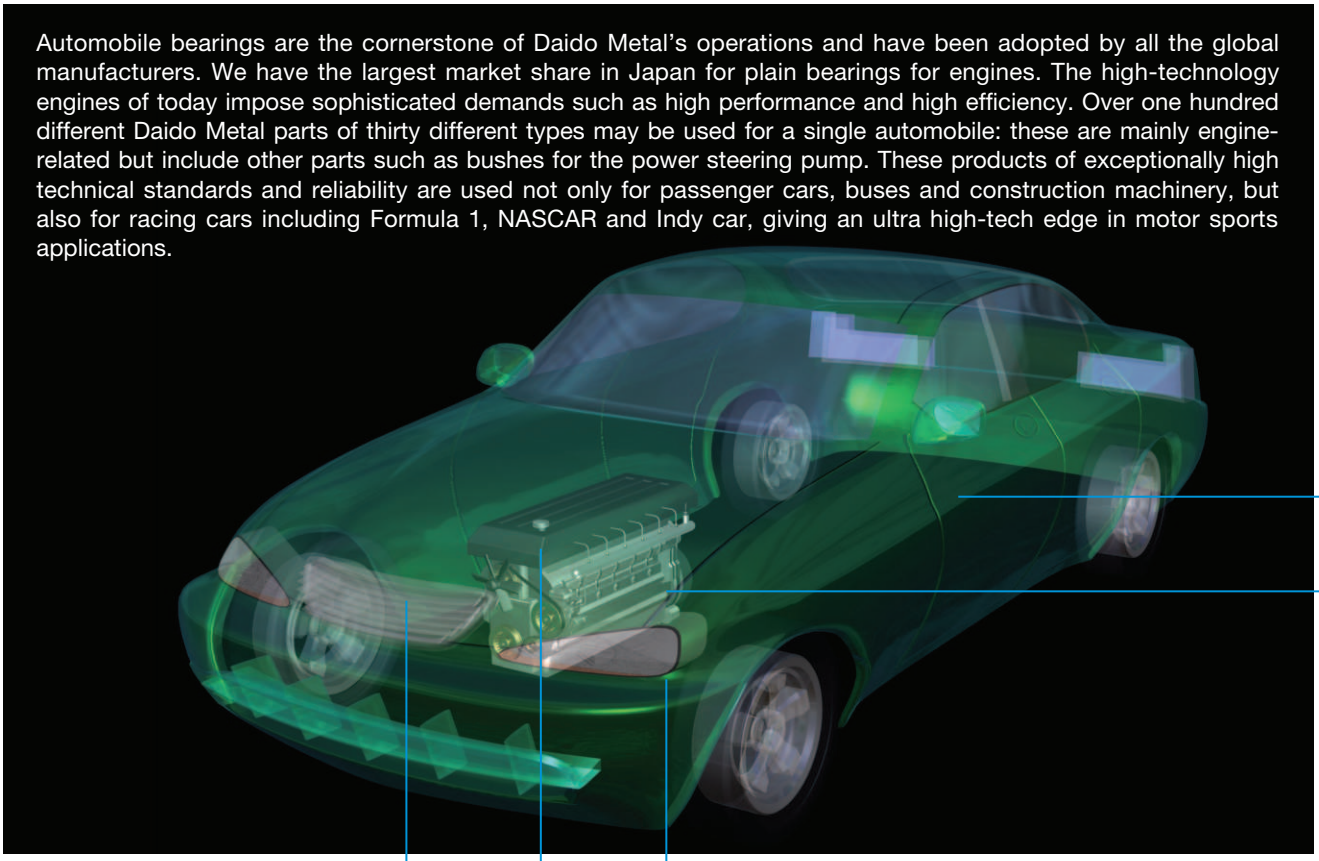
Construction	Bearing series	Primary bearing material	Model No.
BIMETAL		White metal	W90
		Phosphor bronze	B05
			B11
		Lead-bronze	L10
			L23
		Aluminum	A20
			A17X
			A21X
			A22E
			A66T
		Bronze with embedded solid lubricant	LG21X
			BG1K
SOLID		Wear-resistant, high-strength phosphor bronze	YZ5
			YZ5N
		Steel	SPC, H, etc.
		SUS	SUS
SURFACE TREATMENT		Bearing alloys	P10, P9, P9X, P8, P1, etc.
		Sulphur nitriding	DAISULPH

APPLICATION

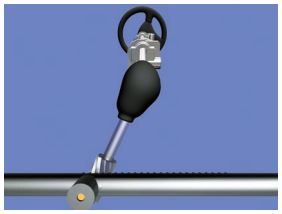
APPLICATION

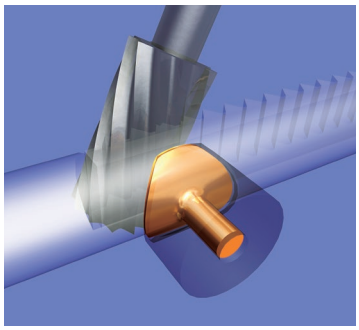
Automobiles

Automobile bearings are the cornerstone of Daido Metal's operations and have been adopted by all the global manufacturers. We have the largest market share in Japan for plain bearings for engines. The high-technology engines of today impose sophisticated demands such as high performance and high efficiency. Over one hundred different Daido Metal parts of thirty different types may be used for a single automobile: these are mainly engine-related but include other parts such as bushes for the power steering pump. These products of exceptionally high technical standards and reliability are used not only for passenger cars, buses and construction machinery, but also for racing cars including Formula 1, NASCAR and Indy car, giving an ultra high-tech edge in motor sports applications.

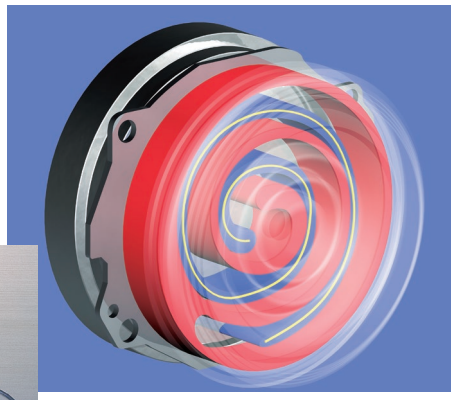


Power steering

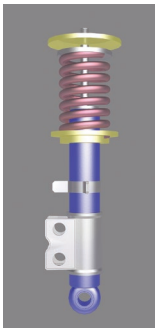


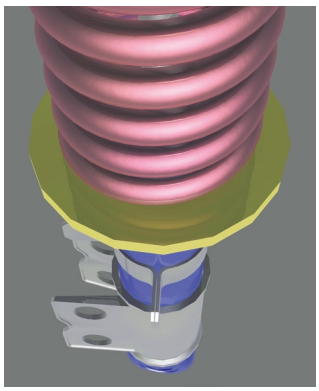


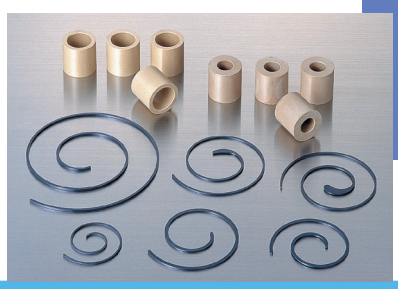
Air compressor



Shock absorber



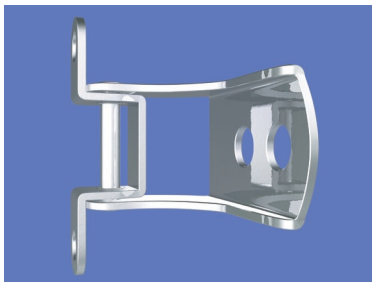




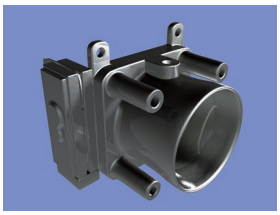
DAITHERMO DTP

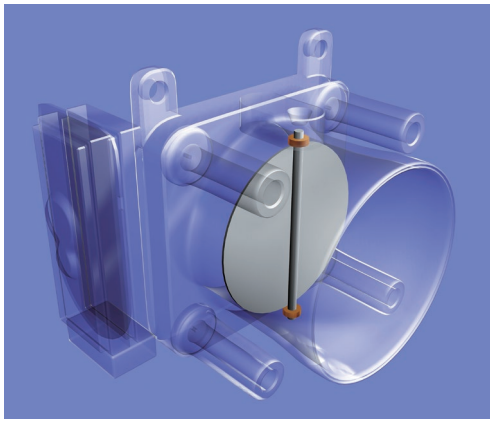
DAIDYNE DDK05

Door hinge

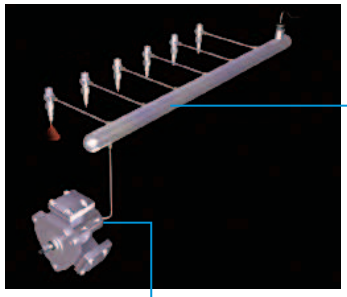


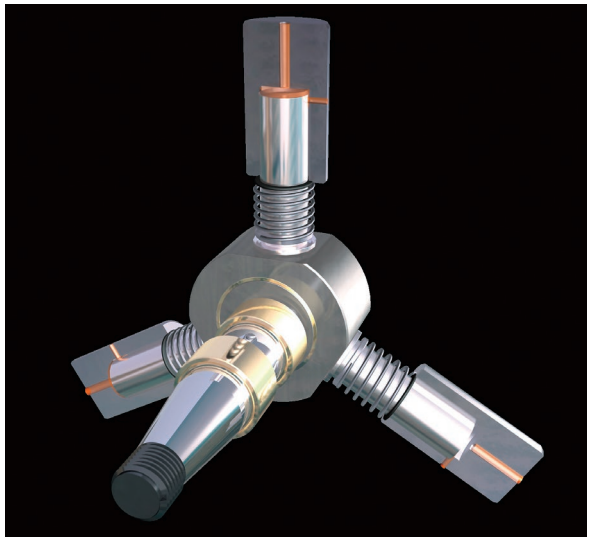
Throttle lever





Engine





APPLICATION

FOODS & ECOLOGY

We provide a wide range of bearings that contribute to the environment and ecology through their usage in renewable energy applications. Our products are energy-saving, labour-saving, non-polluting, and contribute to the preservation of resources and environmental conservation.

Wind Power System

DAIDYNE DBB01

THERMALLOY TYPE T

Beer Production Line

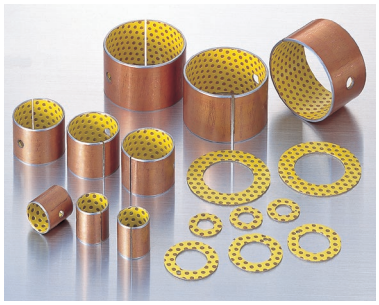
Offshore Oil Drilling Platform

TRANSPORT

This includes automobiles for personal transport, as well as railways and aircraft for the mass transportation of passengers and cargo. Manufacturers of these modes of transport are constantly searching for improvements in efficiency, convenience, comfort and safety. Our non-lubricant bearings provide excellent reliability with zero maintenance needed over a long period of time.

Aircraft

Monorail



DAIBEST DBX01

DAISLIDE

Vessel

APPLICATION

CONSTRUCTION

Bridge

Resources Development such as engineering and construction requires machinery that is designed for the hostile environment in which they operate. Particular requirements have led to our high impact resistant, wear resistant, non-lubricated bearings being specified in these machines. In other fields, such as dams, bridges and water gates earthquake resistant equipment is required.

THERMALLOY TYPE D

DAISLIDE

Excavator

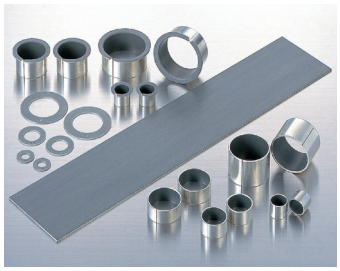
Construction site

Dam

GENERAL INDUSTRY

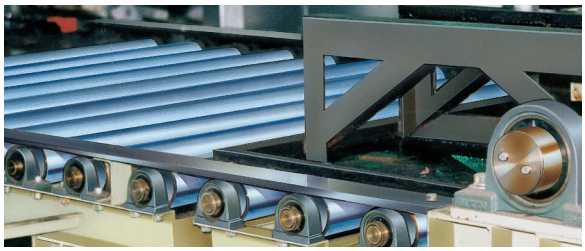
Our maintenance free bearings are also used in a wide range of Factory Automation equipment requiring high accuracy and complex process control in machine tools and injection moulding machines respectively, and also in industrial robots where there are strict requirements for wear resistance, seizure resistance and long term operation.

THERMALLOY

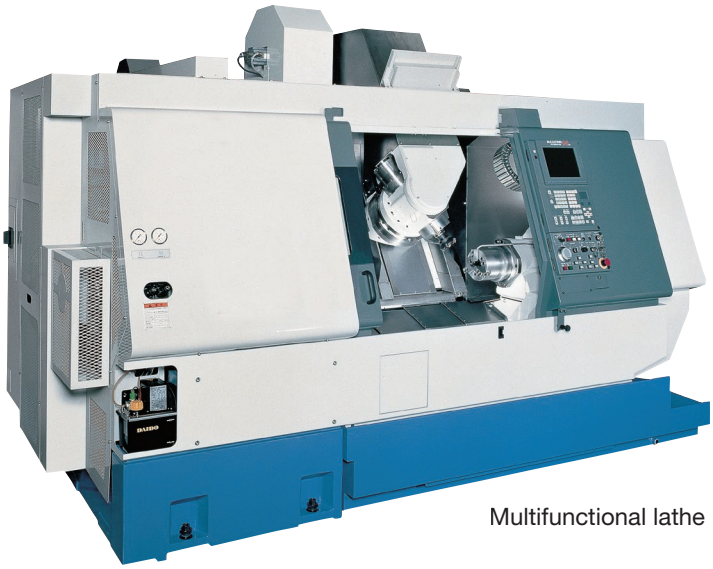


DAIDYNE DDK05

Roundness tester



Roller conveyor



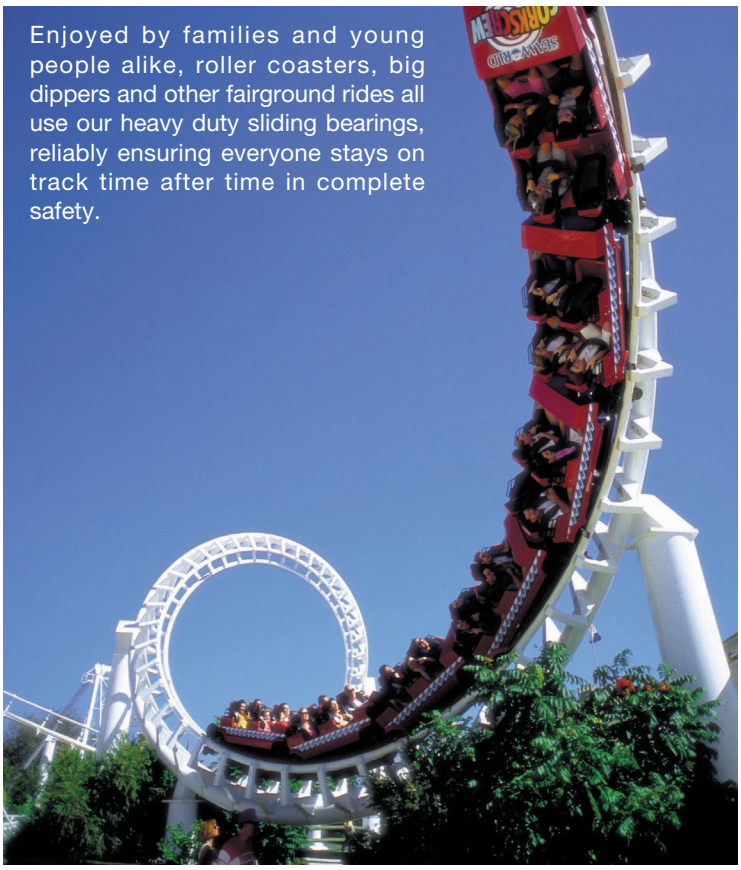
Multifunctional lathe

Injection molding machine

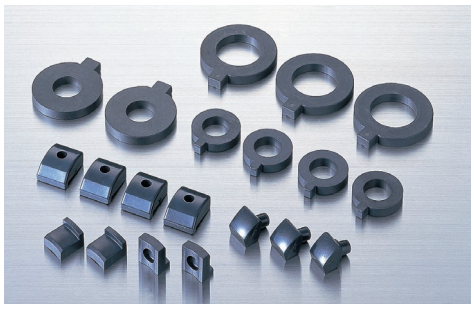
APPLICATION

AMUSEMENT

Enjoyed by families and young people alike, roller coasters, big dippers and other fairground rides all use our heavy duty sliding bearings, reliably ensuring everyone stays on track time after time in complete safety.



Roller coaster



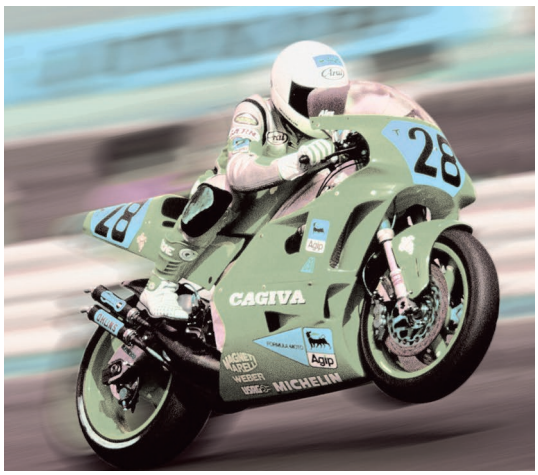
DAITHERMO DTK

Ferris wheel

LEISURE & SPORT

375 kph race car F1 machine, motocross bike, jet ski, snowmobile — For those fields high-speed resistance, a comfortable ride and extra high safety are required. In those fields, our maintenance free highly reliable bearings are used in engines and shock absorber etc.

Racing car



Racing bikes

DAIDYNE DDK35

Snowmobile

COMMUNICATIONS AND OFFICE AUTOMATION SYSTEM

Photocopier, Printer, Video machines, etc. All of these are high performance information processing devices which use our non lubricant bearings meaning that they are free from oil stains and leakage in areas such as quiet, low vibration drives. Another benefit is the light weight and compact design.

DAIMESH DMM01

Parabolic Antenna

Multi-function Photocopier

LIVING AND HEALTH EQUIPMENT

Electrical equipment and Interior Appliances have one requirement in common: zero pollution. We have a wide range of bearings which support this requirement.

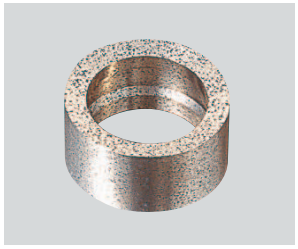
DHA

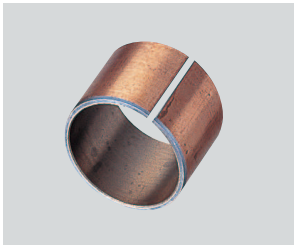
Home-care beds

Massage equipment

Contamination resistant


THERMALLOY D type


THERMALLOY T type


THERMALLOY BB type

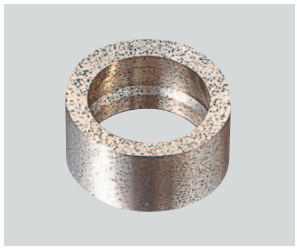

THERMALLOY PV plates

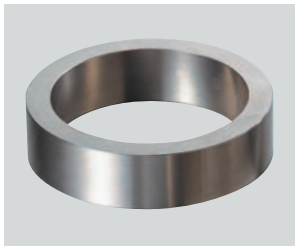

THERMALLOY pillow unit


DAIBEST DBX01


DAISLIDE

Heat resistant

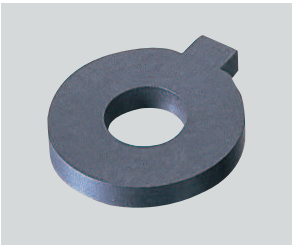

THERMALLOY T type


THERMALLOY TM

Vibration resistant

DAIBEST DBB01

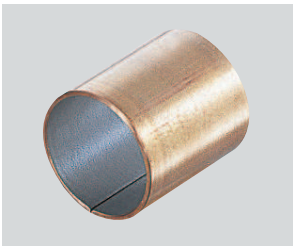
DAIBEST DBX01



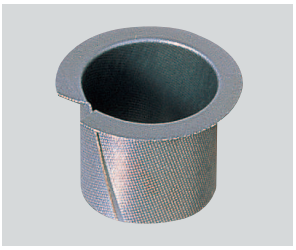
DAITHERMO DTK

DAIHYLON DHR

Suitable for underwater applications

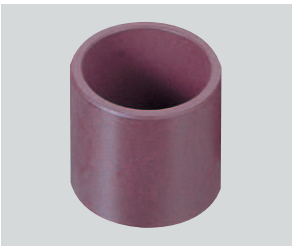


DAIDYNE DDK35



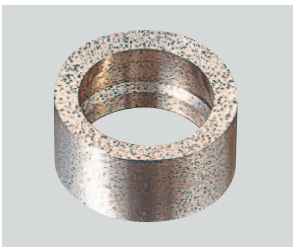
DAIMESH DMM01

DAIFORCE A



DAIFORCE G

THERMALLOY D type



THERMALLOY T type

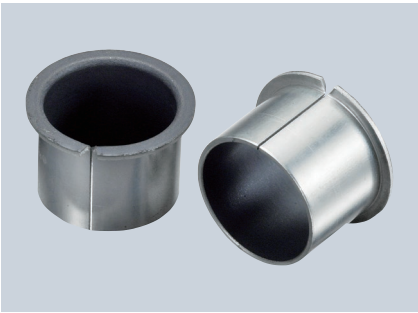
THERMALLOY pillow unit

DAISLIDE

Application chart for polymer bearings

● Recommended product

	Automotive parts	Shock absorbers	Gear pump	PS pumps	Automotive door hinges	Trucks	Leisure vehicles	Conveyor equipment	Hydraulic or pneumatic equipment	Construction equipment	Building materials	Geared motors	Hoists	Agricultural machinery	Lawn mowers
DDK05	●	●	●		●	●	●	●	●		●			●	●
DDK35	●					●	●	●	●		●			●	●
DDK02	●	●	●	●		●	●	●	●		●			●	●
DDK06	●	●							●						
DBB01	●					●	●	●		●		●	●	●	●
DBS02	●				●	●	●	●		●	●			●	●
DBX01	●					●	●	●		●		●	●	●	●
DMM01	●				●	●	●								
DAIFORCE A	●								●						
DAIFORCE G	●							●							
DAIHILON DHA	●										●				
DAIHILON DHR	●					●									
DAITHERMO DTP	●							●							
DAITHERMO DTK	●						●								

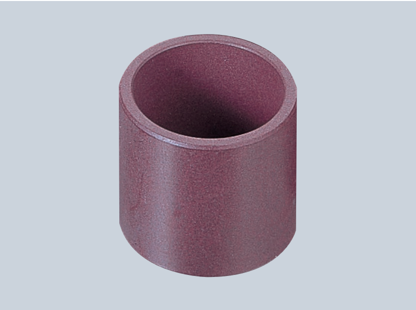


DDK05

DBX01

	Excavation equipment	Electronic devices	Electrical appliances	Textile machinery	Food packaging equipment	Food processing equipment	Seals	Machine tools	Industrial robots	Aerospace	Inspection equipment	Office automation equipment	Optical devices	Compact motors	HVAC equipment
DDK05			●	●				●	●	●		●			●
DDK35			●							●		●			●
DDK02	●							●	●	●					●
DDK06	●														
DBB01				●				●				●			
DBS02			●	●								●		●	
DBX01	●			●											
DMM01				●						●		●	●		
DAIFORCE A					●				●		●	●			●
DAIFORCE G				●		●		●			●	●			●
DAIHILON DHA		●		●								●			
DAIHILON DHR			●												
DAITHERMO DTP				●	●		●					●			●
DAITHERMO DTK		●												●	●

DMM01



DAIFORCE G

Application chart for metal bearings ▪Recommended product

	Automotive parts	Coachwork	Automotive exhaust system parts	High-temperature valves	Conveyor equipment	Agricultural machinery	Construction equipment	Office automation equipment	Machine tools	Food processing equipment	Foundry equipment	Heavy industrial machinery	Shipbuilding equipment	Ceramics facilities	Dams
THERMALLOY D type	●	●			●	●		●	●	●					
THERMALLOY T type		●			●	●	●		●	●	●	●	●	●	●
THERMALLOY TM			●	●											
THERMALLOY BB type	●	●							●		●	●			●
THERMALLOY PV plate		●							●		●	●	●		
THERMALLOY pillow unit															
DAISLIDE HA							●				●	●			
DAISLIDE BA											●	●			
DAISLIDE HK															●
DAISLIDE KA							●								
DAILUBO	●							●							

THERMALLOY D type

THERMALLOY T type

	Sluice gates	Water turbines	Energy-saving equipment	Conveyor equipment	Printing equipment	All types of molds and dies	All types of food processing equipment	Furnace equipment	Injection-molding equipment and dies	Coastal and offshore structures	Compact motors	Audio-visual devices	Electronic devices	Temporary support for steel-framed structures	General-purpose industrial machinery
THERMALLOY D type	●				●										●
THERMALLOY T type	●	●	●	●			●	●		●				●	●
THERMALLOY TM								●							●
THERMALLOY BB type	●	●	●	●	●										●
THERMALLOY PV plate				●		●								●	●
THERMALLOY pillow unit							●	●							●
DAISLIDE HA						●			●						●
DAISLIDE BA															●
DAISLIDE HK	●	●								●					●
DAISLIDE KA									●						●
DAILUBO											●	●	●		


THERMALLOY pillow unit


DAISLIDE

Target performance for polymer dry bearings

No.	Major applications	Construction	Sliding surface materials	Wear resistant			Resistance to heavy loading			Sliding speed		
				Maintenance-free	Grease	Boundaries and fluids	Maintenance-free	Grease	Boundaries and fluids	Maintenance-free	Grease	Boundaries and fluids
1	Hydraulic pumps, fans, dishwashers, building materials, automotive parts, office automation equipment	Steel-backing	PTFE and others	5	3	4	5	4	4	4	3	4
2	Hydraulic pumps, fans, dishwashers, building materials, automotive parts, office automation equipment	Phosphor-bronze backing	PTFE and others	5	3	4	5	4	4	4	3	4
3	Shock absorbers, hydraulic equipment, automotive parts, building materials	Steel-backing	PTFE and others	4	4	5	4	4	5	3	3	5
4	Shock absorbers, hydraulic equipment, automotive parts, building materials	Steel-backing	PTFE and others	4	4	5	3	4	4	3	3	5
5	Textile machinery, agricultural machinery, construction equipment, machine tools, office automation equipment, automotive parts	Steel-backing	POM, oil, and others	5	5	5	4	4	4	5	4	4
6	Office automation equipment, automotive parts, construction materials, textile machinery, agricultural machinery	Solid	POM, oil, and others	5	5	5	3	3	3	5	4	4
7	Coachwork, agricultural machinery, grass mowers, excavation equipment, geared motors, hoists, automotive parts	Steel-backing	POM and others	2	5	5	2	5	5	2	5	5
8	Copying equipment, textile machinery, optical devices, automotive door hinges	Bronze mesh	PTFE and others	4	3	4	4	4	4	3	3	3
9	Office automation equipment, industrial robots, automotive parts, food packaging equipment	Solid	PTFE and others	5	3	4	3	3	3	5	3	4
10	Textile machinery, office automation equipment, machine tools, automotive parts, conveyor equipment, food processing equipment	Solid	PTFE and others	4	3	4	3	3	3	4	3	4
11	Building materials, office automation equipment, textile machinery, electronic devices	Solid	PA and others	3	5	5	3	3	3	3	4	4
12	Trucks, automotive parts, electrical appliances	Solid	Polyester elastomer and others	3	4	4	3	3	3	3	4	4
13	Office automation equipment, textile machinery, automotive parts, conveyor equipment, food packaging equipment, seals	Solid	PPS and others	4	4	5	3	3	3	4	4	4
14	Automotive parts, leisure vehicles, electronic devices	Solid	PEEK and others	4	5	5	3	3	3	4	4	4

Coefficient of friction				Effects of ambient conditions					Operating temperature ranges in °C	Characteristics	Product
Maintenance-free	Grease	Boundaries and fluids	Contamination acceptance	In air	In a vacuum	Underwater	In steam	In acidity or alkalinity			
5	4	5	3	5	5	3	3	3	-200 to +280	Offers a low coefficient of friction and excellent wear-resistance under dry conditions.	DAIDYNE DDK05
5	4	5	3	5	5	5	5	3	-200 to +280	Offers a low coefficient of friction and excellent wear-resistance under dry conditions. Best-selling dry bearing For corrosive environments	DAIDYNE DDK35
4	4	5	3	5	5	3	3	3	-200 to +280	Offers excellent resistance to wear and heavy loading with boundary lubrication.	DAIDYNE DDK02
4	4	5	3	5	5	3	3	3	-200 to +280	Offers excellent resistance to wear and heavy loading with boundary lubrication.	DAIDYNE DDK06
4	4	5	4	5	2	3	3	3	-40 to +120	At medium loads and high speeds	DAIBEST DBB01
4	4	5	4	5	2	4	3	3	-40 to +80	Injection molded grades At light loads and high speeds	DAIBEST DBS02
2	5	5	4	5	3	3	3	3	-40 to +120	Offers a low coefficient of friction and excellent wear-resistance with grease lubrication.	DAIBEST DBX01
4	4	4	4	5	5	5	5	4	-200 to +280	Can be installed with negative clearances	DAIMESH DMM01
5	4	5	4	5	5	5	5	5	-200 to +280	Offers chemical stability, a low coefficient of friction and excellent wear-resistance under light loads.	DAIFORCE A
3	4	5	4	5	5	5	5	4	-200 to +280	High-material-strength PTFE	DAIFORCE G
3	4	5	3	5	5	3 Potential swelling	3 Potential swelling	4 (Acidic 2)	-40 to +140	Injection molded grades High strength and electrical conductivity	DAIHILON DHA
3	4	4	5	5	3	3	3	3	-40 to +60	Injection molded grades Superior flexibility and embedding	DAIHILON DHR
5	4	5	3	5	5	5	5	4	-40 to +180	Injection molded grades Superior friction characteristics	DAITHERMO DTP
4	4	5	3	5	5	5	5	4	-150 to +260	Injection molded grades High strength and heat resistance	DAITHERMO DTK

Figures for target performance indicate: 5 = excellent, 4 = very good, 3 = good, 2 = inadequate, 1 = failure

* Performance in acidic or alkaline environments will vary per type, concentration, and temperature. We recommend careful evaluation per trial operation. Please inquire directly for detailed information about specific applications.

Target performance for metal dry bearings

No.	Major applications	Construction	Sliding surface materials	Wear resistant			Resistance to heavy loading			Sliding speed		
				Maintenance-free	Grease	Boundaries and fluids	Maintenance-free	Grease	Boundaries and fluids	Maintenance-free	Grease	Boundaries and fluids
15	Coachwork, conveyor equipment, agricultural machinery, construction equipment, office automation equipment, machine tools, food processing equipment	Solid	Bronze and graphite	4	5	5	5	5	5	3	4	4
16	Foundry equipment, heavy industrial machinery, shipbuilding equipment, machine tools, glass, cement, ceramics equipment, dams, sluice gates, water turbines	Solid		5	5	5	5	5	5	3	4	4
17	Furnace equipment (hearth plates, furnace bearings), high-temperature valves, automotive exhaust system parts	Solid	FeCr, Cu, and others	5	(3)	(3)	5	(3)	(3)	3	(3)	(3)
18	Machine tools, energy-saving equipment, conveyor equipment, woodworking tools, printing equipment	Steel-backing	Bronze and graphite	4	5	5	5	5	5	3	4	4
19	Molds and dies, machine tools, conveyor equipment, energy-saving equipment, shipbuilding equipment, foundry equipment	Steel-backing	Bronze and graphite particles	4	5	5	5	5	5	3	4	4
20	Food processing equipment, general-purpose equipment	Bearings, casings, inner wheels, outer wheels	Bronze and graphite	5	5	5	5	5	5	3	4	4
21	Shipbuilding equipment, heavy industrial machinery, construction equipment, injection molding equipment, molds and dies	Solid	Copper alloy and embedded solid lubricant	4	5	5	5	5	5	3	4	4
	Shipbuilding equipment, heavy industrial machinery	Solid	Copper alloy and embedded solid lubricant	4	5	5	4	4	4	4	4	4
	Dams, sluice gates, water turbines, coastal and offshore structures	Solid	Copper alloy and embedded solid lubricant	4	5	5	5	5	5	3	4	4
	Construction equipment, earthwork and excavation equipment, injection molding equipment	Solid	High-strength copper alloy and embedded solid lubricant	4	5	5	5	5	5	3	4	4
22	Compact motors, automotive parts, audiovisual equipment, electronic devices	Solid	Copper or steel, oil, and others	5	5	5	3	3	3	5	5	5

Coefficient of friction				Effects of ambient conditions					Operating temperature ranges in °C	Characteristics	Product
Maintenance-free	Grease	Boundaries and fluids	Contamination acceptance	In air	In a vacuum	Underwater	In steam	In acidity or alkalinity			
3	4	4	4	5	3	5	5	4	-70 to +200	Standard grade of Thermalloy Cutting processes not required	THERMALLOY D type
3	4	4	5	5	4 (5)	5	5	5	-200 to +700	Countermeasures for temperature, impurities, seawater, or corrosive environments Materials suitable for use in vacuums	(NB1) THERMALLOY T type
3	(4)	(4)	3	5	1	(3)	5	5 (Alkaline 3)	(-200) to +700	Superior acid-resistant and wear resistant performance in high-temperature, acidic environments	THERMALLOY TM
3	4	4	4	5	3	3	3	3	-70 to +250	Space-saving, high-load bearing	(NB2) THERMALLOY BB type
3	4	4	5	5	3	3	3	3	-70 to +250	Can be used directly as a component mechanical part	THERMALLOY PV plate
3	4	4	5	5	3	5	5	4	-50 to +200	Can be used directly as a Maintenance-free, self-aligning bearing unit	THERMALLOY pillow unit
3	4	4	4	5	3	3	4	3	-70 to +250	For general-purpose, medium- and high-load applications	DAISLIDE HA
3	4	4	4	5	3	3	4	3	-70 to +250	For general-purpose, medium- and high-load applications	DAISLIDE BA
3	4	4	4	–	–	5	4	3	-40 to +80	For use underwater or in sea water	DAISLIDE HK
3	4	4	4	5	3	3	4	3	-70 to +250	HA for even heavier-duty use	DAISLIDE KA
5	5	5	3	5	1	1	1	1	-20 to +80	Superior economic performance Superior friction characteristics	DAILUBO

Figures for target performance indicate: 5 = excellent, 4 = very good, 3 = good, 2 = inadequate, 1 = failure

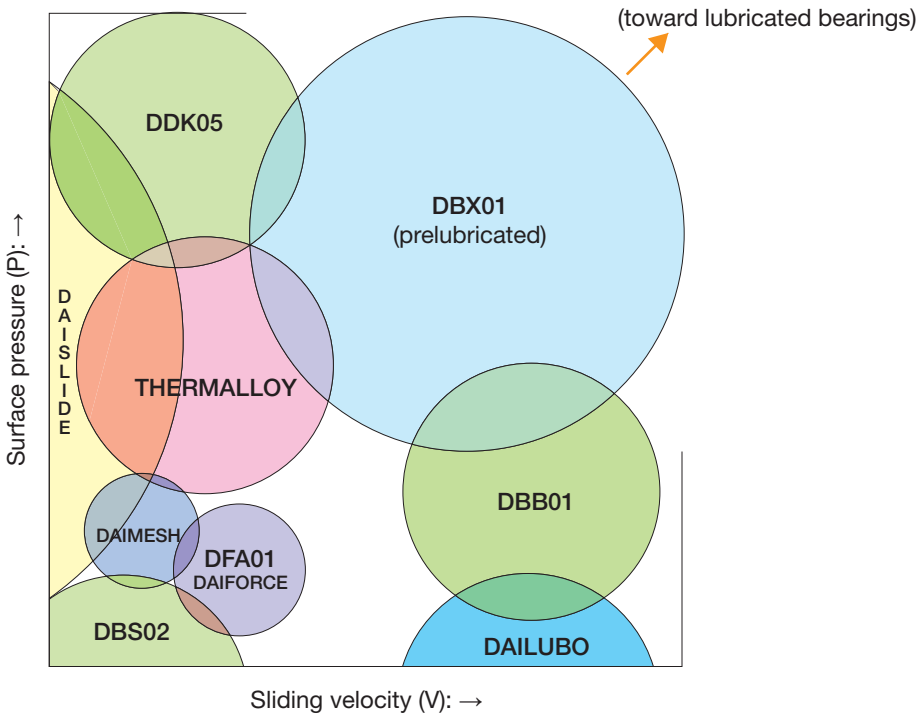
* Performance in acidic or alkaline environments will vary per type, concentration, and temperature. We recommend careful evaluation per trial operation. Please inquire directly for detailed information about specific applications.

NB1 and NB2: Excluding some products.

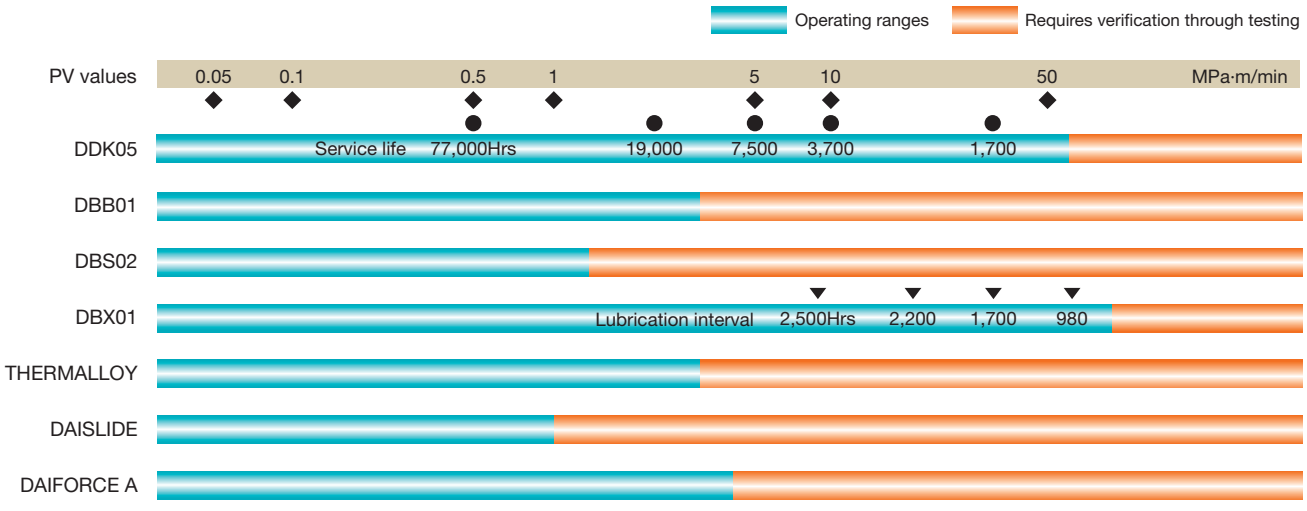
Applications for dry bearings

Dry bearings and trends in PV values

Shows primarily dry bearings.

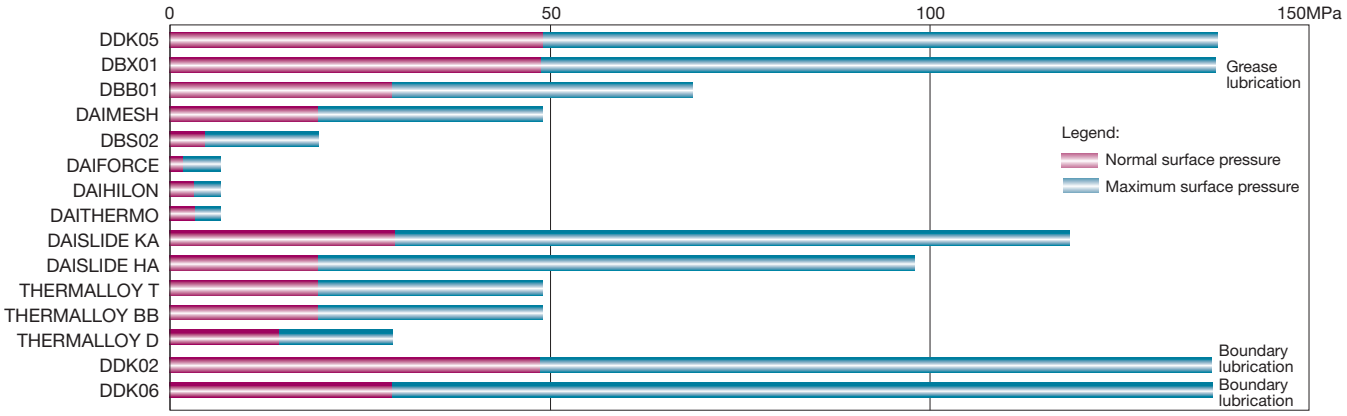


Selecting dry bearings



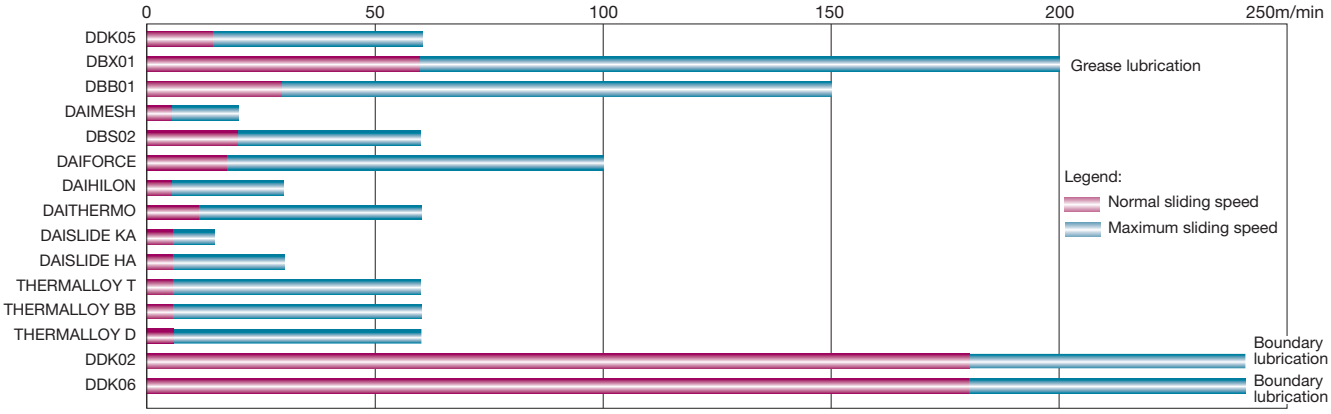
Max. permissible surface pressures for dry bearings

Permissible surface pressures vary with sliding velocity.



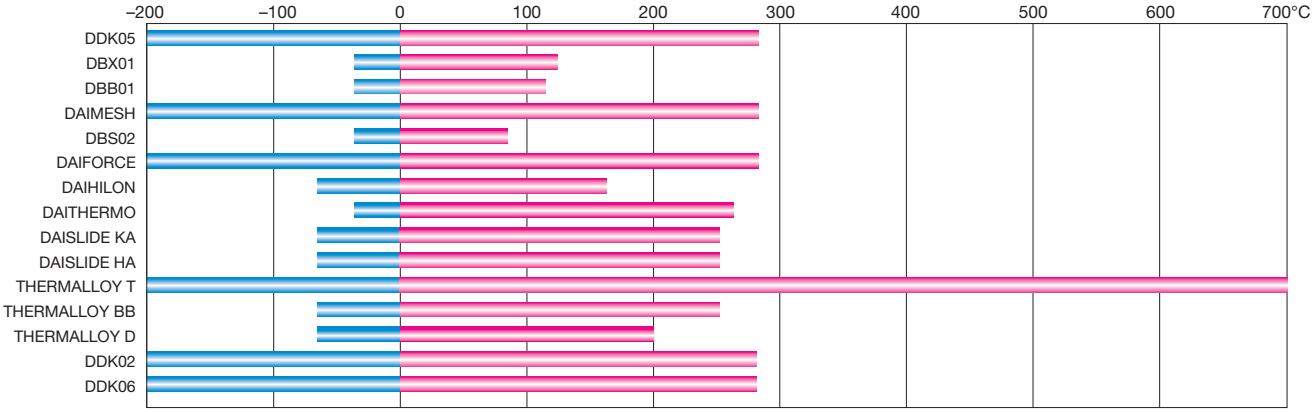
Max. sliding velocity for dry bearings

Permissible sliding velocities vary with surface pressure.



Operating temperature range for dry bearings

Operating temperature ranges vary with sliding velocity and surface pressure.



MANUFACTURE

Polymer bearing materials

Lead-free bearings

RoHS2-compliant bearings

ELV-compliant bearings

Shown on page 000 Shown on page

【Note 1】
How to read target performance charts.
- Figures indicate optimal performance under ideal conditions, but actual performance cannot be expected to achieve these levels simultaneously in all categories.
- Various grades of DAIHYLON and DAITHERMO are available for each product. Figures indicate performance levels for typical grades. Please inquire directly for detailed information about specific applications.
- The pascal (Pa) is an SI-derived unit used to quantify pressure and stress. One megapascal (MPa) is equivalent to 10.197kgf/cm^2

【Note 2】
Figures for target performance indicate: 5 = excellent, 4 = very good, 3 = good, 2 = inadequate, 1 = failure
Performance in acidic or alkaline environments will vary per type, concentration, and temperature. We recommend careful evaluation per trial operation. Please inquire directly for detailed information about specific applications.

Pb Free RoHS 2 ELV

1

Shown on page 054

DAIDYNE DDK05

This completely maintenance-free bearing material comprises a porous copper-tin alloy sintered on a steel backing and a lining made of polytetrafluoroethylene (PTFE) mixed with a special filler. The excellent tribological properties of this lining provide optimal utilization of the strength, dimensional stability, and other characteristics of the metals.

Major applications

General-purpose industrial machinery, hydraulic equipment, electrical appliances, automotive parts, textile machinery, and packaging machinery

Characteristics

① Offers a low coefficient of friction and excellent wear-resistance under dry conditions.
② Eliminates “stick and slip” thanks to a low coefficient of friction.
③ Performs well under high loads.
④ Performs well through an extended range of operating temperatures.
⑤ Offers superior resistance to chemical substances.

Component materials

Polytetrafluoroethylene (PTFE) mixed with a special filler

Characteristics

Specific Load MPa		Sliding Speed m/min		Service Temp. Range °C	Friction Coefficient μ	Tolerance of Foreign Particles
Normal	Max.	Normal	Max.	Min. to Max.		
Below 49.0	137	Below 15.0	60	-200 to 280	0.03 to 0.2	Low

Target Properties

Structure	Sliding Layer Component	Wear Resistance			Load Resistance		
		No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid
With Steel Backing	PTFE and others	5	3	4	5	4	4

Sliding Speed			Friction Coefficient			Tolerance of Foreign Particles	Effect of Various Atmospheres				
No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid		In Air	In Vacuum	In Water	In Vapor	In Acid or Alkali
4	3	4	5	4	5	3	5	5	3	3	3

5=Excellent 4=Very good 3=Good 2=Fair 1=Poor

Pb Free RoHS 2 ELV

2

Shown on page 066

DAIDYNE DDK35

This completely maintenance-free bearing material comprises a porous copper-tin alloy sintered on a phosphor-bronze backing and a lining made of polytetrafluoroethylene (PTFE) mixed with a special filler. Not only do the excellent tribological properties of this lining provide optimal utilization of the strength, dimensional stability, and other characteristics of the metals, it also features water-resistant properties that make it suitable for underwater applications.

Major applications

General-purpose industrial machinery, food processing equipment, electrical appliances, and automotive parts

Characteristics

① Offers superior resistance to both water and chemical substances.
② Features nonmagnetic materials.
③ Offers a low coefficient of friction and excellent wear-resistance under dry conditions.
④ Offers a low coefficient of friction eliminates “stick and slip.”
⑤ Performs well under high loads.
⑥ Performs well through an extended range of operating temperatures.

Component materials

Polytetrafluoroethylene (PTFE) mixed with a special filler

Characteristics

Specific Load MPa		Sliding Speed m/min		Service Temp. Range °C	Friction Coefficient μ	Tolerance of Foreign Particles
Normal	Max.	Normal	Max.	Min. to Max.		
Below 49.0	137	Below 15.0	60	-200 to 280	0.03 to 0.2	Low

Target Properties

Structure	Sliding Layer Component	Wear Resistance			Load Resistance		
		No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid
Phosphor bronze backing	PTFE and others	5	3	4	5	4	4

Sliding Speed			Friction Coefficient			Tolerance of Foreign Particles	Effect of Various Atmospheres				
No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid		In Air	In Vacuum	In Water	In Vapor	In Acid or Alkali
4	3	4	5	4	5	3	5	5	5	5	3

5=Excellent 4=Very good 3=Good 2=Fair 1=Poor

Pb Free RoHS 2 ELV

3

Shown on page 068

DAIDYNE DDK02

This lead-free, ecofriendly bearing comprises a porous copper-tin alloy sintered on a steel backing and a lining made of polytetrafluoroethylene (PTFE) mixed with a special filler. This bearing demonstrates superior durability along boundary surfaces and under fluid lubrication, and the excellent tribological properties of this lining provide optimal utilization of the strength, dimensional stability, and other characteristics of the metals.

Major applications

Shock absorbers, gear pumps, power steering pumps, other automotive parts, and general-purpose industrial machinery

Characteristics

① Provides performance under high loads that is comparable to metal bearings.
② Offers a low coefficient of friction and excellent wear-resistance along boundary surfaces and under fluid lubrication.
③ Eliminates "stick and slip" thanks to a low coefficient of friction.
④ Offers superior resistance to chemical substances.
⑤ Offers cavitation-resistant performance.
⑥ Performs well through an extended range of operating temperatures.

Component materials

Polytetrafluoroethylene (PTFE) mixed with a special filler

Characteristics

Specific Load MPa		Sliding Speed m/min		Service Temp. Range °C	Friction Coefficient μ	Tolerance of Foreign Particles
Normal	Max.	Normal	Max.	Min. to Max.		
Below 49.0	137	Below 180 (Boundary Lubrication)	Below 240 (Boundary Lubrication)	-200 to 280	0.01 to 0.1 (Boundary Lubrication)	Low

Target Properties

Structure	Sliding Layer Component	Wear Resistance			Load Resistance		
		No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid
With Steel Backing	PTFE and others	4	4	5	4	4	5

Sliding Speed			Friction Coefficient			Tolerance of Foreign Particles	Effect of Various Atmospheres				
No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid		In Air	In Vacuum	In Water	In Vapor	In Acid or Alkali
3	3	5	4	4	5	3	5	5	3	3	3

5=Excellent 4=Very good 3=Good 2=Fair 1=Poor

Pb Free RoHS 2 ELV

4

Shown on page 069

DAIDYNE DDK06

This lead-free bearing provides superior cavitation-resistant performance and comprises a porous copper-tin alloy sintered on a steel backing and a lining made of polytetrafluoroethylene (PTFE) mixed with a special filler. This bearing demonstrates superior durability along boundary surfaces and under fluid lubrication, and the excellent tribological properties of this lining provide optimal utilization of the strength, dimensional stability, and other characteristics of the metals.

Major applications

Shock absorbers, hydraulic cylinders, general-purpose industrial machinery, and automotive parts

Characteristics

① Offers cavitation-resistant performance.
② Offers a low coefficient of friction and excellent wear-resistance along boundary surfaces and under fluid lubrication.
③ Eliminates “stick and slip” thanks to a low coefficient of friction.
④ Performs well under high loads.
⑤ Offers superior resistance to chemical substances.
⑥ Performs well through an extended range of operating temperatures.

Component materials

Polytetrafluoroethylene (PTFE) mixed with a special filler

Characteristics

Specific Load MPa		Sliding Speed m/min		Service Temp. Range °C	Friction Coefficient μ	Tolerance of Foreign Particles
Normal	Max.	Normal	Max.	Min. to Max.		
Below 29.4	137	Below 180 (Boundary Lubrication)	240 (Boundary Lubrication)	-200 to 280	0.01 to 0.1 (Boundary Lubrication)	Low

Target Properties

Structure	Sliding Layer Component	Wear Resistance			Load Resistance		
		No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid
With Steel Backing	PTFE and others	4	4	5	3	4	4

Sliding Speed			Friction Coefficient			Tolerance of Foreign Particles	Effect of Various Atmospheres				
No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid		In Air	In Vacuum	In Water	In Vapor	In Acid or Alkali
3	3	5	4	4	5	3	5	5	3	3	3

5=Excellent 4=Very good 3=Good 2=Fair 1=Poor

Pb Free RoHS 2 ELV

5

Shown on page 070

DAIBEST DBB01

This lead-free, ecofriendly bearing is completely maintenance-free thanks to a porous copper-tin alloy sintered on a steel backing and a lining made of polyoxymethylene (POM), lipophilic fiber, a special filler, and lubricant. The excellent tribological properties of this lining provide optimal utilization of the strength, dimensional stability, and other characteristics of the metals.

Major applications

General-purpose industrial machinery, hydraulic equipment, electrical appliances, and automotive parts

Characteristics

① Offers a low coefficient of friction and excellent wear-resistance under dry conditions.
② Suitable for applications requiring high-speed, operation under dry conditions.
③ Performs well under high loads.
④ Provides superior resiliency against misalignment.
⑤ Eliminates “stick and slip” thanks to a low coefficient of friction.
⑥ Performs well through an extended range of operating temperatures.

Component materials

Polyoxymethylene (POM) mixed with a special filler, lipophilic fiber, and lubricant

Characteristics

Specific Load MPa		Sliding Speed m/min		Service Temp. Range °C	Friction Coefficient μ	Tolerance of Foreign Particles
Normal	Max.	Normal	Max.	Min. to Max.		
Below 29.4	68.6	Below 30	150	-40 to 120	0.02 to 0.15 (Oil Retaining)	Medium

Target Properties

Structure	Sliding Layer Component	Wear Resistance			Load Resistance		
		No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid
With Steel Backing	POM + Oil and others	5	5	5	4	4	4

Sliding Speed			Friction Coefficient			Tolerance of Foreign Particles	Effect of Various Atmospheres				
No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid		In Air	In Vacuum	In Water	In Vapor	In Acid or Alkali
5	4	4	4	4	5	4	5	2	3	3	3

5=Excellent 4=Very good 3=Good 2=Fair 1=Poor

Pb Free RoHS 2 ELV

6

Shown on page 076

DAIBEST DBS02

This lead-free, ecofriendly bearing is completely maintenance-free and made of polyoxymethylene (POM), lipophilic fiber, a special filler, and lubricant. These materials are not only suitable for injection molding of complex shapes but also offer excellent tribological properties.

Major applications

General-purpose industrial machinery, food processing equipment, electrical appliances, automotive parts, and parts for entertainment equipment

Characteristics

① Offers a low coefficient of friction and excellent wear-resistance under dry conditions.
② Suitable for applications requiring high-speed, operation under dry conditions.
③ Eliminates “stick and slip” thanks to a low coefficient of friction.
④ Suitable for injection molding of complex shapes.
⑤ Provides superior resiliency against misalignment.
⑥ Performs well through an extended range of operating temperatures.

Component materials

Polyoxymethylene (POM), lipophilic fiber, a special filler, and lubricant

Characteristics

Specific Load MPa		Sliding Speed m/min		Service Temp. Range °C	Friction Coefficient μ	Tolerance of Foreign Particles
Normal	Max.	Normal	Max.	Min. to Max.		
Below 4.9	Below 9.6	Below 20	60	-40 to 80	0.02 to 0.15 (Oil Retaining)	Medium

Target Properties

Structure	Sliding Layer Component	Wear Resistance			Load Resistance		
		No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid
Solid	POM + Oil and others	5	5	5	3	3	3

Sliding Speed			Friction Coefficient			Tolerance of Foreign Particles	Effect of Various Atmospheres				
No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid		In Air	In Vacuum	In Water	In Vapor	In Acid or Alkali
5	4	4	4	4	5	4	5	2	4	3	3

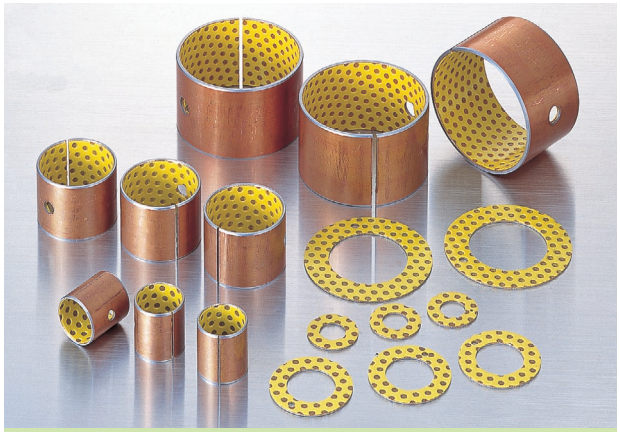
5=Excellent 4=Very good 3=Good 2=Fair 1=Poor

Pb Free RoHS 2 ELV

7

Shown on page 082

DAIBEST DBX01



This lead-free, ecofriendly bearing materials are filled with lubricant during installation, after which periodic maintenance is enough to guarantee an extended service life even under heavy loads. They comprise a porous copper-tin alloy sintered on a steel backing and a lining primarily made of polyoxymethylene (POM). Indented lubricant reservoirs enable this lining to provide optimal utilization of the strength, dimensional stability, and other characteristics of the metals.

Major applications

General-purpose industrial machinery, heavy-duty machinery and equipment, mechanical plants and facilities, and automotive parts

Characteristics

① Performs well at high speeds and under high loads.
② Provides excellent durability thanks to its ability to retain lubricant.
③ Offer a low coefficient of friction and excellent wear-resistance under dry conditions.
④ Performs well through an extended range of operating temperatures.
⑤ Provides superior resiliency against misalignment.

Component materials

Polyoxymethylene (POM) mixed with a special filler

Characteristics

Specific Load MPa		Sliding Speed m/min		Service Temp. Range °C	Friction Coefficient μ	Tolerance of Foreign Particles
Normal	Max.	Normal	Max.	Min. to Max.		
Below 49.0	137	Below 60 (Grease lubrication)	Below 200 (Grease lubrication)	-40 to 120	0.01 to 0.15 (Grease lubrication)	Medium

Target Properties

Structure	Sliding Layer Component	Wear Resistance			Load Resistance		
		No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid
With Steel Backing	POM and others	2	5	5	2	5	5

Sliding Speed			Friction Coefficient			Tolerance of Foreign Particles	Effect of Various Atmospheres				
No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid		In Air	In Vacuum	In Water	In Vapor	In Acid or Alkali
2	5	5	2	5	5	4	5	2	3	3	3

5=Excellent 4=Very good 3=Good 2=Fair 1=Poor

Pb Free RoHS 2 ELV

8

Shown on page 088

DAIMESH DMM01

This completely maintenance-free bearing material comprises a copper-tin alloy mesh and a lining made of polytetrafluoroethylene (PTFE) mixed with a special filler. The flexible structure enables installation with negative clearances, thereby completely eliminating any play between the axle and the bearing.

Major applications

General-purpose industrial machinery, electrical appliances, automotive parts, and the aerospace industry

Characteristics

① Offers the flexibility needed for superior formability.
② Can be installed with negative clearances.
③ Offers a low coefficient of friction and excellent wear-resistance with maintenance-free operation.
④ Eliminates “stick and slip” thanks to a low coefficient of friction.
⑤ Performs well under high loads.
⑥ Performs well through an extended range of operating temperatures.

Component materials

Polytetrafluoroethylene (PTFE) mixed with a special filler

Characteristics

Specific Load MPa		Sliding Speed m/min		Service Temp. Range °C	Friction Coefficient μ	Tolerance of Foreign Particles
Normal	Max.	Normal	Max.	Min. to Max.		
Below 19.6	49	Below 6	20	-200 to 280	0.04 to 0.15	Low

Target Properties

Structure	Sliding Layer Component	Wear Resistance			Load Resistance		
		No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid
With Bronze Mesh Backing	PTFE and others	4	3	4	4	4	4

Sliding Speed			Friction Coefficient			Tolerance of Foreign Particles	Effect of Various Atmospheres				
No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid		In Air	In Vacuum	In Water	In Vapor	In Acid or Alkali
3	3	3	4	4	4	4	5	5	5	5	4

5=Excellent 4=Very good 3=Good 2=Fair 1=Poor

Pb Free RoHS 2 ELV

9

Shown on page 092

DAIFORCE A

This lead-free, ecofriendly bearing material comprises polytetrafluoroethylene (PTFE) mixed with a special filler, which gives it a low coefficient of friction and excellent wear-resistance at a relatively light weight. It also demonstrates superior resistance to chemicals and to corrosion, so it can be used with confidence even when immersed in sea water or corrosive fluids. It is compliant with Japan's Food Sanitation Law and other regulations affecting food additives.

Major applications

General-purpose industrial machinery, food processing equipment, electrical appliances, and testing or inspection equipment

Characteristics

① Offers a low coefficient of friction and excellent wear-resistance under dry conditions.
② Eliminates “stick and slip” thanks to a low coefficient of friction.
③ Offers superior resistance to chemical substances and corrosion.
④ Provides superior resiliency against misalignment.

Component materials

Polytetrafluoroethylene (PTFE) mixed with a special filler

Characteristics

Specific Load MPa		Sliding Speed m/min		Service Temp. Range °C	Friction Coefficient μ	Tolerance of Foreign Particles
Normal	Max.	Normal	Max.	Min. to Max.		
Below 2.0	6.9	Below 18	100	-200 to 280	0.04 to 0.18	Medium

Target Properties

Structure	Sliding Layer Component	Wear Resistance			Load Resistance		
		No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid
Polymer monolayer	PTFE and others	5	3	4	3	3	3

Sliding Speed			Friction Coefficient			Tolerance of Foreign Particles	Effect of Various Atmospheres				
No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid		In Air	In Vacuum	In Water	In Vapor	In Acid or Alkali
5	3	4	5	4	5	4	5	5	5	5	5

5=Excellent 4=Very good 3=Good 2=Fair 1=Poor

Pb Free RoHS 2 ELV

10

Shown on page 094

DAIFORCE G

This ecofriendly, lead-free plastic bearing material comprises glass fiber reinforced polytetrafluoroethylene (PTFE) mixed with a special filler. Thanks to this special filler, DAIFORCE G has a low coefficient of friction and excellent wear-resistance at a relatively light weight. It also demonstrates superior resistance to chemicals and to corrosion, so it can be used with confidence even when immersed in sea water or corrosive fluids. It is compliant with Japan's Food Sanitation Law and other regulations affecting food additives.

Major applications

General-purpose industrial machinery, food processing equipment, electrical appliances, and testing or inspection equipment

Characteristics

① Offers a low coefficient of friction and excellent wear-resistance under dry conditions.
② Eliminates “stick and slip” thanks to a low coefficient of friction.
③ Offers superior resistance to chemical substances and corrosion.
④ Provides superior resiliency against misalignment.
⑤ Offers superior resistance to heavy loading.

Component materials

Glass-fiber-reinforced polytetrafluoroethylene (PTFE) mixed with a special filler

Characteristics

Specific Load MPa		Sliding Speed m/min		Service Temp. Range °C	Friction Coefficient μ	Tolerance of Foreign Particles
Normal	Max.	Normal	Max.	Min. to Max.		
Below 2.9	6.9	Below 15	60	-200 to 280	0.05 to 0.2	Medium

Target Properties

Structure	Sliding Layer Component	Wear Resistance			Load Resistance		
		No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid
Polymer monolayer	PTFE and others	4	3	4	3	3	3

Sliding Speed			Friction Coefficient			Tolerance of Foreign Particles	Effect of Various Atmospheres				
No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid		In Air	In Vacuum	In Water	In Vapor	In Acid or Alkali
4	3	4	3	4	5	4	5	5	5	5	4

5=Excellent 4=Very good 3=Good 2=Fair 1=Poor

Pb Free RoHS 2 ELV

11

Shown on page 096

DAIHYLON DHA

This ecofriendly, lead-free plastic bearing material comprises fiber-reinforced nylon (polyamide or PA) mixed with a special filler. It is available in a variety of grades with low coefficients of thermal expansion as well as enhanced strength and tribological properties.

Major applications

General-purpose industrial machinery, architectural materials, textile machinery, electrical appliances, and automotive parts

Characteristics

① Offered enhanced strength in fiber-reinforced grades.
② Is more heat resistant than polyoxymethylene and suitable for applications in heat of up to 140°C.
③ Offers a low coefficient of friction and excellent wear-resistance.
④ Suitable for injection molding of complex shapes.

Component materials

Fiber-reinforced nylon (polyamide or PA) mixed with a special filler

Characteristics (DHA01)

Specific Load MPa		Sliding Speed m/min		Service Temp. Range °C	Friction Coefficient μ	Tolerance of Foreign Particles
Normal	Max.	Normal	Max.	Min. to Max.		
Below 3.9	6.9	Below 6	30	-40 to 140	0.1 to 0.3	Low

Target Properties (DHA01)

Structure	Sliding Layer Component	Wear Resistance			Load Resistance		
		No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid
Polymer monolayer	PA and others	3	5	5	3	3	3

Sliding Speed			Friction Coefficient			Tolerance of Foreign Particles	Effect of Various Atmospheres				
No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid		In Air	In Vacuum	In Water	In Vapor	In Acid or Alkali
3	4	4	3	4	5	3	5	5	3 (potential swelling)	3 (potential swelling)	4 (Oxide 2)

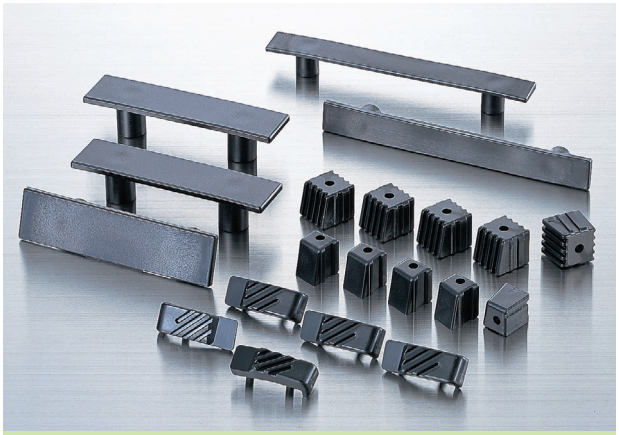
5=Excellent 4=Very good 3=Good 2=Fair 1=Poor

Pb Free RoHS 2 ELV

12

Shown on page 097

DAIHYLON DHR



This ecofriendly, lead-free plastic bearing material comprises polyester elastomer mixed with a special filler for excellent flexibility and frictional properties.

Major applications

Trucks, automotive parts, electrical appliances

Characteristics

① Offers extremely high flexibility, suitable for use in countermeasures for percussive noise.
② Eliminates “stick and slip” thanks to a low coefficient of friction.
③ Suitable for injection molding of complex shapes.

Component materials

Polyester elastomer mixed with a special filler

Characteristics (DHR01)

Specific Load MPa		Sliding Speed m/min		Service Temp. Range °C	Friction Coefficient μ	Tolerance of Foreign Particles
Normal	Max.	Normal	Max.	Min. to Max.		
Below 2.0	4.9	Below 6	15	-40 to 60	0.1 to 0.3	Medium

Target Properties (DHR01)

Structure	Sliding Layer Component	Wear Resistance			Load Resistance		
		No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid
Polymer monolayer	Polyester elastomer and others	3	4	4	3	3	3

Sliding Speed			Friction Coefficient			Tolerance of Foreign Particles	Effect of Various Atmospheres				
No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid		In Air	In Vacuum	In Water	In Vapor	In Acid or Alkali
3	4	4	3	4	4	5	5	3	3	3	3

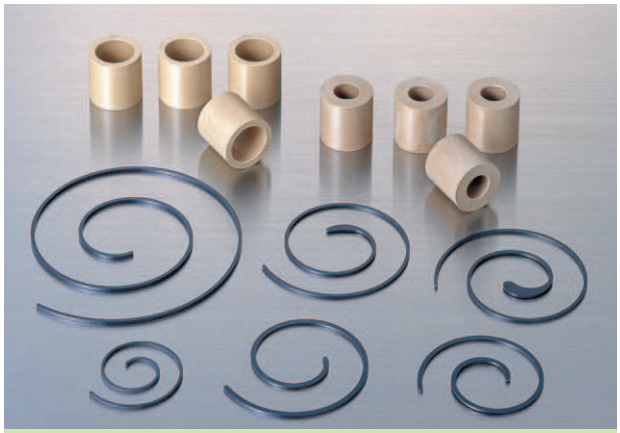
5=Excellent 4=Very good 3=Good 2=Fair 1=Poor

Pb Free RoHS 2 ELV

13

Shown on page 098

DAITHERMO DTP



This ecofriendly, lead-free plastic bearing material comprises polyphenylene sulfide (PPS) mixed with a special filler and is suitable for injection molding of complex shapes. It has tribological properties equivalent to polytetrafluoroethylene (PTFE). It is also available in fiber-reinforced grades with enhanced strength and heat resistance.

Major applications

General-purpose industrial machinery, hydraulic equipment, HVAC equipment, and automotive parts

Characteristics

① Offers an extremely low coefficient of friction.
② Eliminates “stick and slip” thanks to a low coefficient of friction.
③ Suitable for use in bearings for flexible axles.
④ Suitable for injection molding of complex shapes.
⑤ Is more heat resistant than DAIHYLON and suitable for applications in heat of up to 160°C.

Component materials

Fiber-reinforced polyphenylene sulfide (PPS) mixed with a special filler

Characteristics (DTP02) NB: Carbon fiber reinforced types have a tensile strength of 78 MPa

Specific Load MPa		Sliding Speed m/min		Service Temp. Range °C	Friction Coefficient μ	Tolerance of Foreign Particles
Normal	Max.	Normal	Max.	Min. to Max.		
Below 2.9	6.9	Below 15	60	-40 to 180	0.05 to 0.2	Low

Target Properties (DTP02)

Structure	Sliding Layer Component	Wear Resistance			Load Resistance		
		No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid
Polymer monolayer	PPS and others	4	4	5	3	3	3

Sliding Speed			Friction Coefficient			Tolerance of Foreign Particles	Effect of Various Atmospheres				
No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid		In Air	In Vacuum	In Water	In Vapor	In Acid or Alkali
4	4	4	5	4	5	3	5	5	5	5	4

5=Excellent 4=Very good 3=Good 2=Fair 1=Poor

Pb Free RoHS 2 ELV

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Shown on page 099

DAITHERMO DTK

This lead-free, ecofriendly bearing material comprises polyether ether ketone (PEEK), a super engineering plastic. PEEK exhibits excellent heat resistance for a thermoplastic and when mixed with fiber reinforcing and a special filler, offers resistance to both heat and chemicals, high strength, and superior tribological characteristics.

Major applications

Brake, automatic transmission, and other automotive parts, HVAC equipment

Characteristics

① Exhibits superior heat resistance up to 260°C.
② Available in fiber-reinforced grades and other grades offering strength equivalent to aluminum alloys.
③ Offers superior resistance to chemical substances.
④ Suitable for injection molding of complex shapes.

Component materials

Fiber-reinforced polyetheretherketone (PEEK) mixed with a special filler

Characteristics (DTK04)

Specific Load MPa		Sliding Speed m/min		Service Temp. Range °C	Friction Coefficient μ	Tolerance of Foreign Particles
Normal	Max.	Normal	Max.	Min. to Max.		
Below 3.9	6.9	Below 12	60	-40 to 260	0.1 to 0.3	Low

Target Properties (DTK04)

Structure	Sliding Layer Component	Wear Resistance			Load Resistance		
		No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid
Polymer monolayer	PEEK and others	4	5	5	3	3	3

Sliding Speed			Friction Coefficient			Tolerance of Foreign Particles	Effect of Various Atmospheres				
No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid		In Air	In Vacuum	In Water	In Vapor	In Acid or Alkali
4	4	4	4	4	5	3	5	5	5	5	4

5=Excellent 4=Very good 3=Good 2=Fair 1=Poor

Metallic bearing materials

Lead-free bearings

RoHS2-compliant bearings

ELV-compliant bearings

Shown on page 000 Shown on page

【Note 1】
How to read target performance charts.
- Figures indicate optimal performance under ideal conditions, but actual performance cannot be expected to achieve these levels simultaneously in all categories.
- Various grades of THERMALLOY, DAISLIDE, and DAILUBO are available for each product. Figures indicate performance levels for typical grades. Please inquire directly for details.
- The pascal (Pa) is an SI-derived unit used to quantify pressure and stress. One megapascal (MPa) is equivalent to 10.197kgf/cm^2

【Note 2】
Figures for target performance indicate: 5 = excellent, 4 = very good, 3 = good, 2 = inadequate, 1 = failure
Performance in acidic or alkaline environments will vary per type, concentration, and temperature. We recommend careful evaluation per trial operation. Please inquire directly for detailed information about specific applications.

Pb Free RoHS 2 ELV

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Shown on page 102

THERMALLOY D type

These maintenance-free metal bearings are made of a bronze base metal embedded with graphite solid lubricants distributed minutely and evenly throughout. The D type is suitable for use under a wide range of conditions and is the general-purpose grade of the THERMALLOY series. Standard specification Thermalloy bearings are always kept inventory.

Major applications

General-purpose industrial machinery, architectural materials, textile machinery, electrical appliances, and automotive parts

Characteristics

① Offered enhanced strength in fiber-reinforced grades.
② Is more heat resistant than polyoxymethylene and suitable for applications in heat of up to 140°C.
③ Offers a low coefficient of friction and excellent wear-resistance.
④ Suitable for injection molding of complex shapes.

Component materials

Fiber-reinforced nylon (polyamide or PA) mixed with a special filler

Characteristics

Specific Load MPa		Sliding Speed m/min		Service Temp. Range °C	Friction Coefficient μ	Tolerance of Foreign Particles
Normal	Max.	Normal	Max.	Min. to Max.		
Below 14.7	29.4	Below 6	60	-70 to 200	0.1 to 0.25	Medium

Target Properties

Structure	Sliding Layer Component	Wear Resistance			Load Resistance		
		No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid
Solid	Bronze + Graphite	4	5	5	5	5	5

Sliding Speed			Friction Coefficient			Tolerance of Foreign Particles	Effect of Various Atmospheres				
No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid		In Air	In Vacuum	In Water	In Vapor	In Acid or Alkali
3	4	4	3	4	4	4	5	3	5	5	4

5=Excellent 4=Very good 3=Good 2=Fair 1=Poor

Not available for all products.

Pb Free RoHS 2 ELV

16

Shown on page 108

THERMALLOY T type

These maintenance-free metal bearings are made of a variety of base metals embedded primarily with graphite solid lubricants distributed evenly throughout. The T type is suitable for use under an even wider range of conditions and is a special-purpose grade of the THERMALLOY series. Available base metals include bronze, steel, nickel, and other materials. And with a variety of solid lubricants to choose from, these bearings can be designed to meet a wide range of applications. Put these bearings to work solving any problem imaginable.
Bearings made of lead-bronze alloy are not compliant with either RoHS or ELV.

Major applications

General-purpose industrial machinery, food equipment, temporary support for steel-framed structures

Characteristics

① Offers a low coefficient of friction and excellent wear-resistance under dry conditions.
② Demonstrates high resiliency against intrusion of foreign matter.
③ Offers superior corrosion resistance.
④ Performs well through an extended range of operating temperatures. (-200 to +700°C, per base metal)
⑤ Offers superior electrical conductivity.

Component materials

Various base metals and embedded solid lubricant

Characteristics

Specific Load MPa		Sliding Speed m/min		Service Temp. Range °C	Friction Coefficient μ	Tolerance of Foreign Particles
Normal	Max.	Normal	Max.	Min. to Max.		
Below 19.6	49	Below 6	60	-200 to 700	0.05 to 0.25 (Boundary Lubrication)	High

Target Properties

Structure	Sliding Layer Component	Wear Resistance			Load Resistance		
		No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid
Solid	All types of alloys and graphite	5	5	5	5	5	5

Sliding Speed			Friction Coefficient			Tolerance of Foreign Particles	Effect of Various Atmospheres				
No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid		In Air	In Vacuum	In Water	In Vapor	In Acid or Alkali
3	4	4	3	4	4	5	5	4 (5)	5	5	5

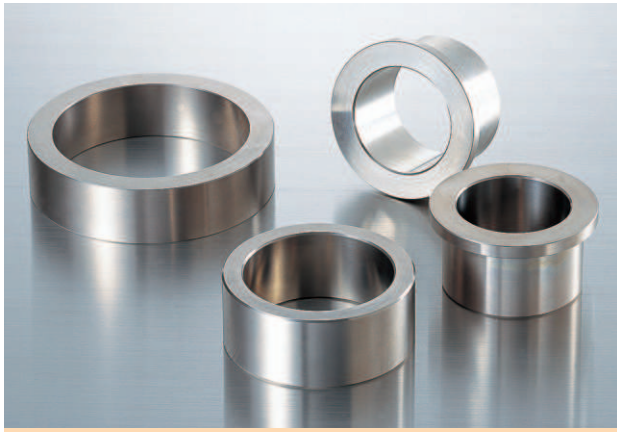
5=Excellent 4=Very good 3=Good 2=Fair 1=Poor

Pb Free RoHS2 ELV

17

Shown on page 110

THERMALLOY TM



This is a lead-free, ecofriendly bearing made of a chromium-steel alloy and suitable for use in high-temperature, acidic environments.

Major applications

General-purpose industrial machinery, heat-treatment ovens, smoke exhaust equipment, and automotive parts

Characteristics

① Provides excellent resistance to acid and corrosion in high-temperature, acid environments up to 700°C.
② Features excellent wear resistance.
③ Offers superior resistance to seizing.
④ Won't damage the axle it bears.

Component materials

FeCr, Cu, and embedded solid lubricant

Characteristics

Specific Load MPa		Sliding Speed m/min		Service Temp. Range °C	Friction Coefficient μ	Tolerance of Foreign Particles
Normal	Max.	Normal	Max.	Min. to Max.		
Below 19.6	39.2	Below 1.2	2.4	(-200) to 700	0.5 (at 500°C)	Low

Target Properties

Structure	Sliding Layer Component	Wear Resistance			Load Resistance		
		No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid
Solid	FeCr + Cu and others	5	(3)	(3)	5	(3)	(3)

Sliding Speed			Friction Coefficient			Tolerance of Foreign Particles	Effect of Various Atmospheres				
No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid		In Air	In Vacuum	In Water	In Vapor	In Acid or Alkali
3	(3)	(3)	3	(4)	(4)	3	5	1	(3)	5	5 (Alkali 3)

5=Excellent 4=Very good 3=Good 2=Fair 1=Poor

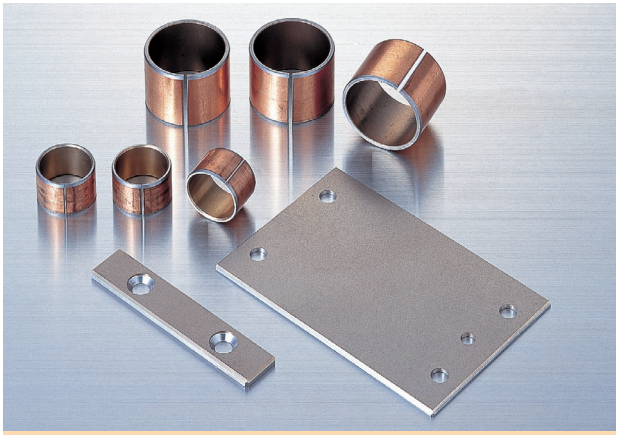
Not available for all products.

Pb Free RoHS2 ELV

18

Shown on page 111

THERMALLOY BB type



These maintenance-free metal bearings are made of a bronze base metal embedded with graphite solid lubricants distributed minutely and evenly throughout.
BB type bearings are made with thin-walled steel-backed bimetal.
Bearings made of lead-bronze alloy are not compliant with either RoHS2 or ELV.

Major applications

General-purpose industrial machinery, printing equipment

Characteristics

① Offers a low coefficient of friction and excellent wear-resistance under dry conditions.
② Demonstrates high resiliency against intrusion of foreign matter.
③ Offers superior corrosion resistance.
④ Performs well through an extended range of operating temperatures.

Component materials

Bronze and embedded solid lubricant

Characteristics

Specific Load MPa		Sliding Speed m/min		Service Temp. Range °C	Friction Coefficient μ	Tolerance of Foreign Particles
Normal	Max.	Normal	Max.	Min. to Max.		
Below 19.6	49.0	Below 6	60	-70 to 250	0.05 to 0.25 (Boundary Lubrication)	Medium

Target Properties

Structure	Sliding Layer Component	Wear Resistance			Load Resistance		
		No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid
With Steel Backing	Bronze + Graphite	4	5	5	5	5	5

Sliding Speed			Friction Coefficient			Tolerance of Foreign Particles	Effect of Various Atmospheres				
No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid		In Air	In Vacuum	In Water	In Vapor	In Acid or Alkali
3	4	4	3	4	4	4	5	3	3	3	3

5=Excellent 4=Very good 3=Good 2=Fair 1=Poor

Pb Free RoHS 2 ELV

19

Shown on page 115

THERMALLOY PV plate

These maintenance-free metal bearings are made of a bronze base metal embedded with graphite solid lubricants distributed evenly throughout. PV plate bearings are made with thick-walled steel-backed plate. Standard specification THERMALLOY bearings are always kept inventory.

Major applications

General-purpose industrial machinery, food equipment, temporary support for steel-framed structures

Characteristics

① Offers a low coefficient of friction and excellent wear-resistance under dry conditions.
② Demonstrates high resiliency against intrusion of foreign matter.
③ Offers superior corrosion resistance.
④ Performs well through an extended range of operating temperatures.
⑤ Offers superior electrical conductivity.

Component materials

Bronze and embedded solid lubricant

Characteristics

Specific Load MPa		Sliding Speed m/min		Service Temp. Range °C	Friction Coefficient μ	Tolerance of Foreign Particles
Normal	Max.	Normal	Max.	Min. to Max.		
Below 19.6	49.0	Below 6	30	-70 to 250	0.05 to 0.25 (Boundary Lubrication)	High

Target Properties

Structure	Sliding Layer Component	Wear Resistance			Load Resistance		
		No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid
With Steel Backing	Bronze + Graphite Particles	4	5	5	5	5	5

Sliding Speed			Friction Coefficient			Tolerance of Foreign Particles	Effect of Various Atmospheres				
No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid		In Air	In Vacuum	In Water	In Vapor	In Acid or Alkali
3	4	4	3	4	4	5	5	3	3	3	3

5=Excellent 4=Very good 3=Good 2=Fair 1=Poor

Pb Free RoHS 2 ELV

20

Shown on page 118

THERMALLOY pillow unit

THERMALLOY metal bearings are made of a bronze base metal embedded with graphite solid lubricants distributed minutely and evenly throughout, and have piro units applied to the bearing section. They offer an extended service life in applications for which ordinary bearings cannot be used. Standard specification THERMALLOY bearings are always kept in inventory. These bearings are produced on order and the quantity of solid lubricant embedded in the base metal can be adjusted to suit any application.

Major applications

General-purpose industrial machinery, conveyor equipment

Characteristics

① Offers a low coefficient of friction and excellent wear-resistance under dry conditions.
② Demonstrates high resiliency against intrusion of foreign matter.
③ Offers superior corrosion resistance.
④ Performs well through an extended range of operating temperatures.
⑤ Offers superior electrical conductivity.

Component materials

Bronze and embedded solid lubricant

Characteristics

Specific Load MPa		Sliding Speed m/min		Service Temp. Range °C	Friction Coefficient μ	Tolerance of Foreign Particles
Normal	Max.	Normal	Max.	Min. to Max.		
Below 14.7	29.4	Below 15	30	-50 to 200	0.1 to 0.3	High

Target Properties

Structure	Sliding Layer Component	Wear Resistance			Load Resistance		
		No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid
Bearing box and outer and inner rings	Bronze + Graphite	5	5	5	5	5	5

Sliding Speed			Friction Coefficient			Tolerance of Foreign Particles	Effect of Various Atmospheres				
No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid		In Air	In Vacuum	In Water	In Vapor	In Acid or Alkali
3	4	4	3	4	4	5	5	3	5	5	4

5=Excellent 4=Very good 3=Good 2=Fair 1=Poor

Not available for all products.

Pb Free RoHS2 ELV

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Shown on page 122

DAISLIDE

DAISLIDE bearing are made primarily of copper alloy embedded with solid lubricant plugs. Standard specification DaiSlide bearings are available in a wide range of sizes. Grades that are suitable for us underwater and in sea water are also available.
BA- and SL -grade bearings are not compliant with either RoHS2 or ELV.

Major applications

General-purpose industrial machinery, heavy industrial machinery

Characteristics

① Offers excellent wear-resistance and under boundary lubrication or dry conditions.
② Performs well under high loads.

Component materials

Copper alloy and embedded solid lubricant (plug)

DAISLIDE HA solid bearings for medium- and heavy-loads

Specific Load MPa		Sliding Speed m/min		Service Temp. Range °C	Friction Coefficient μ	Tolerance of Foreign Particles
Normal	Max.	Normal	Max.	Min. to Max.		
Below 19.6	49.0 (98.0)	Below 6	30	-70 to 250	0.05 to 0.3 (Boundary Lubrication)	Medium

DAISLIDE KA solid bearings for even heavier loads than suitable for HA

Specific Load MPa		Sliding Speed m/min		Service Temp. Range °C	Friction Coefficient μ	Tolerance of Foreign Particles
Normal	Max.	Normal	Max.	Min. to Max.		
Below 29.4	73.0 (118)	Below 6	15	-70 to 250	0.05 to 0.3 (Boundary Lubrication)	Medium

Figures shown in parenthesis are for static surface pressure when there is no sliding or when sliding under extremely low speeds.

Target Properties

Structure	Sliding Layer Component	Wear Resistance			Load Resistance		
		No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid
Solid	Copper Alloy + Solid Lubricant Burying Typeolid	4	5	5	5	5	5

Sliding Speed			Friction Coefficient			Tolerance of Foreign Particles	Effect of Various Atmospheres				
No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid		In Air	In Vacuum	In Water	In Vapor	In Acid or Alkali
3	4	4	3	4	4	4	5	3	3	4	3

5=Excellent 4=Very good 3=Good 2=Fair 1=Poor

Not available for all products.

Pb Free RoHS2 ELV

22

Shown on page 140

DAILUBO

Oil-impregnated sintered copper or steel bearings with solid lubrication or oil.

Major applications

Electrical appliances, and automotive parts

Characteristics

① Offers a low coefficient of friction and excellent wear-resistance under dry conditions.
② Eliminates "stick and slip" thanks to a low coefficient of friction.

Component materials

Cu-Sn-C and Fe-Sn-C

Characteristics

Specific Load MPa		Sliding Speed m/min		Service Temp. Range °C	Friction Coefficient μ	Tolerance of Foreign Particles
Normal	Max.	Normal	Max.	Min. to Max.		
Below 2.0	9.8	Below 60	200	-20 to 80	0.01 to 0.15 (Oil Retaining)	Low

Target Properties

Structure	Sliding Layer Component	Wear Resistance			Load Resistance		
		No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid
Solid	Copper or steel, oil, and others	5	5	5	3	3	3

Sliding Speed			Friction Coefficient			Tolerance of Foreign Particles	Effect of Various Atmospheres				
No Lubrication	Grease	Boundary and Fluid	No Lubrication	Grease	Boundary and Fluid		In Air	In Vacuum	In Water	In Vapor	In Acid or Alkali
5	5	5	5	5	5	3	5	1	1	1	1

5=Excellent 4=Very good 3=Good 2=Fair 1=Poor

RoHS 2 ELV

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Shown on page 145

Steel bushing (lubricated metal)

Made of steel or stainless steel without any slide bearing alloys, this wound bushing is manufactured using an ecofriendly process and produces relatively few shavings compared with cutting pipe stock, thereby providing improved material yield. Also suitable for use in non-bearing applications, too. Surface treatments for enhancing tribological properties are also available.

Major applications

General-purpose industrial machinery, hydraulic equipment, automotive parts, vaporizer parts

Characteristics

① Enhanced material yield.
② Reduced production of shavings.
③ Heat and surfaces treatments available.

Component materials

All types of steel and copper alloys

RoHS 2 ELV

24

Shown on page 146

Metal bushing (lubricated metal)

The use of bimetal or trimetal linings made of aluminum and copper alloys on a steel backing provides these lubricated metal bearings with good mechanical strength and makes them suitable for high-speed, high-load applications with proper lubrication. Choose from a wide variety of materials to match your application, operating conditions, and lubrication requirements to achieve desired load-bearing performance, which can be further enhanced through modified design of lubricating grooves and bearing structure. In some cases, maintenance-free (dry) bearings can be applied in lubricated environments.

Major applications

Engine bearings, automotive parts, general-purpose industrial machinery, food processing equipment, electrical appliances

Characteristics

① Enhanced material yield.
② Reduced production of shavings.
③ Heat and surfaces treatments available.

Geometry and dimensions

In addition to conventional round bushings, we also offer slotted, grooved, notched, and other types of bushing design.

Modular products

Customized bearing designs

These composite products are assembled at Daido Metal and feature the load-bearing performance of our dry bearings as well as structural materials for the bearing housing, as best suits the application. Feel free to consult with us on the design and manufacture of bearings that meet your requirements for geometry, housing materials, and application.

Shown on page 000 Shown on page

25

Shown on page 149

Compact assemblies

These composite products are subassemblies comprising a Daido Metal dry bearing and housing material of suitable functionality for both load-bearing performance and structural properties that suit the application. The Daido in-house assembly process also achieves a very high precision for the inner diameter.
Daido's deep-draw stamping technology is also available for manufacturing housing parts.

Major applications

Shock absorbers, automotive parts, general-purpose industrial machinery, electrical appliances

Characteristics

① Dimensional accuracy of inner diameters is assured by precision assembly.
② Assembled products with load-bearing performance and structural properties that suit the application.
③ Reduces logistical costs.
④ Quality assurance for the entire product.
⑤ Suitable for use with draw-stamped housing parts.

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Insert-molded parts

These composite products are subassemblies comprising a Daido Metal dry bearing and injection-molded housing material of suitable functionality for both load-bearing performance and structural properties that suit the application.
The Daido in-house insert-molding process also achieves a very high precision for the inner diameter. Effective as a countermeasure against problems related to ejecting parts and assuring inside diameters when inserted into resin.

Major applications

Automotive parts, general-purpose industrial machinery, electrical appliances

Characteristics

① Dimensional accuracy of inner diameters is assured by precision assembly.
② Effective for assuring inside diameters formed by conventional insertion and ejection load.
③ Assembled products with load-bearing performance and structural properties that suit the application.
④ Reduces logistical costs.
⑤ Quality assurance for the entire product.

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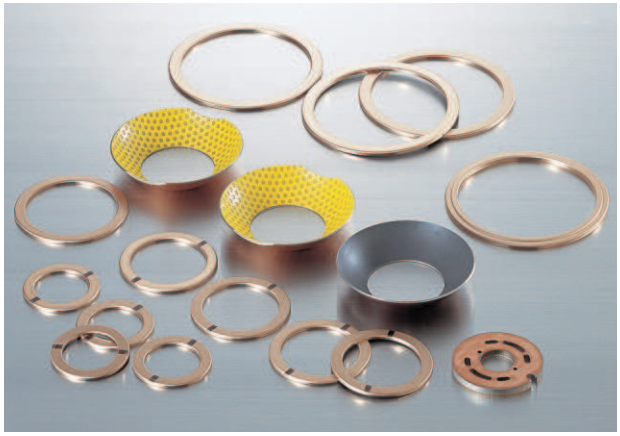
Special geometries



Daido technology for deep-draw stamping and machining are suitable for manufacturing bearing with complex geometries. By using bearing materials in the sliding sections of bearings with complex geometries, a single product can be designed to perform multiple functions.

Major applications

Hydraulic pumps, automotive parts, general-purpose industrial machinery

Characteristics

① Can be manufactured in complex geometries.
② Can perform multiple bearing and housing functions with a single product.

MATERIALS

& SIZE

Polymer bearing materials

Metallic bearing materials

Modular products

DAIDYNE DDK05

Pb Free RoHS 2 ELV

HOISI PRECISION 凱獅精密 ISO 7312 9830

This product is an environmentally friendly "Lead free bearing."
This compound bearing, a "perfect oilless bearing" that does not require any lubricant at all uses polytetrafluoroethylene (PTFE) resin, has excellent low friction characteristics and also optimizes metal properties such as strength and dimensional stability.

Features

① The bearing surface has such low a coefficient of static and dynamic friction that the surface runs smoothly without lubrication, and in addition, the so-called stick and slip phenomenon is eliminated. The bearing can be used in oil as well.
② The operating temperature range extends from -200°C to +280°C.
③ Adaptable to operations under high-load, impact load, intermittent operation and reciprocating motion.
④ Free from electrostatic induction (When installed, each bearing has an electrical resistance of 1Ω to 10Ω per 1 cm^2 wide contact area.)
⑤ The bearing surface is highly resistant to most industrial chemicals and solvents such as petroleum and alcohol.
⑥ The bearing will not damage the surface of engaging component (shaft).
⑦ Extended service life.
⑧ The bearing is light and thin (max. 3 mm thick), requiring little space and permits compact equipment design.
⑨ The bearing minimizes operating noise.

Major Superior Points to Roller Bearing

① DDK05 bearing is free from the skew problem.
② DDK05 bearing can also be used for sliding motion in the axial direction.
③ DDK05 bearing allows very compact equipment design that does not occupy wide space.
④ In general the bearing price is competitive compared to rolling element bearings.
⑤ The bearing exhibits exceptional resistance against fretting corrosion.

Superior Points to Roller Bearing

① Permitted bearing pressure is high.
② The rolling element bearings are inferior to Daido plain bearings in conditions of high-load, low speed operation, reciprocating and intermittent motion where boundary lubrication condition cannot be assured and further at high temperature (+280°C) or low temperature (-200°C).
③ DDK05 bearing can be used in various liquids and gases, or in a vacuum.
④ Standard bearings are stocked and are available for quick delivery.

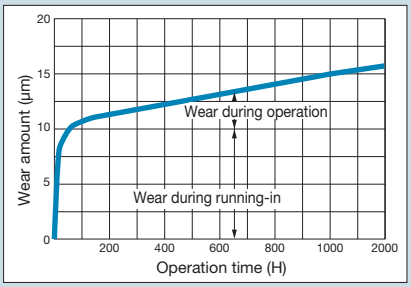
Physical Characteristics (Typical Values)

Compressive Strength (MPa)	304
Coefficient of Linear Thermal Expansion (10^{-6}/°C)	11(direction parallel to bearing face), 30 (thickness direction)
Heat Transfer Coefficient (W/m-k)	42
Service Temperature Limit (°C)	-200 to +280
Friction Coefficient	0.04 to 0.1 (below 6 m/min, 3.5 to 55 MPa)
	0.06 to 0.18 (6 to 300 m/min, below 3.5 MPa)

Friction properties/characteristics of DDK05 Dry Bearing

The graph shows that during the running in stage, part of the surface layer rapidly transfers to the shaft surface to make to the irregularity flat and form a smooth low-wear and low-friction surface. During operation when the surface layer consisting of PTFE mixture becomes thinner friction between the metals of the bearing and the shaft temporarily occurs. Then the PTFE mixture expands due to the heat generated by the friction and the mixture is pushed out from the porous intermediate layer and supplied to the bearing surface very slowly. Therefore no wear occurs on the shaft.

<Table 1>Wear of DDK05 Dry Bearing



Designing DDK05 dry bearings

① **PV value and wear**

The service life of DDK05 dry bearings is determined primarily by bearing load and PV value. The term PV value refers to the product of a pressure (P) in MPa and a velocity (V) in m/min. A bearing with a PV value of 206 MPa m/min can only operate for short periods of time. The maximum PV value for a bearing that be used for continuous operation is 103 MPa m/min. Testing has shown that the rate of wear to a DDK05 dry bearing after breaking in is roughly proportional to its PV value up to 0.04 to 0.05 mm of wear.
Fig. 1 shows the relationship between service life and PV value.

② **Basic relationship between service life and PV value (PV value in MPa·m/min)**

●Thrust washer

$$\text{Service life in hours (H)} = \frac{39\times10^3\times f\times m}{PV} - C$$

NB: The term "unidirectional loading" refers to bearing loads applied to a fixed bushing by an axle that is either rotating or sliding.

●Bushings (rotational loading)

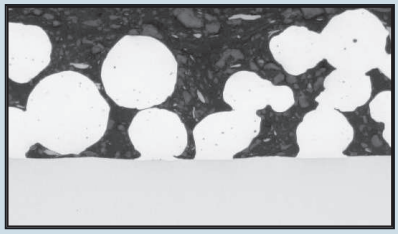
$$\text{Service life in hours (H)} = \frac{78\times10^3\times f\times m}{PV} - C$$

NB: The term "rotational loading" refers to bearing loads applied to a rotating bushing by a fixed axle.

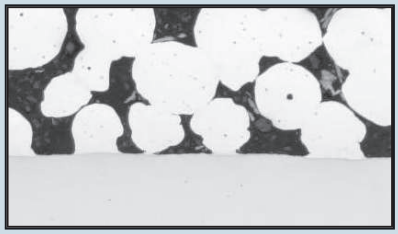
●Thrust washer

$$\text{Service life in hours (H)} = \frac{25\times10^3\times f\times m}{PV} - C$$

NB: Refer to Table 2 on page 56 and Table 3 on page 57 for values of the coefficients f, m, and C.



Prior to breaking in the bearing



Photographic cross-section of a DDK05 dry bearing after breaking in and operating for a certain period of time.

③ **Formula for calculating (PV value in MPa·m/min)**

For rotational loading

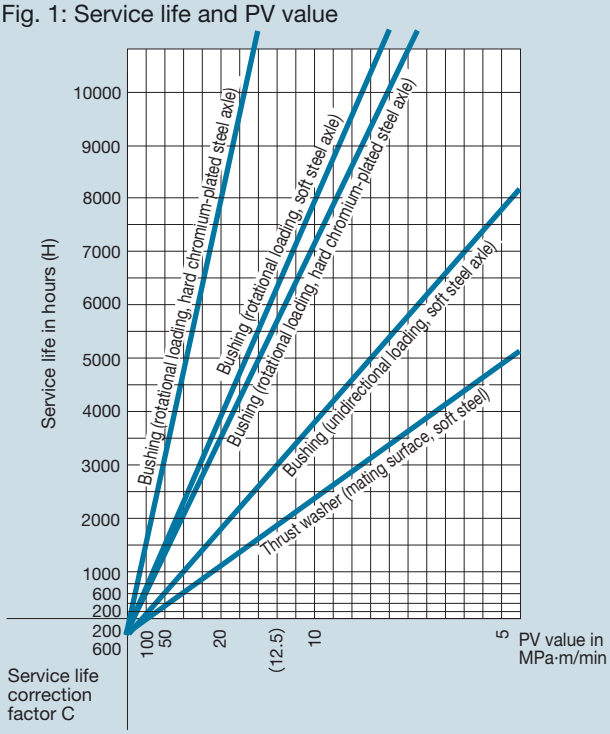
Bushing	Thrust washer
$V=\pi dN/10^3$	$V=\pi(D+d)N/2\times10^3$
$P=W/Ld$	$P=W/(D^2-d^2)\pi\times4$
$PV=\pi WN/10^3L$	$PV=2WN/10^3\cdot(D-d)$

V : rotating speed in m/min,
π : ratio of the circumference to the diameter,
d : inner diameter in mm
D : outer diameter in mm,
P : surface pressure in MPa
W: load in N,
N : rotational speed in rpm

NB1: During oscillating movement, the articulation θ in degrees (°) is calculated using a rotational speed N of 2θC/360, where C is the cycles per minute.

NB2: During axial movement, V is the sliding speed in meters per minute.

Fig. 1: Service life and PV value



④ Load-bearing capacity (U)

Although actual load-bearing capacity with vary with load characteristics, the maximum load that can be supported with DDK05 dry bearings is as follows.

<Table1> Allowable load (U)

Types of loading	U MPa
① Static loading with virtually no movement or an extremely slow movement, where V≈0.	137.0
② Rotational or oscillating movement, provided that the load affecting the DDK05 dry bearing does not move.	55.0
③ When the DDK05 dry bearing is subject to alternating or variable loads, the allowable load varies per the number of changes in loading that occur while the bearing is in use.	
(a) 10^5 times or less	27.5
(b) 10^7 times or more	13.7

⑤ Operating factors (f)

<Table 2> Operating factors (f)

Operating conditions	Housing properties	Ambient temperature of axle In °C					
		25	60	100	150	200	280
Continuously dry conditions	For material with ordinary heat conductivity	1	0.8	0.6	0.4	0.2	0.1
	For material with poor heat conductivity	0.5	0.4	0.3	0.2	0.1	–
	For non-metallic housings with poor heat conductivity	0.3	0.3	0.2	0.1	–	–
Intermittently dry conditions (No more than two minutes of operation, followed by two minutes or more of rest.)	For material with ordinary heat conductivity	2	1.6	1.2	0.8	0.4	0.2
When continuously immersed in water		2	1.5	0.6	–	–	–
When alternating between immersion in water and dry conditions		0.2	0.1	–	–	–	–
When continuously immersed in fluids other than water (excluding lubricants)		1.5	1.2	0.9	0.6	0.3	0.1

⑥ **Axle (mating surface) surface factor (m) and service life correction factor (C)**
The surface factor (m) is applicable in cases where the mating surface roughness is equivalent or better to the former Rmax 3.2 μm. In many cases, the surface finish is rougher than this and will require additional polishing to ensure the necessary surface quality.

<Table3>
Axle (mating surface) surface factor (m) and service life correction factor (C)

Material	Axle surface factor (m)	Service life correction factor (C)
Steel		
Soft steel	1	200
Hardened steel	1	200
Nitrided steel	1	200
Cast iron	1	200
Stainless steel	2	200
Thermal spray stainless steel	1	200
Non-ferrous		
Anodized aluminum	0.4	200
Hard anodized aluminum (0.025-mm coating)	3	600
Bronze and copper alloys	0.2	200
Galvanized steel (0.013-mm coating or more)		
Hard chromium	2	600
Lead	1.5	600
Tin-nickel	1.2	600
Nickel	0.2	600
Cadmium	0.2	600
Zinc	0.2	600
Thermal spray tungsten carbide	3	600
Phosphate-coated steel	0.2	300

NB: Refer to Fig. 11 on page 156 for the relationship between mating surface roughness and wear.

K5B DDK05 Bushing (Bushing Inner Diameter: 3 to 28 mm)

Designation of Part Number

K5 B 00 00

- 00 — Bushing Length
- 00 — Bushing Nominal I.D.
- B — Bushing
- K5 — Product Symbol

K5B 0303

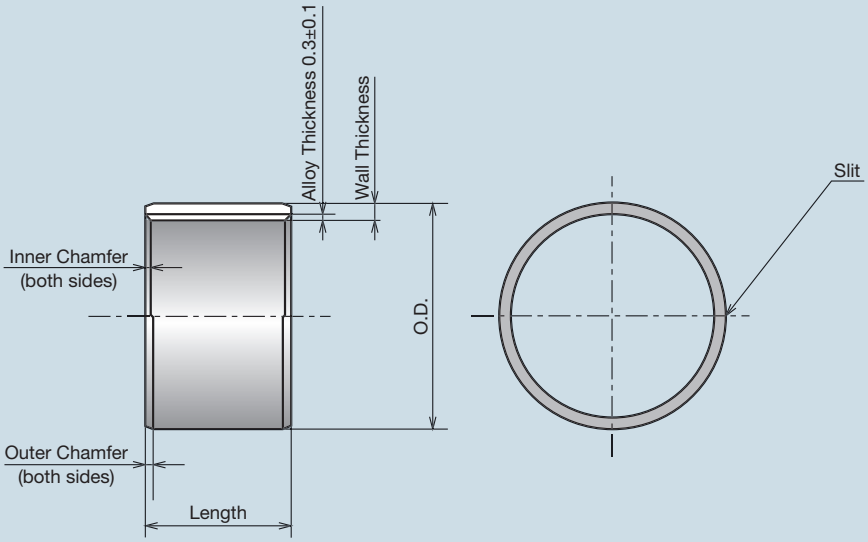
Please specify by part number.

Pb Free

RoHS 2

ELV

Bushing I.D.	Recommended Dimension Mating Part		Bushing Dimensions								
	Housing I.D.	Shaft Dia.	O.D.	Wall Thickness	3	4	5	6	7	8	
3	$\phi 5H7\ ^{+0.012}_{0}$	$\phi 3\ ^{-0.025}_{-0.035}$	$\phi 5\ ^{+0.047}_{+0.017}$	$1.0\ ^{0}_{-0.025}$	**0303**	**0304**	**0305**	**0306**			
4	$\phi 6H7\ ^{+0.012}_{0}$	$\phi 4\ ^{-0.025}_{-0.037}$	$\phi 6\ ^{+0.047}_{+0.017}$	$1.0\ ^{0}_{-0.025}$	**0403**	**0404**	**0405**	**0406**		**0408**	
5	$\phi 7H7\ ^{+0.015}_{0}$	$\phi 5\ ^{-0.025}_{-0.037}$	$\phi 7\ ^{+0.053}_{+0.023}$	$1.0\ ^{0}_{-0.025}$	**0503**	**0504**	**0505**	**0506**		**0508**	
6	$\phi 8H7\ ^{+0.015}_{0}$	$\phi 6\ ^{-0.025}_{-0.037}$	$\phi 8\ ^{+0.053}_{+0.023}$	$1.0\ ^{0}_{-0.025}$	**0603**	**0604**	**0605**	**0606**	**0607**	**0608**	
7	$\phi 9H7\ ^{+0.015}_{0}$	$\phi 7\ ^{-0.025}_{-0.040}$	$\phi 9\ ^{+0.053}_{+0.023}$	$1.0\ ^{0}_{-0.025}$			**0705**	**0706**	**0707**	**0708**	
8	$\phi 10H7\ ^{+0.015}_{0}$	$\phi 8\ ^{-0.025}_{-0.040}$	$\phi 10\ ^{+0.055}_{+0.025}$	$1.0\ ^{0}_{-0.025}$			**0805**	**0806**	**0807**	**0808**	
9	$\phi 11H7\ ^{+0.018}_{0}$	$\phi 9\ ^{-0.025}_{-0.040}$	$\phi 11\ ^{+0.060}_{+0.030}$	$1.0\ ^{0}_{-0.025}$				**0906**			
10	$\phi 12H7\ ^{+0.018}_{0}$	$\phi 10\ ^{-0.025}_{-0.040}$	$\phi 12\ ^{+0.060}_{+0.030}$	$1.0\ ^{0}_{-0.025}$				**1006**	**1007**	**1008**	
12	$\phi 14H7\ ^{+0.018}_{0}$	$\phi 12\ ^{-0.025}_{-0.043}$	$\phi 14\ ^{+0.060}_{+0.030}$	$1.0\ ^{0}_{-0.025}$				**1206**		**1208**	
13	$\phi 15H7\ ^{+0.018}_{0}$	$\phi 13\ ^{-0.025}_{-0.043}$	$\phi 15\ ^{+0.063}_{+0.033}$	$1.0\ ^{0}_{-0.025}$						**1308**	
14	$\phi 16H7\ ^{+0.018}_{0}$	$\phi 14\ ^{-0.025}_{-0.043}$	$\phi 16\ ^{+0.063}_{+0.033}$	$1.0\ ^{0}_{-0.025}$						**1408**	
15	$\phi 17H7\ ^{+0.018}_{0}$	$\phi 15\ ^{-0.025}_{-0.043}$	$\phi 17\ ^{+0.073}_{+0.038}$	$1.0\ ^{0}_{-0.025}$						**1508**	
16	$\phi 18H7\ ^{+0.018}_{0}$	$\phi 16\ ^{-0.025}_{-0.043}$	$\phi 18\ ^{+0.073}_{+0.038}$	$1.0\ ^{0}_{-0.025}$							
17	$\phi 19H7\ ^{+0.021}_{0}$	$\phi 17\ ^{-0.025}_{-0.043}$	$\phi 19\ ^{+0.081}_{+0.046}$	$1.0\ ^{0}_{-0.025}$							
18	$\phi 20H7\ ^{+0.021}_{0}$	$\phi 18\ ^{-0.025}_{-0.043}$	$\phi 20\ ^{+0.081}_{+0.046}$	$1.0\ ^{0}_{-0.025}$							
19	$\phi 22H7\ ^{+0.021}_{0}$	$\phi 19\ ^{-0.025}_{-0.046}$	$\phi 22\ ^{+0.081}_{+0.046}$	$1.5\ ^{0}_{-0.030}$							
20	$\phi 23H7\ ^{+0.021}_{0}$	$\phi 20\ ^{-0.025}_{-0.046}$	$\phi 23\ ^{+0.081}_{+0.046}$	$1.5\ ^{0}_{-0.030}$							
22	$\phi 25H7\ ^{+0.021}_{0}$	$\phi 22\ ^{-0.025}_{-0.046}$	$\phi 25\ ^{+0.086}_{+0.051}$	$1.5\ ^{0}_{-0.030}$							
24	$\phi 27H7\ ^{+0.021}_{0}$	$\phi 24\ ^{-0.025}_{-0.046}$	$\phi 27\ ^{+0.086}_{+0.051}$	$1.5\ ^{0}_{-0.030}$							
25	$\phi 28H7\ ^{+0.021}_{0}$	$\phi 25\ ^{-0.025}_{-0.046}$	$\phi 28\ ^{+0.093}_{+0.056}$	$1.5\ ^{0}_{-0.030}$							
26	$\phi 30H7\ ^{+0.021}_{0}$	$\phi 26\ ^{-0.025}_{-0.046}$	$\phi 30\ ^{+0.115}_{+0.075}$	$2.0\ ^{0}_{-0.030}$							
28	$\phi 32H7\ ^{+0.025}_{0}$	$\phi 28\ ^{-0.025}_{-0.046}$	$\phi 32\ ^{+0.115}_{+0.075}$	$2.0\ ^{0}_{-0.030}$							



(Unit: mm)

Part Number & Bushing Length Tolerance $^{0}_{-0.3}$								Bushing I.D.
10	12	15	20	25	30	35	40	
								3
								4
								5
0610	**0612**							6
0710	**0712**							7
0810	**0812**	**0815**						8
0910								9
1010	**1012**	**1015**	**1020**					10
1210	**1212**	**1215**	**1220**					12
1310	**1312**	**1315**	**1320**					13
1410	**1412**	**1415**	**1420**					14
1510	**1512**	**1515**	**1520**	**1525**				15
1610	**1612**	**1615**	**1620**	**1625**				16
1710		**1715**						17
1810	**1812**	**1815**	**1820**	**1825**	**1830**			18
1910		**1915**	**1920**					19
2010	**2012**	**2015**	**2020**	**2025**	**2030**			20
2210	**2212**	**2215**	**2220**	**2225**	**2230**			22
		2415	**2420**	**2425**	**2430**			24
2510	**2512**	**2515**	**2520**	**2525**	**2530**	**2535**		25
		2615	**2620**	**2625**	**2630**			26
	2812	**2815**	**2820**	**2825**	**2830**			28

K5B DDK05 Bushing (Bushing Inner Diameter: 30 to 160 mm)

Designation of Part Number

K5 B 00 00
- 00 — Bushing Length
- 00 — Bushing Nominal I.D.
- B — Bushing
- K5 — Product Symbol

K5B 3012

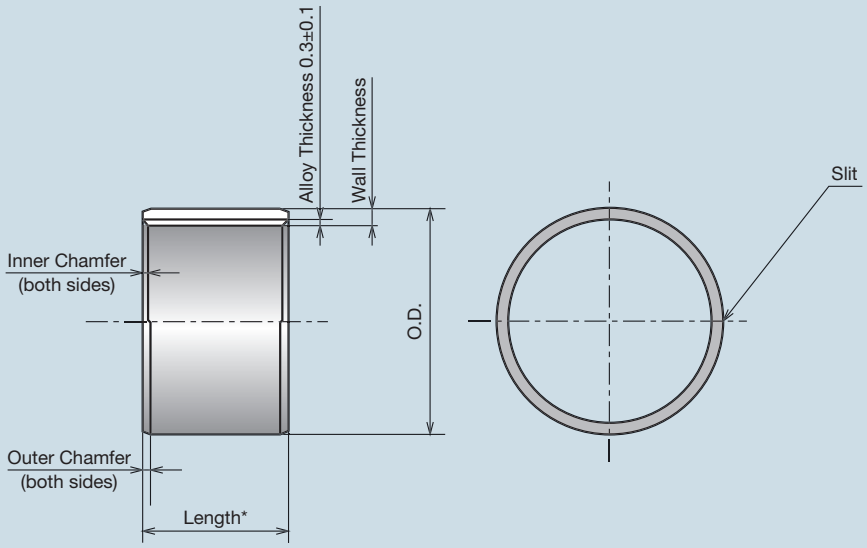
Please specify by part number.

Pb Free

RoHS 2

ELV

Bushing I.D.	Recommended Dimension Mating Part		Bushing Dimensions								
	Housing I.D.	Shaft Dia.	O.D.	Wall Thickness	12	15	20	25	30	35	
30	$\phi34H7\ ^{+0.025}_{0}$	$\phi30\ ^{-0.025}_{-0.046}$	$\phi34\ ^{+0.115}_{+0.075}$	$2.0\ ^{0}_{-0.030}$	**3012**	**3015**	**3020**	**3025**	**3030**	**3035**	
31	$\phi35H7\ ^{+0.025}_{0}$	$\phi31\ ^{-0.025}_{-0.050}$	$\phi35\ ^{+0.115}_{+0.075}$	$2.0\ ^{0}_{-0.030}$		**3115**		**3125**	**3130**		
32	$\phi36H7\ ^{+0.025}_{0}$	$\phi32\ ^{-0.025}_{-0.050}$	$\phi36\ ^{+0.115}_{+0.075}$	$2.0\ ^{0}_{-0.030}$		**3215**	**3220**	**3225**	**3230**		
35	$\phi39H7\ ^{+0.025}_{0}$	$\phi35\ ^{-0.025}_{-0.050}$	$\phi39\ ^{+0.115}_{+0.075}$	$2.0\ ^{0}_{-0.030}$	**3512**	**3515**	**3520**	**3525**	**3530**	**3535**	
38	$\phi42H7\ ^{+0.025}_{0}$	$\phi38\ ^{-0.025}_{-0.050}$	$\phi42\ ^{+0.115}_{+0.075}$	$2.0\ ^{0}_{-0.030}$			**3820**	**3825**	**3830**	**3835**	
40	$\phi44H7\ ^{+0.025}_{0}$	$\phi40\ ^{-0.025}_{-0.050}$	$\phi44\ ^{+0.115}_{+0.075}$	$2.0\ ^{0}_{-0.030}$	**4012**	**4015**	**4020**	**4025**	**4030**	**4035**	
45	$\phi50H7\ ^{+0.025}_{0}$	$\phi45\ ^{-0.025}_{-0.050}$	$\phi50\ ^{+0.115}_{+0.075}$	$2.5\ ^{0}_{-0.040}$			**4520**	**4525**	**4530**	**4535**	
50	$\phi55H7\ ^{+0.030}_{0}$	$\phi50\ ^{-0.025}_{-0.050}$	$\phi55\ ^{+0.145}_{+0.095}$	$2.5\ ^{0}_{-0.040}$			**5020**	**5025**	**5030**	**5035**	
55	$\phi60H7\ ^{+0.030}_{0}$	$\phi55\ ^{-0.025}_{-0.055}$	$\phi60\ ^{+0.145}_{+0.095}$	$2.5\ ^{0}_{-0.040}$				**5525**	**5530**	**5535**	
60	$\phi65H7\ ^{+0.030}_{0}$	$\phi60\ ^{-0.025}_{-0.055}$	$\phi65\ ^{+0.145}_{+0.095}$	$2.5\ ^{0}_{-0.040}$					**6030**	**6035**	
65	$\phi70H7\ ^{+0.030}_{0}$	$\phi65\ ^{+0.035}_{+0.005}$	$\phi70\ ^{+0.145}_{+0.095}$	$2.47\ ^{0}_{-0.050}$					**6530**		
70	$\phi75H7\ ^{+0.030}_{0}$	$\phi70\ ^{+0.035}_{+0.005}$	$\phi75\ ^{+0.145}_{+0.095}$	$2.47\ ^{0}_{-0.050}$					**7030**	**7035**	
75	$\phi80H7\ ^{+0.030}_{0}$	$\phi75\ ^{+0.035}_{+0.005}$	$\phi80\ ^{+0.160}_{+0.095}$	$2.47\ ^{0}_{-0.050}$					**7530**	**7535**	
80	$\phi85H7\ ^{+0.035}_{0}$	$\phi80\ ^{+0.035}_{+0.005}$	$\phi80\ ^{+0.165}_{+0.100}$	$2.47\ ^{0}_{-0.050}$							
85	$\phi90H7\ ^{+0.035}_{0}$	$\phi85\ ^{+0.035}_{0}$	$\phi90\ ^{+0.165}_{+0.100}$	$2.47\ ^{0}_{-0.050}$							
90	$\phi95H7\ ^{+0.035}_{0}$	$\phi90\ ^{+0.035}_{0}$	$\phi95\ ^{+0.165}_{+0.100}$	$2.47\ ^{0}_{-0.050}$							
100	$\phi105H7\ ^{+0.035}_{0}$	$\phi100\ ^{+0.035}_{0}$	$\phi105\ ^{+0.180}_{+0.110}$	$2.47\ ^{0}_{-0.050}$							
110	$\phi115H7\ ^{+0.035}_{0}$	$\phi110\ ^{+0.035}_{0}$	$\phi115\ ^{+0.180}_{+0.110}$	$2.47\ ^{0}_{-0.050}$							
120	$\phi125H7\ ^{+0.040}_{0}$	$\phi120\ ^{+0.035}_{0}$	$\phi125\ ^{+0.185}_{+0.120}$	$2.47\ ^{0}_{-0.050}$							
130	$\phi135H7\ ^{+0.040}_{0}$	$\phi130\ ^{+0.035}_{-0.005}$	$\phi135\ ^{+0.185}_{+0.120}$	$2.47\ ^{0}_{-0.050}$							
140	$\phi145H7\ ^{+0.040}_{0}$	$\phi140\ ^{+0.035}_{-0.005}$	$\phi145\ ^{+0.185}_{+0.120}$	$2.47\ ^{0}_{-0.050}$							
150	$\phi155H7\ ^{+0.040}_{0}$	$\phi150\ ^{+0.035}_{-0.005}$	$\phi155\ ^{+0.205}_{+0.140}$	$2.47\ ^{0}_{-0.050}$							
160	$\phi165H7\ ^{+0.040}_{0}$	$\phi160\ ^{+0.035}_{-0.005}$	$\phi165\ ^{+0.205}_{+0.140}$	$2.47\ ^{0}_{-0.050}$							



(Unit: mm)

Part Number & Bushing Length								Bushing I.D.
40	50	60	70	80	90	95	100	
3040	**3050**							30
3140								31
3240								32
3540	**3550**							35
3840								38
4040	**4050**							40
4540	**4550**							45
5040	**5050**	**5060**						50
5540	**5550**	**5560**						55
6040	**6050**	**6060**		**6080**				60
6540	**6550**	**6560**						65
7040	**7050**	**7060**	**7070**	**7080**				70
7540	**7550**	**7560**		**7580**				75
8040	**8050**	**8060**		**8080**				80
8540	**8550**	**8560**		**8580**				85
9040	**9050**	**9060**			**9090**			90
	10050		**10070**	**10080**		**10095**	**100100**	100
	11050		**11070**			**11095**	**110100**	110
	12050		**12070**			**12095**	**120100**	120
	13050			**13080**			**130100**	130
	14050			**14080**			**140100**	140
	15050			**15080**			**150100**	150
	16050			**16080**			**160100**	160

* Width tolerance is:
~ID 110 $^{0}_{-0.3}$
OD 120~ $^{0}_{-0.4}$

K5F DDK05 Flanged Bushing (Bushing Inner Diameter: 3 to 60 mm)

Designation of Part Number

K5 F 00 00 00

- 00 — Flange O.D.
- 00 — Bushing Length
- 00 — Bushing Nominal I.D.
- F — Flanged Bushing
- K5 — Product Symbol

K5F 0303-7

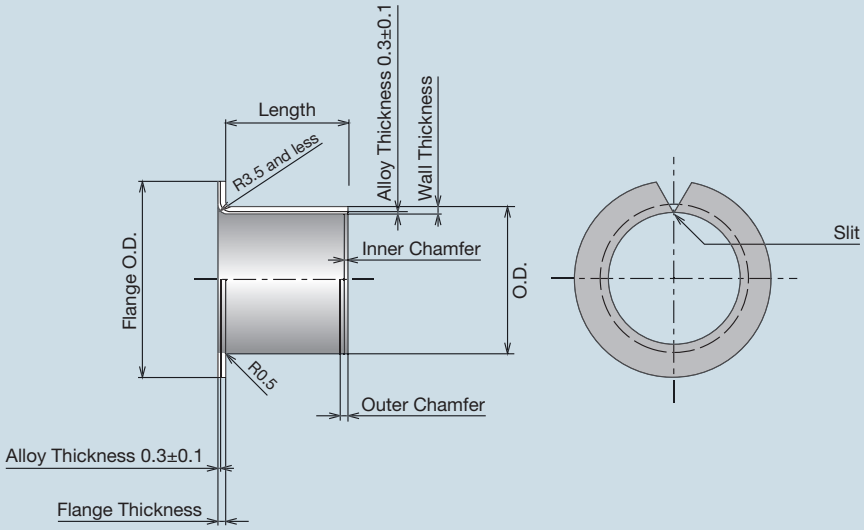
Please specify by part number.

Pb Free

RoHS 2

ELV

Bushing I.D.	Recommended Dimension Mating Part		Bushing Dimensions							
	Housing I.D.	Shaft Dia.	Flange O.D.	Flange Thickness	O.D.	Wall Thickness	3	4	5	6
3	ϕ4.6H7 $^{+0.012}_{0}$	ϕ3 $^{-0.025}_{-0.035}$	ϕ7 $^{0}_{-0.8}$	0.8 $^{0}_{-0.15}$	ϕ4.6 $^{+0.047}_{+0.017}$	0.8 $^{0}_{-0.025}$	0303-7		0305-7	
4	ϕ5.6H7 $^{+0.012}_{0}$	ϕ4 $^{-0.025}_{-0.037}$	ϕ9 $^{0}_{-0.8}$	0.8 $^{0}_{-0.15}$	ϕ5.6 $^{+0.047}_{+0.017}$	0.8 $^{0}_{-0.025}$		0404-9		0406-9
5	ϕ7H7 $^{+0.015}_{0}$	ϕ5 $^{-0.025}_{-0.037}$	ϕ10 $^{0}_{-0.8}$	1.0 $^{0}_{-0.15}$	ϕ7 $^{+0.053}_{+0.023}$	1.0 $^{0}_{-0.025}$		0504-10	0505-10	0506-10
6	ϕ8H7 $^{+0.015}_{0}$	ϕ6 $^{-0.025}_{-0.037}$	ϕ12 $^{0}_{-0.8}$	1.0 $^{0}_{-0.15}$	ϕ8 $^{+0.053}_{+0.023}$	1.0 $^{0}_{-0.025}$			0605-12	0606-12
7	ϕ9H7 $^{+0.015}_{0}$	ϕ7 $^{-0.025}_{-0.040}$	ϕ13 $^{0}_{-0.8}$	1.0 $^{0}_{-0.15}$	ϕ9 $^{+0.053}_{+0.023}$	1.0 $^{0}_{-0.025}$			0705-13	
8	ϕ10H7 $^{+0.015}_{0}$	ϕ8 $^{-0.025}_{-0.040}$	ϕ15 $^{0}_{-0.8}$	1.0 $^{0}_{-0.15}$	ϕ10 $^{+0.055}_{+0.025}$	1.0 $^{0}_{-0.025}$				0806-15
10	ϕ12H7 $^{+0.018}_{0}$	ϕ10 $^{-0.025}_{-0.040}$	ϕ18 $^{0}_{-0.8}$	1.0 $^{0}_{-0.15}$	ϕ12 $^{+0.060}_{+0.030}$	1.0 $^{0}_{-0.025}$				1006-18
12	ϕ14H7 $^{+0.018}_{0}$	ϕ12 $^{-0.025}_{-0.043}$	ϕ20 $^{0}_{-0.8}$	1.0 $^{0}_{-0.15}$	ϕ14 $^{+0.060}_{+0.030}$	1.0 $^{0}_{-0.025}$				1206-20
14	ϕ16H7 $^{+0.018}_{0}$	ϕ14 $^{-0.025}_{-0.043}$	ϕ22 $^{0}_{-0.8}$	1.0 $^{0}_{-0.15}$	ϕ16 $^{+0.063}_{+0.033}$	1.0 $^{0}_{-0.025}$				
15	ϕ17H7 $^{+0.018}_{0}$	ϕ15 $^{-0.025}_{-0.043}$	ϕ23 $^{0}_{-0.8}$	1.0 $^{0}_{-0.15}$	ϕ17 $^{+0.073}_{+0.038}$	1.0 $^{0}_{-0.025}$				
16	ϕ18H7 $^{+0.018}_{0}$	ϕ16 $^{-0.025}_{-0.043}$	ϕ24 $^{0}_{-0.8}$	1.0 $^{0}_{-0.15}$	ϕ18 $^{+0.073}_{+0.038}$	1.0 $^{0}_{-0.025}$				
18	ϕ20H7 $^{+0.021}_{0}$	ϕ18 $^{-0.025}_{-0.043}$	ϕ26 $^{0}_{-0.8}$	1.0 $^{0}_{-0.15}$	ϕ20 $^{+0.081}_{+0.046}$	1.0 $^{0}_{-0.025}$				
20	ϕ23H7 $^{+0.021}_{0}$	ϕ20 $^{-0.025}_{-0.046}$	ϕ31 $^{0}_{-0.8}$	1.5 $^{0}_{-0.15}$	ϕ23 $^{+0.081}_{+0.046}$	1.5 $^{0}_{-0.030}$				
22	ϕ25H7 $^{+0.021}_{0}$	ϕ22 $^{-0.025}_{-0.046}$	ϕ33 $^{0}_{-0.8}$	1.5 $^{0}_{-0.15}$	ϕ25 $^{+0.086}_{+0.051}$	1.5 $^{0}_{-0.030}$				
24	ϕ27H7 $^{+0.021}_{0}$	ϕ24 $^{-0.025}_{-0.046}$	ϕ35 $^{0}_{-0.8}$	1.5 $^{0}_{-0.15}$	ϕ27 $^{+0.086}_{+0.051}$	1.5 $^{0}_{-0.030}$				
25	ϕ28H7 $^{+0.021}_{0}$	ϕ25 $^{-0.025}_{-0.046}$	ϕ36 $^{0}_{-0.8}$	1.5 $^{0}_{-0.15}$	ϕ28 $^{+0.093}_{+0.056}$	1.5 $^{0}_{-0.030}$				
26	ϕ30H7 $^{+0.021}_{0}$	ϕ26 $^{-0.025}_{-0.046}$	ϕ38 $^{0}_{-0.8}$	2.0 $^{0}_{-0.15}$	ϕ30 $^{+0.115}_{+0.075}$	2.0 $^{0}_{-0.030}$				
28	ϕ32H7 $^{+0.025}_{0}$	ϕ28 $^{-0.025}_{-0.046}$	ϕ40 $^{0}_{-0.8}$	2.0 $^{0}_{-0.15}$	ϕ32 $^{+0.115}_{+0.075}$	2.0 $^{0}_{-0.030}$				
30	ϕ34H7 $^{+0.025}_{0}$	ϕ30 $^{-0.025}_{-0.046}$	ϕ42 $^{0}_{-0.8}$	2.0 $^{0}_{-0.15}$	ϕ34 $^{+0.115}_{+0.075}$	2.0 $^{0}_{-0.030}$				
31	ϕ35H7 $^{+0.025}_{0}$	ϕ31 $^{-0.025}_{-0.050}$	ϕ45 $^{0}_{-0.8}$	2.0 $^{0}_{-0.15}$	ϕ35 $^{+0.115}_{+0.075}$	2.0 $^{0}_{-0.030}$				
32	ϕ36H7 $^{+0.025}_{0}$	ϕ32 $^{-0.025}_{-0.050}$	ϕ46 $^{0}_{-0.8}$	2.0 $^{0}_{-0.15}$	ϕ36 $^{+0.115}_{+0.075}$	2.0 $^{0}_{-0.030}$				
35	ϕ39H7 $^{+0.025}_{0}$	ϕ35 $^{-0.025}_{-0.050}$	ϕ49 $^{0}_{-0.8}$	2.0 $^{0}_{-0.15}$	ϕ39 $^{+0.115}_{+0.075}$	2.0 $^{0}_{-0.030}$				
38	ϕ42H7 $^{+0.025}_{0}$	ϕ38 $^{-0.025}_{-0.050}$	ϕ52 $^{0}_{-0.8}$	2.0 $^{0}_{-0.15}$	ϕ42 $^{+0.115}_{+0.075}$	2.0 $^{0}_{-0.030}$				
40	ϕ44H7 $^{+0.025}_{0}$	ϕ40 $^{-0.025}_{-0.050}$	ϕ54 $^{0}_{-0.8}$	2.0 $^{0}_{-0.15}$	ϕ44 $^{+0.115}_{+0.075}$	2.0 $^{0}_{-0.030}$				
45	ϕ50H7 $^{+0.025}_{0}$	ϕ45 $^{-0.025}_{-0.050}$	ϕ60 $^{0}_{-0.8}$	2.5 $^{0}_{-0.15}$	ϕ50 $^{+0.115}_{+0.075}$	2.5 $^{0}_{-0.040}$				
50	ϕ55H7 $^{+0.030}_{0}$	ϕ50 $^{-0.025}_{-0.050}$	ϕ65 $^{0}_{-0.8}$	2.5 $^{0}_{-0.15}$	ϕ55 $^{+0.145}_{+0.095}$	2.5 $^{0}_{-0.040}$				
55	ϕ60H7 $^{+0.030}_{0}$	ϕ55 $^{-0.025}_{-0.050}$	ϕ70 $^{0}_{-0.8}$	2.5 $^{0}_{-0.15}$	ϕ60 $^{+0.145}_{+0.095}$	2.5 $^{0}_{-0.040}$				
60	ϕ65H7 $^{+0.030}_{0}$	ϕ60 $^{-0.025}_{-0.050}$	ϕ75 $^{0}_{-0.8}$	2.5 $^{0}_{-0.15}$	ϕ65 $^{+0.145}_{+0.095}$	2.5 $^{0}_{-0.040}$				



(Unit: mm)

Part Number & Bushing Length Tolerance $^{0}_{-0.3}$											Bushing I.D.
7	8	10	12	15	20	25	30	40	50	60	
											3
											4
											5
0607-12	0608-12	0610-12									6
0707-13		0710-13	0712-13								7
	0808-15	0810-15	0812-15								8
1007-18	1008-18	1010-18	1012-18	1015-18							10
1207-20	1208-20	1210-20	1212-20	1215-20	1220-20						12
		1410-22	1412-22	1415-22	1420-22						14
		1510-23	1512-23	1515-23	1520-23	1525-23					15
		1610-24	1612-24	1615-24	1620-24	1625-24					16
		1810-26	1812-26	1815-26	1820-26	1825-26					18
		2010-31	2012-31	2015-31	2020-31	2025-31	2030-31				20
		2210-33	2212-33	2215-33	2220-33	2225-33					22
				2415-35	2420-35	2425-35	2430-35				24
		2510-36	2512-36	2515-36	2520-36	2525-36	2530-36				25
				2615-38	2620-38						26
			2812-40	2815-40	2820-40		2830-40				28
			3012-42	3015-42	3020-42	3025-42	3030-42	3040-42			30
						3125-45					31
					3220-46	3225-46	3230-46				32
			3512-49		3520-49	3525-49	3530-49	3540-49	3550-49		35
					3820-52		3830-52	3840-52			38
			4012-54		4020-54	4025-54	4030-54	4040-54	4050-54		40
					4520-60	4525-60	4530-60	4540-60	4550-60		45
					5020-65		5030-65	5040-65		5060-65	50
							5530-70	5540-70		5560-70	55
							6030-75	6040-75		6060-75	60

K5T DDK05 Thrust Washer

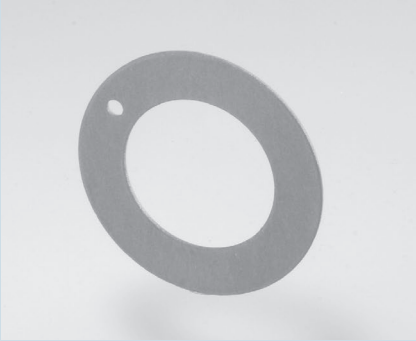
Designation of Part Number

K5 T 00

- 00 — Nominal I.D.
- T — Thrust Washer
- K5 — Product Symbol

K5T 06

Please specify by part number.



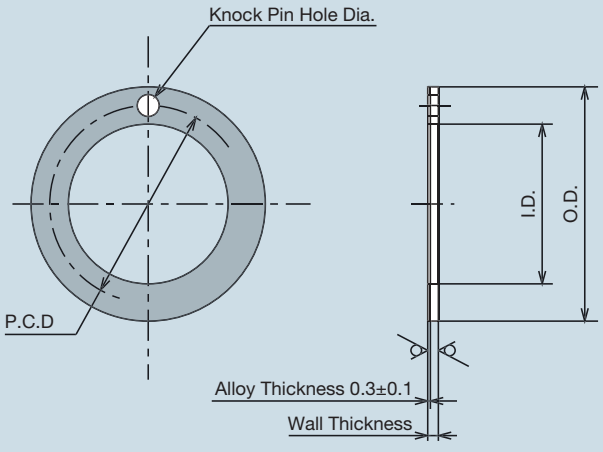
Pb Free

RoHS 2

ELV

(Unit: mm)

Nominal I.D.	Part Number	I.D.	O.D.	Thickness	Knock Pin Hole		Housing Recess Depth
					Dia.	P.C.D	
6	**K5T06**	8 +0.25 0	16 0 −0.25	1.5 −0.03 −0.08	1.100 +0.20 0	12 ±0.12	1.0 +0.20 −0.05
8	**K5T08**	10 +0.25 0	18 0 −0.25			14 ±0.12	
10	**K5T10**	12 +0.25 0	24 0 −0.25		1.625 +0.25 0	18 ±0.12	
12	**K5T12**	14 +0.25 0	26 0 −0.25		2.125 +0.25 0	20 ±0.12	
14	**K5T14**	16 +0.25 0	30 0 −0.25			23 ±0.12	
16	**K5T16**	18 +0.25 0	32 0 −0.25			25 ±0.12	
18	**K5T18**	20 +0.25 0	36 0 −0.25		3.125 +0.25 0	28 ±0.12	
20	**K5T20**	22 +0.25 0	38 0 −0.25			30 ±0.12	
22	**K5T22**	24 +0.25 0	42 0 −0.25			33 ±0.12	
24	**K5T24**	26 +0.25 0	44 0 −0.25			35 ±0.12	
25	**K5T25**	28 +0.25 0	48 0 −0.25		4.125 +0.25 0	38 ±0.12	
30	**K5T30**	32 +0.25 0	54 0 −0.25			43 ±0.12	
35	**K5T35**	38 +0.25 0	62 0 −0.25			50 ±0.12	
40	**K5T40**	42 +0.25 0	66 0 −0.25			54 ±0.12	
45	**K5T45**	48 +0.25 0	74 0 −0.25	2.0 −0.03 −0.08		61 ±0.12	1.5 +0.20 −0.05
50	**K5T50**	52 +0.25 0	78 0 −0.25			65 ±0.12	

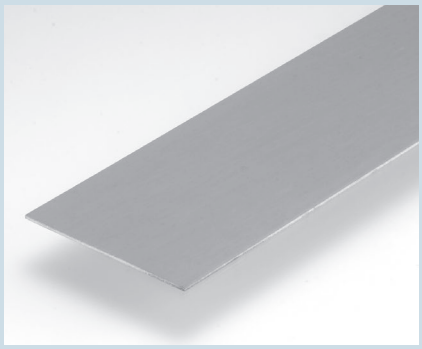


K5P DDK05 Slide Plate

Designation of Part Number

K5 P 00

- 00 — Thickness Indication Symbol
- P — Slide Plate
- K5 — Product Symbol



Pb Free

RoHS 2

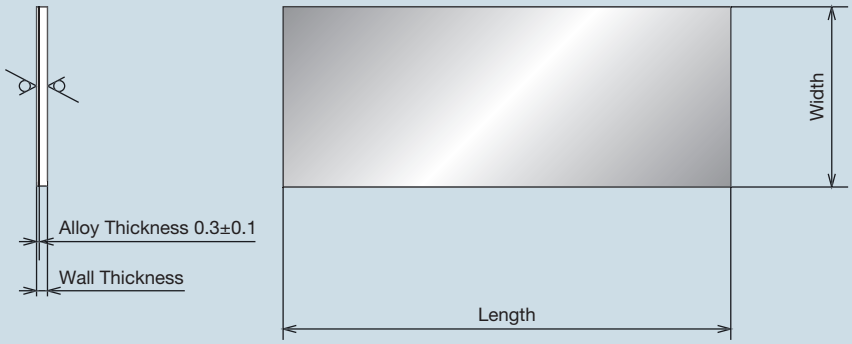
ELV

K5P 100

Please specify by part number.

(Unit: mm)

Part Number	Thickness	Width	Length
K5P100	1.0 $^{-0.03}_{-0.13}$	80 $^{+2.0}_{0}$	500 $^{+10.0}_{0}$
K5P150	1.5 $^{-0.03}_{-0.13}$	90 $^{+2.0}_{0}$	
K5P200	2.0 $^{-0.03}_{-0.13}$	100 $^{+2.0}_{0}$	
K5P250	2.5 $^{-0.05}_{-0.15}$	100 $^{+2.0}_{0}$	
K5P300	3.0 $^{0}_{-0.1}$	100 $^{+2.0}_{0}$	



DAIDYNE DDK35

Pb Free RoHS 2 ELV

HOISI PRECISION 凱獅精密 ISO 7312 9830

This is a completely maintenance-free composite bearing made of polytetrafluoroethylene (PTFE) resin mixed with a special filler for low friction characteristics as well as optimal strength and dimensional stability of the metal. The phosphor bronze used for the backing provides excellent water resistance. This bearing is identical in construction to the DAIDYNE DDK05 with the lone exception that phosphor bronze is used instead of steel for the backing.

Features

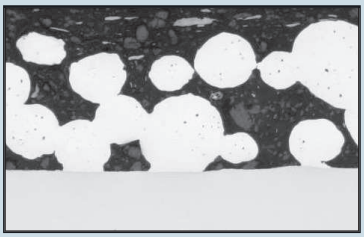
1. The basic features and characteristics of this bearing are identical to those of the DDK05. Refer to pages 54 to 57 for more information.
2. Provides superior water resistance compared with the DDK05.
3. Constructed of non-magnetic materials.

Suitable applications for DDK35 dry bearings

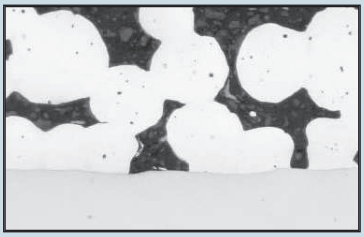
When using DDK35 dry bearings for heavy-duty operations, the appearance of the bearing will change during breaking-in. Once broken in, the bearing surface will change to the greenish-grey color like a semi-metallic mat. The areas that bear the brunt of a heavy load will have a dull bronze color. In some cases, the bearing surface could exhibit feathers. These are all typical of a DDK35 dry bearing that is well broken in and operating normally. Therefore, even though its appearance changes, there is no deterioration of the bearing's performance and it remains suitable for use in extremely long-term operations.

Designing DDK35 dry bearings

Identical to the DDK05.
Refer to "Designing DDK05 Dry Bearings" on pages 55 to 57.



Prior to breaking in the bearing



Photographic cross-section of a DDK35 dry bearing after breaking in and operating for a certain period of time.

DDK35 dimensions and specifications

Bushing inner diameter from 3 to 160 mm

Designation of Part Number

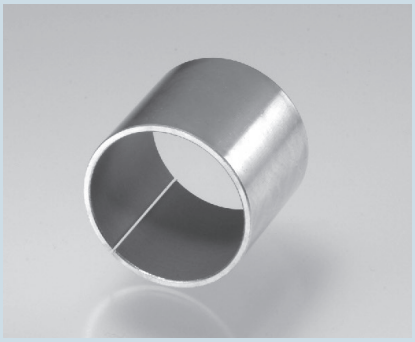
K5 B ○○ ○○ (B)

- (B): Phosphor bronze backing
- ○○: Bushing length
- ○○: Bushing nominal inner diameter
- B: Bushing
- K5: Materials symbol

K5B 0303 (B)

Please specify by Part No.
This product is produced on order only.

K5B 0303 (B)



Dimensions are identical to the DDK05 flanged bushing.
Refer to pages 58 to 61 for more information.

Flanged bushing inner diameter from 5 to 60 mm

Designation of Part Number

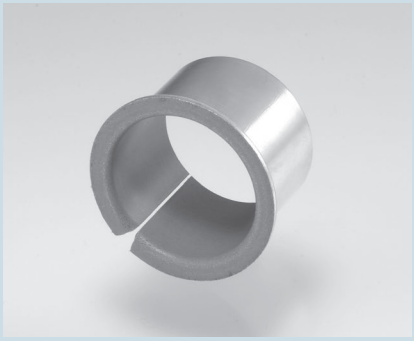
K5 F ○○ ○○-○○ (B)

- (B): Phosphor bronze backing
- ○○: Outer flange diameter
- ○○: Bushing length
- ○○: Bushing nominal inner diameter
- F: Flanged bushing
- K5: Materials symbol

K5F 0504-10 (B)

Please specify by Part No.
This product is produced on order only.

K5F 0504-10 (B)



Dimensions are identical to the DDK05 flanged bushing.
Refer to pages 62 to 63 for more information.

Thrust washer

Designation of Part Number

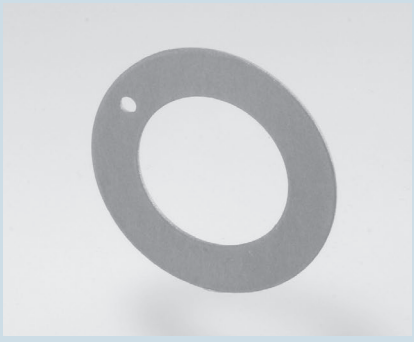
K5 T ○○ (B)

- (B): Phosphor bronze backing
- ○○: Nominal inner diameter
- T: Thrust washer
- K5: Materials symbol

K5T 06 (B)

Please specify by Part No.
This product is produced on order only.

K5T 06 (B)



Dimensions are identical to the DDK05 thrust washer.
Refer to page 64 for more information.

Slide plate

Designation of Part Number

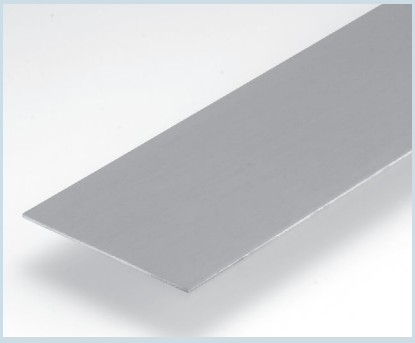
K5 P ○○ (B)

- (B): Phosphor bronze backing
- ○○: Wall thickness symbols
- P: Slide plate
- K5: Materials symbol

K5P 100 (B)

Please specify by Part No.
This product is produced on order only.

K5P 100 (B)



Dimensions are identical to the DDK05 slide plate.
Refer to page 65 for more information.

DAIDYNE DDK02

Pb Free RoHS 2 ELV

HOISI PRECISION 凱獅精密 180 7312 9830

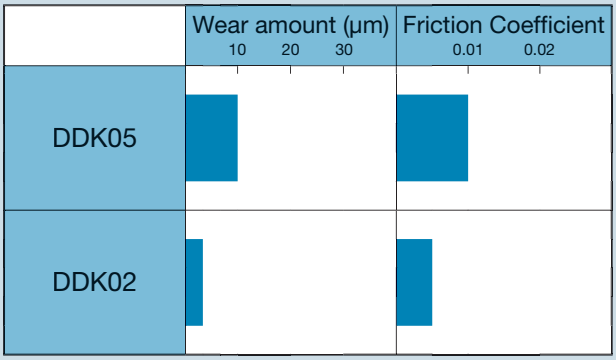
This product is an environmentally friendly "lead-free bearing." The material structure of DAIDYNE DDK02 consists of multiple layers of PTFE resin + porous intermediate layer + steel lining (similar to that of DDK05 Dry Bearing) and due to the improvement of the sliding layer and porous layer, boundary surface performance and fluid lubrication have also improved.

Features

1. Offers excellent wear-resistance along boundary surfaces and under fluid lubrication.
   Provides three to five times the wear resistance of DDK05.
2. Offers low friction characteristics along boundary surfaces and under fluid lubrication.
   Even less friction than DDK05.
3. Excellent corrosion resistance
   Suitable for a wide range of applications.

Performance Comparison between DDK05 and DDK02

The following results show the comparison of the amount of wear and the friction coefficient under the conditions of lubrication using shock absorber oil.



Test Conditions	
1. Bushing Size (mm)	ϕ20×ϕ23×20L
2. Speed (m/min)	3
3. Specific Load (MPa)	19.6
4. Clearance (Diameter)(mm)	0.08
5. Lubrication	SAE#10,0.15 mm³/min
6. Temperature	Room Temperature
7. Shaft Material Roughness (μm Rmax) Hardness (Hv)	S55C 1.0 700
8. Test Time (H)	100

Standard Dimensions of the DDK02 Bushing

Thickness Dimensions of the DDK02 Bushing (Unit: mm)

Bushing nominal inner diameter		Thickness (T)
min	max	
–	ϕ19	1.0 $^{0}_{-0.020}$
ϕ19	ϕ25	1.5 $^{0}_{-0.020}$
ϕ25	ϕ40	2.0 $^{0}_{-0.025}$
ϕ40	ϕ60	2.5 $^{0}_{-0.040}$
ϕ60	ϕ160	2.47 $^{0}_{-0.050}$

Identical to DDK05 bushings except for wall thickness tolerances.
Please see pages 58 to 61 for DDK05 bushing dimensions.

DAIDYNE DDK06

Pb Free RoHS2 ELV

HOISI PRECISION 凱獅精密 ISO 7312 9830

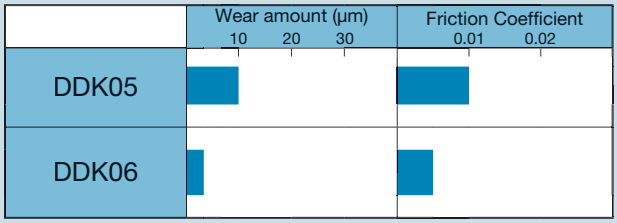
The material structure of DDK06 consists of multiple layers of PTFE resin + porous intermediate layer + steel lining (similar to that of DDK05 Dry Bearing) and due to the improvement of the sliding layer and porous layer, boundary surface performance and fluid lubrication have also improved.

Features

- Excellent cavitation resistance – Approximately ten times better than DDK05
- Low friction characteristics of the boundary surface and fluid lubrication – Lower friction characteristics than DDK05
- Excellent wear resistance of the boundary surface and fluid lubrication (at low or intermediate load) – Three to five times better wear resistance than DDK05
- Excellent corrosion resistance – Wide range of applications

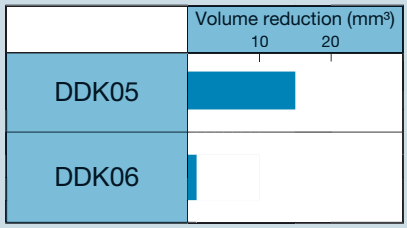
Performance Comparison between DDK05 and DDK06

The following results show the comparison of the amount of wear and the friction coefficient under the conditions of lubrication using shock absorber oil.



Test Conditions	
1. Bushing Size (mm)	ϕ20×ϕ23×20L
2. Speed (m/min)	3
3. Specific Load (MPa)	19.6
4. Clearance (Diameter)(mm)	0.08
5. Lubrication	SAE#10,0.15 mm³/min
6. Temperature	Room Temperature
7. Shaft Material Roughness (μm Rmax) Hardness (Hv)	S55C 1.0 700
8. Test Time (H)	100

Results of Cavitation Testing



Test conditions	Dimensions	Unit
1. Test sample dimensions	40×40	mm
2. Alloy thickness	0.3	mm
3. Surface layer thickness	0.01 to 0.03	mm
4. Frequency	19	kHz
5. Output	600	W
6. Lubricant	Water	–
7. Lubricant temperature	10 to 20	°C
8. Clearance	1.0	mm
9. Honed diameter	35	mm
10. Test time	3	min

Standard Dimensions of the DDK06 Bushing

Thickness Dimensions of the DDK06 Bushing (Unit: mm)

Bushing nominal inner diameter		Thickness (T)	
min	max		
–	ϕ19	1.0	0 -0.020
ϕ19	ϕ25	1.5	0 -0.020
ϕ25	ϕ40	2.0	0 -0.025
ϕ40	ϕ60	2.5	0 -0.040
ϕ60	ϕ160	2.47	0 -0.050

Identical to DDK05 bushings except for wall thickness tolerances.
Please see pages 58 to 61 for DDK05 bushing dimensions.

DAIBEST DBB01

Pb Free RoHS 2 ELV

HOISI PRECISION 凱獅精密 ISO 7312 9830

These are oil-impregnated bearings of our own proprietary lubrication characteristics, in which lipophilic fibers and special filler material are uniformly dispersed within polyacetal plastic resin, a plastic bearing material offering excellent bearing characteristics.
Bimetal type with back metal — DBB01 dry bearing

Features

1. Can be used without an oil supply
2. Can be used at high-load and at high speed
3. Dimensions and shape are stabilized. Thin wall permits compact equipment design.
4. Exhibits superior wear resistant properties where oil film formation is difficult such as reciprocating motion, oscillating motion or frequent start/stop
5. Abundant standard parts such as wrapped bushes and thrust washers are available.
6. There is interchangeability with DDK05 Dry bearing and DBX01 bearing.

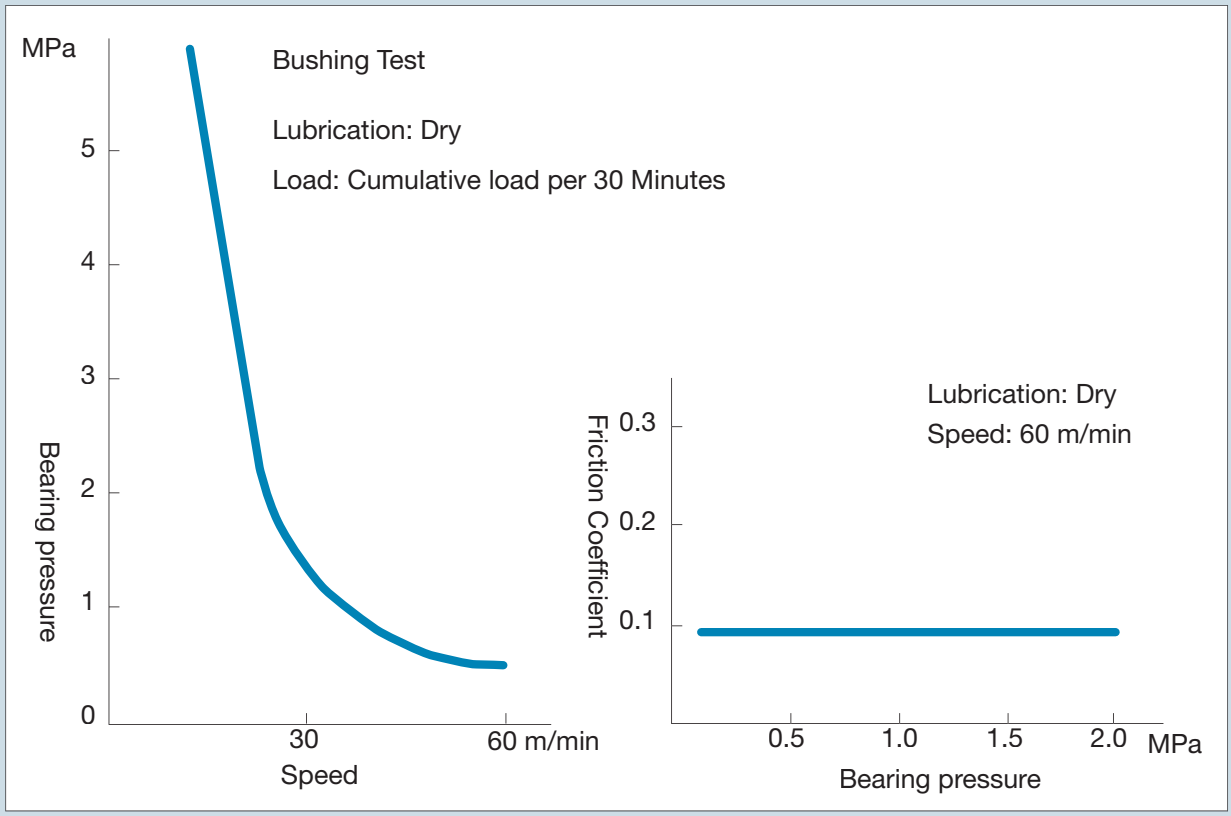
Material Characteristics DAIBEST (Typical Values)

Property of DAIBEST Bearing Resin Layer

Gravity	Coefficient of Linear Thermal Expansion ($\times 10^{-5}$/°C)	Heat Transfer Coefficient (Cal/sec · °C/cm)	Tensile Strength (MPa)	Elongation (%)	Oil Content (%)
1.4	8.4	5.5×10^{-4}	Above 42	Above 10	Above 4

Bearing Characteristics and Test Data

DBB01 Dry Bearing



Lubrication	No Oil supply
Allowable Max. Load MPa	68.6
Allowable Max. Speed m/min	150
Allowable Max. PV value MPa-m/min	157
Limit Service Temperature °C	-40 to +120

When the bearing is used under lubrication the bearing properties will increase depending on the condition.

DBB DBB01 Bushing (Bushing Inner Diameter: 5 to 100 mm)

Designation of Part Number

DBB ○○ ○○
- ○○ — Bushing Length
- ○○ — Bushing Nominal I.D.
- DBB — Product Symbol

DBB 0504

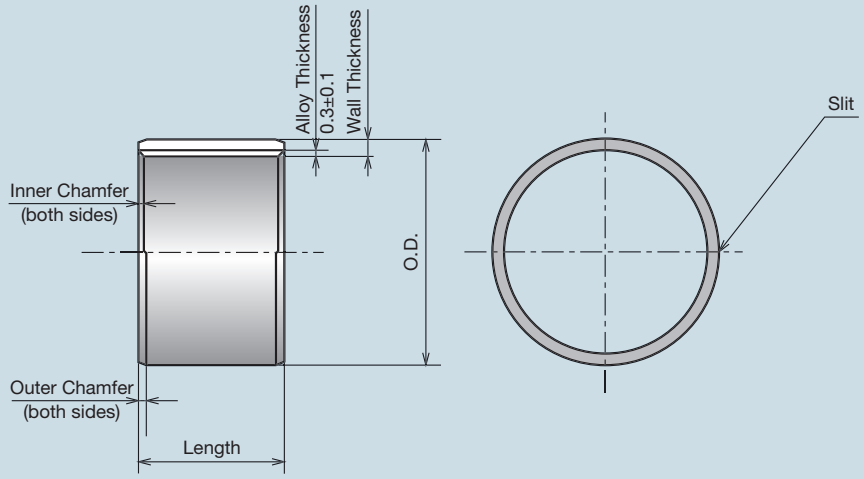
Please specify by part number.

Pb Free

RoHS 2

ELV

Bushing I.D.	Recommended Dimension Mating Part		Bushing Dimensions							
	Housing I.D.	Shaft Dia.	O.D.	Wall Thickness	4	5	6	7	8	
5	φ7H7 $^{+0.015}_{0}$	φ5h7 $^{0}_{-0.012}$	φ7 $^{+0.053}_{+0.023}$	1.0 $^{-0.020}_{-0.060}$	**0504**	**0505**	**0506**		**0508**	
6	φ8H7 $^{+0.015}_{0}$	φ6h7 $^{0}_{-0.012}$	φ8 $^{+0.053}_{+0.023}$	1.0 $^{-0.020}_{-0.060}$		**0605**	**0606**	**0607**	**0608**	
7	φ9H7 $^{+0.015}_{0}$	φ7h7 $^{0}_{-0.015}$	φ9 $^{+0.053}_{+0.023}$	1.0 $^{-0.020}_{-0.060}$		**0705**		**0707**		
8	φ10H7 $^{+0.015}_{0}$	φ8h7 $^{0}_{-0.015}$	φ10 $^{+0.055}_{+0.025}$	1.0 $^{-0.020}_{-0.060}$			**0806**		**0808**	
10	φ12H7 $^{+0.018}_{0}$	φ10h7 $^{0}_{-0.015}$	φ12 $^{+0.053}_{+0.023}$	1.0 $^{-0.020}_{-0.060}$			**1006**	**1007**	**1008**	
12	φ14H7 $^{+0.018}_{0}$	φ12h7 $^{0}_{-0.018}$	φ14 $^{+0.060}_{+0.030}$	1.0 $^{-0.020}_{-0.060}$			**1206**		**1208**	
14	φ16H7 $^{+0.018}_{0}$	φ14h7 $^{0}_{-0.018}$	φ16 $^{+0.063}_{+0.033}$	1.0 $^{-0.020}_{-0.060}$						
15	φ17H7 $^{+0.018}_{0}$	φ15h7 $^{0}_{-0.018}$	φ17 $^{+0.073}_{+0.038}$	1.0 $^{-0.020}_{-0.060}$						
16	φ18H7 $^{+0.018}_{0}$	φ16h7 $^{0}_{-0.018}$	φ18 $^{+0.073}_{+0.038}$	1.0 $^{-0.020}_{-0.060}$						
18	φ20H7 $^{+0.021}_{0}$	φ18h7 $^{0}_{-0.018}$	φ20 $^{+0.081}_{+0.046}$	1.0 $^{-0.020}_{-0.060}$						
20	φ23H7 $^{+0.021}_{0}$	φ20h7 $^{0}_{-0.021}$	φ23 $^{+0.081}_{+0.046}$	1.5 $^{-0.025}_{-0.065}$						
22	φ25H7 $^{+0.021}_{0}$	φ22h7 $^{0}_{-0.021}$	φ25 $^{+0.086}_{+0.051}$	1.5 $^{-0.025}_{-0.065}$						
24	φ27H7 $^{+0.021}_{0}$	φ24h7 $^{0}_{-0.021}$	φ27 $^{+0.086}_{+0.051}$	1.5 $^{-0.025}_{-0.065}$						
25	φ28H7 $^{+0.021}_{0}$	φ25h7 $^{0}_{-0.021}$	φ28 $^{+0.093}_{+0.056}$	1.5 $^{-0.025}_{-0.065}$						
26	φ30H7 $^{+0.021}_{0}$	φ26h7 $^{0}_{-0.021}$	φ30 $^{+0.115}_{+0.075}$	2.0 $^{-0.030}_{-0.080}$						
28	φ32H7 $^{+0.025}_{0}$	φ28h7 $^{0}_{-0.021}$	φ32 $^{+0.115}_{+0.075}$	2.0 $^{-0.030}_{-0.080}$						
30	φ34H7 $^{+0.025}_{0}$	φ30h7 $^{0}_{-0.021}$	φ34 $^{+0.115}_{+0.075}$	2.0 $^{-0.030}_{-0.080}$						
32	φ36H7 $^{+0.025}_{0}$	φ32h7 $^{0}_{-0.025}$	φ36 $^{+0.115}_{+0.075}$	2.0 $^{-0.030}_{-0.080}$						
					12	15	20	25	30	
35	φ39H7 $^{+0.025}_{0}$	φ35h7 $^{0}_{-0.025}$	φ39 $^{+0.115}_{+0.075}$	2.0 $^{-0.030}_{-0.080}$	**3512**		**3520**	**3525**	**3530**	
38	φ42H7 $^{+0.025}_{0}$	φ38h7 $^{0}_{-0.025}$	φ42 $^{+0.115}_{+0.075}$	2.0 $^{-0.030}_{-0.080}$			**3820**			
40	φ44H7 $^{+0.025}_{0}$	φ40h7 $^{0}_{-0.025}$	φ44 $^{+0.115}_{+0.075}$	2.0 $^{-0.030}_{-0.080}$	**4012**		**4020**	**4025**	**4030**	
45	φ50H7 $^{+0.025}_{0}$	φ45h7 $^{0}_{-0.025}$	φ50 $^{+0.115}_{+0.075}$	2.5 $^{-0.040}_{-0.095}$			**4520**	**4525**	**4530**	
50	φ55H7 $^{+0.030}_{0}$	φ50h7 $^{0}_{-0.025}$	φ55 $^{+0.145}_{+0.095}$	2.5 $^{-0.040}_{-0.095}$			**5020**		**5030**	
55	φ60H7 $^{+0.030}_{0}$	φ55h7 $^{0}_{-0.030}$	φ60 $^{+0.145}_{+0.095}$	2.5 $^{-0.040}_{-0.095}$					**5530**	
60	φ65H7 $^{+0.030}_{0}$	φ60h7 $^{0}_{-0.030}$	φ65 $^{+0.145}_{+0.095}$	2.5 $^{-0.040}_{-0.095}$					**6030**	
65	φ70H7 $^{+0.030}_{0}$	φ65h7 $^{0}_{-0.030}$	φ70 $^{+0.145}_{+0.095}$	2.5 $^{-0.040}_{-0.095}$					**6530**	
70	φ75H7 $^{+0.030}_{0}$	φ70h7 $^{0}_{-0.030}$	φ75 $^{+0.145}_{+0.095}$	2.5 $^{-0.040}_{-0.095}$						
75	φ80H7 $^{+0.030}_{0}$	φ75h7 $^{0}_{-0.030}$	φ80 $^{+0.145}_{+0.095}$	2.5 $^{-0.040}_{-0.095}$					**7530**	
80	φ85H7 $^{+0.035}_{0}$	φ80h7 $^{0}_{-0.030}$	φ85 $^{+0.165}_{+0.100}$	2.5 $^{-0.040}_{-0.095}$						
85	φ90H7 $^{+0.035}_{0}$	φ85h7 $^{0}_{-0.035}$	φ90 $^{+0.165}_{+0.100}$	2.5 $^{-0.040}_{-0.095}$						
90	φ95H7 $^{+0.035}_{0}$	φ90h7 $^{0}_{-0.035}$	φ95 $^{+0.165}_{+0.100}$	2.5 $^{-0.040}_{-0.095}$						
100	φ105H7 $^{+0.035}_{0}$	φ100h7 $^{0}_{-0.035}$	φ105 $^{+0.180}_{+0.115}$	2.5 $^{-0.040}_{-0.095}$						



(Unit: mm)

Part Number & Bushing Length Tolerance $^{0}_{-0.3}$							Bushing I.D.
10	12	15	20	25	30	40	
							5
0610							6
0710	**0712**						7
0810	**0812**						8
1010	**1012**	**1015**	**1020**				10
1210	**1212**	**1215**	**1220**				12
1410	**1412**	**1415**	**1420**				14
1510	**1512**	**1515**	**1520**	**1525**			15
1610	**1612**	**1615**	**1620**	**1625**			16
1810	**1812**	**1815**	**1820**	**1825**			18
2010	**2012**	**2015**	**2020**	**2025**	**2030**		20
2210	**2212**	**2215**	**2220**	**2225**			22
		2415	**2420**	**2425**	**2430**		24
2510	**2512**	**2515**	**2520**	**2525**	**2530**		25
		2615	**2620**		**2630**		26
	2812	**2815**	**2820**		**2830**		28
	3012	**3015**	**3020**	**3025**	**3030**	**3040**	30
			3220	**3225**	**3230**	**3240**	32
40	50	60	70	80	90	95	
3540	**3550**						35
3840							38
4040	**4050**						40
4540	**4550**						45
5040		**5060**					50
5540		**5560**					55
6040		**6060**					60
6540		**6560**					65
7040		**7060**		**7080**			70
7540		**7560**		**7580**			75
8040		**8060**		**8080**			80
8540		**8560**		**8580**			85
9040		**9060**			**9090**		90
	10050		**10070**			**10095**	100

* Some size requires special coating to avoid lube evaporate.
* Material thickness in the list does not include special coating thickness.

DBB DBB01 Thrust Washer

Designation of Part Number

DBB ○○ W
- W — Thrust Washer
- ○○ — Nominal I.D.
- DBB — Product Symbol

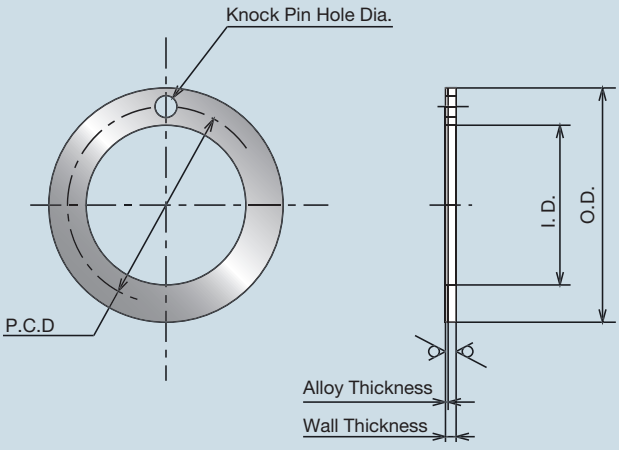
Pb Free
RoHS 2
ELV

DBB 10W

Please specify by part number.

(Unit: mm)

Nominal I.D.	Part Number	I.D.	O.D.	Thickness	Knock Pin Hole		Housing Recess Depth
					Dia.	P.C.D	
10	**DBB10W**	12 $^{+0.25}_{0}$	24 $^{0}_{-0.25}$	1.5 $^{-0.05}_{-0.20}$	1.6 $^{+0.45}_{+0.20}$	18 ±0.12	1.1 $^{0}_{-0.25}$
12	**DBB12W**	14 $^{+0.25}_{0}$	26 $^{0}_{-0.25}$		2.0 $^{+0.45}_{+0.20}$	20 ±0.12	
14	**DBB14W**	16 $^{+0.25}_{0}$	30 $^{0}_{-0.25}$			23 ±0.12	
16	**DBB16W**	18 $^{+0.25}_{0}$	32 $^{0}_{-0.25}$			25 ±0.12	
18	**DBB18W**	20 $^{+0.25}_{0}$	36 $^{0}_{-0.25}$		3.0 $^{+0.45}_{+0.20}$	28 ±0.12	
20	**DBB20W**	23 $^{+0.25}_{0}$	38 $^{0}_{-0.25}$			31 ±0.12	
22	**DBB22W**	25 $^{+0.25}_{0}$	42 $^{0}_{-0.25}$			34 ±0.12	
24	**DBB24W**	27 $^{+0.25}_{0}$	44 $^{0}_{-0.25}$			36 ±0.12	
25	**DBB25W**	28 $^{+0.25}_{0}$	48 $^{0}_{-0.25}$		4.0 $^{+0.45}_{+0.20}$	38 ±0.12	
30	**DBB30W**	34 $^{+0.25}_{0}$	54 $^{0}_{-0.25}$			44 ±0.12	
35	**DBB35W**	39 $^{+0.25}_{0}$	62 $^{0}_{-0.25}$			51 ±0.12	
40	**DBB40W**	44 $^{+0.25}_{0}$	66 $^{0}_{-0.25}$			55 ±0.12	
45	**DBB45W**	50 $^{+0.25}_{0}$	74 $^{0}_{-0.25}$	2.5 $^{-0.05}_{-0.20}$		62 ±0.12	1.6 $^{0}_{-0.25}$
50	**DBB50W**	55 $^{+0.25}_{0}$	78 $^{0}_{-0.25}$			67 ±0.12	

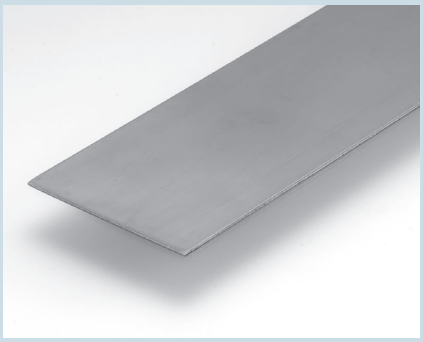


DBB DBB01 Slide Plate

Designation of Part Number

SS ○○○ DBB

- DBB — Product Symbol
- ○○○ — Thickness Indication Symbol
- SS — Slide Plate



Pb Free

RoHS 2

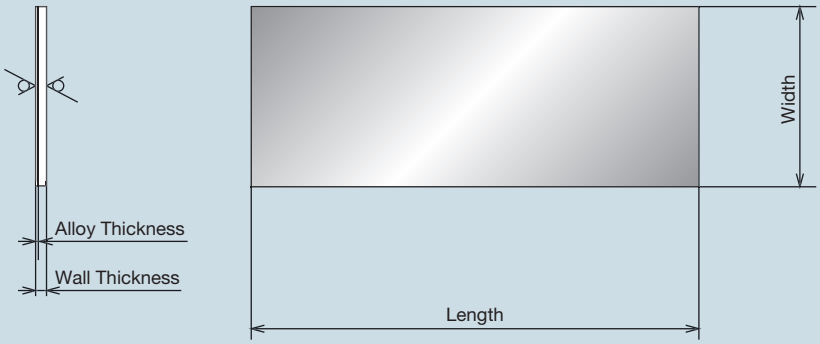
ELV

SS150 DBB

Please specify by part number.

(Unit: mm)

Part Number	Thickness	Width	Length
SS150DBB	1.5 $^{-0.05}_{-0.20}$	80 $^{+2.0}_{0}$	500 $^{+10.0}_{0}$
SS200DBB	2.0 $^{-0.05}_{-0.20}$	100 $^{+2.0}_{0}$	
SS250DBB	2.5 $^{-0.05}_{-0.20}$	100 $^{+2.0}_{0}$	



DAIBEST DBS02

Pb Free RoHS 2 ELV

HOISI PRECISION 凱獅精密 ISO 7312 9830

These are oil-impregnated bearings of our own proprietary lubrication characteristics, in which lipophilic fibers and special filler material are uniformly dispersed within polyacetal plastic resin, a plastic bearing material offering excellent bearing characteristics.
Solid type — DBS02 dry bearing

Features

1. Can be used without oil supply
2. Superior load carrying characteristics and wear resistant properties
3. Low friction coefficient (μ=0.01 to 0.15) and excellent speed properties
4. Minimizes operating noise and free from stick slip phenomenon
5. Will not damage the surface of engaging component
6. Shaft misalignment tolerance is excellent.

Material: DBS02

POM + special filler material + lipophilic fibers + oil (oil-impregnation rate of 4% or higher)

Material Characteristics (typical values)

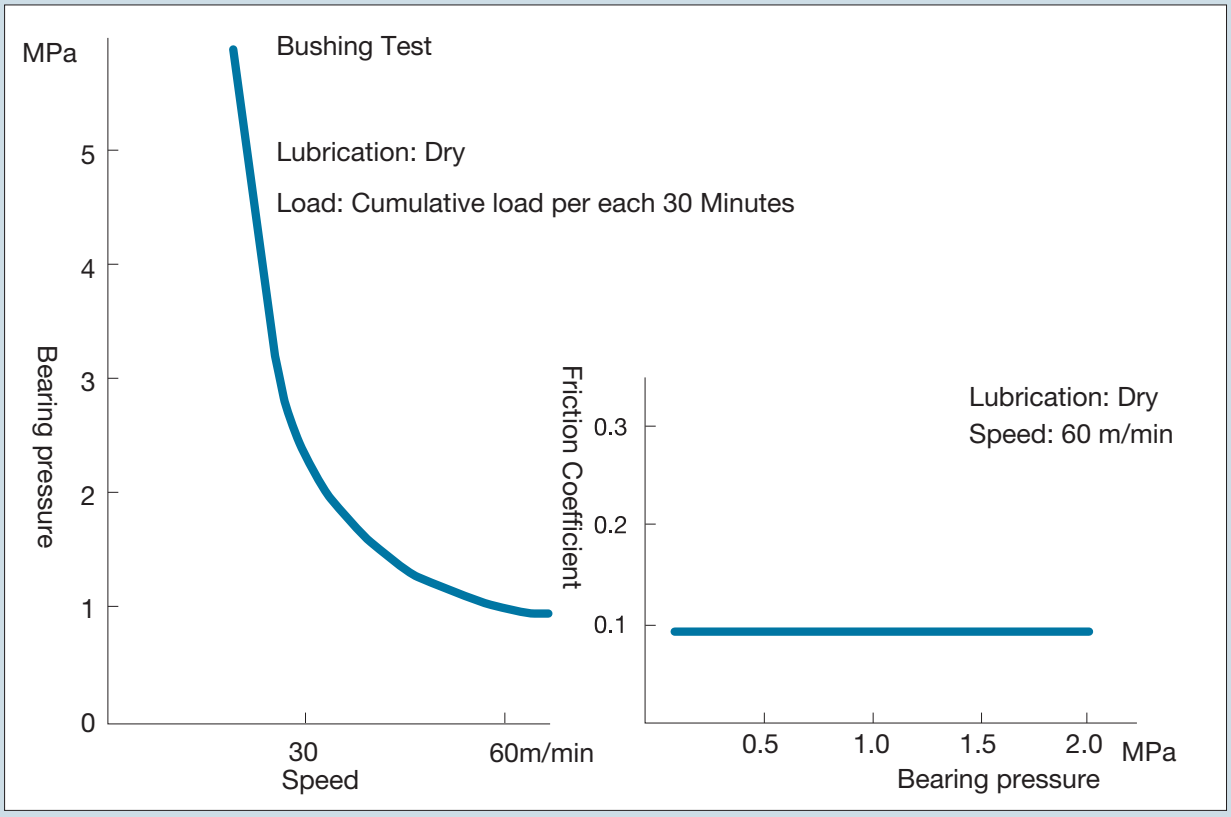
Specific gravity	Tensile strength (MPa)	Elongation (%)	Hardness (HRM)	Linear-expansion coefficient
1.47	60.8	60	80	9 to 13

Sliding Characteristics (typical values)

Material	Friction coefficient (μ)	Rated maximum load (MPa)	Rated maximum speed (m/min)	Service temperature range (°C)
DBS02	0.01 to 0.15	9.6	60	-40 to 80

Bearing Characteristics and Test Data

• DBS02 Dry Bearing



Lubrication	No Oil supply
Allowable Max. Load MPa	9.6
Allowable Max. Speed m/min	60
Allowable Max. PV value MPa-m/min	30
Limit Service Temperature °C	-40 to +80

When the bearing is used under lubrication the bearing properties will improve depending on the condition.

DBS DBS02 Bushing (Bushing Inner Diameter: 3 to 30 mm)

Designation of Part Number

DBS ○○ ○○
- ○○ — Bushing Length
- ○○ — Bushing Nominal I.D.
- DBS — Product Symbol

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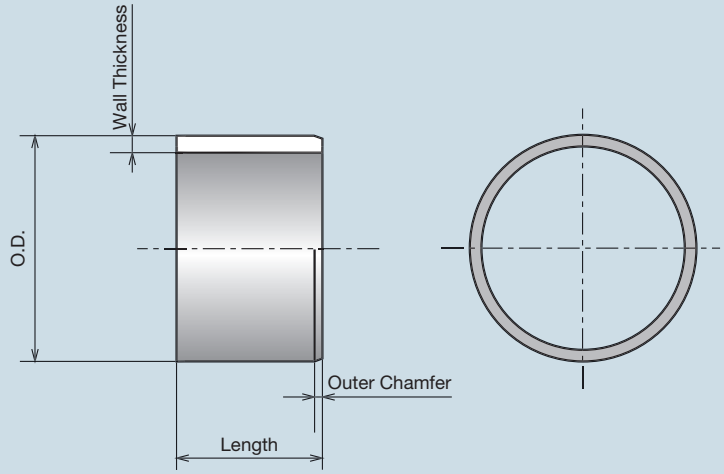
DBS 0303

Please specify by part number.

Bushing I.D.	Recommended Dimension Mating Part		Bushing Dimensions							
	Housing I.D.	Shaft Dia.	O.D.	Wall Thickness	3	4	5	6	8	10
3	ϕ5H7 $^{+0.012}_{0}$	ϕ3h7 $^{0}_{-0.010}$	ϕ5 $^{+0.210}_{+0.072}$	1.0 $^{-0.015}_{-0.046}$	**0303**		**0305**			
4	ϕ6H7 $^{+0.012}_{0}$	ϕ4h7 $^{0}_{-0.012}$	ϕ6 $^{+0.210}_{+0.072}$	1.0 $^{-0.023}_{-0.078}$		**0404**		**0406**		
5	ϕ7H7 $^{+0.015}_{0}$	ϕ5h7 $^{0}_{-0.012}$	ϕ7 $^{+0.270}_{+0.095}$	1.0 $^{-0.025}_{-0.085}$			**0505**		**0508**	**0510**
6	ϕ8H7 $^{+0.015}_{0}$	ϕ6h7 $^{0}_{-0.012}$	ϕ8 $^{+0.270}_{+0.095}$	1.0 $^{-0.025}_{-0.085}$			**0605**	**0606**	**0608**	**0610**
8	ϕ10H7 $^{+0.015}_{0}$	ϕ8h7 $^{0}_{-0.015}$	ϕ10 $^{+0.270}_{+0.095}$	1.0 $^{-0.025}_{-0.085}$				**0806**	**0808**	**0810**
10	ϕ12H7 $^{+0.018}_{0}$	ϕ10h7 $^{0}_{-0.015}$	ϕ12 $^{+0.340}_{+0.108}$	1.0 $^{-0.025}_{-0.085}$					**1008**	**1010**
12	ϕ14H7 $^{+0.018}_{0}$	ϕ12h7 $^{0}_{-0.018}$	ϕ14 $^{+0.340}_{+0.108}$	1.0 $^{-0.025}_{-0.085}$						**1210**
14	ϕ16H7 $^{+0.018}_{0}$	ϕ14h7 $^{0}_{-0.018}$	ϕ16 $^{+0.340}_{+0.108}$	1.0 $^{-0.025}_{-0.085}$						**1410**
15	ϕ17H7 $^{+0.018}_{0}$	ϕ15h7 $^{0}_{-0.018}$	ϕ17 $^{+0.340}_{+0.108}$	1.0 $^{-0.025}_{-0.085}$						**1510**
16	ϕ18H7 $^{+0.018}_{0}$	ϕ16h7 $^{0}_{-0.018}$	ϕ18 $^{+0.340}_{+0.108}$	1.0 $^{-0.025}_{-0.085}$						
18	ϕ20H7 $^{+0.021}_{0}$	ϕ18h7 $^{0}_{-0.018}$	ϕ20 $^{+0.450}_{+0.121}$	1.0 $^{-0.025}_{-0.085}$						
20	ϕ23H7 $^{+0.021}_{0}$	ϕ20h7 $^{0}_{-0.021}$	ϕ23 $^{+0.450}_{+0.121}$	1.5 $^{-0.027}_{-0.087}$						**2010**
22	ϕ25H7 $^{+0.021}_{0}$	ϕ22h7 $^{0}_{-0.021}$	ϕ25 $^{+0.450}_{+0.121}$	1.5 $^{-0.027}_{-0.087}$						
25	ϕ28H7 $^{+0.021}_{0}$	ϕ25h7 $^{0}_{-0.021}$	ϕ28 $^{+0.450}_{+0.121}$	1.5 $^{-0.027}_{-0.087}$						
28	ϕ32H7 $^{+0.025}_{0}$	ϕ28h7 $^{0}_{-0.021}$	ϕ32 $^{+0.550}_{+0.131}$	2.0 $^{-0.030}_{-0.090}$						
30	ϕ34H7 $^{+0.025}_{0}$	ϕ30h7 $^{0}_{-0.021}$	ϕ34 $^{+0.550}_{+0.131}$	2.0 $^{-0.030}_{-0.090}$						

Note: Dimensions are subject to change without prior notice.



(Unit: mm)

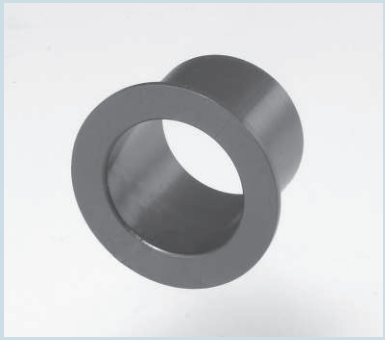
Part Number & Bushing Length Tolerance $^{0}_{-0.3}$						Bushing I.D.
12	15	20	25	30	40	
						3
						4
						5
						6
0812	**0815**					8
1012	**1015**					10
1212	**1215**	**1220**				12
	1415	**1420**				14
	1515	**1520**				15
	1615	**1620**	**1625**			16
	1815	**1820**	**1825**			18
	2015	**2020**	**2025**	**2030**		20
		2220		**2230**		22
		2520	**2525**	**2530**		25
		2820	**2825**	**2830**		28
		3020		**3030**	**3040**	30

DBS DBS02 Flanged Bushing (Bushing Inner Diameter: 3 to 35 mm)

Designation of Part Number

DBS ○○ ○○ - ○○ F

- F — Flanged Bushing
- ○○ — Flange O.D.
- ○○ — Bushing length
- ○○ — Bushing Nominal I.D.
- DBS — Product Symbol



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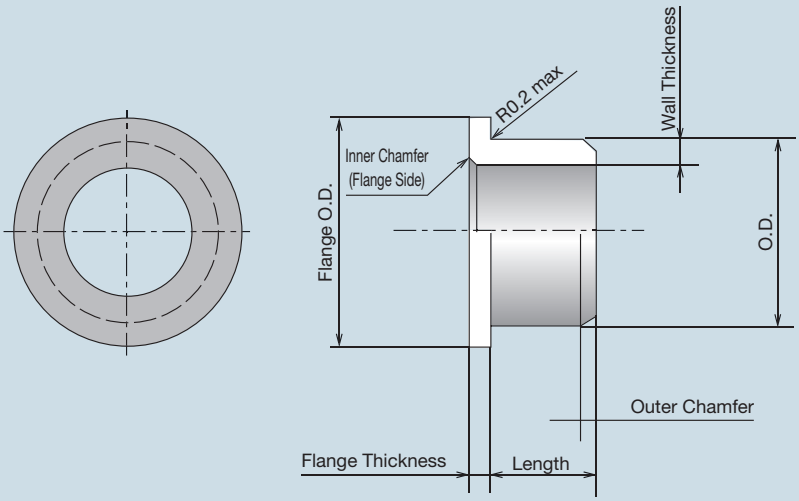
DBS 0303-8F

Please specify by part number.

Bushing I.D.	Recommended Dimension Mating Part		Bushing Dimensions							
	Housing I.D.	Shaft Dia.	Flange O.D.	Flange Thickness	O.D.	Wall Thickness	3	4	5	6
3	ϕ5H7 $^{+0.012}_{0}$	ϕ3h7 $^{0}_{-0.010}$	ϕ8 ±0.25	1.0 $^{0}_{-0.1}$	ϕ5 $^{+0.210}_{+0.072}$	1.0 $^{-0.015}_{-0.070}$	**0303-8F**			
4	ϕ6H7 $^{+0.012}_{0}$	ϕ4h7 $^{0}_{-0.012}$	ϕ9 ±0.25	1.0 $^{0}_{-0.1}$	ϕ6 $^{+0.210}_{+0.072}$	1.0 $^{-0.023}_{-0.078}$		**0404-9F**		**0406-9F**
5	ϕ7H7 $^{+0.015}_{0}$	ϕ5h7 $^{0}_{-0.012}$	ϕ10 ±0.25	1.0 $^{0}_{-0.1}$	ϕ7 $^{+0.270}_{+0.095}$	1.0 $^{-0.025}_{-0.085}$		**0504-10F**	**0505-10F**	
6	ϕ8H7 $^{+0.015}_{0}$	ϕ6h7 $^{0}_{-0.012}$	ϕ12 ±0.25	1.0 $^{0}_{-0.1}$	ϕ8 $^{+0.270}_{+0.095}$	1.0 $^{-0.025}_{-0.085}$			**0605-12F**	**0606-12F**
7	ϕ9H7 $^{+0.015}_{0}$	ϕ7h7 $^{0}_{-0.015}$	ϕ13 ±0.25	1.0 $^{0}_{-0.1}$	ϕ9 $^{+0.270}_{+0.095}$	1.0 $^{-0.025}_{-0.085}$			**0705-13F**	
8	ϕ10H7 $^{+0.015}_{0}$	ϕ8h7 $^{0}_{-0.015}$	ϕ15 ±0.25	1.0 $^{0}_{-0.1}$	ϕ10 $^{+0.270}_{+0.095}$	1.0 $^{-0.025}_{-0.085}$	**0803-15F**			**0806-15F**
10	ϕ12H7 $^{+0.018}_{0}$	ϕ10h7 $^{0}_{-0.015}$	ϕ18 ±0.25	1.0 $^{0}_{-0.1}$	ϕ12 $^{+0.340}_{+0.108}$	1.0 $^{-0.025}_{-0.085}$				**1006-18F**
12	ϕ14H7 $^{+0.018}_{0}$	ϕ12h7 $^{0}_{-0.018}$	ϕ20 ±0.25	1.0 $^{0}_{-0.1}$	ϕ14 $^{+0.340}_{+0.108}$	1.0 $^{-0.025}_{-0.085}$				**1206-20F**
14	ϕ16H7 $^{+0.018}_{0}$	ϕ14h7 $^{0}_{-0.018}$	ϕ22 ±0.25	1.0 $^{0}_{-0.1}$	ϕ16 $^{+0.340}_{+0.108}$	1.0 $^{-0.025}_{-0.085}$				
15	ϕ17H7 $^{+0.018}_{0}$	ϕ15h7 $^{0}_{-0.018}$	ϕ23 ±0.25	1.0 $^{0}_{-0.1}$	ϕ17 $^{+0.340}_{+0.108}$	1.0 $^{-0.025}_{-0.085}$				
16	ϕ18H7 $^{+0.018}_{0}$	ϕ16h7 $^{0}_{-0.018}$	ϕ24 ±0.25	1.0 $^{0}_{-0.1}$	ϕ18 $^{+0.340}_{+0.108}$	1.0 $^{-0.025}_{-0.085}$				
18	ϕ20H7 $^{+0.021}_{0}$	ϕ18h7 $^{0}_{-0.018}$	ϕ26 ±0.25	1.0 $^{0}_{-0.1}$	ϕ20 $^{+0.450}_{+0.121}$	1.0 $^{-0.025}_{-0.085}$				
20	ϕ23H7 $^{+0.021}_{0}$	ϕ20h7 $^{0}_{-0.021}$	ϕ31 ±0.25	1.5 $^{0}_{-0.15}$	ϕ23 $^{+0.450}_{+0.121}$	1.5 $^{-0.027}_{-0.087}$				
22	ϕ25H7 $^{+0.021}_{0}$	ϕ22h7 $^{0}_{-0.021}$	ϕ33 ±0.25	1.5 $^{0}_{-0.15}$	ϕ25 $^{+0.450}_{+0.121}$	1.5 $^{-0.027}_{-0.087}$				
25	ϕ28H7 $^{+0.021}_{0}$	ϕ25h7 $^{0}_{-0.021}$	ϕ36 ±0.25	1.5 $^{0}_{-0.15}$	ϕ28 $^{+0.450}_{+0.121}$	1.5 $^{-0.027}_{-0.087}$				
30	ϕ34H7 $^{+0.025}_{0}$	ϕ30h7 $^{0}_{-0.021}$	ϕ42 ±0.25	2.0 $^{0}_{-0.15}$	ϕ34 $^{+0.550}_{+0.131}$	2.0 $^{-0.030}_{-0.090}$				
35	ϕ39H7 $^{+0.025}_{0}$	ϕ35h7 $^{0}_{-0.025}$	ϕ49 ±0.25	2.0 $^{0}_{-0.15}$	ϕ39 $^{+0.550}_{+0.131}$	2.0 $^{-0.030}_{-0.090}$				

Note: Dimensions are subject to change without prior notice.



(Unit: mm)

Part Number & Bushing Length Tolerance $^{0}_{-0.3}$										Bushing I.D.
	7	8	10	12	15	20	25	30	40	
										3
										4
	0507-10F									5
		0608-12F								6
	0707-13F									7
		0808-15F	0810-15F							8
		1008-18F	1010-18F	1012-18F	1015-18F					10
		1208-20F	1210-20F	1212-20F	1215-20F					12
			1410-22F	1412-22F	1415-22F	1420-22F				14
			1510-23F	1512-23F	1515-23F	1520-23F				15
			1610-24F		1615-24F	1620-24F				16
			1810-26F	1812-26F	1815-26F	1820-26F				18
			2010-31F		2015-31F	2020-31F	2025-31F			20
			2210-33F		2215-33F	2220-33F	2225-33F			22
			2510-36F		2515-36F	2520-36F	2525-36F	2530-36F		25
						3020-42F		3030-42F	3040-42F	30
						3520-49F		3530-49F	3540-49F	35

DAIBEST DBX01

Pb Free RoHS 2 ELV

HOISI PRECISION 凱獅精密 ISO 7312 9830

As this is a pre-lubricating bearing ensure it is filled with lubricant before installation. Then the material will supply a small amount of lubricant at predetermined intervals to allow the bearing to withstand long term operation. The bearing has a structure where bronze in a spherical powdered form is sintered on to the steel backing. Polyacetal resin is then impregnated into the surface.

Features

1. Operation is quiet, free from squeaking or knocking.
2. Low friction characteristic prevents damage to the shaft (mating surface).
3. The bearing surface remains virtually wear-free with minimum amount of lubricant (grease or oil).
4. Low starting friction permits very smooth rotation at start up and at low speed under high load conditions. Sliding surfaces are also seizure free.
5. Shaft misalignment tolerance is excellent.
6. The bearing can withstand impact loads.
7. Excellent load-carrying performance is maintained even under oscillating and fretting conditions.

Characteristics

1. Load Carrying Capability

The capability varies depending on the load properties and lubrication conditions. The maximum load that DBX01 can carry is shown in Table 1.

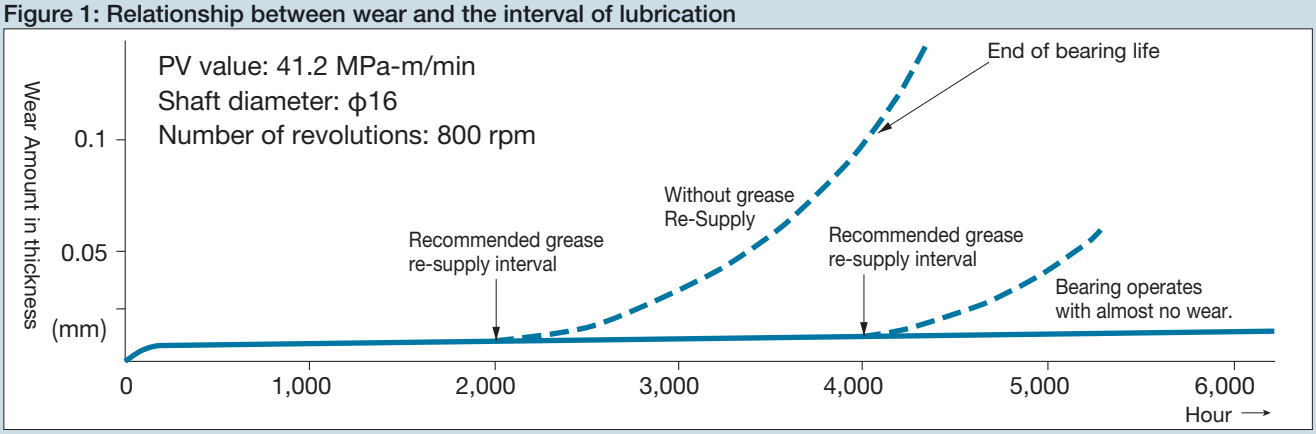
Table 1: Allowable Load (U)

Load	Motion Condition	Lubrication	U MPa
1. Static Load	Slight or very slow movement	Grease or Oil	137.0
2. Static Load	Continuous Rotation	Grease or Oil (Boundary lubrication)	68.6
3. Static Load or Dynamic Load	Continuous Rotation	Oil (Fluid Lubrication)	44.1
4. Static Load	Oscillating Rotation	Grease or Oil	*
5. Dynamic Load	Continuous Rotation	Grease or Oil (Boundary lubrication)	*
* These values vary according to the frequency of the cycle. The representative values are shown on the right.		10^5 cycles or less 10^7 cycles 10^8 cycles or more	137.0 19.6 4.9

2. Relation between Wear and the interval of lubrication

Oil is supplied to DBX01 bearings at assembly. The amount of wear after running in is very small. Furthermore, wear is kept to a minimum until the lubricant is exhausted (Figure 1).

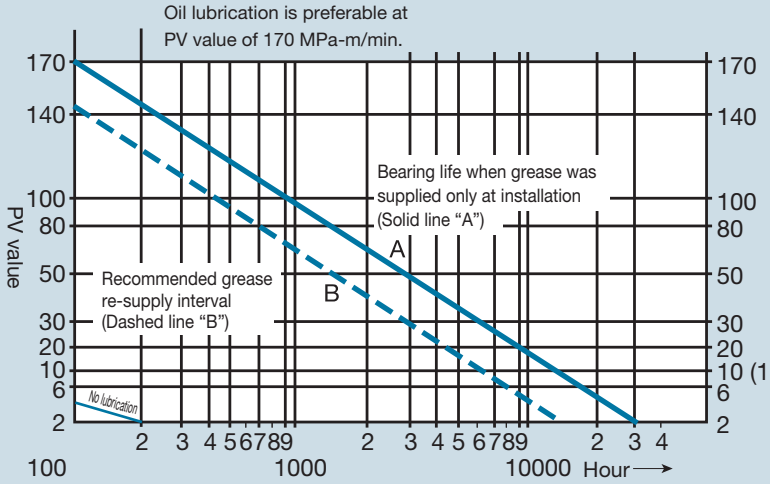
Figure 1: Relationship between wear and the interval of lubrication



3. PV Value and Bearing performance

The performance of bearing is influenced by the PV value and the operating conditions.
The PV value is the product of Specific Load (MPa) and sliding speed (m/min). The solid line "A" in Figure 2 shows the bearing life when grease was supplied only at installation, and the dashed line "B" shows the recommended grease re-supply interval.
When the PV value exceeds 170 MPa-m/min, successive oil lubrication is desired.

Figure 2: Lubrication Diagram of DBX01 Bearing



Relation between bearing life and grease re-supply interval

4. Conditions of use

To calculate service life and lubrication interval accurately, it is necessary to take such factors as speed, type of load, and ambient temperature as well as the condition of the housing and roughness of the mating surfaces into consideration, which requires that figures obtained from Fig. 2 must be multiplied by coefficients of usage q, t, and s, found in Tables 2, 3, and 4, respectively.

Table 2: Coefficient of usage q for grease lubrication per speed and bearing performance at an ambient temperature of 25°C

Speed in m/min	24 or less	24 to 45	45 to 90	90 or more
Maximum allowable PV value MPa·m/min	170.0	170.0	170.0	62.0
DBX01 Bushing Static loading, vertical (Lubricant flows into the loaded region.)	2.0	2.0	1.5	0.8
DBX01 Bushing Static loading, other than vertical (Lubricant flows out of the loaded region.)	1.0	1.0	0.8	0.4
DBX01 Bushing rotational loading	3.0	3.0	2.0	1.2
DBX01 Thrust washer	1.0	0.5	0.1	–

Table 3: Coefficient of usage t for the effect of temperature per operating temperature range

Condition of the housing	Type of grease	Ambient temperature of axle in °C			
		20 to 40	50	75	100
Ordinary heat dissipation properties	Silicone-based	1.0	0.7	0.4	0.2
	Lithium-based	1.0	0.6	0.3	0.1
Light-weight stamped-metal housing with poor heat dissipation properties or segmented housing	Silicone-based	0.5	0.35	0.2	0.1
	Lithium-based	0.4	0.25	0.1	
Non-metal housing with poor heat dissipation properties	Silicone-based	0.3	0.2	Not recommended.	
	Lithium-based	0.2	0.1		

Table 4: Coefficient of usage s for the effect of mating surface roughness.

Mating surface roughness	Coefficient of usage s
0 to 2.5μm Rmx	1.00
2.5 to 3.9μm Rmx	0.25
3.9 to 5.5μm Rmx	0.10
5.5 to 7.8μm Rmx	0.05

DXB DBX01 Bushing (Bushing Inner Diameter: 10 to 100 mm)

Designation of Part Number

DX B ○○ ○○
- ○○ — Bushing Length
- ○○ — Bushing Nominal I.D.
- B — Bushing
- DX — Product Symbol

DXB 1010

Please specify by part number.

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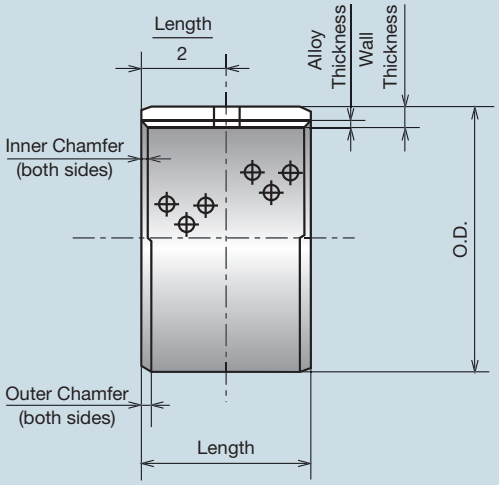
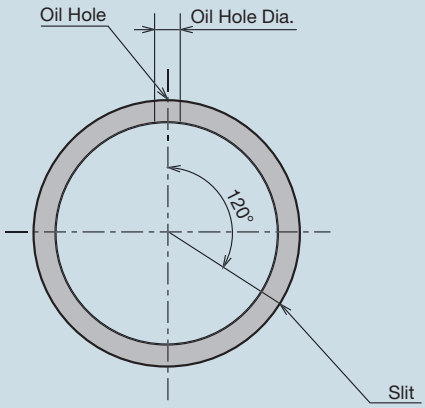
Bushing I.D.	Recommended Dimension Mating Part		Bushing Dimensions							
	Housing I.D.	Shaft Dia.	O.D.	Wall Thickness	Oil Hole Dia.	10	15	20	25	30
10	$\phi13H7^{+0.018}_{0}$	$\phi10h7\ ^{0}_{-0.015}$	$\phi13\ ^{+0.060}_{+0.030}$	$1.5\ (^{-0.026}_{-0.058})$	$\phi4$	**1010**	**1015**	**1020**		
12	$\phi15H7^{+0.018}_{0}$	$\phi12h7\ ^{0}_{-0.018}$	$\phi15\ ^{+0.063}_{+0.033}$	$1.5\ (^{-0.026}_{-0.058})$	$\phi4$		**1215**	**1220**		
14	$\phi17H7^{+0.018}_{0}$	$\phi14h7\ ^{0}_{-0.018}$	$\phi17\ ^{+0.073}_{+0.038}$	$1.5\ (^{-0.026}_{-0.058})$	$\phi4$		**1415**	**1420**		
15	$\phi18H7^{+0.018}_{0}$	$\phi15h7\ ^{0}_{-0.018}$	$\phi18\ ^{+0.073}_{+0.038}$	$1.5\ (^{-0.026}_{-0.058})$	$\phi4$		**1515**		**1525**	
16	$\phi19H7^{+0.021}_{0}$	$\phi16h7\ ^{0}_{-0.018}$	$\phi19\ ^{+0.081}_{+0.046}$	$1.5\ (^{-0.026}_{-0.058})$	$\phi4$		**1615**	**1620**	**1625**	
18	$\phi21H7^{+0.021}_{0}$	$\phi18h7\ ^{0}_{-0.018}$	$\phi21\ ^{+0.081}_{+0.046}$	$1.5\ (^{-0.026}_{-0.058})$	$\phi4$		**1815**	**1820**	**1825**	
20	$\phi23H7^{+0.021}_{0}$	$\phi20h7\ ^{0}_{-0.021}$	$\phi23\ ^{+0.081}_{+0.046}$	$1.5\ (^{-0.026}_{-0.058})$	$\phi4$		**2015**		**2025**	**2030**
22	$\phi25H7^{+0.021}_{0}$	$\phi22h7\ ^{0}_{-0.021}$	$\phi25\ ^{+0.086}_{+0.051}$	$1.5\ (^{-0.026}_{-0.058})$	$\phi6$		**2215**	**2220**	**2225**	
24	$\phi27H7^{+0.021}_{0}$	$\phi24h7\ ^{0}_{-0.021}$	$\phi27\ ^{+0.086}_{+0.051}$	$1.5\ (^{-0.026}_{-0.058})$	$\phi6$		**2415**	**2420**	**2425**	**2430**
25	$\phi28H7^{+0.021}_{0}$	$\phi25h7\ ^{0}_{-0.021}$	$\phi28\ ^{+0.093}_{+0.056}$	$1.5\ (^{-0.026}_{-0.058})$	$\phi6$		**2515**		**2525**	**2530**
30	$\phi34H7^{+0.025}_{0}$	$\phi30h7\ ^{0}_{-0.021}$	$\phi34\ ^{+0.115}_{+0.075}$	$2.0\ (^{-0.032}_{-0.068})$	$\phi6$			**3020**		**3030**
35	$\phi39H7^{+0.025}_{0}$	$\phi35h7\ ^{0}_{-0.025}$	$\phi39\ ^{+0.115}_{+0.075}$	$2.0\ (^{-0.032}_{-0.068})$	$\phi6$			**3520**		**3530**
40	$\phi44H7^{+0.025}_{0}$	$\phi40h7\ ^{0}_{-0.025}$	$\phi44\ ^{+0.115}_{+0.075}$	$2.0\ (^{-0.032}_{-0.068})$	$\phi8$			**4020**		**4030**
45	$\phi50H7^{+0.025}_{0}$	$\phi45h7\ ^{0}_{-0.025}$	$\phi50\ ^{+0.115}_{+0.075}$	$2.5\ (^{-0.040}_{-0.086})$	$\phi8$					**4530**
50	$\phi55H7^{+0.030}_{0}$	$\phi50h7\ ^{0}_{-0.025}$	$\phi55\ ^{+0.145}_{+0.095}$	$2.5\ (^{-0.040}_{-0.086})$	$\phi8$					
55	$\phi60H7^{+0.030}_{0}$	$\phi55h7\ ^{0}_{-0.030}$	$\phi60\ ^{+0.145}_{+0.095}$	$2.5\ (^{-0.040}_{-0.086})$	$\phi8$					
60	$\phi65H7^{+0.030}_{0}$	$\phi60h7\ ^{0}_{-0.030}$	$\phi65\ ^{+0.145}_{+0.095}$	$2.5\ (^{-0.040}_{-0.086})$	$\phi8$					
65	$\phi70H7^{+0.030}_{0}$	$\phi65h7\ ^{0}_{-0.030}$	$\phi70\ ^{+0.145}_{+0.095}$	$2.5\ (^{-0.050}_{-0.116})$	$\phi8$					
70	$\phi75H7^{+0.030}_{0}$	$\phi70h7\ ^{0}_{-0.030}$	$\phi75\ ^{+0.145}_{+0.095}$	$2.5\ (^{-0.050}_{-0.116})$	$\phi8$					
75	$\phi80H7^{+0.030}_{0}$	$\phi75h7\ ^{0}_{-0.030}$	$\phi80\ ^{+0.160}_{+0.095}$	$2.5\ (^{-0.050}_{-0.116})$	$\phi9.5$					
80	$\phi85H7^{+0.035}_{0}$	$\phi80h7\ ^{0}_{-0.030}$	$\phi85\ ^{+0.165}_{+0.100}$	$2.5\ (^{-0.050}_{-0.116})$	$\phi9.5$					
85	$\phi90H7^{+0.035}_{0}$	$\phi85h7\ ^{0}_{-0.035}$	$\phi90\ ^{+0.165}_{+0.100}$	$2.5\ (^{-0.050}_{-0.116})$	$\phi9.5$					
90	$\phi95H7^{+0.035}_{0}$	$\phi90h7\ ^{0}_{-0.035}$	$\phi95\ ^{+0.165}_{+0.100}$	$2.5\ (^{-0.050}_{-0.116})$	$\phi9.5$					
100	$\phi105H7^{+0.035}_{0}$	$\phi100h7\ ^{0}_{-0.035}$	$\phi105\ ^{+0.180}_{+0.115}$	$2.5\ (^{-0.050}_{-0.116})$	$\phi9.5$					





(Unit: mm)

Part Number & Bushing Length Tolerance $^{0}_{-0.4}$						Bushing I.D.
40	50	60	80	90	95	
						10
						12
						14
						15
						16
						18
						20
						22
						24
						25
3040						30
	3550					35
	4050					40
	4550					45
5040		**5060**				50
5540		**5560**				55
6040		**6060**				60
6540		**6560**				65
7040			**7080**			70
7540			**7580**			75
8040			**8080**			80
8540			**8580**			85
9040				**9090**		90
					10095	100

DXT DBX01 Thrust Washer

Designation of Part Number

DX T ○○

- ○○ — Nominal I.D.
- T — Thrust Washer
- DX — Product Symbol

DXT 10

Please specify by part number.

Pb Free

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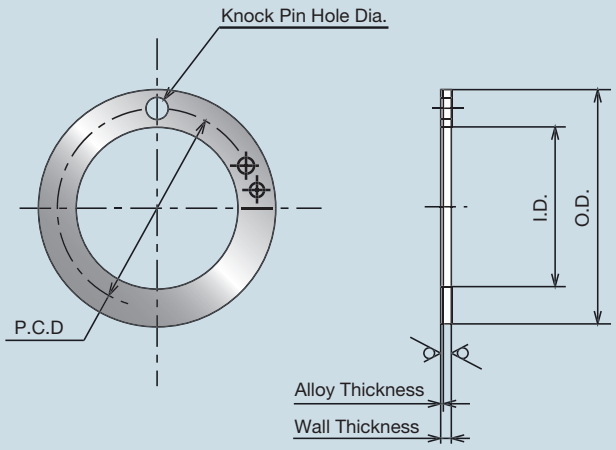
ELV

(Unit: mm)

Nominal I.D.	Part Number	I.D.	O.D.	Thickness	Knock Pin Hole		Housing Recess Depth
					Dia.	P.C.D	
10	**DXT10**	12 +0.25 0	24 0 -0.25	1.5 -0.08 -0.15	1.625 +0.25 0	18 ±0.12	1.1 0 -0.25
12	**DXT12**	14 +0.25 0	26 0 -0.25		2.125 +0.25 0	20 ±0.12	
14	**DXT14**	16 +0.25 0	30 0 -0.25			23 ±0.12	
16	**DXT16**	18 +0.25 0	32 0 -0.25			25 ±0.12	
18	**DXT18**	20 +0.25 0	36 0 -0.25		3.125 +0.25 0	28 ±0.12	
20	**DXT20**	22 +0.25 0	38 0 -0.25			30 ±0.12	
22	**DXT22**	24 +0.25 0	42 0 -0.25			33 ±0.12	
24	**DXT24**	26 +0.25 0	44 0 -0.25			35 ±0.12	
25	**DXT25**	28 +0.25 0	48 0 -0.25		4.125 +0.25 0	38 ±0.12	
30	**DXT30**	32 +0.25 0	54 0 -0.25			43 ±0.12	
35	**DXT35**	38 +0.25 0	62 0 -0.25			50 ±0.12	
40	**DXT40**	42 +0.25 0	66 0 -0.25			54 ±0.12	
45	**DXT45**	48 +0.25 0	74 0 -0.25	2.5 -0.07 -0.15		61 ±0.12	1.6 0 -0.25
50	**DXT50**	52 +0.25 0	78 0 -0.25			65 ±0.12	



DXP DBX01 Slide Plate

Designation of Part Number

DX P ○○○

- ○○○ — Thickness Indication Symbol
- P — Slide Plate
- DX — Product Symbol

Pb Free

RoHS 2

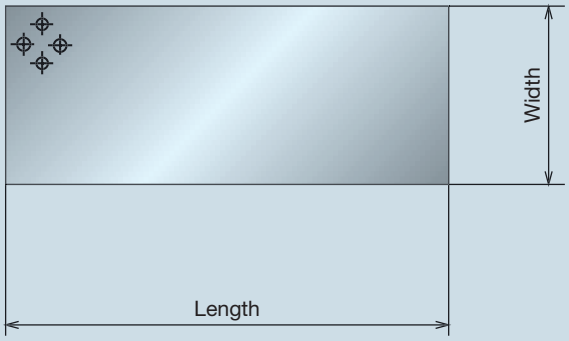
ELV

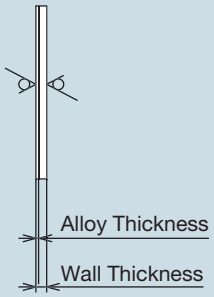
DXP 150

Please specify by Part number.
This product is produced on order only.

Part Number	Thickness	Width	Length
DXP150	1.5 $^{-0.05}_{-0.15}$	90 $^{+0.2}_{0}$	500 $^{+10.0}_{0}$
DXP200	2.0 $^{-0.05}_{-0.15}$	100 $^{+0.2}_{0}$	
DXP250	2.5 $^{-0.05}_{-0.15}$	100 $^{+0.2}_{0}$	

(Unit: mm)





DAIMESH DMM01

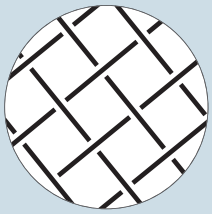
Pb Free RoHS 2 ELV

HOISI PRECISION 凱獅精密 ISO 7312 9830

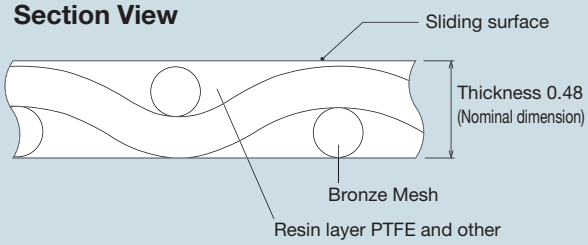
The new generation of sliding material, "DAIMESH DMM01" has excellent performance and high applicability due to the compound of bronze mesh and resin it contains.

Features

1. The wide range of adjustment from micro clearance to negative clearance eliminates noise inside the assembly.
2. A resin layer consisting mostly of PTFE provides smooth operation with stable friction.
3. Compound material of metal mesh and resin offers excellent load, wear and corrosion resistance.
4. This material is applicable to a wide range of service temperatures (-200 to +280°C).
5. Does not scratch the other surface, and can be used without lubrication.
6. Due to thin and flexible wall the material is space saving and enables easy installation.
7. Installation by adhesion is possible.



Section View



Installation procedure

The dimensions of DAIMESH DMM01 can be set as either clearance or negative clearance. Select one of these two installation methods by taking into consideration the balance of rattling and service torque.

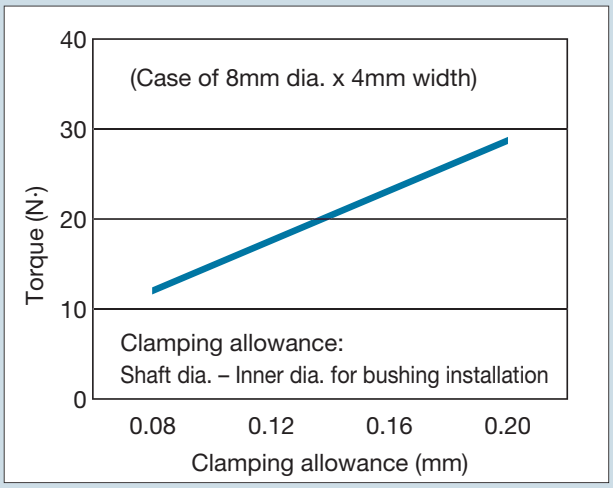
1. Clearance method
Install the bearing and then assemble the shaft. The torque changes corresponding to surface load and surface speed.

2. Negative clearance method
This method should be selected to eliminate noise. Bearing and shaft can be installed together in the housing. Torque is related to the negative clearance condition.

3. Calculation of shaft dimensions (ensure to take max and min values of each dimension into consideration)

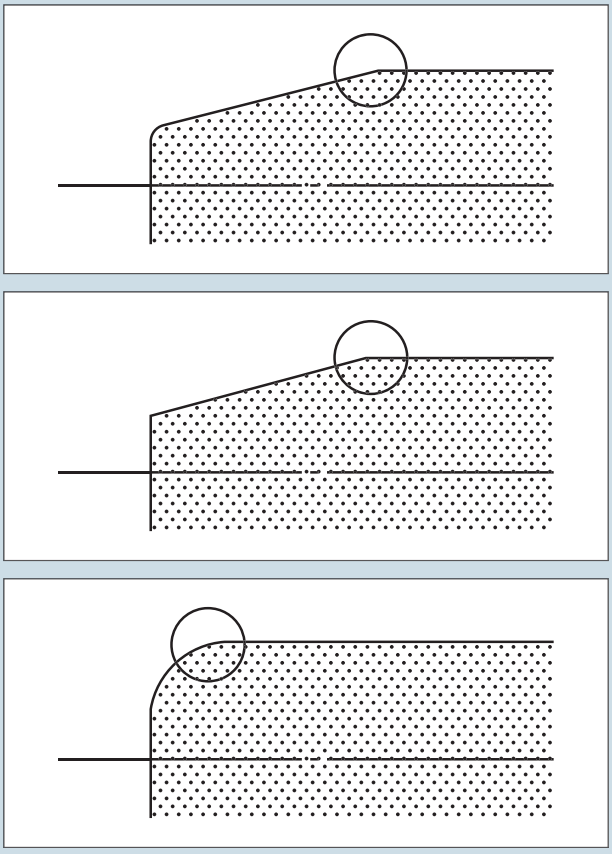
(1) Clearance method
Shaft diameter = Inner diameter of housing - (2 x thickness of bushing) - clearance

(2) Clamping allowance method
Shaft diameter = Inner diameter of housing - (2 x thickness of bushing) + negative clearance



Shaft

1. Process the bottom end of the shaft as shown in the diagram below to avoid damage at the time of installation.



(Note) Make the part marked with a circle (O) smooth.

2. Ensure the shaft roughness is set at 3.2s. For more stable operational use ensure that shaft roughness is set to 1.6s.

Adhesion

DAIMESH DMM01 can be installed by adhesion. This method is effective especially for the installation of flat bar figure and hemispherical cup figure.

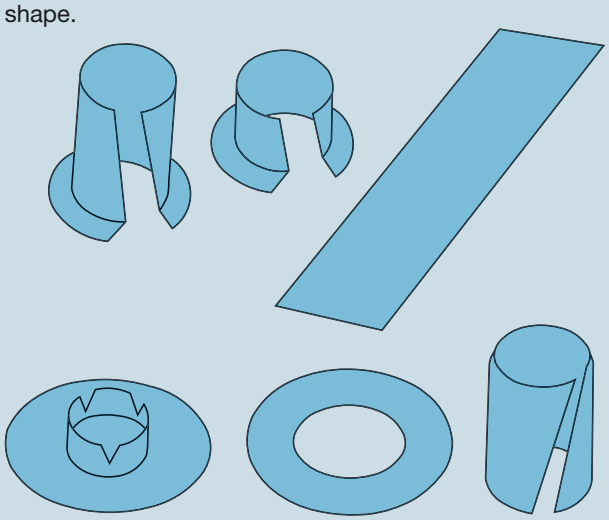
1. It is important to pre-clean both the DAIMESH DMM and the surface to which it will be adhered. Select an appropriate adhesive for accurate adhesion.
2. Please consult us for more information on adhesion.

Physical Characteristics (Typical Values)

Thickness	mm	0.48
Weight	g/cm^2	0.18
Tensile Strength	N/cm^2	3500
Elongation Percentage	%	25
Coefficient of Linear Thermal Expansion	% (20→250°C)	2.8 (Thickness direction)
Friction Coefficient	–	0.05 to 0.15
Allowable Max. Load	MPa	50
Allowable Max. Speed	m/min	20
Allowable Max. PV value	MPa·m/min	100
Service Temp. Range °C	°C	-200 to +280

Example of Typical Forming

This material can be cut to any figure and formed to any shape.

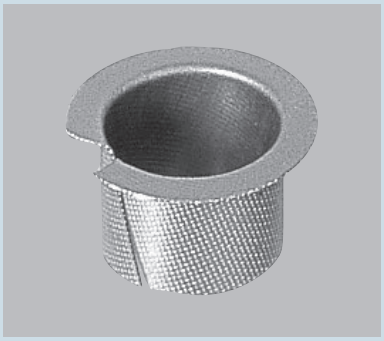


MS DMM01 Flanged Bushing (Bushing Inner Diameter: 3 to 30 mm)

Designation of Part Number

MS ○○ ○○ - ○○ F

- F — Flanged Bushing
- ○○ — Flange O.D.
- ○○ — Length
- ○○ — Nominal I.D.
- MS — Product Symbol



Pb Free

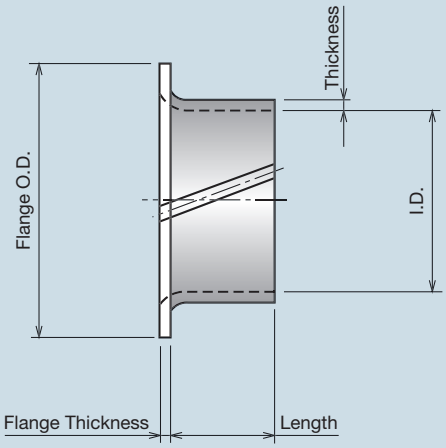
RoHS 2

ELV

MS 0303-6F

Please specify by Part No.
This product is produced on order only.

Bushing I.D.	Recommended Dimension Mating Part		Bushing Dimensions							
	Housing I.D.	Shaft Dia.	Flange O.D.	Flange Thickness	O.D.	Wall Thickness	3	4	5	7
3	ϕ4	ϕ3	ϕ6	0.5 ±0.05	ϕ4	0.5 $^{0}_{-0.040}$	**0303-6F**	**0304-6F**	**0305-6F**	**0307-6F**
4	ϕ5	ϕ4	ϕ8	0.5 ±0.05	ϕ5	0.5 $^{0}_{-0.040}$	**0403-8F**	**0404-8F**	**0405-8F**	**0407-8F**
5	ϕ6	ϕ5	ϕ10	0.5 ±0.05	ϕ6	0.5 $^{0}_{-0.040}$		**0504-10F**	**0505-10F**	**0507-10F**
6	ϕ7	ϕ6	ϕ11	0.5 ±0.05	ϕ7	0.5 $^{0}_{-0.040}$			**0605-11F**	**0607-11F**
8	ϕ9	ϕ8	ϕ14	0.5 ±0.05	ϕ9	0.5 $^{0}_{-0.040}$				**0807-14F**
10	ϕ11	ϕ10	ϕ16	0.5 ±0.05	ϕ11	0.5 $^{0}_{-0.040}$				**1007-16F**
12	ϕ13	ϕ12	ϕ18	0.5 ±0.05	ϕ13	0.5 $^{0}_{-0.040}$				
15	ϕ16	ϕ15	ϕ22	0.5 ±0.05	ϕ16	0.5 $^{0}_{-0.040}$				
18	ϕ19	ϕ18	ϕ25	0.5 ±0.05	ϕ19	0.5 $^{0}_{-0.040}$				
20	ϕ21	ϕ20	ϕ29	0.5 ±0.05	ϕ21	0.5 $^{0}_{-0.040}$				
25	ϕ26	ϕ25	ϕ36	0.5 ±0.05	ϕ26	0.5 $^{0}_{-0.040}$				
30	ϕ31	ϕ30	ϕ42	0.5 ±0.05	ϕ31	0.5 $^{0}_{-0.040}$				



(Unit: mm)

Part Number & Bushing Length Tolerance ±0.5										Bushing I.D.
8	10	12	15	20	25	30	35	40	50	
0308-6F	**0310-6F**									3
0408-8F	**0410-8F**	**0412-8F**	**0415-8F**							4
0508-10F	**0510-10F**	**0512-10F**	**0515-10F**	**0520-10F**						5
0608-11F	**0610-11F**	**0612-11F**	**0615-11F**	**0620-11F**						6
0808-14F	**0810-14F**	**0812-14F**	**0815-14F**	**0820-14F**	**0825-14F**	**0830-14F**				8
1008-16F	**1010-16F**	**1012-16F**	**1015-16F**	**1020-16F**	**1025-16F**	**1030-16F**				10
1208-18F	**1210-18F**	**1212-18F**	**1215-18F**	**1220-18F**	**1225-18F**	**1230-18F**	**1235-18F**	**1240-18F**		12
1508-22F	**1510-22F**	**1512-22F**	**1515-22F**	**1520-22F**	**1525-22F**	**1530-22F**	**1535-22F**	**1540-22F**		15
	1810-25F	**1812-25F**	**1815-25F**	**1820-25F**	**1825-25F**	**1830-25F**	**1835-25F**	**1840-25F**		18
	2010-29F	**2012-29F**	**2015-29F**	**2020-29F**	**2025-29F**	**2030-29F**	**2035-29F**	**2040-29F**		20
			2515-36F	**2520-36F**	**2525-36F**	**2530-36F**	**2535-36F**	**2540-36F**	**2550-36F**	25
			3015-42F	**3020-42F**	**3025-42F**	**3030-42F**	**3035-42F**	**3040-42F**	**3050-42F**	30

DAIFORCE A

Pb Free RoHS 2 ELV

HOISI PRECISION 凱獅精密 ISO 7312 9830

A solid plastic sliding material comprising polytetrafluoroethylene (PTFE) resin mixed with a special filler.
This special filler gives DAIFORCE A excellent friction and wear-resistance characteristics at a light weight.
Thanks for excellent chemical-resistance properties, DAIFORCE A can be used with confidence in all kinds of lubricants as well as in corrosive liquids or seawater. Demonstrates suitable performance for a wide range of applications, including office automation equipment, industrial robots, automotive parts, and food packaging equipment.

Features

1. An excellent bearing that combines the superior surface characteristics of fluoropolymers with mechanical strength.
2. The special filler material does not include metals or other hard substances and does not cause excessive wear to aluminum alloys or other soft materials.
3. Suitable for use in both dry and wet conditions.
4. Excellent chemical resistance thanks to the inert nature of fluoropolymers.
5. Special filler contains no materials that are hazardous to humans, making this product suitable for use in food processing applications. Conforms with Japan's Food Sanitation Act as well as standards and regulations for food products and additives.
6. Suitable for use in a wide range of ambient temperatures from -200 to +280°C.

Material: DFA01

PTFE mixed with a special filler

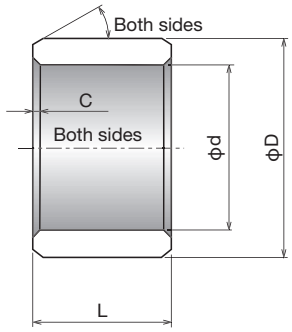
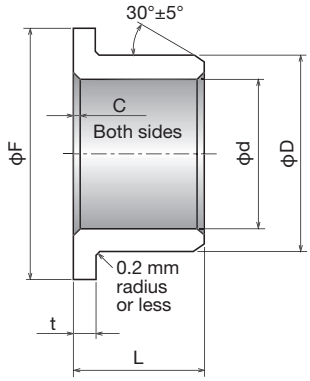
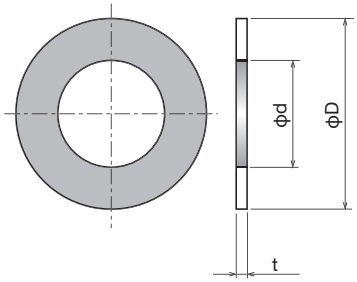
Material Characteristics (typical values)

Specific gravity	Tensile strength (MPa)	Elongation (%)	Hardness (durometer D-scale)	Coefficient of expansion between 25 to 150°C ($\times 10^{-5}$/°C)
1.90 to 2.02	9 or more	100 or more	55 to 65	11

Tribological Characteristics (typical values)

Material properties	Coefficient of friction (μ)	Maximum permissible load (MPa)	Maximum permissible speed (m/min)	Operating temperature range (°C)
DFA01	0.04 to 0.18	6.9	100	-200 to 280

Geometry

1. Cylinder	2. Flanged cylinder	3. Thrust washer
		

DAIFORCE A bearing dimensions

(unit: mm)

Cylindrical bushing

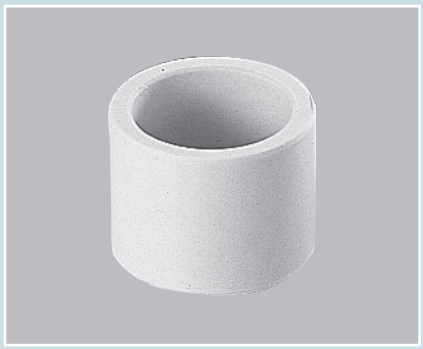
Name	Dimensional range
Inner diameter (d)	ϕ3 to 50
Outer diameter (D)	ϕ6 to 60
Length (L)	5 to 50 mm

Flanged cylindrical bushing

Name	Dimensional range
Inner diameter (d)	ϕ3 to 50
Outer diameter (D)	ϕ6 to 60
Outer flange diameter (F)	ϕ9 to 70
Length (L)	5 to 60 mm

Thrust washer

Name	Dimensional range
Inner diameter (d)	6 to 50 mm
Outer diameter (D)	12 to 80 mm
Thickness (t)	0.5 to 1.0 mm



DAIFORCE G

Pb Free RoHS 2 ELV

HOISI PRECISION 凱獅精密 ISO 7312 9830

A solid plastic sliding material comprising polytetrafluoroethylene (PTFE) mixed with glass fiber reinforcement.
This is a new product with a combination of glass-fiber reinforcing and special filler that gives high strength and excellent tribological properties compared with conventional PTFE sliding materials.
Demonstrates suitable performance for a wide range of applications, including textile machinery, office automation equipment, machine tools, automotive parts, conveyor equipment, and food processing equipment.

Features

1. Glass-fiber reinforced PTFE offers high strength with no stick slip.
2. Offers excellent friction and wear-resistance characteristics.
3. Special filler contains no materials that are hazardous to humans, making this product suitable for use in food processing applications. Conforms with Japan's Food Sanitation Act as well as standards and regulations for food products and additives.
4. Suitable for use in a wide range of ambient temperatures from -200 to +280°C.

Material: DFG01

Glass-fiber-reinforced PTFE mixed with a special filler

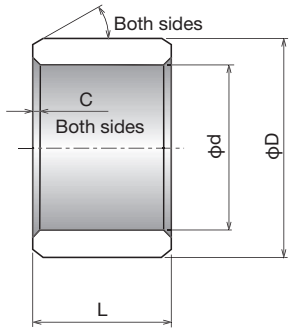
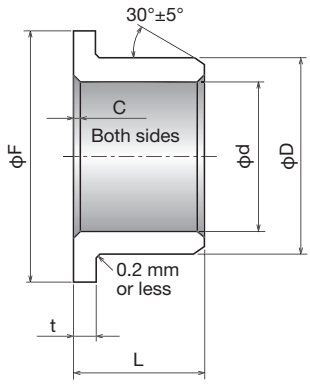
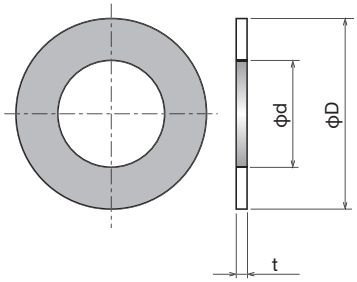
Material Characteristics (typical values)

Specific gravity	Tensile strength (MPa)	Elongation (%)	Hardness (durometer D-scale)	Coefficient of expansion between 25 to 200°C ($\times 10^{-5}$/°C)
2.10 to 2.30	9	80 or more	55 to 65	6 to 13

Sliding Characteristics (typical values)

Material properties	Coefficient of friction (μ)	Maximum permissible load (MPa)	Maximum permissible speed (m/min)	Operating temperature range (°C)
DFG01	0.05 to 0.2	6.9	60	-200 to 280

Geometry

1. Cylinder	2. Flanged cylinder	3. Thrust washer
		

DAIFORCE G bearing dimensions

(unit: mm)

Cylindrical bushing

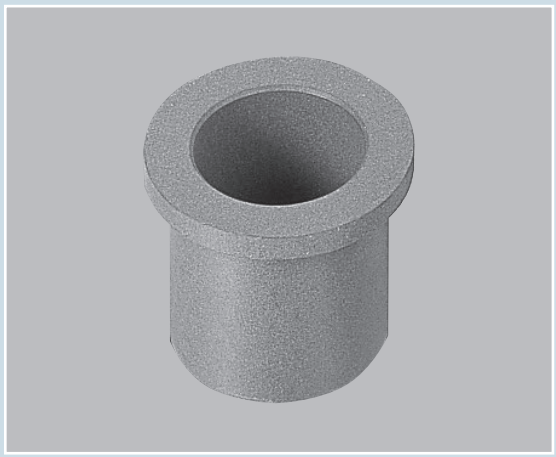
Name	Dimensional range
Inner diameter (d)	ϕ3 to 50
Outer diameter (D)	ϕ6 to 60
Length (L)	5 to 50 mm

Flanged cylindrical bushing

Name	Dimensional range
Inner diameter (d)	ϕ3 to 50
Outer diameter (D)	ϕ6 to 60
Outer flange diameter (F)	ϕ9 to 70
Length (L)	5 to 60 mm

Thrust washer

Name	Dimensional range
Inner diameter (d)	6 to 50 mm
Outer diameter (D)	12 to 80 mm
Thickness (t)	0.5 to 1.0 mm



DAIHYLON DHA

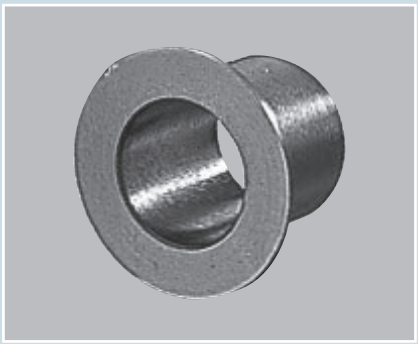
Pb Free RoHS 2 ELV

HOISI PRECISION 凱獅精密 ISO 7312 9830

Fiber-reinforced nylon sliding material.
The addition of fiber reinforcing and special filler to nylon (polyamide or PA) provides a low coefficient of linear expansion as well as enhanced strength and tribological properties.
Demonstrates suitable performance for a wide range of applications, including building materials, office automation equipment, textile machinery, and electronic devices.

Features

1. Is more heat resistant than polyoxymethylene and suitable for applications in high heat.
2. Offers excellent friction and wear-resistance characteristics.
3. Suitable for injection molding of complex shapes.
4. Also available in grades suitable for use with soft axle materials.



Material: DHA01

PA66 mixed with glass-fiber-reinforcing and special filler

Material Characteristics (typical values)

Specific gravity	Tensile strength (MPa)	Elongation (%)	Hardness (HRM)	Coefficient of expansion ($\times 10^{-5}$/°C)
1.37 to 1.47	160 or more (100 or more)	1 or more (2 or more)	77 to 93 (72 to 88)	2 to 6

NB: Figures in parenthesis are at 23°C and 50% water absorption.

Sliding Characteristics (typical values)

Material properties	Coefficient of friction (μ)	Maximum permissible load (MPa)	Maximum permissible speed (m/min)	Operating temperature range (°C)
DHA01	0.1 to 0.3	6.9	30	-40 to 140

Dimensional range

Injection-molded bearings can be made to a wide variety of complex shapes.

DAIHYLON DHR

Pb Free RoHS2 ELV

HOISI PRECISION 凱獅精密 ISO 7312 9830

A sliding material made from polyester elastomer mixed with a special filler.
This material is made by adding a special filler to extremely flexible polyester elastomer.
Demonstrates suitable performance for a wide range of applications, including office automation equipment, textile machinery, automotive parts, conveyor equipment, and food packaging equipment.

Features

1. Offers a low coefficient of friction.
2. Suitable for use with soft axle materials.
3. Offers extremely high flexibility, suitable for use in countermeasures for percussive noise.
4. Offers superior absorption of contamination.
5. Suitable for injection molding of complex shapes.

Material: DHR01

Polyester elastomer mixed with a special filler

Material Characteristics (typical values)

Specific gravity	Tensile strength (MPa)	Elongation (%)	Hardness (Shore D-scale)	Coefficient of expansion ($\times 10^{-5}$/°C)
1.28 to 1.36	20 or more	100 or more	65 to 73	20

Sliding Characteristics (typical values)

Material properties	Coefficient of friction (μ)	Maximum permissible load (MPa)	Maximum permissible speed (m/min)	Operating temperature range (°C)
DHR01	0.1 to 0.3	4.9	15	-40 to 60

Dimensional range

Injection-molded bearings can be made to a wide variety of complex shapes.

DAITHERMO DTP

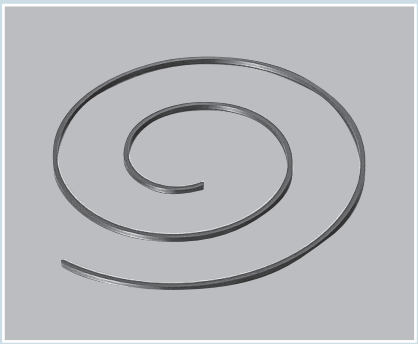
Pb Free RoHS 2 ELV

HOISI PRECISION 凱獅精密 ISO 7312 9830

A sliding material made from polyphenylene sulphide (PPS) mixed with a special filler.
This material is made by adding a special filler to heat-resistant and chemical-resistant polyphenylene sulphide (PPS), which gives it frictional properties roughly identical to those of PTFE sliding materials.
Demonstrates suitable performance for a wide range of applications, including office automation equipment, textile machinery, automotive parts, conveyor equipment, and food packaging equipment.

Features

1. Offers a low coefficient of friction.
2. Stable even when exposed to a variety of chemicals and solvents.
3. Suitable for injection molding of complex shapes.
4. Also available in grades suitable for use with soft axle materials.



Material: DTP11

PPS mixed with glass-fiber-reinforcing and special filler

Material Characteristics (typical values)

Specific gravity	Tensile strength (MPa)	Elongation (%)	Hardness (HRM)	Coefficient of expansion ($\times 10^{-5}$/°C)
1.60 to 1.72	30 or more	2 or more	32 to 48	2 to 6

Sliding Characteristics (typical values)

Material properties	Coefficient of friction (μ)	Maximum permissible load (MPa)	Maximum permissible speed (m/min)	Operating temperature range (°C)
DTP11	0.05 to 0.3	6.9	60	-40 to 200

Dimensional range

Injection-molded bearings can be made to a wide variety of complex shapes.

DAITHERMO DTK

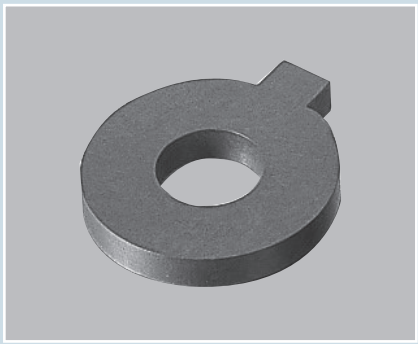
Pb Free RoHS 2 ELV

HOISI PRECISION 凱獅精密 ISO 7312 9830

A sliding material made from polyetheretherketone (PEEK) mixed with a special filler. Polyetheretherketone (PEEK) exhibits excellent heat resistance for a thermoplastic and when mixed with a special filler, offers resistance to both heat and chemicals as well as superior tribological characteristics. Demonstrates suitable performance for a wide range of applications, including automotive parts, sports equipment, and electronic devices.

Features

1. Offers excellent friction and wear-resistance characteristics.
2. Stable even when exposed to a variety of chemicals, lubricants, and solvents.
3. Suitable for use throughout a wide range of operating temperatures.
4. Suitable for injection molding of complex shapes.
5. Also available in grades suitable for use with soft axle materials.



Material: DTK01

PEEK mixed with glass-fiber-reinforcing and special filler

Material Characteristics (typical values)

Specific gravity	Tensile strength (MPa)	Elongation (%)	Hardness (HRM)	Coefficient of expansion ($\times 10^{-5}$/°C)
1.50 to 1.60	70 or more	2 or more	51 to 65	3 to 6

Sliding Characteristics (typical values)

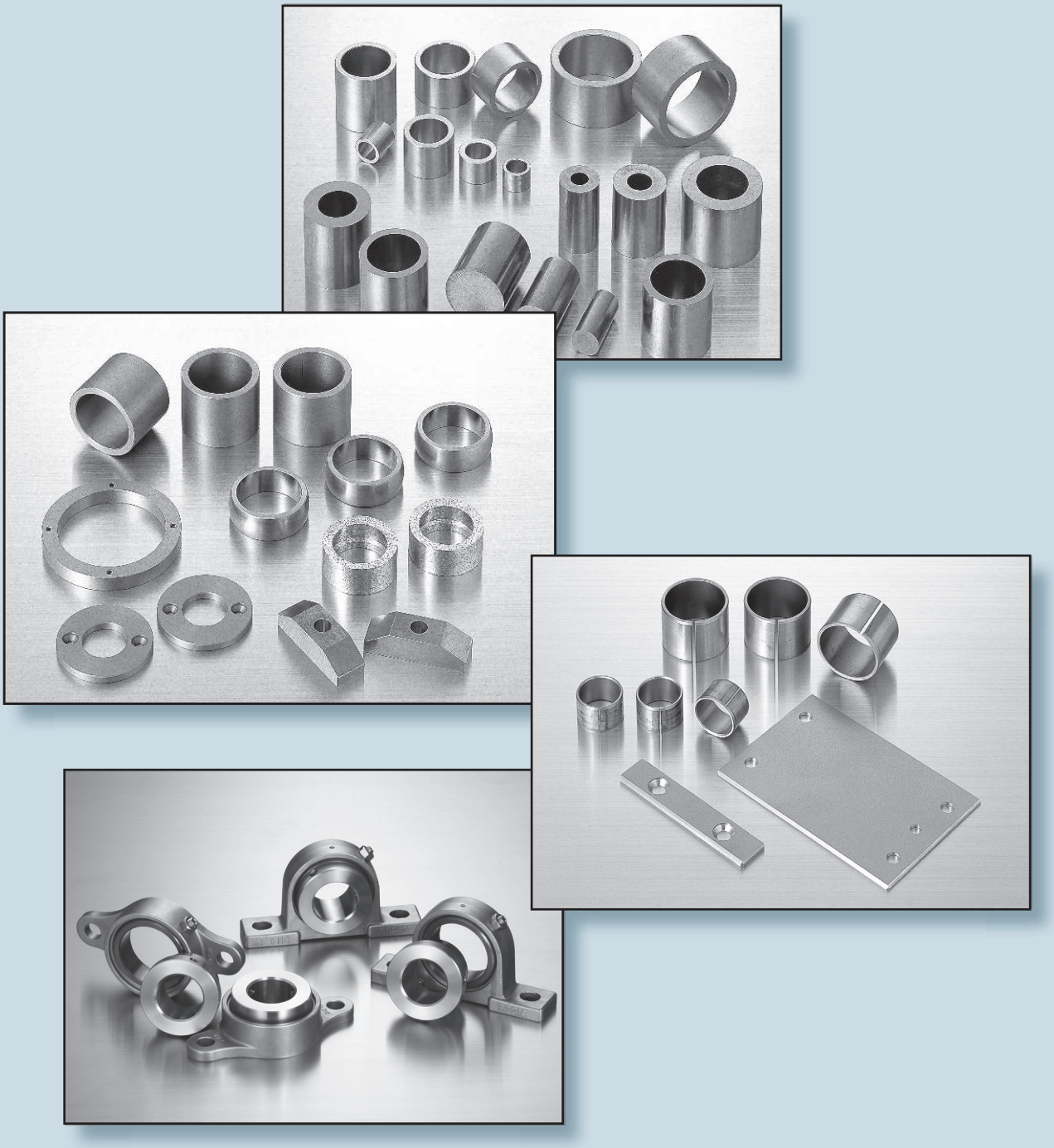
Material properties	Coefficient of friction (μ)	Maximum permissible load (MPa)	Maximum permissible speed (m/min)	Operating temperature range (°C)
DTK01	0.05 to 0.3	6.9	60	-40 to 260

Dimensional range

Injection-molded bearings can be made to a wide variety of complex shapes.

THERMALLOY

THERMALLOY is an oilless metal bearing into whose base metal a fine solid lubricant (usually consisting of carbon) is uniformly dispersed. THERMALLOY is supplied as an optimum bearing due to its design, and the selected combinations of base metal, solid lubricant and grain size which enable it to accommodate a wide range of operating conditions.



Features

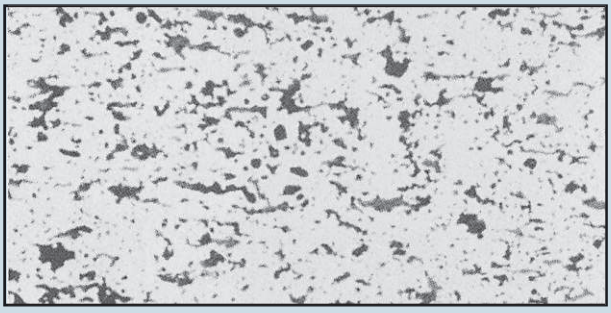
① Can be used from extremely high temperatures to low temperatures
(-200°C to +700°C depending on type of material)
② Strong against mixed hard foreign particles
③ Can withstand high-speed operation in water and in seawater
④ Can withstand strong corrosive atmospheres
⑤ Although the bearing is designed as a dry bearing, when oil and grease are both provided its performance exceeds that of lubricated bearings.
⑥ The material is strong enough to withstand high loads.
⑦ The bearing adapts to the shaft smoothly from the beginning of operation and the slip stick phenomenon is prevented.
⑧ Seizure is prevented and the surface of engaging component is not damaged.
⑨ Can be machined to special shapes
⑩ Can be used in a vacuum
⑪ The material is a good conductor of heat and electricity, therefore heat is not accumulated in the bearing.
⑫ The solid material allows sliding on multiple surfaces at the same time.
⑬ Compliant with the Dam Facility Technical Standards (Proposed) as a dispersed solid-lubricant type product.

Types

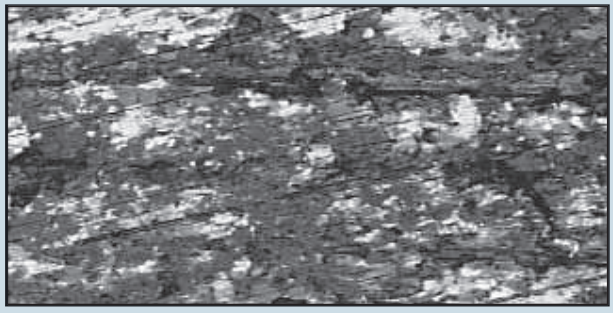
① THERMALLOY D type
This is a general grade bearing that can be applied to a wide range of operating conditions.
② THERMALLOY T type
This is a high grade bearing suitable for use when high performance or particular operating conditions are necessary.
③ THERMALLOY BB type
This is a thin compound layer type bearing consisting of THERMALLOY and steel plate.
★Stainless steel backing type is available.
④ THERMALLOY PV plate
This is a thick plate type with steel backing.
This type is standardized as finished product and in stock.
⑤ THERMALLOY pillow unit
This is a bearing unit in which THERMALLOY T type is used for the spherical bearing section.
This type is standardized as a pillow type and stock is available.

Distribution status of solid lubricant in THERMALLOY (microphotography)

The fine solid lubricant is distributed on each surface as shown in the photographs below.



THERMALLOY Bronze B 1/6
6% weight (volume 18%) carbon
×100



Flow pattern of carbon after running
×100

THERMALLOY D type

(solid lubricant dispersal bearing)

Pb Free RoHS 2 ELV

HOISI PRECISION 凱獅精密 ISO 7312 9830

We offer bronze alloys as a standard material for THERMALLOY D type and also standard parts such as finished bushings.

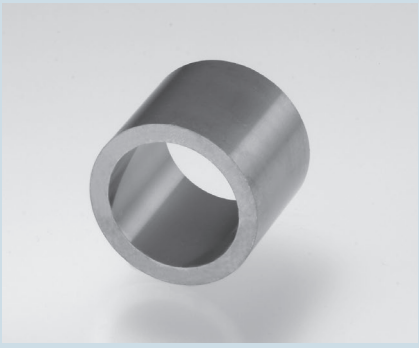
Physical Properties

Material Symbol	Contents (Metal)	Carbon Amount (wt%)	Density (g/cm^3)	Hardness (Hv)	Compressive Strength (MPa)	Max. Operating Temperature (°C)	Coefficient of Linear Thermal Expansion (°C)
B1/6	Cu-Sn	6	7.0	65	324	200	18×10^{-6}
B1/8	Cu-Sn	8	6.6	60	245		

Bearing Characteristics

Alloy	Bronze	
Material Symbol	B1/6	B1/8
Bearing Pressure MPa	10 to 30	1 to 10
Allowable Sliding Speed m/min	4.2 m/min for 10 MPa 1.0 m/min for 30 MPa	72.0 m/min for 1 MPa 9.0 m/min for 10 MPa
Wear Amount per Friction Distance of 1 km	9μm (2MPa·3.0m/min)	6μm (2MPa·3.0m/min)
Hardness of Mating Surface	Above HB200	

- The above mentioned bearing pressure is the value given at normal clearance. If the bearing is used with extremely large clearance, apply a lower bearing pressure.
- The relationship between the bearing pressure and allowable sliding speed is decided through a balance of heat generation and heat radiation in the bearing.
- The amount of wear is affected by bearing pressure, sliding speed and the roughness of the shaft.



Material Dimension Table

(Unit: mm)

Dimension Part Number	O.D.	I.D.	Length $^{+4}_{0}$	Material Code
BR12-20DM	12.50	–	20	B1/6 · B1/8
BR20-40DM	20.45	–	40	B1/6 · B1/8
BR30-50DM	30.55	–	50	B1/6 · B1/8
BR45-50DM	45.75	–	50	B1/8 Only
BR45-60DM	45.75	–	60	B1/6 Only
TU20- 8-30DM	20.45	7.00	30	B1/6 · B1/8
TU25-15-30DM	25.55	14.10	30	B1/6 · B1/8
TU30-15-50DM	30.55	14.10	50	B1/6 · B1/8
TU30-20-40DM	30.55	19.00	40	B1/6 · B1/8
TU35-25-40DM	35.60	24.00	40	B1/6 · B1/8
TU40-20-50DM	40.60	19.00	50	B1/8 Only
TU40-20-60DM	40.60	19.00	60	B1/6 Only
TU40-30-40DM	40.60	29.00	40	B1/6 · B1/8
TU45-25-50DM	45.75	24.00	50	B1/8 Only
TU45-25-60DM	45.75	24.00	60	B1/6 Only
TU45-35-40DM	45.75	34.05	40	B1/6 · B1/8
TU50-30-50DM	50.60	29.00	50	B1/8 Only
TU50-30-60DM	50.60	29.00	60	B1/6 Only
TU50-40-40DM	50.60	39.25	40	B1/6 · B1/8
TU55-45-50DM	55.60	44.05	50	B1/6 · B1/8
TU60-40-50DM	60.95	39.25	50	B1/8 Only
TU60-40-60DM	60.95	39.25	60	B1/6 Only
TU60-50-50DM	60.95	49.05	50	B1/6 · B1/8
TU65-55-50DM	65.65	54.05	50	B1/6 · B1/8
TU70-55-50DM	70.65	54.05	50	B1/8 Only
TU70-55-60DM	70.65	54.05	60	B1/6 Only
TU75-60-50DM	75.65	59.05	50	B1/6 · B1/8

Note: When ordering, please specify the material code and dimension number (example: "B1/6 TU40-30-40DM").

DM D type DM Series (Bushing Inner Diameter: 10 to 100 mm)

Designation of Part Number

DM ○○ ○○ ○○

- ○○ Bushing Length
- ○○ Bushing O.D.
- ○○ Bushing I.D.
- DM Product Symbol (Material B1/8)

(Bushing Inner Diameter: 10 to 100 mm)

DM 101610

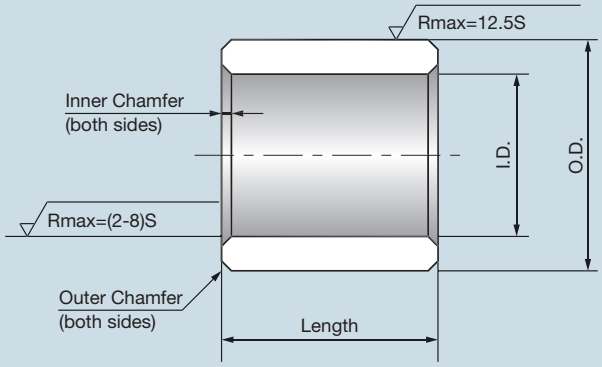
Please specify by part number.

Pb Free

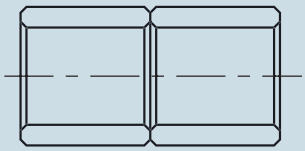
RoHS 2

ELV

Bushing I.D.	Recommended Dimension Mating Part		Bushing Dimensions					
	Housing I.D.	Shaft Dia.	I.D.	O.D.				
					10	15	16	20
10	φ16H7 $^{+0.018}_{0}$	φ10h7 $^{0}_{-0.015}$	φ10C7 $^{+0.095}_{+0.080}$	φ16r6 $^{+0.034}_{+0.023}$	**101610**	**101615**		**101620**
12	φ18H7 $^{+0.018}_{0}$	φ12h7 $^{0}_{-0.018}$	φ12C7 $^{+0.113}_{+0.095}$	φ18r6 $^{+0.034}_{+0.023}$	**121810**	**121815**	**121816**	**121820**
13	φ19H7 $^{+0.021}_{0}$	φ13h7 $^{0}_{-0.018}$	φ13C7 $^{+0.113}_{+0.095}$	φ19r6 $^{+0.041}_{+0.028}$		**131915**		**131920**
14	φ20H7 $^{+0.021}_{0}$	φ14h7 $^{0}_{-0.018}$	φ14C7 $^{+0.113}_{+0.095}$	φ20r6 $^{+0.041}_{+0.028}$		**142015**		**142020**
15	φ21H7 $^{+0.021}_{0}$	φ15h7 $^{0}_{-0.018}$	φ15C7 $^{+0.113}_{+0.095}$	φ21r6 $^{+0.041}_{+0.028}$		**152115**		**152120**
16	φ22H7 $^{+0.021}_{0}$	φ16h7 $^{0}_{-0.018}$	φ16C7 $^{+0.113}_{+0.095}$	φ22r6 $^{+0.041}_{+0.028}$		**162215**	**162216**	**162220**
18	φ24H7 $^{+0.021}_{0}$	φ18h7 $^{0}_{-0.018}$	φ18C7 $^{+0.113}_{+0.095}$	φ24r6 $^{+0.041}_{+0.028}$		**182415**		**182420**
20	φ28H7 $^{+0.021}_{0}$	φ20h7 $^{0}_{-0.021}$	φ20C7 $^{+0.131}_{+0.110}$	φ28r6 $^{+0.041}_{+0.028}$		**202815**	**202816**	**202820**
20	φ30H7 $^{+0.021}_{0}$	φ20h7 $^{0}_{-0.021}$	φ20C7 $^{+0.131}_{+0.110}$	φ30r6 $^{+0.041}_{+0.028}$				**203020**
22	φ30H7 $^{+0.021}_{0}$	φ22h7 $^{0}_{-0.021}$	φ22C7 $^{+0.131}_{+0.110}$	φ30r6 $^{+0.041}_{+0.028}$				**223020**
25	φ33H7 $^{+0.025}_{0}$	φ25h7 $^{0}_{-0.021}$	φ25C7 $^{+0.131}_{+0.110}$	φ33r6 $^{+0.050}_{+0.034}$			**253316**	**253320**
25	φ35H7 $^{+0.025}_{0}$	φ25h7 $^{0}_{-0.021}$	φ25C7 $^{+0.131}_{+0.110}$	φ35r6 $^{+0.050}_{+0.034}$				**253520**
28	φ38H7 $^{+0.025}_{0}$	φ28h7 $^{0}_{-0.021}$	φ28C7 $^{+0.131}_{+0.110}$	φ38r6 $^{+0.050}_{+0.034}$				**283820**
30	φ38H7 $^{+0.025}_{0}$	φ30h7 $^{0}_{-0.021}$	φ30C7 $^{+0.131}_{+0.110}$	φ38r6 $^{+0.050}_{+0.034}$				**303820**
30	φ40H7 $^{+0.025}_{0}$	φ30h7 $^{0}_{-0.021}$	φ30C7 $^{+0.131}_{+0.110}$	φ40r6 $^{+0.050}_{+0.034}$				**304020**
					15	16	20	25
31.5	φ40H7 $^{+0.025}_{0}$	φ31.5h7 $^{0}_{-0.025}$	φ31.5C7 $^{+0.095}_{+0.080}$	φ40r6 $^{+0.050}_{+0.034}$				
32	φ42H7 $^{+0.025}_{0}$	φ32h7 $^{0}_{-0.025}$	φ32C7 $^{+0.113}_{+0.095}$	φ42r6 $^{+0.050}_{+0.034}$				**324225**
35	φ44H7 $^{+0.025}_{0}$	φ35h7 $^{0}_{-0.025}$	φ35C7 $^{+0.113}_{+0.095}$	φ44r6 $^{+0.050}_{+0.034}$				
35	φ45H7 $^{+0.025}_{0}$	φ35h7 $^{0}_{-0.025}$	φ35C7 $^{+0.113}_{+0.095}$	φ45r6 $^{+0.050}_{+0.034}$				
40	φ50H7 $^{+0.025}_{0}$	φ40h7 $^{0}_{-0.025}$	φ40C7 $^{+0.113}_{+0.095}$	φ50r6 $^{+0.050}_{+0.034}$			**405020**	**405025**
45	φ55H7 $^{+0.030}_{0}$	φ45h7 $^{0}_{-0.025}$	φ45C7 $^{+0.113}_{+0.095}$	φ55r6 $^{+0.060}_{+0.041}$				
50	φ60H7 $^{+0.030}_{0}$	φ50h7 $^{0}_{-0.025}$	φ50C7 $^{+0.113}_{+0.095}$	φ60r6 $^{+0.060}_{+0.041}$				
55	φ65H7 $^{+0.030}_{0}$	φ55h7 $^{0}_{-0.030}$	φ55C7 $^{+0.131}_{+0.110}$	φ65r6 $^{+0.060}_{+0.041}$				
60	φ75H7 $^{+0.030}_{0}$	φ60h7 $^{0}_{-0.030}$	φ60C7 $^{+0.131}_{+0.110}$	φ75r6 $^{+0.062}_{+0.043}$				
65	φ80H7 $^{+0.030}_{0}$	φ65h7 $^{0}_{-0.030}$	φ65C7 $^{+0.131}_{+0.110}$	φ80r6 $^{+0.062}_{+0.043}$				
70	φ85H7 $^{+0.035}_{0}$	φ70h7 $^{0}_{-0.030}$	φ70C7 $^{+0.131}_{+0.110}$	φ85r6 $^{+0.073}_{+0.051}$				
75	φ90H7 $^{+0.035}_{0}$	φ75h7 $^{0}_{-0.030}$	φ75C7 $^{+0.131}_{+0.110}$	φ90r6 $^{+0.073}_{+0.051}$				
80	φ100H7 $^{+0.035}_{0}$	φ80h7 $^{0}_{-0.030}$	φ80C7 $^{+0.131}_{+0.110}$	φ100r6 $^{+0.073}_{+0.051}$				
85	φ105H7 $^{+0.035}_{0}$	φ85h7 $^{0}_{-0.035}$	φ85C7 $^{+0.131}_{+0.110}$	φ105r6 $^{+0.076}_{+0.054}$				
90	φ110H7 $^{+0.035}_{0}$	φ90h7 $^{0}_{-0.035}$	φ90C7 $^{+0.131}_{+0.110}$	φ110r6 $^{+0.076}_{+0.054}$				
100	φ120H7 $^{+0.035}_{0}$	φ100h7 $^{0}_{-0.035}$	φ100C7 $^{+0.131}_{+0.110}$	φ120r6 $^{+0.076}_{+0.054}$				



① If products with a shorter length are required, adjust the dimension of the length to suit.
② If products with a longer length are required use multiple pieces as shown in the figure below.



Multiple bushes

(Unit: mm)

Part Number & Bushing Length Tolerance $^{0}_{-0.3}$						Outer Chamfer	Inner Chamfer	Bushing I.D.
	25	30	35	40	50			
						C0.3	C0.3	10
	121825	**121830**				C0.3	C0.3	12
						C0.3	C0.3	13
						C0.3	C0.3	14
	152125					C0.3	C0.3	15
	162225	**162230**	**162235**			C0.3	C0.3	16
	182425	**182430**				C0.5	C0.5	18
	202825	**202830**	**202835**	**202840**		C0.5	C0.5	20
	203025	**203030**	**203035**	**203040**		C0.5	C0.5	20
	223025	**223030**				C0.5	C0.5	22
	253325	**253330**	**253335**	**253340**		C0.5	C0.5	25
	253525	**253530**	**253535**	**253540**		C0.5	C0.5	25
		283830				C0.5	C0.5	28
	303825	**303830**	**303835**	**303840**	**303850**	C0.5	C0.5	30
	304025	**304030**	**304035**	**304040**	**304050**	C0.5	C0.5	30
	30	35	40	50	60			
	314030		**314040**			C0.5	C0.5	31.5
	324230		**324240**			C0.5	C0.5	32
	354430	**354435**	**354440**	**354450**		C0.5	C0.5	35
	354530	**354535**	**354540**	**354550**		C0.5	C0.5	35
	405030	**405035**	**405040**	**405050**		C0.5	C0.5	40
			455540	**455550**		C0.5	C0.5	45
			506040	**506050**	**506060**	C0.5	C0.5	50
			556540		**556560**	C0.5	C0.5	55
			607540		**607560**	C0.5	C0.5	60
			658040		**658060**	C1.0	C1.0	65
			708540		**708560**	C1.0	C1.0	70
			759040		**759060**	C1.0	C1.0	75
			8010040		**8010060**	C1.0	C1.0	80
			8510540		**8510560**	C1.0	C1.0	85
			9011040		**9011060**	C1.0	C1.0	90
			10012040		**10012060**	C1.0	C1.0	100

GB-C D type C Series (Bushing Inner Diameter: 6 to 50 mm)

Designation of Part Number

GB-C 00 00
- 00 — Bushing Length
- 00 — Bushing I.D.
- GB-C — Product Symbol (Material B1/8)

Pb Free

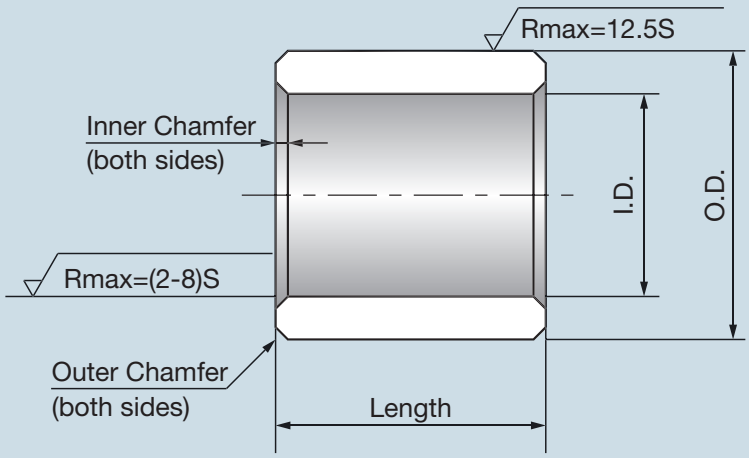
RoHS 2

ELV

GB-C 0606

Please specify by part number.

Bushing I.D.	Recommended Dimension Mating Part		Bushing Dimensions								
	Housing I.D.	Shaft Dia.	I.D.	O.D.	6	8	10	12	16	20	
6	φ10H7 $^{+0.015}_{0}$	φ6g6 $^{-0.004}_{-0.012}$	φ6 $^{+0.028}_{+0.013}$	φ10 $^{+0.021}_{+0.006}$	**0606**	**0608**	**0610**				
8	φ14H7 $^{+0.018}_{0}$	φ8g6 $^{-0.005}_{-0.014}$	φ8 $^{+0.028}_{+0.013}$	φ14 $^{+0.021}_{+0.006}$		**0808**	**0810**	**0812**	**0816**		
10	φ16H7 $^{+0.018}_{0}$	φ10g6 $^{-0.005}_{-0.014}$	φ10 $^{+0.034}_{+0.016}$	φ16 $^{+0.021}_{+0.006}$			**1010**	**1012**	**1016**	**1020**	
12	φ18H7 $^{+0.018}_{0}$	φ12g6 $^{-0.006}_{-0.017}$	φ12 $^{+0.034}_{+0.016}$	φ18 $^{+0.021}_{+0.006}$			**1210**	**1212**	**1216**	**1220**	
16	φ22H7 $^{+0.021}_{0}$	φ16g6 $^{-0.006}_{-0.017}$	φ16 $^{+0.034}_{+0.016}$	φ22 $^{+0.021}_{+0.006}$					**1616**	**1620**	
20	φ30H7 $^{+0.021}_{0}$	φ20g6 $^{-0.007}_{-0.020}$	φ20 $^{+0.041}_{+0.020}$	φ30 $^{+0.021}_{+0.006}$					**2016**	**2020**	
25	φ35H7 $^{+0.025}_{0}$	φ25g6 $^{-0.007}_{-0.020}$	φ25 $^{+0.041}_{+0.020}$	φ35 $^{+0.025}_{+0.009}$						**2520**	
30	φ40H7 $^{+0.025}_{0}$	φ30g6 $^{-0.007}_{-0.020}$	φ30 $^{+0.041}_{+0.020}$	φ40 $^{+0.025}_{+0.009}$						**3020**	
35	φ45H7 $^{+0.025}_{0}$	φ35g6 $^{-0.009}_{-0.025}$	φ35 $^{+0.050}_{+0.025}$	φ45 $^{+0.025}_{+0.009}$							
40	φ50H7 $^{+0.025}_{0}$	φ40g6 $^{-0.009}_{-0.025}$	φ40 $^{+0.050}_{+0.025}$	φ50 $^{+0.025}_{+0.009}$							
45	φ55H7 $^{+0.030}_{0}$	φ45g6 $^{-0.009}_{-0.025}$	φ45 $^{+0.050}_{+0.025}$	φ55 $^{+0.033}_{+0.011}$							
50	φ62H7 $^{+0.030}_{0}$	φ50g6 $^{-0.009}_{-0.025}$	φ50 $^{+0.050}_{+0.025}$	φ62 $^{+0.033}_{+0.011}$							



(Unit: mm)

Part Number & Bushing Length Tolerance $^{0}_{-0.3}$									Outer Chamfer	Inner Chamfer	Bushing I.D.
	25	30	35	40	45	50	55	60			
									C0.3	C0.3	6
									C0.3	C0.3	8
									C0.3	C0.3	10
									C0.3	C0.3	12
	1625								C0.3	C0.3	16
	2025	**2030**							C0.5	C0.5	20
	2525	**2530**							C0.5	C0.5	25
	3025	**3030**	**3035**	**3040**					C0.5	C0.5	30
		3530	**3535**	**3540**	**3545**	**3550**			C0.5	C0.5	35
		4030	**4035**	**4040**	**4045**	**4050**			C0.5	C0.5	40
				4540	**4545**	**4550**			C0.5	C0.5	45
				5040	**5045**	**5050**	**5055**	**5060**	C0.5	C0.5	50

THERMALLOY T type

(solid lubricant dispersal bearing)

Pb Free RoHS 2 ELV

Excluding products marked ※

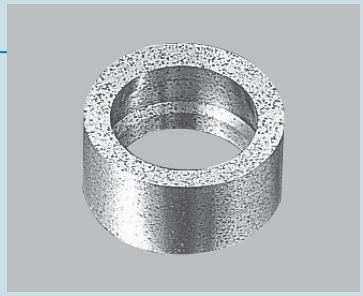
HOISI PRECISION 凱獅精密 ISO 7312 9830

Material Characteristics

	Material Symbol		Operating Temperature °C	Max. Bearing Pressure (MPa)	Max. Sliding Speed (m/min)	Description
	Powder Carbon	Granulate Carbon				
※ Lead Bronze Alloy	30/6 30/8 30/12	30/8P 30/12P	-50 to +200	49.0 29.4 4.9	1.2 30.0 60.0	Lead added bronze. General purpose material for use in air or water
Bronze Alloy	144SB6 144SB8 144SB12	144SB8P 144SB12P		49.0 29.4 4.9	1.2 30.0 60.0	Bronze with no lead added so can be used in food factory machinery. Can also be used in pure water
Special Bronze Alloy	144SB6W 144SB8W 144SB12W	144SB8PW 144SB12PW	-200 to +350	39.2 19.6 2.9	1.2 30.0 60.0	Copper alloy which has excellent dimensional stability
Nickel-Copper -Iron Alloy	277NC8W 277NC12W 653NC8W		to +450 to +450 to +550	19.6 4.9 19.6	2.4 30.0 2.4	Excellent corrosion resistance, particularly in sea water
Iron Alloy	963/8W		to +600	19.6	2.4	Used when oxidisation of the bearing is a problem
Nickel Alloy	Ni98/8W Ni98/12W		to +600	19.6 4.9	2.4 18.0	Used for bearings for atomic energy related and anti-radiation use. Has good corrosion resistance and operation in liquid is preferable.
Iron Nickel Alloy	831FN10W	831FN12PW	to +700	39.2	1.2	High temperature properties are good, strength is excellent.
	237NF10W			39.2		High temperature and corrosion resistance properties are excellent.

Note:
- The values given for maximum bearing pressure and maximum sliding speed are merely for guidance, and may vary dependant on other conditions. In addition, usage of the bearing at both maximum bearing pressure and maximum sliding speed is likely to cause heat generation and wear.
- Special material is prepared for use in a vacuum. Please consult us for more information.
- For usage below 200°C the W symbol is required only on lead-bronze alloy or bronze alloy materials.

Important Notes on the Determination of Material Codes



① Each material code is composed of symbols that indicate the alloy series, the amount of graphite contained, and the state of graphite dispersal. When you have determined the material code from the upper table, we add a manufacturing-based classification code and indicate it on the label for the actual article and in the drawings.

Examples
Your selected code plus our added classification code.
30/8 → 30/8-2Mo

Meaning of the code
In this example, "30/" is the alloy series, "8" is the percentage of powdered graphite, and "2Mo" is a code we add.
144SB12PW → 144SB12P-2MoW
In this example, "144SBW" is the alloy series, "12P" is the percentage of powdered graphite, and "2Mo" is a code we add.

② The amount of graphite contained is normally 6%, 8%, 10%, or 12%.

③ A powdered-graphite value of 8% and a granulated-graphite value of 12% (indicated by a "P" code) are nearly equivalent in terms of strength, and have an identical maximum specific load. Powdered graphite is effective in situations where contamination by external foreign matter does not occur, and granulated graphite is effective in situations susceptible to contamination by sand, iron filings, or the like.

Material Dimension Table (All Parts with Chamfering Margin)

(Unit: mm)

Die No	Outer diameter	Inner diameter	Length	Length	Length	Length	Remarks
B20	22	–				–	*1 For powdered graphite and lead-bronze, bronze, and special bronze alloys of B40 up to B120, values of up to 84ℓ are possible. For other than the above, values are up to 64ℓ. For granulated graphite, values are up to 64ℓ for all dies.
B30	32	–				–	
B40	43	–					
B60	63	–	44ℓ	54ℓ	64ℓ	84ℓ *1	
B80	83	–					
B100	103	–					
B120	123	–					
R40	43	17				–	*2 For powdered graphite and lead-bronze, bronze, and special bronze alloys other than R40, R50, R60B, or R70, values of up to 84ℓ are possible. For other than the above, values are up to 64ℓ. For granulated graphite, values are up to 64ℓ for all dies. For other than the above, values are up to 64ℓ. For granulated graphite, values are up to 64ℓ for all dies.
R50	52	23				–	
R60A	63	27					
R60B	63	38				–	
R70	72	43				–	
R80A	83	38					
R80B	83	47					
R90	93	57					
R100A	103	47					
R100B	103	67					
R110	113	77					
R120A	123	67					
R120B	123	87					
R130A	133	77	44ℓ	54ℓ	64ℓ	84ℓ *2	
R130B	133	97					
R140A	143	87					
R140B	143	97					
R140C	143	107					
R150	153	117					
R160A	163	107					
R160B	163	127					
R170A	173	117					
R170B	173	137					
R180A	183	137					
R180B	183	147					
R190	193	157					
R200	204	167					
R220	224	186					
P65	Height 65	Width 100	Thickness 29				For plate material (powdered graphite) and lead-bronze, bronze, and special bronze alloys, values of up to 34T are possible.
P90	Height 90	Width 130	Thickness 29				

Notes:
- When ordering, please specify the material code and die dimensions.
- All granulated-graphite material other than *1 or *2 is up to 64l.

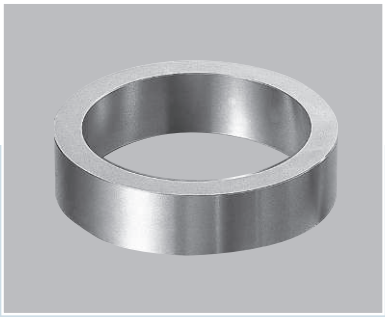
Die Dimensions

① All T type material has cutting margins on the outer-diameter, inner-diameter, and length faces.
② The minimum cutting margin is 2 to 4 mm for the diameter, and in the length direction is 4 mm on a side for iron or iron-nickel alloys and about 2 mm on a side for other materials.
③ The material is round bar, hollow, and oblong.
④ We perform complete finishing before delivery. Products are delivered with a grip margin in some cases.

THERMALLOY TM type

(solid lubricant dispersal bearing for use in ultrahigh temperatures)

Pb Free RoHS 2 ELV



THERMALLOY TM type is made from a material that is highly resistant to oxidation and wear in high temperature oxidative environments.

Features

① Highly resistant to oxidation and corrosion in high temperature oxidative environments (700°C max).
② Resistant to wear.
③ Highly resistant to seizure at higher temperatures.
④ The bearing causes very little damage to the mating shaft.

Chemical Composition

FeCr + Cu + Solid lubricant

Mechanical Properties

Density (g/cm^3)	Compressive strength (MPa)	Ring compression strength (MPa)
7.4	1630	980

Strength

Temperature (°C)	Hardness (Hv)	Tensile strength (MPa)
Room temperature	230	450
300	180	410
500	170	340
700	110	150

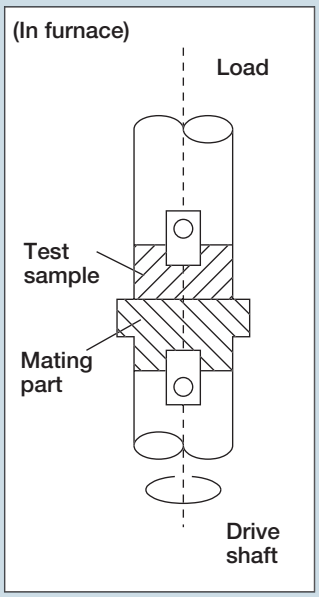
Coefficient of Linear Thermal Expansion

Temperature (°C)	Coefficient of linear thermal expansion (×10^{-6}/°C)
50 to 300	16.5
50 to 500	16.6
50 to 700	17.0

Oxidation Resistance

Heating time (hrs.)	Weight change rate (%)
5	0.01
10	0.05
25	0.05
50	0.05
100	0.06

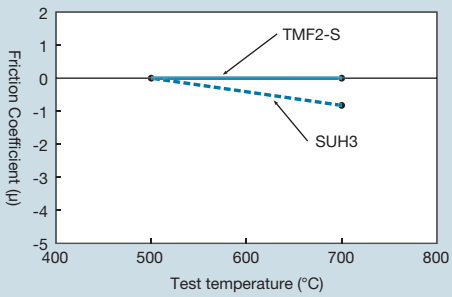
Sliding properties at higher temperatures (THERMALLOY TM type TMF2-S)



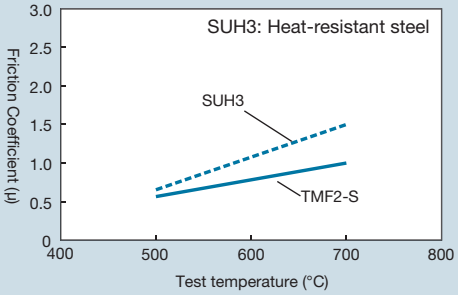
Test conditions

Specific load : 2.45MPa
Speed : 1.2m/min
Material of mating part : SUS303
Duration : 30min

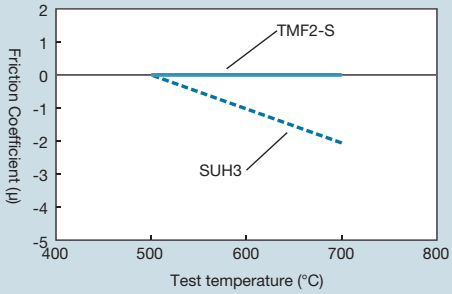
Bearing weight change



Friction coefficient



Material weight change of mating part



THERMALLOY BB type

(solid lubricant dispersal bimetal bearing)

Pb Free RoHS 2 ELV

Excluding products marked ※

HOISI PRECISION 凱獅精密 ISO 7372 9830

THERMALLOY BB type is a steel backed material with a D type material lining (B1/6, B1/8 or BL2/8). It is suitable for use under high loads in a limited space.
Dimensions of materials and wrapped bush for sliding plates have been standardized.

BB type Materials

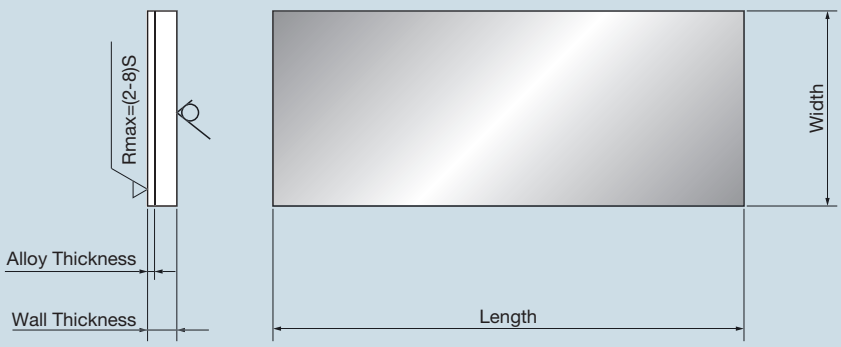
Alloy	Material symbol	Backing
Bronze based	BB1/6	Steel
	BB1/8	
Lead bronze based	BBL2/8	

Optional bearings backed with stainless steel are also available.

Standard Dimensions of Plates (Custom-made)

(Unit: mm)

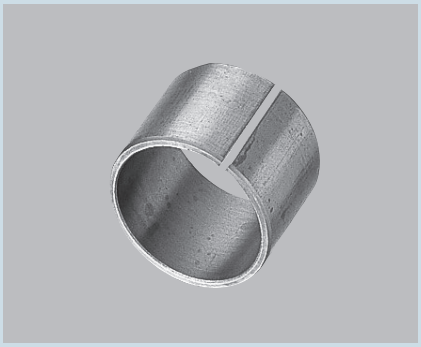
Part No.	Overall thickness	Alloy thickness	Width $^{+0.2}_{0}$	Length $^{+5.0}_{0}$
BBL2/8-P1.5	1.5±0.05	0.4	70	500
BBL2/8-P2	2.0±0.05	0.6	70	
BBL2/8-P2.5	2.5±0.05	0.9	120	
BBL2/8-P3	3.0±0.05	1.0	120	
BBL2/8-P5	5.0±0.075	1.0	120	
BBL2/8-P8	8.0±0.075	1.3	110	



BM BB type BM Series (Bushing Inner Diameter: 10 to 70 mm)

Designation of Part Number

BM 00 00
- 00 — Bushing Length
- 00 — Nominal I.D. of Bushing
- BM — Product Symbol



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RoHS 2

ELV

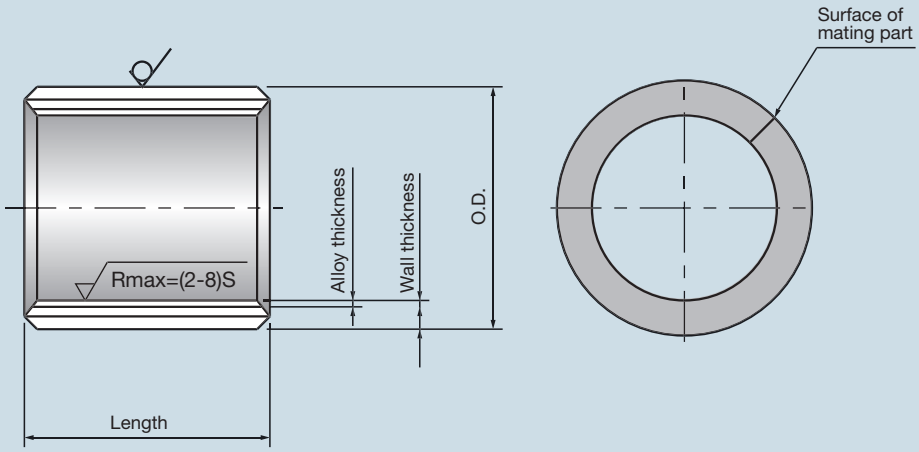
BM 1010

Please specify by Part No.

This product is produced on order only.

Bushing I.D.	Recommended Dimension Mating Part		Bushing Dimensions						
	Housing I.D.	Shaft Dia.	O.D.	Wall Thickness	Alloy Thickness	10	15	20	25
10	φ12H7 $^{+0.018}_{0}$	φ10h7 $^{0}_{-0.015}$	φ12 $^{+0.051}_{+0.033}$	1.0 $^{-0.013}_{-0.028}$	0.5	**1010**	**1015**		
12	φ14H7 $^{+0.018}_{0}$	φ12h7 $^{0}_{-0.018}$	φ14 $^{+0.051}_{+0.033}$	1.0 $^{-0.013}_{-0.028}$	0.5	**1210**	**1215**		
14	φ16H7 $^{+0.018}_{0}$	φ14h7 $^{0}_{-0.018}$	φ16 $^{+0.051}_{+0.033}$	1.0 $^{-0.013}_{-0.028}$	0.5	**1410**	**1415**		
15	φ17H7 $^{+0.018}_{0}$	φ15h7 $^{0}_{-0.018}$	φ17 $^{+0.051}_{+0.033}$	1.0 $^{-0.013}_{-0.028}$	0.5	**1510**	**1515**		**1525**
16	φ18H7 $^{+0.018}_{0}$	φ16h7 $^{0}_{-0.018}$	φ18 $^{+0.051}_{+0.033}$	1.0 $^{-0.013}_{-0.028}$	0.5	**1610**	**1615**	**1620**	**1625**
18	φ20H7 $^{+0.021}_{0}$	φ18h7 $^{0}_{-0.018}$	φ20 $^{+0.062}_{+0.041}$	1.0 $^{-0.013}_{-0.028}$	0.5	**1810**	**1815**	**1820**	**1825**
20	φ23H7 $^{+0.021}_{0}$	φ20h7 $^{0}_{-0.021}$	φ23 $^{+0.062}_{+0.041}$	1.5 $^{-0.013}_{-0.033}$	0.5		**2015**	**2020**	**2025**
22	φ25H7 $^{+0.021}_{0}$	φ22h7 $^{0}_{-0.021}$	φ25 $^{+0.062}_{+0.041}$	1.5 $^{-0.013}_{-0.033}$	0.5				
24	φ27H7 $^{+0.021}_{0}$	φ24h7 $^{0}_{-0.021}$	φ27 $^{+0.062}_{+0.041}$	1.5 $^{-0.013}_{-0.033}$	0.5		**2415**	**2420**	**2425**
25	φ28H7 $^{+0.021}_{0}$	φ25h7 $^{0}_{-0.021}$	φ28 $^{+0.062}_{+0.041}$	1.5 $^{-0.013}_{-0.033}$	0.5		**2515**		**2525**
28	φ32H7 $^{+0.025}_{0}$	φ28h7 $^{0}_{-0.021}$	φ32 $^{+0.073}_{+0.048}$	2.0 $^{-0.013}_{-0.033}$	0.6				
30	φ34H7 $^{+0.025}_{0}$	φ30h7 $^{0}_{-0.021}$	φ34 $^{+0.073}_{+0.048}$	2.0 $^{-0.013}_{-0.033}$	0.6			**3020**	
32	φ36H7 $^{+0.025}_{0}$	φ32h7 $^{0}_{-0.025}$	φ36 $^{+0.073}_{+0.048}$	2.0 $^{-0.013}_{-0.033}$	0.6				
35	φ39H7 $^{+0.025}_{0}$	φ35h7 $^{0}_{-0.025}$	φ39 $^{+0.073}_{+0.048}$	2.0 $^{-0.013}_{-0.033}$	0.6			**3520**	
36	φ40H7 $^{+0.025}_{0}$	φ36h7 $^{0}_{-0.025}$	φ40 $^{+0.073}_{+0.048}$	2.0 $^{-0.013}_{-0.033}$	0.6				
38	φ42H7 $^{+0.025}_{0}$	φ38h7 $^{0}_{-0.025}$	φ42 $^{+0.079}_{+0.054}$	2.0 $^{-0.013}_{-0.033}$	0.6				
40	φ44H7 $^{+0.025}_{0}$	φ40h7 $^{0}_{-0.025}$	φ44 $^{+0.079}_{+0.054}$	2.0 $^{-0.013}_{-0.033}$	0.6			**4020**	
42	φ46H7 $^{+0.025}_{0}$	φ42h7 $^{0}_{-0.025}$	φ46 $^{+0.079}_{+0.054}$	2.0 $^{-0.013}_{-0.033}$	0.6				
45	φ50H7 $^{+0.025}_{0}$	φ45h7 $^{0}_{-0.025}$	φ50 $^{+0.079}_{+0.054}$	2.5 $^{-0.020}_{-0.045}$	0.6				
50	φ55H7 $^{+0.030}_{0}$	φ50h7 $^{0}_{-0.025}$	φ55 $^{+0.096}_{+0.066}$	2.5 $^{-0.020}_{-0.045}$	0.6				
55	φ60H7 $^{+0.030}_{0}$	φ55h7 $^{0}_{-0.030}$	φ60 $^{+0.096}_{+0.066}$	2.5 $^{-0.020}_{-0.045}$	0.6				
60	φ65H7 $^{+0.030}_{0}$	φ60h7 $^{0}_{-0.030}$	φ65 $^{+0.096}_{+0.066}$	2.5 $^{-0.020}_{-0.045}$	0.6				
65	φ70H7 $^{+0.030}_{0}$	φ65h7 $^{0}_{-0.030}$	φ70 $^{+0.105}_{+0.075}$	2.5 $^{-0.020}_{-0.045}$	0.6				
70	φ75H7 $^{+0.030}_{0}$	φ70h7 $^{0}_{-0.030}$	φ75 $^{+0.105}_{+0.075}$	2.5 $^{-0.020}_{-0.045}$	0.6				

Notes: 1. Tolerances for length and outside diameters are determined separately for bushing with an inside diameter of ≥φ160.
2. When ordering, specify the alloy type (BB1/6, BB1/8 or BBL2/8) and the part number.
3. If press-fitting a BB type wrapped bush with allowance into a housing and then finishing its inside diameter, the bushing may be supplied with finishing allowance between 0.2mm to 0.3mm in diameter. Please ensure that you add "SS" after the part No. (e.g. BB1/8, BM5060SS).
4. The BBL2/8 alloy is not regulated by RoHS/ELV.



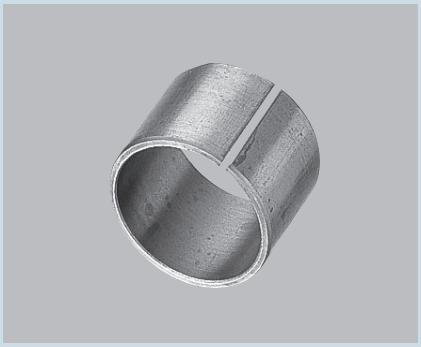
(Unit: mm)

Part Number & Bushing Length Tolerance ±0.25						Outer Chamfer	Inner Chamfer	Bushing I.D.
	30	40	50	60	70			
						0.6×20°	C0.2	10
						0.6×20°	C0.2	12
						0.6×20°	C0.2	14
						0.6×20°	C0.2	15
						0.6×20°	C0.2	16
						0.6×20°	C0.2	18
	2030					1.0×20°	C0.5	20
	2230					1.0×20°	C0.5	22
	2430					1.0×20°	C0.5	24
	2530					1.0×20°	C0.5	25
	2830					1.0×20°	C0.5	28
	3030	**3040**				1.0×20°	C0.5	30
		3240				1.0×20°	C0.5	32
	3530		**3550**			1.0×20°	C0.5	35
		3640				1.0×20°	C0.5	36
		3840				1.0×20°	C0.5	38
	4030		**4050**			1.0×20°	C0.5	40
			4250			1.0×20°	C0.5	42
	4530		**4550**	**4560**		1.0×20°	C0.5	45
		5040	**5050**	**5060**		1.0×20°	C0.5	50
		5540				1.0×20°	C0.5	55
		6040		**6060**	**6070**	1.0×20°	C0.5	60
			6550		**6570**	1.0×20°	C0.5	65
			7050		**7070**	1.0×20°	C0.5	70

BM BB type BM Series (Bushing Inner Diameter: 75 to 300 mm)

Designation of Part Number

BM 00 00
- 00 — Bushing Length
- 00 — Nominal I.D. of Bushing
- BM — Product Symbol



Pb Free

RoHS 2

ELV

BM 1010

Please specify by Part No.

This product is produced on order only.

(Unit: mm)

Bushing I.D.	Recommended Dimension Mating Part		Bushing Dimensions							Bushing I.D.
	Housing I.D.	Shaft Dia.	O.D.	Wall Thickness	Alloy Thickness	Part Number & Bushing Length Tolerance ±0.25			Outer Chamfer	Inner Chamfer	
						60	80	100			
75	φ81H7 +0.035 0	φ75h7 0 -0.030	φ81 +0.126 +0.091	3.0 -0.020 -0.045	0.9	**7560**	**7580**	**75100**	1.0x20°	C0.5	75
80	φ86H7 +0.035 0	φ80h7 0 -0.030	φ86 +0.126 +0.091	3.0 -0.020 -0.045	0.9	**8060**	**8080**	**80100**	1.0x20°	C0.5	80
85	φ91H7 +0.035 0	φ85h7 0 -0.035	φ91 +0.126 +0.091	3.0 -0.020 -0.045	0.9	**8560**	**8580**	**85100**	1.0x20°	C0.5	85
90	φ96H7 +0.035 0	φ90h7 0 -0.035	φ96 +0.126 +0.091	3.0 -0.020 -0.045	0.9	**9060**	**9080**	**90100**	1.0x20°	C0.5	90
95	φ101H7 +0.035 0	φ95h7 0 -0.035	φ101 +0.139 +0.104	3.0 -0.020 -0.045	0.9	**9560**	**9580**	**95100**	1.0x20°	C0.5	95
100	φ106H7 +0.035 0	φ100h7 0 -0.035	φ106 +0.139 +0.104	3.0 -0.025 -0.050	0.9	**10060**	**10080**	**100100**	1.0x20°	C0.5	100
105	φ111H7 +0.035 0	φ105h7 0 -0.035	φ111 +0.139 +0.104	3.0 -0.025 -0.050	0.9	**10560**	**10580**	**105100**	1.0x20°	C0.5	105
110	φ116H7 +0.035 0	φ110h7 0 -0.035	φ116 +0.139 +0.104	3.0 -0.025 -0.050	0.9	**11060**	**11080**	**110100**	1.0x20°	C0.5	110
115	φ121H7 +0.040 0	φ115h7 0 -0.035	φ121 +0.162 +0.122	3.0 -0.025 -0.050	0.9	**11560**	**11580**	**115100**	1.0x20°	C0.5	115
120	φ126H7 +0.040 0	φ120h7 0 -0.035	φ126 +0.162 +0.122	3.0 -0.025 -0.050	0.9	**12060**	**12080**	**120100**	1.0x20°	C0.5	120
125	φ131H7 +0.040 0	φ125h7 0 -0.040	φ131 +0.162 +0.122	3.0 -0.025 -0.050	0.9	**12560**	**12580**	**125100**	1.0x20°	C0.5	125
130	φ136H7 +0.040 0	φ130h7 0 -0.040	φ136 +0.162 +0.122	3.0 -0.025 -0.050	0.9	**13060**	**13080**	**130100**	1.0x20°	C0.5	130
135	φ141H7 +0.040 0	φ135h7 0 -0.040	φ141 +0.174 +0.134	3.0 -0.025 -0.050	0.9	**13560**	**13580**	**135100**	1.0x20°	C0.5	135
140	φ146H7 +0.040 0	φ140h7 0 -0.040	φ146 +0.174 +0.134	3.0 -0.025 -0.050	0.9	**14060**	**14080**	**140100**	1.0x20°	C0.5	140
145	φ151H7 +0.040 0	φ145h7 0 -0.040	φ151 +0.174 +0.134	3.0 -0.025 -0.050	0.9	**14560**	**14580**	**145100**	1.0x20°	C0.5	145
150	φ156H7 +0.040 0	φ150h7 0 -0.040	φ156 +0.174 +0.134	3.0 -0.025 -0.065	0.9	**15060**	**15080**	**150100**	1.0x20°	C0.5	150
160	φ166H7 +0.040 0	φ160h7 0 -0.040	φ166	3.0 -0.025 -0.065	0.9	**16060**	**16080**	**160100**	1.0x20°	C0.5	160
180	φ186H7 +0.046 0	φ180h7 0 -0.040	φ186	3.0 -0.025 -0.065	0.9	**18060**	**18080**	**180100**	1.0x20°	C0.5	180
200	φ206H7 +0.046 0	φ200h7 0 -0.046	φ206	3.0 -0.025 -0.065	0.9	**20060**	**20080**	**200100**	1.0x20°	C0.5	200
220	φ226H7 +0.046 0	φ220h7 0 -0.046	φ226	3.0 -0.025 -0.065	0.9	**22060**	**22080**	**220100**	1.0x20°	C0.5	220
250	φ256H7 +0.052 0	φ250h7 0 -0.046	φ256	3.0 -0.025 -0.065	0.9	**25060**	**25080**	**250100**	1.0x20°	C0.5	250
280	φ286H7 +0.052 0	φ280h7 0 -0.052	φ286	3.0 -0.025 -0.065	0.9	**28060**	**28080**	**280100**	1.0x20°	C0.5	280
300	φ306H7 +0.052 0	φ300h7 0 -0.052	φ306	3.0 -0.025 -0.065	0.9	**30060**	**30080**	**300100**	1.0x20°	C0.5	300

Notes: 1. Tolerances for length and outside diameters are determined separately for bushing with an inside diameter of ≥φ160.
2. When ordering, specify the alloy type (BB1/6, BB1/8 or BBL2/8) and the part number.
3. If press-fitting a BB type wrapped bush with allowance into a housing and then finishing its inside diameter, the bushing may be supplied with finishing allowance between 0.2mm to 0.3mm in diameter. Please ensure that you add "SS" after the part No. (e.g. BB1/8, BM5060SS).
4. The BBL2/8 alloy is not regulated by RoHS/ELV.

THERMALLOY PV plate

(solid lubricant dispersed bimetal plate)

Pb Free RoHS 2 ELV

HOISI PRECISION 凱獅精密 ISO 7312 9830

A bimetal sliding plate made from an alloy containing solid lubricant sintered onto a steel backing.

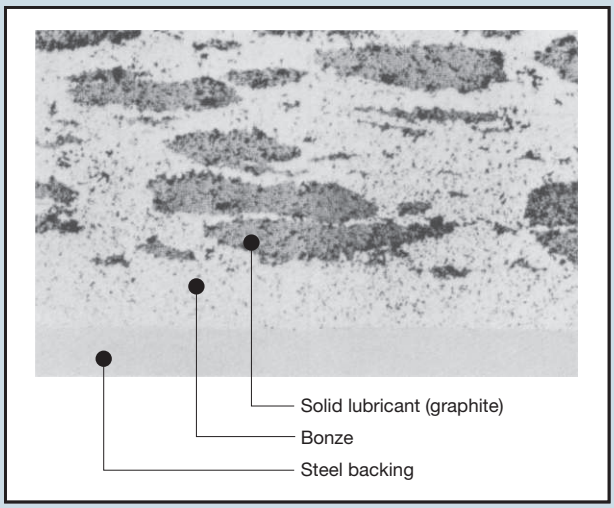
Features

① Can be used without a lubricant supply.
② Capable of withstanding higher loads.
③ Can be used at high temperatures.
④ Protected from seizure to prevent damage to the surface of the mating part.
⑤ The performance is further improved with the use of a lubricant.
⑥ A variety of standard products are available for quick delivery.
⑦ The plate can be additionally machined using ordinary machinery.

Dispersion of solid lubricant (micrograph)

A high performance, metallic bearing alloy based on bronze in which a numerous number of solid lubricant particles are uniformly dispersed.

Structure **×30**



Physical properties (alloy)

Chemical composition	Cu-Sn-Gr (10% graphite by weight)
Density	6.4
Hardness	HB50
Compressive strength	343MPa
Max. service temperature	250°C
Coefficient of linear thermal expansion*	18×10^{-6}/°C

*The coefficient of linear thermal expansion of the whole alloy is equivalent to that of steel.

Bearing Characteristics

Allowable max. specific load	50MPa
Allowable max. speed	6m/min
Max. service temperature	250°C
Allowable max. PV value	63Pa·m/min
Friction coefficient	0.10 to 0.20

Specific load MPa	1	5	10
Speed m/min	0.6	3	0.3
Wear depth (mm) per 1km of friction distance	0.004	0.015	0.008

Standard Dimensions of THERMALLOY PV plate

Designation of Part Number

H or S ○○ ○○ U or L

- Mounting method — U: Screwed from the top, L: Screwed from the bottom
- Length (L)
- Width (W)
- Plate thickness H:10mm, S:20mm

HorS 35 100U

Please specify by part number.

Pb Free

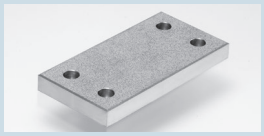
RoHS 2

ELV

Part No.		Dimensions			Mounting Hole Pitch			
		Width (W)	Length (L)	Thickness (T)	a	b	c	d
H 35 100U		35	100	10	60	-	-	-
H 35 150U		35	150	10	55	55	-	-
H 35 200U		35	200	10	55	50	55	-
H 35 250U		35	250	10	70	70	70	-
H 35 300U		35	300	10	65	65	65	65
H 35 350U		35	350	10	80	75	75	80
S 35 100U	S 35 100L	35	100	20	60	-	-	-
S 35 150U	S 35 150L	35	150	20	55	55	-	-
S 35 200U	S 35 200L	35	200	20	55	50	55	-
S 35 250U	S 35 250L	35	250	20	70	70	70	-
S 35 300U	S 35 300L	35	300	20	65	65	65	65
S 35 350U	S 35 350L	35	350	20	80	75	75	80
S 48 75U	S 48 75L	48	75	20	45	-	-	-
S 48 100U	S 48 100L	48	100	20	50	-	-	-
S 48 125U	S 48 125L	48	125	20	75	-	-	-
S 48 150U	S 48 150L	48	150	20	100	-	-	-
S 50 75U	S 50 75L	50	75	20	45	-	-	-
S 50 100U	S 50 100L	50	100	20	50	-	-	-
S 50 125U	S 50 125L	50	125	20	75	-	-	-
S 50 150U	S 50 150L	50	150	20	100	-	-	-
S 75 75U	S 75 75L	75	75	20	45	-	-	-
S 75 100U	S 75 100L	75	100	20	50	-	-	-
S 75 125U	S 75 125L	75	125	20	75	-	-	-
S 75 150U	S 75 150L	75	150	20	100	-	-	-
S 75 200U	S 75 200L	75	200	20	150	-	-	-
S 100 100U	S 100 100L	100	100	20	-	-	-	-
S 100 125U	S 100 125L	100	125	20	-	-	-	-
S 100 150U	S 100 150L	100	150	20	-	-	-	-
S 100 200U	S 100 200L	100	200	20	-	-	-	-
S 100 250U	S 100 250L	100	250	20	-	-	-	-
S 125 150U	S 125 150L	125	150	20	-	-	-	-
S 125 200U	S 125 200L	125	200	20	-	-	-	-
S 125 250U	S 125 250L	125	250	20	-	-	-	-
S 150 150U	S 150 150L	150	150	20	-	-	-	-
S 150 200U	S 150 200L	150	200	20	-	-	-	-
S 150 250U	S 150 250L	150	250	20	-	-	-	-

Flat-head machine screws (JIS B1101) are required for Thickness Type H. The product may be made to order with dim

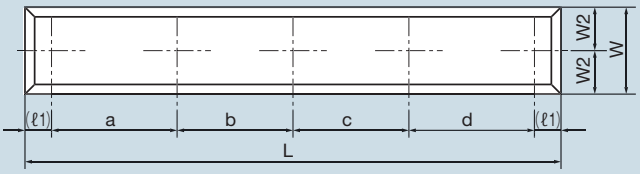
Shape Type A



Shape Type B

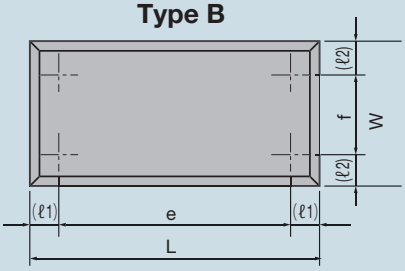
Standard product shapes

Type A

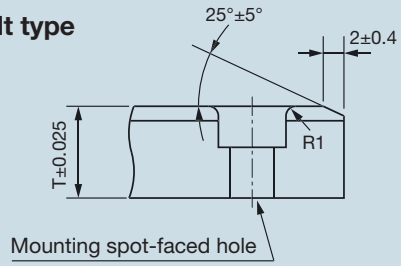


Products with a steel backing have an alloy thickness of 1.25±0.25.

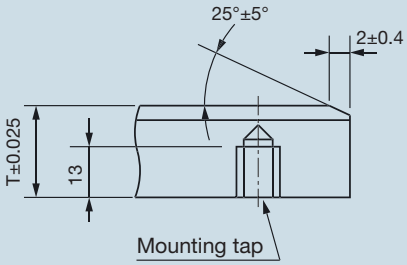
Type B



Bolt type U



Bolt type L



(Unit: mm)

					Mounting Hole Bolt		Shape Type
	e	f	ℓ_1	ℓ_2	Bolt Type	Quantity	
	-	-	20	-	Type U: ϕ9 through, ϕ16 spot-faced, 6 deep	2	A
	-	-	20	-		3	A
	-	-	20	-		4	A
	-	-	20	-		4	A
	-	-	20	-		5	A
	-	-	20	-		5	A
	-	-	20	-	Type U: ϕ9 through, ϕ14 spot-faced, 9 deep Type L: M8 tapped, 13 deep	2	A
	-	-	20	-		3	A
	-	-	20	-		4	A
	-	-	20	-		4	A
	-	-	20	-		5	A
	-	-	20	-		5	A
	-	-	15	-	Type U: ϕ11 through, ϕ17.5 spot-faced, 11 deep Type L: M10 tapped, 13 deep	2	A
	-	-	25	-		2	A
	-	-	25	-		2	A
	-	-	25	-		2	A
	-	-	15	-		2	A
	-	-	25	-		2	A
	-	-	25	-		2	A
	-	-	25	-		2	A
	-	-	15	-	Type U: ϕ11 through, ϕ17.5 spot-faced, 11 deep Type L: M10 tapped, 13 deep	2	A
	-	-	25	-		2	A
	-	-	25	-		2	A
	-	-	25	-		2	A
	-	-	25	-		2	A
	50	50	25	25		4	B
	75	50	25	25		4	B
	100	50	25	25		4	B
	150	50	25	25		4	B
	200	50	25	25		4	B
	100	50	25	37.5		4	B
	150	50	25	37.5		4	B
	200	50	25	37.5		4	B
	100	100	25	25		4	B
	150	100	25	25		4	B
	200	100	25	25		4	B

ensions other than standard.

THERMALLOY pillow unit

(solid lubricant dispersed pillow unit)

Pb Free RoHS 2 ELV

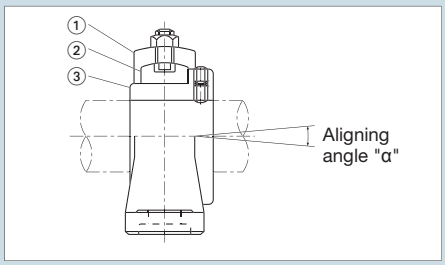
The pillow unit is a lubrication free, self-aligning bearing unit that comprises of an outer ring made from the high performance bearing material THERMALLOY and a stainless steel inner ring incorporated as a bearing into a stainless steel bearing box.

Features

1. Can be used without a lubricant supply.
2. Can be used in water, seawater, vapour or water splashes.
3. Applicable within a wide temperature range.
4. Durable against intrusion of dust, sand or foreign bodies.
5. Suitable for use with rotary motion, vibratory motion, reciprocation and intermittent operation.
6. Able to move at extremely low speed compared with the solid lubricant embedded type and particularly superior with respect to minute motion.
7. Capable of withstanding higher loads and supporting radial and thrust loads.
8. Superior fretting resistance to that of embedded solid lubricant and ball bearing types.

Construction and Components

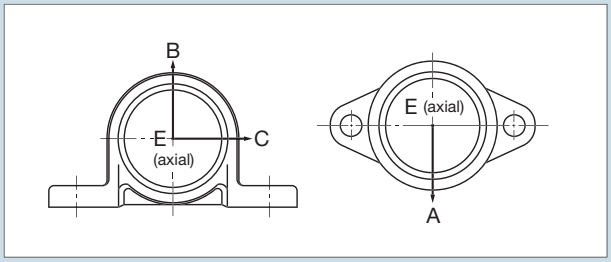
Part No.	Part name	Material
1	Bearing box	SCS13 (cast stainless steel)
2	Outer ring	144SB12P (THERMALLOY)
3	Inner ring	SUS304 (stainless steel)
(Attached screws are also made of stainless steel.)		



- Outer rings for standard units are made of 144SB12P (THERMALLOY), but may also be made of another bearing material.
- The pillow and diamond flange units and their components for shaft diameters between 20 to 50mm have been standardized. Please contact us if you require specifications other than those given above.

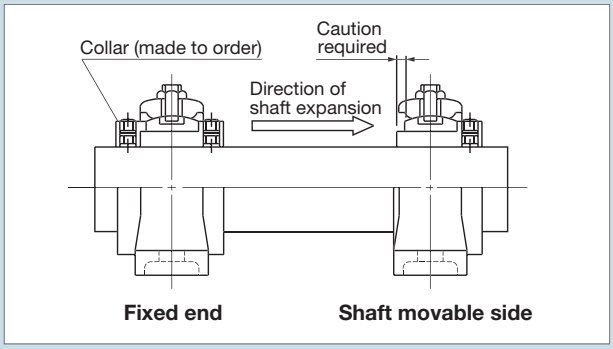
Static Breaking Strength of Bearing Box

Loading direction			
A	B	C	E
W×2	W×2.5	W×4	W×1



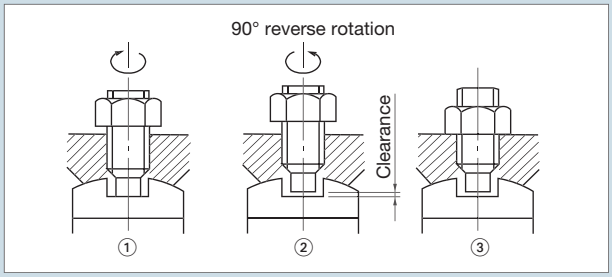
Mounting in a Hot Place

If the shaft expands thermally (in the axial direction) at high temperatures it is recommended that the shaft be mounted as shown below.



Securing The Outer Ring For The Bearing

Tighten the set screw and nut in the following order.
1. Rotate the set screw until it makes contact with the bottom of the outer ring hole.
2. Rotate the set screw by 90° in the reverse direction to provide a clearance above the bottom of the hole.
3. Tighten the nut as shown in ②.



Designing Conditions

Operating Ranges

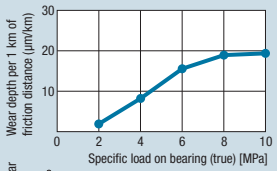
Shaft diameter	Nominal No.	Max. radial load "W"	Max. rotating speed "N"	Allowable "W-N" value	Operating temperature	Max. rotating speed "α"
mm	–	N {kgf}	rpm	N·rpm {kgf·rpm}	°C	Degrees
20	204	9,800 {1,000}	150	3.12×10^5 {31,800}	-50 to +200	7
25	205	11,800 {1,200}	120	3.43×10^5 {35,000}		6
30	206	16,700 {1,700}	100	3.90×10^5 {39,800}		7
35	207	20,600 {2,100}	90	4.21×10^5 {43,000}		7
40	208	24,500 {2,500}	80	4.53×10^5 {46,200}		6
45	209	27,500 {2,800}	70	4.53×10^5 {46,200}		6
50	210	30,400 {3,100}	70	4.68×10^5 {47,700}		6

- The "W," "N" and "W-N" values are measured in the air at an ordinary temperature without a lubricant supply.
- When using the unit at temperatures above 100°C as a guide the "N" and "W-N" values should be half of that of the service range.
- When the unit is used with a lubricant, a smaller load, at lower speed, operated intermittently or for a shorter time it may be used above the service range. Please consult us.
- When the unit is to be used out of the specified service range or in a special atmosphere (in a vacuum, gas or chemical solution), it may be made from other materials. Please consult us.
- Bearing boxes made of gray cast iron (FC) are also available.

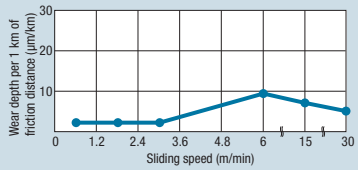
Service Life

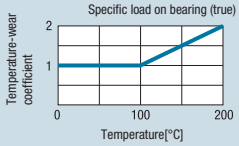
The service life of the THERMALLOY pillow unit is generally determined by the wear to the inside diameter of the THERMALLOY. The wear greatly depends on the conditions of use. In other words it is affected by many factors including load, rotating speed, temperature, lubrication status, atmosphere and intrusion of foreign particles, so it is very difficult to calculate with a formula. Use the test data shown on the right as a reference when designing the THERMALLOY pillow unit.

<Test conditions>
Test method : DIN50321
Speed : 0.6m/min (constant shaft speed)
Temperature : Room temperature (in the air)
Lubrication : Dry



<Test conditions>
Test method : DIN50321
Specific load (true): 2MPa [20kg/cm²] (constant shaft speed)
Temperature : Room temperature (in the air)
Lubrication : Dry





Example
The wear depth per 1 km of friction distance at a specific load of 2MPa [20kg/cm²], a speed of 3m/min and a temperature of 150°C without a lubricant supply can be approximated as follows:
Wear depth / friction distance=2μm/km×1.5
=3μm/km

Dimensions of Bearings for units

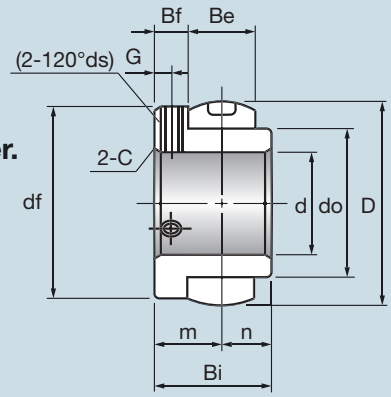
Designation of Part Number

UD2○○T1

UD2 04 T1

Please specify by part number.

(Round hole type, diameter series 2)



Pb Free

RoHS 2

ELV

(Unit: mm)

Part No. of bearing	Dimensions											
	d	D	do	Be	Bi	n	m	c	df	Bf	G	ds
UD204T1	20	47	33	20	31	12.7	18.3	1.5	43	8.3	4	M5×0.8
UD205T1	25	52	38	22	34	14.3	19.7	1.5	48	8.7	4.5	M5×0.8
UD206T1	30	62	46	25	38.1	15.9	22.2	1.5	58	9.7	5	M6×1
UD207T1	35	72	53	27	42.9	17.5	25.4	2	68	11.9	6	M8×1.25
UD208T1	40	80	60	29	49.2	19	30.2	2	75	15.7	8	M8×1.25
UD209T1	45	85	65	29	49.2	19	30.2	2	80	15.7	8	M8×1.25
UD210T1	50	90	70	30	51.6	19	32.6	2	85	17.6	9	M10×1.5

Bearings with specifications and dimensions other than those given above are also available. Please consult us.

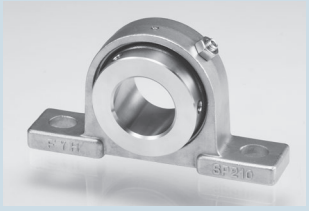
Dimensions of pillow units

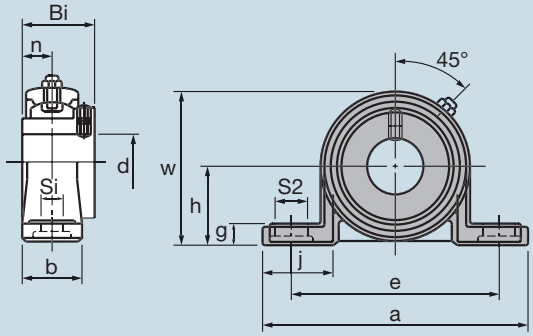
Designation of Part Number

UDSP2○○S1T1

UDSP2 04 S1T1

Please specify by part number.





Pb Free

RoHS 2

ELV

(Unit: mm)

Part No. of bearing	Dimensions												Nominal size of mounting bolt	Part No. of bearing	Part No. of bearing box
	d	h	a	e	b	S1	S2	g	w	j	Bi	n			
UDSP204S1T1	20	33.3	127	95	30	13	19	9	64	39	31	12.7	M10	UD204T1	SP204S1
UDSP205S1T1	25	36.5	140	105	30	13	19	10	70	42	34	14.3	M10	UD205T1	SP205S1
UDSP206S1T1	30	42.9	165	121	36	17	21	11	82	50	38.1	15.9	M14	UD206T1	SP206S1
UDSP207S1T1	35	47.6	167	127	38	17	21	12	92	46	42.9	17.5	M14	UD207T1	SP207S1
UDSP208S1T1	40	49.2	184	137	40	17	21	12	98	50	49.2	19	M14	UD208T1	SP208S1
UDSP209S1T1	45	54	190	146	40	17	21	13	105	50	49.2	19	M14	UD209T1	SP209S1
UDSP210S1T1	50	57.2	206	159	45	20	22	14	112	56	51.6	19	M16	UD210T1	SP210S1

Bearings with specifications and dimensions other than those given above are also available. Please consult us.

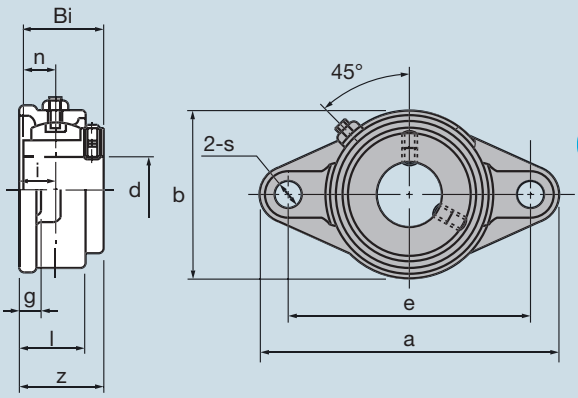
Dimensions of Diamond Flange units

Designation of Part Number

UDSFL2○○S1T1

UDSFL2 04 S1T1

Please specify by part number.



Pb Free

RoHS 2

ELV

(Unit: mm)

Part No. of bearing	Dimensions											Nominal size of mounting bolt	Part No. of bearing	Part No. of bearing box
	d	a	e	i	g	l	S	b	Z	Bi	n			
UDSFL204S1T1	20	113	90	15	10	25.5	12	60	33.3	31	12.7	M10	UD204T1	SFL204S1
UDSFL205S1T1	25	130	99	16	10	27	16	68	35.7	34	14.3	M14	UD205T1	SFL205S1
UDSFL206S1T1	30	148	117	18	10	31	16	80	40.2	38.1	15.9	M14	UD206T1	SFL206S1
UDSFL207S1T1	35	161	130	19	11	34	16	90	44.4	42.9	17.5	M14	UD207T1	SFL207S1
UDSFL208S1T1	40	175	144	21	11	36	16	100	51.2	49.2	19	M14	UD208T1	SFL208S1
UDSFL209S1T1	45	188	148	22	13	38	19	108	52.2	49.2	19	M16	UD209T1	SFL209S1
UDSFL210S1T1	50	197	157	22	13	40	19	115	54.6	51.6	19	M16	UD210T1	SFL210S1

Bearings with specifications and dimensions other than those given above are also available. Please consult us.

DAISLIDE

(embedded solid lubricant)

Pb Free RoHS 2 ELV

Excluding products BA

HOISI PRECISION 凱獅精密 ISO 7312 9830

DAISLIDE is a copper based dry bearing for heavy load applications into which solid lubricant plugs are embedded.

Features

1. Maintenance-free, requires no lubrication
2. Excellent wear resistance properties. Excellent wear resistance properties are exhibited in applications where oil film formation is difficult such as reciprocating, intermittent or oscillating motions under conditions of high load and low speed.
3. Friction coefficient is low.
4. Can be used at a range of temperatures
5. Free design is possible on the shape and the size.
6. Excellent corrosion and chemical resistance. This bearing can be used in river or sea water, in special liquids where chemical resistance of the metal base and solid lubricant is needed, and in gas where oil supply is difficult.
   (In an acid or alkaline atmosphere properties may differ depending on the type, density and humidity. Please do a sample test or consult us.)
7. Excellent impact resistance

Material Type

1. Base Metal

Three types of base metal are offered:
B: Bronze (BC)
S: High Strength Brass (HBsC)
K: High Strength Special Copper Alloy

2. Solid Lubricant Plug

(1) Arrangement of solid lubricant plug
The solid lubricant plugs are aligned obliquely from the axial in line direction to enable the bearing to obtain a thin film of lubricant during movement in the axial direction.

(2) Types of solid lubricant plug
1. Plug A is for general use and is usually kept in stock.
2. Plug L is for use in water and sea water and is made to order.
   Special plugs are prepared for applications in water or seawater, where electrolytic corrosion is anticipated due to the material of housing and shaft.

3. Combination with Base Metal

Plug Symbol	A			L
Base Metal	High Strength Brass	Bronze	High Strength Special Copper Alloy	High Strength Brass
Merchandise Symbol	HA SAF SAFG TA PA LA	*BA	KA	HK
Use	General		High Load	In Water, in Seawater
Stock	Standard Stock Available	made to order		Standard Stock Available

Physical Properties

Characteristics of Base Metal

Item	Unit, etc	DAISLIDE B (Bronze Base)	DAISLIDE S (High Strength Brass Base)	DAISLIDE K (High Strength Special Copper Alloy Base)
Specific Gravity		8.7	8.2	–
Coefficient of Linear Thermal Expansion	$\times 10^{-6}$/°C	16 to 18	16 to 20	16 to 20
Heat Transfer Coefficient	cal/sec°C·cm	0.11 to 0.15	0.09 to 0.13	–
Tensile Strength	N/mm^2	Above 196	Above 690	Above 760
Impact Strength	N·m/cm^2	15	19	–
Hardness	HB	60 to 80	Above 210	Above 240
Modulus of Longitudinal Elasticity	kN/mm^2	96	98 to 137	–
Compression Yield Strength (0.1%)	N/mm^2	–	Above 350	–
Solid Lubricant Area on Slide Surface	%	25 to 30		
Elongation	%	Above 15	Above 12	Above 4

Bearing Characteristics

Type	Base Metal	Plug Symbol	Oil Supply Condition	Allowable Max. Load *MPa	Allowable Max. Speed *m/min	Allowable Max. PV Value *MPa·m/min	Limit Operating Temperature *°C
DAISLIDE B	Bronze	A	No Oil Supply	14.7	25	58.8	250
			Grease Cup Type Periodic Lubrication	14.7	150	98.1	250
			Oil Drip Lubrication	14.7	250	196.1	250
DAISLIDE S	High Strength Brass	A	No Oil Supply	49.0	15	196.1	Normal Temperature
				24.5	15	98.1	250
			Grease Cup Type Periodic Lubrication	24.5	50	147.1	250
			Oil Drip Lubrication	24.5	100	196.1	250
		K	No Oil Supply	49.0	15	99.0	80
DAISLIDE K	High Strength Special Copper Alloy	A	No Oil Supply	73.0	15	99.0	250
			Grease Cup Type Periodic Lubrication	73.0	30	196.1	250

* When the bearing is to be used at temperatures exceeding 100°C it is necessary to provide a margin on the PV value at the design stage.
* In the case of high strength brass base metal and the high strength special copper alloy base metal, depending on the conditions of usage, for example when the bearings are at very low speeds near to V=0, the bearings can be used at pressures higher than those given in the table above.

HA DAISLIDE HA Bushing (Bushing Inner Diameter: 8 to 45 mm)

Designation of Part Number

HA ○○ ○○ ○○

- ○○ — Bushing Length
- ○○ — Bushing O.D.
- ○○ — Bushing I.D.
- HA — Product Symbol

HA 061008

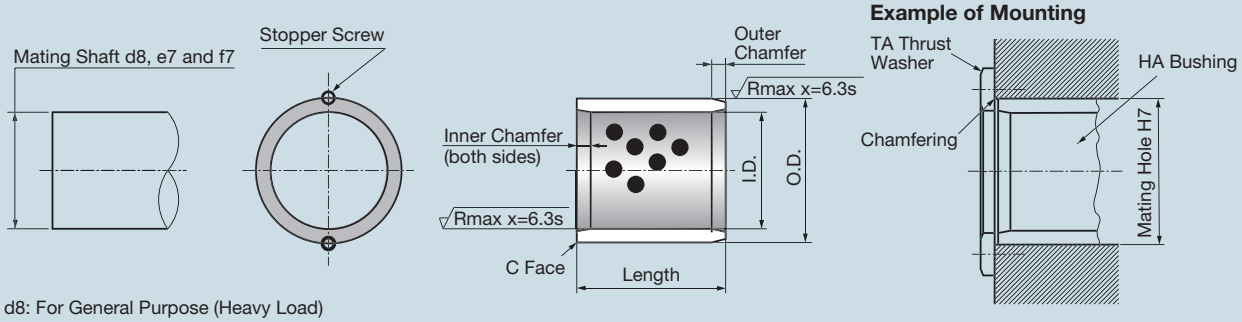
Please specify by part number.

Pb Free

RoHS 2

ELV

Bushing I.D.	Recommended Dimension Mating Part				Bushing Dimensions							
	Housing I.D.	Shaft Dia.			I.D.	O.D.						
		General Purpose (Heavy Load)	General Purpose (Light Load)	High Accuracy Purpose			8	10	12	15	16	
6	φ10H7 +0.015 0	φ6d8 -0.030 -0.048	φ6e7 -0.020 -0.032	φ6f7 -0.010 -0.022	φ6 +0.022 +0.010	φ10 +0.015 +0.006	061008	061010	061012	061015		
8	φ12H7 +0.018 0	φ8d8 -0.040 -0.062	φ8e7 -0.025 -0.040	φ8f7 -0.013 -0.028	φ8 +0.028 +0.013	φ12 +0.018 +0.007	081208	081210	081212	081215		
10	φ14H7 +0.018 0	φ10d8 -0.040 -0.062	φ10e7 -0.025 -0.040	φ10f7 -0.013 -0.028	φ10 +0.028 +0.013	φ14 +0.018 +0.007	101408	101410	101412	101415		
12	φ18H7 +0.018 0	φ12d8 -0.050 -0.077	φ12e7 -0.032 -0.050	φ12f7 -0.016 -0.034	φ12 +0.034 +0.016	φ18 +0.018 +0.007	121808	121810	121812	121815	121816	
13	φ19H7 +0.021 0	φ13d8 -0.050 -0.077	φ13e7 -0.032 -0.050	φ13f7 -0.016 -0.034	φ13 +0.034 +0.016	φ19 +0.021 +0.008		131910	131912	131915		
14	φ20H7 +0.021 0	φ14d8 -0.050 -0.077	φ14e7 -0.032 -0.050	φ14f7 -0.016 -0.034	φ14 +0.034 +0.016	φ20 +0.021 +0.008		142010	142012	142015		
15	φ21H7 +0.021 0	φ15d8 -0.050 -0.077	φ15e7 -0.032 -0.050	φ15f7 -0.016 -0.034	φ15 +0.034 +0.016	φ21 +0.021 +0.008		152110	152112	152515	152116	
16	φ22H7 +0.021 0	φ16d8 -0.050 -0.077	φ16e7 -0.032 -0.050	φ16f7 -0.016 -0.034	φ16 +0.034 +0.016	φ22 +0.021 +0.008		162210	162212	162215	162216	
17	φ23H7 +0.021 0	φ17d8 -0.050 -0.077	φ17e7 -0.032 -0.050	φ17f7 -0.016 -0.034	φ17 +0.034 +0.016	φ23 +0.021 +0.008				172315		
18	φ24H7 +0.021 0	φ18d8 -0.050 -0.077	φ18e7 -0.032 -0.050	φ18f7 -0.016 -0.034	φ18 +0.034 +0.016	φ24 +0.021 +0.008		182410	182412	182415	182416	
19	φ26H7 +0.021 0	φ19d8 -0.065 -0.098	φ19e7 -0.040 -0.061	φ19f7 -0.020 -0.041	φ19 +0.041 +0.020	φ26 +0.021 +0.008				192615		
20	φ28H7 +0.021 0	φ20d8 -0.065 -0.098	φ20e7 -0.040 -0.061	φ20f7 -0.020 -0.041	φ20 +0.041 +0.020	φ28 +0.021 +0.008		202810	202812	202815	202816	
20	φ30H7 +0.021 0	φ20d8 -0.065 -0.098	φ20e7 -0.040 -0.061	φ20f7 -0.020 -0.041	φ20 +0.041 +0.020	φ28 +0.021 +0.008		203010	203012	203015	203016	
22	φ32H7 +0.025 0	φ22d8 -0.065 -0.098	φ22e7 -0.040 -0.061	φ22f7 -0.020 -0.041	φ22 +0.041 +0.020	φ32 +0.025 +0.009			223212	223215		
25	φ33H7 +0.025 0	φ25d8 -0.065 -0.098	φ25e7 -0.040 -0.061	φ25f7 -0.020 -0.041	φ25 +0.041 +0.020	φ33 +0.025 +0.009			253312	253315	253316	
25	φ35H7 +0.025 0	φ25d8 -0.065 -0.098	φ25e7 -0.040 -0.061	φ25f7 -0.020 -0.041	φ25 +0.041 +0.020	φ35 +0.025 +0.009			253512	253515	253516	
28	φ38H7 +0.025 0	φ28d8 -0.065 -0.098	φ28e7 -0.040 -0.061	φ28f7 -0.020 -0.041	φ28 +0.041 +0.020	φ38 +0.025 +0.009						
30	φ38H7 +0.025 0	φ30d8 -0.065 -0.098	φ30e7 -0.040 -0.061	φ30f7 -0.020 -0.041	φ30 +0.041 +0.020	φ38 +0.025 +0.009			303812	303815		
30	φ40H7 +0.025 0	φ30d8 -0.065 -0.098	φ30e7 -0.040 -0.061	φ30f7 -0.020 -0.041	φ30 +0.041 +0.020	φ40 +0.025 +0.009			304012	304015		
31.5	φ40H7 +0.025 0	φ31.5d8 -0.080 -0.119	φ31.5e7 -0.040 -0.061	φ31.5f7 -0.020 -0.041	φ31.5 +0.050 +0.025	φ40 +0.025 +0.009						
32	φ42H7 +0.025 0	φ32d8 -0.080 -0.119	φ32e7 -0.050 -0.075	φ32f7 -0.025 -0.050	φ32 +0.050 +0.025	φ42 +0.025 +0.009						
35	φ44H7 +0.025 0	φ35d8 -0.080 -0.119	φ35e7 -0.050 -0.075	φ35f7 -0.025 -0.050	φ35 +0.050 +0.025	φ44 +0.025 +0.009						
35	φ45H7 +0.025 0	φ35d8 -0.080 -0.119	φ35e7 -0.050 -0.075	φ35f7 -0.025 -0.050	φ35 +0.050 +0.025	φ45 +0.025 +0.009						
38	φ48H7 +0.025 0	φ38d8 -0.080 -0.119	φ38e7 -0.050 -0.075	φ38f7 -0.025 -0.050	φ38 +0.050 +0.025	φ48 +0.025 +0.009						
40	φ50H7 +0.025 0	φ40d8 -0.080 -0.119	φ40e7 -0.050 -0.075	φ40f7 -0.025 -0.050	φ40 +0.050 +0.025	φ50 +0.025 +0.009				405015		
40	φ55H7 +0.030 0	φ40d8 -0.080 -0.119	φ40e7 -0.050 -0.075	φ40f7 -0.025 -0.050	φ40 +0.050 +0.025	φ55 +0.030 +0.011				405515		



d8: For General Purpose (Heavy Load)
e7: For General Purpose (Light Load)
f7 : For High Accuracy Purpose

(Unit: mm)

Part Number & Bushing Length Tolerance $^{-0.1}_{-0.3}$											C Face	Outer Chamfer	Inner Chamfer	Bushing I.D.
	19	20	25	30	35	40	50	60	70	80		Press fit		
											C0.3	1.5×15°	1×10°	6
											C0.5	0.75×15°	1×10°	8
		101420									C0.5	0.75×15°	1×10°	10
	121819	121820	121825	121830							C0.5	2×15°	2×10°	12
		131920	131925	131930							C0.5	2×15°	2×10°	13
		142020	142025	142030							C0.5	2×15°	2×10°	14
		152120	152125	152130	152135	152140					C0.5	2×15°	2×10°	15
	162219	162220	162225	162230	162235	162240					C0.5	2×15°	2×10°	16
											C0.5	2×15°	2×10°	17
		182420	182425	182430	182435	182440					C0.5	2×15°	2×10°	18
		192620									C0.5	2×15°	2×10°	19
	202819	202820	202825	202830	202835	202840	202850				C0.5	2×15°	2×10°	20
		203020	203025	203030	203035	203040	203050				C0.5	2×15°	2×10°	20
		223220	223225								C0.5	2×15°	2.5×10°	22
		253320	253325	253330	253335	253340	253350	253360			C0.5	2.5×15°	2.5×10°	25
		253520	253525	253530	253535	253540	253550	253560			C0.5	2.5×15°	2.5×10°	25
		283820	283825	283830		283840					C0.5	2.5×15°	2.5×10°	28
		303820	303825	303830	303835	303840	303850	303860			C0.5	3×15°	3×10°	30
		304020	304025	304030	304035	304040	304050	304060			C0.5	3×15°	3×10°	30
				314030		314040					C0.5	3×15°	3×10°	31.5
		324220		324230		324240					C0.5	3×15°	3×10°	32
		354420	354425	354430	354435	354440	354450	354460			C0.5	3×15°	3×10°	35
		354520	354525	354530	354535	354540	354550	354560			C0.5	3×15°	3×10°	35
						384840					C0.5	3×15°	3×10°	38
		405020	405025	405030	405035	405040	405050	405060	405070	405080	C0.5	3×15°	3×10°	40
				405530	405535	405540	405550	405560			C0.5	3×15°	3×10°	40

* DAISLIDE HA can be used with TA thrust washer in the thrust load environment.

HA DAISLIDE HA Bushing (Bushing Inner Diameter: 45 to 160 mm)

Designation of Part Number

HA ○○ ○○ ○○

- Bushing Length
- Bushing O.D.
- Bushing I.D.
- Product Symbol

HA 455530

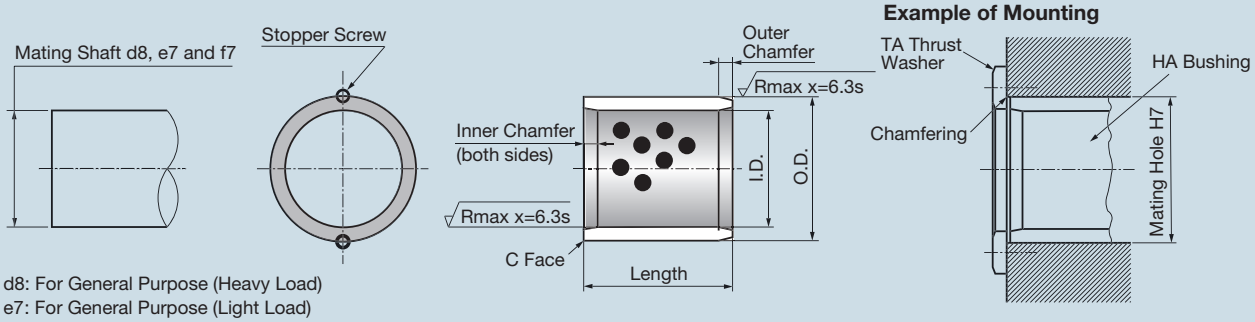
Please specify by part number.

Pb Free

RoHS 2

ELV

Bushing I.D.	Recommended Dimension Mating Part				Bushing Dimensions						
	Housing I.D.	Shaft Dia.			I.D.	O.D.					
		General Purpose (Heavy Load)	General Purpose (Light Load)	High Accuracy Purpose			20	25	30	35	40
45	ϕ55H7 +0.030 0	ϕ45d8 -0.080 -0.119	ϕ45e7 -0.050 -0.075	ϕ45f7 -0.025 -0.050	ϕ45 +0.050 +0.025	ϕ55 +0.030 +0.011			455530	455535	455540
45	ϕ56H7 +0.030 0	ϕ45d8 -0.080 -0.119	ϕ45e7 -0.050 -0.075	ϕ45f7 -0.025 -0.050	ϕ45 +0.050 +0.025	ϕ56 +0.030 +0.011			455630	455635	455640
45	ϕ60H7 +0.030 0	ϕ45d8 -0.080 -0.119	ϕ45e7 -0.050 -0.075	ϕ45f7 -0.025 -0.050	ϕ45 +0.050 +0.025	ϕ60 +0.030 +0.011			456030	456035	456040
50	ϕ60H7 +0.030 0	ϕ50d8 -0.080 -0.119	ϕ50e7 -0.050 -0.075	ϕ50f7 -0.025 -0.050	ϕ50 +0.050 +0.025	ϕ60 +0.030 +0.011	506020		506030	506035	506040
50	ϕ62H7 +0.030 0	ϕ50d8 -0.080 -0.119	ϕ50e7 -0.050 -0.075	ϕ50f7 -0.025 -0.050	ϕ50 +0.050 +0.025	ϕ62 +0.030 +0.011			506230	506235	506240
50	ϕ65H7 +0.030 0	ϕ50d8 -0.080 -0.119	ϕ50e7 -0.050 -0.075	ϕ50f7 -0.025 -0.050	ϕ50 +0.050 +0.025	ϕ65 +0.030 +0.011			506530		506540
55	ϕ70H7 +0.030 0	ϕ55d8 -0.100 -0.146	ϕ55e7 -0.060 -0.090	ϕ55f7 -0.030 -0.060	ϕ55 +0.060 +0.030	ϕ70 +0.030 +0.011			557030	557035	557040
60	ϕ74H7 +0.030 0	ϕ60d8 -0.100 -0.146	ϕ60e7 -0.060 -0.090	ϕ60f7 -0.030 -0.060	ϕ60 +0.060 +0.030	ϕ74 +0.030 +0.011			607430	607435	607440
60	ϕ75H7 +0.030 0	ϕ60d8 -0.100 -0.146	ϕ60e7 -0.060 -0.090	ϕ60f7 -0.030 -0.060	ϕ60 +0.060 +0.030	ϕ75 +0.030 +0.011			607530	607535	
63	ϕ75H7 +0.030 0	ϕ63d8 -0.100 -0.146	ϕ63e7 -0.060 -0.090	ϕ63f7 -0.030 -0.060	ϕ63 +0.060 +0.030	ϕ75 +0.030 +0.011					
65	ϕ80H7 +0.030 0	ϕ65d8 -0.100 -0.146	ϕ65e7 -0.060 -0.090	ϕ65f7 -0.030 -0.060	ϕ65 +0.060 +0.030	ϕ80 +0.030 +0.011					658040
70	ϕ85H7 +0.035 0	ϕ70d8 -0.100 -0.146	ϕ70e7 -0.060 -0.090	ϕ70f7 -0.030 -0.060	ϕ70 +0.060 +0.030	ϕ85 +0.035 +0.013			708530	708535	
70	ϕ90H7 +0.035 0	ϕ70d8 -0.100 -0.146	ϕ70e7 -0.060 -0.090	ϕ70f7 -0.030 -0.060	ϕ70 +0.060 +0.030	ϕ90 +0.035 +0.013					
75	ϕ90H7 +0.035 0	ϕ75d8 -0.100 -0.146	ϕ75e7 -0.060 -0.090	ϕ75f7 -0.030 -0.060	ϕ75 +0.060 +0.030	ϕ90 +0.035 +0.013					
75	ϕ95H7 +0.035 0	ϕ75d8 -0.100 -0.146	ϕ75e7 -0.060 -0.090	ϕ75f7 -0.030 -0.060	ϕ75 +0.060 +0.030	ϕ95 +0.035 +0.013					
80	ϕ96H7 +0.035 0	ϕ80d8 -0.100 -0.146	ϕ80e7 -0.060 -0.090	ϕ80f7 -0.030 -0.060	ϕ80 +0.060 +0.030	ϕ96 +0.035 +0.013					809640
80	ϕ100H7 +0.035 0	ϕ80d8 -0.100 -0.146	ϕ80e7 -0.060 -0.090	ϕ80f7 -0.030 -0.060	ϕ80 +0.060 +0.030	ϕ100 +0.035 +0.013					8010040
85	ϕ100H7 +0.035 0	ϕ85d8 -0.120 -0.174	ϕ85e7 -0.072 -0.107	ϕ85f7 -0.036 -0.071	ϕ85 +0.071 +0.036	ϕ100 +0.035 +0.013					
90	ϕ110H7 +0.035 0	ϕ90d8 -0.120 -0.174	ϕ90e7 -0.072 -0.107	ϕ90f7 -0.036 -0.071	ϕ90 +0.071 +0.036	ϕ110 +0.035 +0.013					
100	ϕ120H7 +0.035 0	ϕ100d8 -0.120 -0.174	ϕ100e7 -0.072 -0.107	ϕ100f7 -0.036 -0.071	ϕ100 +0.071 +0.036	ϕ120 +0.035 +0.013					
110	ϕ130H7 +0.040 0	ϕ110d8 -0.120 -0.174	ϕ110e7 -0.072 -0.107	ϕ110f7 -0.036 -0.071	ϕ110 +0.071 +0.036	ϕ130 +0.040 +0.015					
120	ϕ140H7 +0.040 0	ϕ120d8 -0.120 -0.174	ϕ120e7 -0.072 -0.107	ϕ120f7 -0.036 -0.071	ϕ120 +0.071 +0.036	ϕ140 +0.040 +0.015					
125	ϕ145H7 +0.040 0	ϕ125d8 -0.145 -0.208	ϕ125e7 -0.085 -0.125	ϕ125f7 -0.043 -0.083	ϕ125 +0.083 +0.043	ϕ145 +0.040 +0.015					
130	ϕ150H7 +0.040 0	ϕ130d8 -0.145 -0.208	ϕ130e7 -0.085 -0.125	ϕ130f7 -0.043 -0.083	ϕ130 +0.083 +0.043	ϕ150 +0.040 +0.015					
140	ϕ160H7 +0.040 0	ϕ140d8 -0.145 -0.208	ϕ140e7 -0.085 -0.125	ϕ140f7 -0.043 -0.083	ϕ140 +0.083 +0.043	ϕ160 +0.040 +0.015					
150	ϕ170H7 +0.040 0	ϕ150d8 -0.145 -0.208	ϕ150e7 -0.085 -0.125	ϕ150f7 -0.043 -0.083	ϕ150 +0.083 +0.043	ϕ170 +0.040 +0.015					
160	ϕ180H7 +0.040 0	ϕ160d8 -0.145 -0.208	ϕ160e7 -0.085 -0.125	ϕ160f7 -0.043 -0.083	ϕ160 +0.083 +0.043	ϕ180 +0.040 +0.015					



d8: For General Purpose (Heavy Load)
e7: For General Purpose (Light Load)
f7 : For High Accuracy Purpose

(Unit: mm)

Part Number & Bushing Length Tolerance $^{-0.1}_{-0.3}$											C Face	Outer Chamfer	Inner Chamfer	Bushing I.D.
	50	60	70	80	90	100	120	130	140	150		Press fit		
	455550	455560									C0.5	3.5×15°	3.5×10°	45
	455650	455660									C0.5	3.5×15°	3.5×10°	45
	456050	456060	456070	456080							C0.5	3.5×15°	3.5×10°	45
	506050	506060	506070	506080							C0.5	4.0×15°	4.0×10°	50
	506250	506260	506270	506280							C0.5	4.0×15°	4.0×10°	50
	506550	506560	506570	506580		5065100					C0.5	4.0×15°	4.0×10°	50
	557050	557060	557070								C0.5	4.0×15°	4.0×10°	55
	607450	607460	607470	607480							C0.5	4.0×15°	4.0×10°	60
	607550	607560	607570	607580		6075100					C0.5	4.0×15°	4.0×10°	60
		637560	637570	637580							C0.5	4.0×15°	4.0×10°	63
	658050	658060	658070	658080							C0.5	4.0×15°	4.0×10°	65
	708550	708560	708570	708580		7085100					C0.5	4.0×15°	4.0×10°	70
	709050	709060	709070	709080							C0.5	4.0×15°	4.0×10°	70
	759050	759060	759070	759080		7590100					C0.5	4.0×15°	4.0×10°	75
		759560	759570	759580		7595100					C0.5	4.0×15°	4.0×10°	75
	809650	809660	809670	809680		8096100	8096120				C0.5	4.0×15°	4.0×10°	80
	8010050	8010060	8010070	8010080		80100100	80100120		80100140		C0.5	4.0×15°	4.0×10°	80
		8510060		8510080							C1.0	5.0×15°	5.0×10°	85
	9011050	9011060		9011080	9011090	90110100	90110120				C1.0	5.0×15°	5.0×10°	90
	10012050	10012060	10012070	10012080	10012090	100120100	100120120		100120140		C1.0	5.0×15°	5.0×10°	100
	11013050		11013070	11013080		110130100	110130120				C1.0	5.0×15°	6.0×10°	110
			12014070	12014080	12014090	120140100	120140120		120140140		C1.0	5.0×15°	6.0×10°	120
						125145100	125145120				C1.0	5.0×15°	6.0×10°	125
				13015080		130150100		130150130			C1.0	5.0×15°	6.0×10°	130
						140160100			140160140		C1.0	5.0×15°	6.0×10°	140
				15017080		150170100				150170150	C1.0	5.0×15°	6.0×10°	150
				16018080		160180100				160180150	C1.0	5.0×15°	6.0×10°	160

* DAISLIDE HA can be used with TA thrust washer in the thrust load environment.

HK DAISLIDE HK Bushing (Bushing Inner Diameter: 12 to 160 mm)

Designation of Part Number

HK ○○ ○○ ○○

- Bushing Length
- Bushing O.D.
- Bushing I.D.
- Product Symbol

HK 121820

Please specify by Part No.

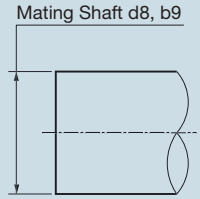
This product is produced on order only.

Pb Free

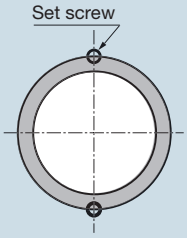
RoHS 2

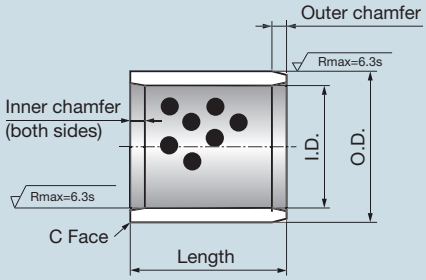
ELV

Bushing I.D.	Recommended Dimension Mating Part			Bushing Dimensions						
	Housing I.D.	Shaft Dia.		I.D.	O.D.					
		General Purpose (Heavy Load)	General Purpose (Light Load)			20	25	30	35	
12	φ18H7 $^{+0.018}_{0}$	φ12b9 $^{-0.150}_{-0.193}$	φ12d8 $^{-0.050}_{-0.077}$	φ12 $^{+0.050}_{+0.032}$	φ18 $^{+0.034}_{+0.023}$	121820				
15	φ21H7 $^{+0.021}_{0}$	φ15b9 $^{-0.150}_{-0.193}$	φ15d8 $^{-0.050}_{-0.077}$	φ15 $^{+0.050}_{+0.032}$	φ21 $^{+0.041}_{+0.028}$	152120				
16	φ22H7 $^{+0.021}_{0}$	φ16b9 $^{-0.150}_{-0.193}$	φ16d8 $^{-0.050}_{-0.077}$	φ16 $^{+0.050}_{+0.032}$	φ22 $^{+0.041}_{+0.028}$	162220		162230		
18	φ24H7 $^{+0.021}_{0}$	φ18b9 $^{-0.150}_{-0.193}$	φ18d8 $^{-0.050}_{-0.077}$	φ18 $^{+0.050}_{+0.032}$	φ24 $^{+0.041}_{+0.028}$	182420				
20	φ30H7 $^{+0.021}_{0}$	φ20b9 $^{-0.160}_{-0.212}$	φ20d8 $^{-0.065}_{-0.098}$	φ20 $^{+0.061}_{+0.040}$	φ30 $^{+0.041}_{+0.028}$	203020		203030		
25	φ35H7 $^{+0.025}_{0}$	φ25b9 $^{-0.160}_{-0.212}$	φ25d8 $^{-0.065}_{-0.098}$	φ25 $^{+0.061}_{+0.040}$	φ35 $^{+0.050}_{+0.034}$	253520	253525	253530		
30	φ40H7 $^{+0.025}_{0}$	φ30b9 $^{-0.160}_{-0.212}$	φ30d8 $^{-0.065}_{-0.098}$	φ30 $^{+0.061}_{+0.040}$	φ40 $^{+0.050}_{+0.034}$	304020	304025	304030		
35	φ45H7 $^{+0.025}_{0}$	φ35b9 $^{-0.170}_{-0.232}$	φ35d8 $^{-0.080}_{-0.119}$	φ35 $^{+0.075}_{+0.050}$	φ45 $^{+0.050}_{+0.034}$	354520		354530	354535	
40	φ50H7 $^{+0.025}_{0}$	φ40b9 $^{-0.170}_{-0.232}$	φ40d8 $^{-0.080}_{-0.119}$	φ40 $^{+0.075}_{+0.050}$	φ50 $^{+0.050}_{+0.034}$			405030		
40	φ55H7 $^{+0.030}_{0}$	φ40b9 $^{-0.170}_{-0.232}$	φ40d8 $^{-0.080}_{-0.119}$	φ40 $^{+0.075}_{+0.050}$	φ55 $^{+0.060}_{+0.041}$					
45	φ60H7 $^{+0.030}_{0}$	φ45b9 $^{-0.180}_{-0.242}$	φ45d8 $^{-0.080}_{-0.119}$	φ45 $^{+0.075}_{+0.050}$	φ60 $^{+0.060}_{+0.041}$			456030		
50	φ60H7 $^{+0.030}_{0}$	φ50b9 $^{-0.180}_{-0.242}$	φ50d8 $^{-0.080}_{-0.119}$	φ50 $^{+0.075}_{+0.050}$	φ60 $^{+0.060}_{+0.041}$					
50	φ65H7 $^{+0.030}_{0}$	φ50b9 $^{-0.180}_{-0.242}$	φ50d8 $^{-0.080}_{-0.119}$	φ50 $^{+0.075}_{+0.050}$	φ65 $^{+0.060}_{+0.041}$					
55	φ70H7 $^{+0.030}_{0}$	φ55b9 $^{-0.190}_{-0.264}$	φ55d8 $^{-0.100}_{-0.146}$	φ55 $^{+0.090}_{+0.060}$	φ70 $^{+0.062}_{+0.043}$					
60	φ75H7 $^{+0.030}_{0}$	φ60b9 $^{-0.190}_{-0.264}$	φ60d8 $^{-0.100}_{-0.146}$	φ60 $^{+0.090}_{+0.060}$	φ75 $^{+0.062}_{+0.043}$					
65	φ80H7 $^{+0.030}_{0}$	φ65b9 $^{-0.190}_{-0.264}$	φ65d8 $^{-0.100}_{-0.146}$	φ65 $^{+0.090}_{+0.060}$	φ80 $^{+0.062}_{+0.043}$					
70	φ90H7 $^{+0.035}_{0}$	φ70b9 $^{-0.200}_{-0.274}$	φ70d8 $^{-0.100}_{-0.146}$	φ70 $^{+0.090}_{+0.060}$	φ90 $^{+0.073}_{+0.051}$					
75	φ95H7 $^{+0.035}_{0}$	φ75b9 $^{-0.200}_{-0.274}$	φ75d8 $^{-0.100}_{-0.146}$	φ75 $^{+0.090}_{+0.060}$	φ95 $^{+0.073}_{+0.051}$					
80	φ100H7 $^{+0.035}_{0}$	φ80b9 $^{-0.200}_{-0.274}$	φ80d8 $^{-0.100}_{-0.146}$	φ80 $^{+0.090}_{+0.060}$	φ100 $^{+0.073}_{+0.051}$					
90	φ110H7 $^{+0.035}_{0}$	φ90b9 $^{-0.220}_{-0.307}$	φ90d8 $^{-0.120}_{-0.174}$	φ90 $^{+0.107}_{+0.072}$	φ110 $^{+0.076}_{+0.054}$					
100	φ120H7 $^{+0.035}_{0}$	φ100b9 $^{-0.220}_{-0.307}$	φ100d8 $^{-0.120}_{-0.174}$	φ100 $^{+0.107}_{+0.072}$	φ120 $^{+0.076}_{+0.054}$					
110	φ130H7 $^{+0.040}_{0}$	φ110b9 $^{-0.240}_{-0.327}$	φ110d8 $^{-0.120}_{-0.174}$	φ110 $^{+0.107}_{+0.072}$	φ130 $^{+0.088}_{+0.063}$					
120	φ140H7 $^{+0.040}_{0}$	φ120b9 $^{-0.240}_{-0.327}$	φ120d8 $^{-0.120}_{-0.174}$	φ120 $^{+0.107}_{+0.072}$	φ140 $^{+0.088}_{+0.063}$					
130	φ150H7 $^{+0.040}_{0}$	φ130b9 $^{-0.260}_{-0.360}$	φ130d8 $^{-0.145}_{-0.208}$	φ130 $^{+0.125}_{+0.085}$	φ150 $^{+0.090}_{+0.065}$					
140	φ160H7 $^{+0.040}_{0}$	φ140b9 $^{-0.260}_{-0.360}$	φ140d8 $^{-0.145}_{-0.208}$	φ140 $^{+0.125}_{+0.085}$	φ160 $^{+0.090}_{+0.065}$					
150	φ170H7 $^{+0.040}_{0}$	φ150b9 $^{-0.280}_{-0.380}$	φ150d8 $^{-0.145}_{-0.208}$	φ150 $^{+0.125}_{+0.085}$	φ170 $^{+0.093}_{+0.068}$					
160	φ180H7 $^{+0.040}_{0}$	φ160b9 $^{-0.280}_{-0.380}$	φ160d8 $^{-0.145}_{-0.208}$	φ160 $^{+0.125}_{+0.085}$	φ180 $^{+0.093}_{+0.068}$					



d8: For General Purpose (Light Load)
b9: For General Purpose (Heavy Load)





(Unit: mm)

Part Number & Bushing Length Tolerance $^{-0.1}_{-0.3}$													Outer Chamfer		Inner Chamfer	Bushing inner diameter
	40	50	60	70	80	90	100	110	120	130	140	150	C Face	Press fit		
													C0.5	2×15°	2×10°	12
													C0.5	2×15°	2×10°	15
													C0.5	2×15°	2×10°	16
													C0.5	2×15°	2×10°	18
	203040												C0.5	2×15°	2×10°	20
	253540	253550											C0.5	2.5×15°	2.5×10°	25
	304040	304050											C0.5	3×15°	3×10°	30
	354540	354550	354560										C0.5	3×15°	3×10°	35
	405040	405050	405060										C0.5	3×15°	3×10°	40
	405540	405550	405560										C0.5	3×15°	3×10°	40
		456050	456060										C0.5	3.5×15°	3.5×10°	45
	506040	506050	506060										C0.5	4×15°	4×10°	50
	506540	506550	506560	506570									C0.5	4×15°	4×10°	50
	557040		557060	557070									C0.5	4×15°	4×10°	55
		607550	607560	607570	607580								C0.5	4×15°	4×10°	60
			658060	658070	658080								C0.5	4×15°	4×10°	65
			709060	709070	709080	709090	7090100						C0.5	4×15°	4×10°	70
				759570			7595100						C0.5	4×15°	4×10°	75
			8010060		8010080	8010090	80100100	80100110					C0.5	4×15°	4×10°	80
			9011060		9011080	9011090	90110100						C1	5×15°	5×10°	90
			10012060		10012080		100120100		100120120				C1	5×15°	5×10°	100
							110130100	110130110					C1	5×15°	6×10°	110
					12014080		120140100		120140120				C1	5×15°	6×10°	120
							130150100			130150130		130150150	C1	5×15°	6×10°	130
							140160100				140160140		C1	5×15°	6×10°	140
							150170100					150170150	C1	5×15°	6×10°	150
							160180100					160180150	C1	5×15°	6×10°	160

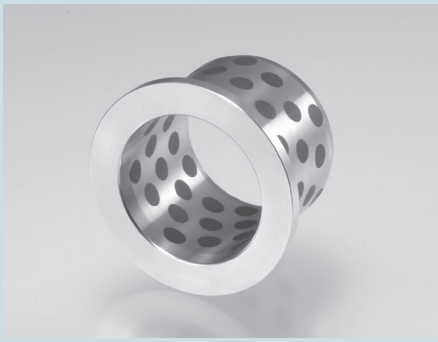
* Sizes not shown in the dimensional tables can also be manufactured.

SAF DAISLIDE SAF Flanged Bushing (Bushing Inner Diameter: 6 to 120 mm)

Designation of Part Number

SAF ○○ ○○

- Bushing Length
- Bushing O.D.
- Product Symbol



Pb Free

RoHS 2

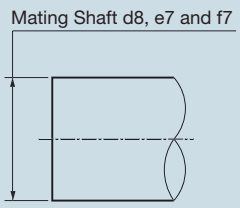
ELV

SAF 0610

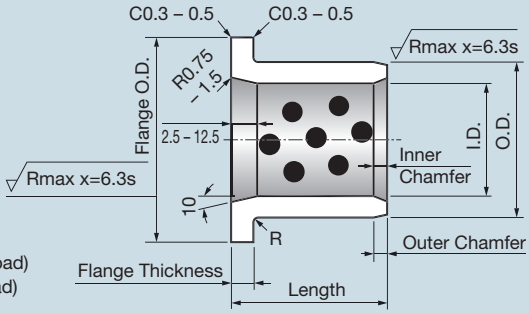
Please specify by part number.

Bushing I.D.	Recommended Dimension Mating Part				Bushing Dimensions					
	Housing I.D.	Shaft Dia.			Flange O.D.	Flange Thickness	I.D.	O.D.		
		General Purpose (Heavy Load)	General Purpose (Light Load)	High Accuracy Purpose					10	12
6	ϕ10H7 $^{+0.015}_{0}$	ϕ6d8 $^{-0.030}_{-0.048}$	ϕ6e7 $^{-0.020}_{-0.032}$	ϕ6f7 $^{-0.010}_{-0.022}$	ϕ16 ±0.25	2 $^{0}_{-0.1}$	ϕ6 $^{+0.032}_{+0.020}$	ϕ10 $^{+0.028}_{+0.019}$	**0610**	**0612**
8	ϕ12H7 $^{+0.018}_{0}$	ϕ8d8 $^{-0.040}_{-0.062}$	ϕ8e7 $^{-0.025}_{-0.040}$	ϕ8f7 $^{-0.013}_{-0.028}$	ϕ20 ±0.25	2 $^{0}_{-0.1}$	ϕ8 $^{+0.045}_{+0.030}$	ϕ12 $^{+0.038}_{+0.023}$	**0810**	**0812**
10	ϕ14H7 $^{+0.018}_{0}$	ϕ10d8 $^{-0.040}_{-0.062}$	ϕ10e7 $^{-0.025}_{-0.040}$	ϕ10f7 $^{-0.013}_{-0.028}$	ϕ22 ±0.25	2 $^{0}_{-0.1}$	ϕ10 $^{+0.045}_{+0.030}$	ϕ14 $^{+0.038}_{+0.023}$	**1010**	**1012**
12	ϕ18H7 $^{+0.018}_{0}$	ϕ12d8 $^{-0.050}_{-0.077}$	ϕ12e7 $^{-0.032}_{-0.050}$	ϕ12f7 $^{-0.016}_{-0.034}$	ϕ25 ±0.25	3 $^{0}_{-0.1}$	ϕ12 $^{+0.050}_{+0.032}$	ϕ18 $^{+0.038}_{+0.023}$	**1210**	**1212**
13	ϕ19H7 $^{+0.021}_{0}$	ϕ13d8 $^{-0.050}_{-0.077}$	ϕ13e7 $^{-0.032}_{-0.050}$	ϕ13f7 $^{-0.016}_{-0.034}$	ϕ26 ±0.25	3 $^{0}_{-0.1}$	ϕ13 $^{+0.060}_{+0.042}$	ϕ19 $^{+0.045}_{+0.028}$	**1310**	**1312**
14	ϕ20H7 $^{+0.021}_{0}$	ϕ14d8 $^{-0.050}_{-0.077}$	ϕ14e7 $^{-0.032}_{-0.050}$	ϕ14f7 $^{-0.016}_{-0.034}$	ϕ27 ±0.25	3 $^{0}_{-0.1}$	ϕ14 $^{+0.060}_{+0.042}$	ϕ20 $^{+0.045}_{+0.028}$		
15	ϕ21H7 $^{+0.021}_{0}$	ϕ15d8 $^{-0.050}_{-0.077}$	ϕ15e7 $^{-0.032}_{-0.050}$	ϕ15f7 $^{-0.016}_{-0.034}$	ϕ28 ±0.25	3 $^{0}_{-0.1}$	ϕ15 $^{+0.060}_{+0.042}$	ϕ21 $^{+0.045}_{+0.028}$	**1510**	**1512**
16	ϕ22H7 $^{+0.021}_{0}$	ϕ16d8 $^{-0.050}_{-0.077}$	ϕ16e7 $^{-0.032}_{-0.050}$	ϕ16f7 $^{-0.016}_{-0.034}$	ϕ29 ±0.25	3 $^{0}_{-0.1}$	ϕ16 $^{+0.060}_{+0.042}$	ϕ22 $^{+0.045}_{+0.028}$		**1612**
18	ϕ24H7 $^{+0.021}_{0}$	ϕ18d8 $^{-0.050}_{-0.077}$	ϕ18e7 $^{-0.032}_{-0.050}$	ϕ18f7 $^{-0.016}_{-0.034}$	ϕ32 ±0.25	3 $^{0}_{-0.1}$	ϕ18 $^{+0.060}_{+0.042}$	ϕ24 $^{+0.045}_{+0.028}$		
20	ϕ30H7 $^{+0.021}_{0}$	ϕ20d8 $^{-0.065}_{-0.098}$	ϕ20e7 $^{-0.040}_{-0.061}$	ϕ20f7 $^{-0.020}_{-0.041}$	ϕ40 ±0.25	5 $^{0}_{-0.1}$	ϕ20 $^{+0.071}_{+0.050}$	ϕ30 $^{+0.045}_{+0.028}$		
25	ϕ35H7 $^{+0.025}_{0}$	ϕ25d8 $^{-0.065}_{-0.098}$	ϕ25e7 $^{-0.040}_{-0.061}$	ϕ25f7 $^{-0.020}_{-0.041}$	ϕ45 ±0.25	5 $^{0}_{-0.1}$	ϕ25 $^{+0.081}_{+0.060}$	ϕ35 $^{+0.055}_{+0.034}$		
30	ϕ40H7 $^{+0.025}_{0}$	ϕ30d8 $^{-0.065}_{-0.098}$	ϕ30e7 $^{-0.040}_{-0.061}$	ϕ30f7 $^{-0.020}_{-0.041}$	ϕ50 ±0.25	5 $^{0}_{-0.1}$	ϕ30 $^{+0.081}_{+0.060}$	ϕ40 $^{+0.055}_{+0.034}$		
30	ϕ40H7 $^{+0.025}_{0}$	ϕ30d8 $^{-0.065}_{-0.098}$	ϕ30e7 $^{-0.040}_{-0.061}$	ϕ30f7 $^{-0.020}_{-0.041}$	ϕ60 ±0.25	5 $^{0}_{-0.1}$	ϕ30 $^{+0.081}_{+0.060}$	ϕ40 $^{+0.055}_{+0.034}$		
31.5	ϕ40H7 $^{+0.025}_{0}$	ϕ31.5d8 $^{-0.080}_{-0.119}$	ϕ31.5e7 $^{-0.050}_{-0.075}$	ϕ31.5f7 $^{-0.025}_{-0.050}$	ϕ50 ±0.25	5 $^{0}_{-0.1}$	ϕ31.5 $^{+0.085}_{+0.060}$	ϕ40 $^{+0.055}_{+0.034}$		
35	ϕ45H7 $^{+0.025}_{0}$	ϕ35d8 $^{-0.080}_{-0.119}$	ϕ35e7 $^{-0.050}_{-0.075}$	ϕ35f7 $^{-0.025}_{-0.050}$	ϕ60 ±0.25	5 $^{0}_{-0.1}$	ϕ35 $^{+0.085}_{+0.060}$	ϕ45 $^{+0.055}_{+0.034}$		
40	ϕ50H7 $^{+0.025}_{0}$	ϕ40d8 $^{-0.080}_{-0.119}$	ϕ40e7 $^{-0.050}_{-0.075}$	ϕ40f7 $^{-0.025}_{-0.050}$	ϕ65 ±0.25	5 $^{0}_{-0.1}$	ϕ40 $^{+0.091}_{+0.066}$	ϕ50 $^{+0.055}_{+0.034}$		
45	ϕ55H7 $^{+0.030}_{0}$	ϕ45d8 $^{-0.080}_{-0.119}$	ϕ45e7 $^{-0.050}_{-0.075}$	ϕ45f7 $^{-0.025}_{-0.050}$	ϕ70 ±0.25	5 $^{0}_{-0.1}$	ϕ45 $^{+0.091}_{+0.066}$	ϕ55 $^{+0.066}_{+0.041}$		
50	ϕ60H7 $^{+0.030}_{0}$	ϕ50d8 $^{-0.080}_{-0.119}$	ϕ50e7 $^{-0.050}_{-0.075}$	ϕ50f7 $^{-0.025}_{-0.050}$	ϕ75 ±0.25	5 $^{0}_{-0.1}$	ϕ50 $^{+0.091}_{+0.066}$	ϕ60 $^{+0.066}_{+0.041}$		
55	ϕ65H7 $^{+0.030}_{0}$	ϕ55d8 $^{-0.100}_{-0.146}$	ϕ55e7 $^{-0.060}_{-0.090}$	ϕ55f7 $^{-0.030}_{-0.060}$	ϕ80 ±0.25	5 $^{0}_{-0.1}$	ϕ55 $^{+0.100}_{+0.070}$	ϕ65 $^{+0.066}_{+0.041}$		
60	ϕ75H7 $^{+0.030}_{0}$	ϕ60d8 $^{-0.100}_{-0.146}$	ϕ60e7 $^{-0.060}_{-0.090}$	ϕ60f7 $^{-0.030}_{-0.060}$	ϕ90 ±0.25	7.5 $^{0}_{-0.1}$	ϕ60 $^{+0.100}_{+0.070}$	ϕ75 $^{+0.068}_{+0.043}$		
63	ϕ75H7 $^{+0.030}_{0}$	ϕ63d8 $^{-0.100}_{-0.146}$	ϕ63e7 $^{-0.060}_{-0.090}$	ϕ63f7 $^{-0.030}_{-0.060}$	ϕ85 ±0.25	7.5 $^{0}_{-0.1}$	ϕ63 $^{+0.100}_{+0.070}$	ϕ75 $^{+0.068}_{+0.043}$		
65	ϕ80H7 $^{+0.030}_{0}$	ϕ65d8 $^{-0.100}_{-0.146}$	ϕ65e7 $^{-0.060}_{-0.090}$	ϕ65f7 $^{-0.030}_{-0.060}$	ϕ95 ±0.25	7.5 $^{0}_{-0.1}$	ϕ65 $^{+0.100}_{+0.070}$	ϕ80 $^{+0.068}_{+0.043}$		
70	ϕ85H7 $^{+0.035}_{0}$	ϕ70d8 $^{-0.100}_{-0.146}$	ϕ70e7 $^{-0.060}_{-0.090}$	ϕ70f7 $^{-0.030}_{-0.060}$	ϕ105 ±0.25	7.5 $^{0}_{-0.1}$	ϕ70 $^{+0.111}_{+0.081}$	ϕ85 $^{+0.080}_{+0.051}$		
75	ϕ90H7 $^{+0.035}_{0}$	ϕ75d8 $^{-0.100}_{-0.146}$	ϕ75e7 $^{-0.060}_{-0.090}$	ϕ75f7 $^{-0.030}_{-0.060}$	ϕ110 ±0.25	7.5 $^{0}_{-0.1}$	ϕ75 $^{+0.111}_{+0.081}$	ϕ90 $^{+0.080}_{+0.051}$		
80	ϕ100H7 $^{+0.035}_{0}$	ϕ80d8 $^{-0.100}_{-0.146}$	ϕ80e7 $^{-0.060}_{-0.090}$	ϕ80f7 $^{-0.030}_{-0.060}$	ϕ120 ±0.25	10 $^{0}_{-0.1}$	ϕ80 $^{+0.111}_{+0.081}$	ϕ100 $^{+0.080}_{+0.051}$		
90	ϕ110H7 $^{+0.035}_{0}$	ϕ90d8 $^{-0.120}_{-0.174}$	ϕ90e7 $^{-0.072}_{-0.107}$	ϕ90f7 $^{-0.036}_{-0.071}$	ϕ130 ±0.25	10 $^{0}_{-0.1}$	ϕ90 $^{+0.117}_{+0.082}$	ϕ110 $^{+0.083}_{+0.054}$		
100	ϕ120H7 $^{+0.035}_{0}$	ϕ100d8 $^{-0.120}_{-0.174}$	ϕ100e7 $^{-0.072}_{-0.107}$	ϕ100f7 $^{-0.036}_{-0.071}$	ϕ150 ±0.40	10 $^{0}_{-0.1}$	ϕ100 $^{+0.117}_{+0.082}$	ϕ120 $^{+0.083}_{+0.054}$		
120	ϕ140H7 $^{+0.040}_{0}$	ϕ120d8 $^{-0.120}_{-0.174}$	ϕ120e7 $^{-0.072}_{-0.107}$	ϕ120f7 $^{-0.036}_{-0.071}$	ϕ170 ±0.40	10 $^{0}_{-0.1}$	ϕ120 $^{+0.132}_{+0.097}$	ϕ140 $^{+0.096}_{+0.063}$		

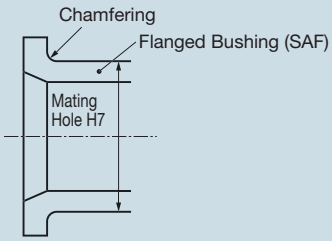
*3035 F has lube also in the Flange part.



d8: For General Purpose (Heavy Load)
e7: For General Purpose (Light Load)
f7 : For High Accuracy Purpose



Example of Mounting



(Unit: mm)

Part Number & Bushing Length Tolerance $^{-0.1}_{-0.3}$															Outer Chamfer	Inner Chamfer	Bushing I.D.
15	17	18	20	23	25	30	35	40	50	60	67	80	100				
0615															1.5x15°	1.0x10°	6
0815															0.75x15°	1.0x10°	8
1015	**1017**		**1020**												0.75x15°	1.0x10°	10
1215			**1220**		**1225**	**1230**									2.0x15°	2.0x10°	12
1315			**1320**		**1325**	**1330**									2.0x15°	2.0x10°	13
1415			**1420**		**1425**										2.0x15°	2.0x10°	14
1515			**1520**		**1525**	**1530**									2.0x15°	2.0x10°	15
1615		**1618**	**1620**	**1623**	**1625**	**1630**	**1635**	**1640**							2.0x15°	2.0x10°	16
1815			**1820**		**1825**	**1830**	**1835**	**1840**							2.0x15°	2.0x10°	18
2015			**2020**		**2025**	**2030**	**2035**	**2040**							2.0x15°	2.0x10°	20
2515			**2520**		**2525**	**2530**	**2535**	**2540**	**2550**						2.5x15°	2.5x10°	25
			3020		**3025**	**3030**	**3035**	**3040**	**3050**						3.0x15°	3.0x10°	30
							***3035F**								3.0x15°	3.0x10°	30
			3120			**3130**	**3135**	**3140**							3.0x15°	3.0x10°	31.5
			3520		**3525**	**3530**	**3535**	**3540**	**3550**						3.0x15°	3.0x10°	35
			4020		**4025**	**4030**	**4035**	**4040**	**4050**						3.0x15°	3.0x10°	40
						4530	**4535**	**4540**	**4550**	**4560**					3.5x15°	3.5x10°	45
						5030	**5035**	**5040**	**5050**	**5060**					4.0x15°	4.0x10°	50
								5540		**5560**					4.0x15°	4.0x10°	55
								6040	**6050**	**6060**		**6080**			4.0x15°	4.0x10°	60
											6367				4.0x15°	4.0x10°	63
										6560					4.0x15°	4.0x10°	65
									7050			**7080**			4.0x15°	4.0x10°	70
										7560					4.0x15°	4.0x10°	75
										8060		**8080**	**80100**		4.0x15°	4.0x10°	80
										9060		**9080**			5.0x15°	5.0x10°	90
												10080	**100100**		5.0x15°	5.0x10°	100
												12080	**120100**		5.0x15°	5.0x10°	120

SAFG DAISLIDE SAFG Flanged Bushing (Bushing Inner Diameter: 6 to 50 mm)

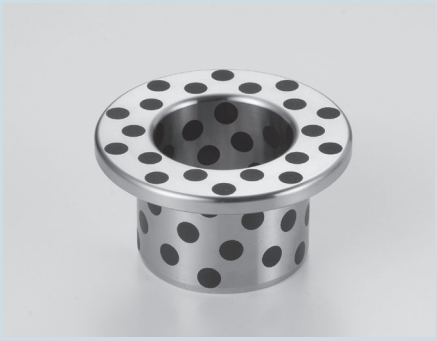
Designation of Part Number

SAFG ○○ ○○

- Bushing length
- Bushing O.D.
- Product symbol

SAFG 0610

Please specify by part number.



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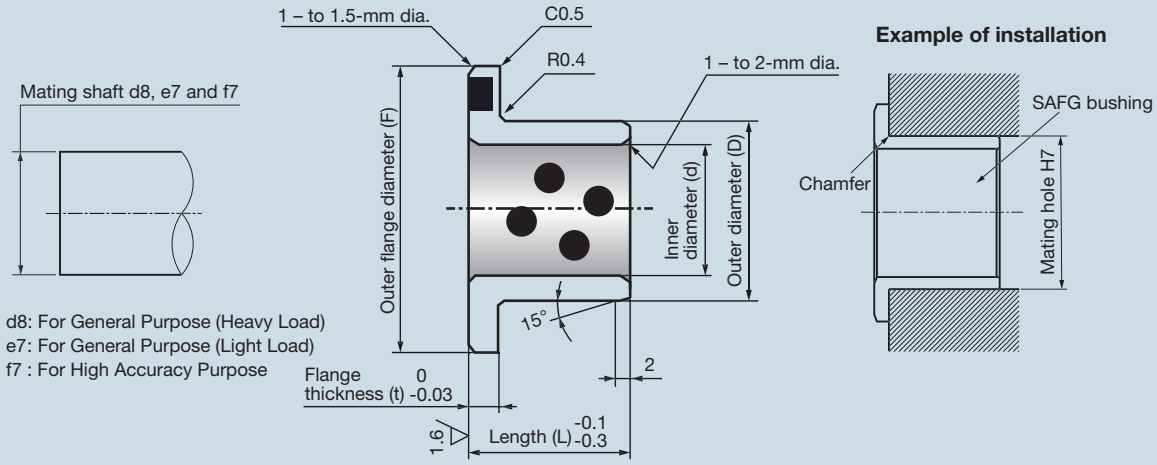
RoHS 2

ELV

Bushing inner diameter	Recommended Dimension Mating Part				Bushing Dimensions			
	Housing I.D.	Shaft Dia.			Outer flange diameter (F)	Flange Thickness (t)	Inner diameter (d)	Outer diameter (D)
		General Purpose (Heavy Load)	General Purpose (Light Load)	High Accuracy Purpose				
6	ϕ10H7 $^{+0.015}_{0}$	ϕ6d8 $^{-0.030}_{-0.048}$	ϕ6e7 $^{-0.020}_{-0.032}$	ϕ6f7 $^{-0.010}_{-0.022}$	ϕ20 ±0.25	3 $^{0}_{-0.03}$	ϕ6 $^{+0.032}_{+0.020}$	ϕ10 $^{+0.028}_{+0.019}$
8	ϕ12H7 $^{+0.018}_{0}$	ϕ8d8 $^{-0.040}_{-0.062}$	ϕ8e7 $^{-0.025}_{-0.040}$	ϕ8f7 $^{-0.013}_{-0.028}$	ϕ25 ±0.25	3 $^{0}_{-0.03}$	ϕ8 $^{+0.040}_{+0.025}$	ϕ12 $^{+0.034}_{+0.023}$
10	ϕ14H7 $^{+0.018}_{0}$	ϕ10d8 $^{-0.040}_{-0.062}$	ϕ10e7 $^{-0.025}_{-0.040}$	ϕ10f7 $^{-0.013}_{-0.028}$	ϕ25 ±0.25	3 $^{0}_{-0.03}$	ϕ10 $^{+0.040}_{+0.025}$	ϕ14 $^{+0.034}_{+0.023}$
12	ϕ18H7 $^{+0.018}_{0}$	ϕ12d8 $^{-0.050}_{-0.077}$	ϕ12e7 $^{-0.032}_{-0.050}$	ϕ12f7 $^{-0.016}_{-0.034}$	ϕ30 ±0.25	3 $^{0}_{-0.03}$	ϕ12 $^{+0.050}_{+0.032}$	ϕ18 $^{+0.034}_{+0.023}$
13	ϕ19H7 $^{+0.021}_{0}$	ϕ13d8 $^{-0.050}_{-0.077}$	ϕ13e7 $^{-0.032}_{-0.050}$	ϕ13f7 $^{-0.016}_{-0.034}$	ϕ30 ±0.25	3 $^{0}_{-0.03}$	ϕ13 $^{+0.050}_{+0.032}$	ϕ19 $^{+0.041}_{+0.028}$
15	ϕ21H7 $^{+0.021}_{0}$	ϕ15d8 $^{-0.050}_{-0.077}$	ϕ15e7 $^{-0.032}_{-0.050}$	ϕ15f7 $^{-0.016}_{-0.034}$	ϕ35 ±0.25	3 $^{0}_{-0.03}$	ϕ15 $^{+0.050}_{+0.032}$	ϕ21 $^{+0.041}_{+0.028}$
16	ϕ22H7 $^{+0.021}_{0}$	ϕ16d8 $^{-0.050}_{-0.077}$	ϕ16e7 $^{-0.032}_{-0.050}$	ϕ16f7 $^{-0.016}_{-0.034}$	ϕ35 ±0.25	3 $^{0}_{-0.03}$	ϕ16 $^{+0.050}_{+0.032}$	ϕ22 $^{+0.041}_{+0.028}$
18	ϕ24H7 $^{+0.021}_{0}$	ϕ18d8 $^{-0.050}_{-0.077}$	ϕ18e7 $^{-0.032}_{-0.050}$	ϕ18f7 $^{-0.016}_{-0.034}$	ϕ40 ±0.25	3 $^{0}_{-0.03}$	ϕ18 $^{+0.050}_{+0.032}$	ϕ24 $^{+0.041}_{+0.028}$
20	ϕ28H7 $^{+0.021}_{0}$	ϕ20d8 $^{-0.065}_{-0.098}$	ϕ20e7 $^{-0.040}_{-0.061}$	ϕ20f7 $^{-0.020}_{-0.041}$	ϕ45 ±0.25	5 $^{0}_{-0.03}$	ϕ20 $^{+0.061}_{+0.040}$	ϕ28 $^{+0.041}_{+0.028}$
25	ϕ33H7 $^{+0.025}_{0}$	ϕ25d8 $^{-0.065}_{-0.098}$	ϕ25e7 $^{-0.040}_{-0.061}$	ϕ25f7 $^{-0.020}_{-0.041}$	ϕ50 ±0.25	5 $^{0}_{-0.03}$	ϕ25 $^{+0.061}_{+0.040}$	ϕ33 $^{+0.050}_{+0.034}$
30	ϕ38H7 $^{+0.025}_{0}$	ϕ30d8 $^{-0.065}_{-0.098}$	ϕ30e7 $^{-0.040}_{-0.061}$	ϕ30f7 $^{-0.020}_{-0.041}$	ϕ55 ±0.25	5 $^{0}_{-0.03}$	ϕ30 $^{+0.061}_{+0.040}$	ϕ38 $^{+0.050}_{+0.034}$
35	ϕ44H7 $^{+0.025}_{0}$	ϕ35d8 $^{-0.080}_{-0.119}$	ϕ35e7 $^{-0.050}_{-0.075}$	ϕ35f7 $^{-0.025}_{-0.050}$	ϕ65 ±0.25	5 $^{0}_{-0.03}$	ϕ35 $^{+0.075}_{+0.050}$	ϕ44 $^{+0.050}_{+0.034}$
40	ϕ50H7 $^{+0.025}_{0}$	ϕ40d8 $^{-0.080}_{-0.119}$	ϕ40e7 $^{-0.050}_{-0.075}$	ϕ40f7 $^{-0.025}_{-0.050}$	ϕ70 ±0.25	7 $^{0}_{-0.03}$	ϕ40 $^{+0.075}_{+0.050}$	ϕ50 $^{+0.050}_{+0.034}$
50	ϕ62H7 $^{+0.030}_{0}$	ϕ50d8 $^{-0.080}_{-0.119}$	ϕ50e7 $^{-0.050}_{-0.075}$	ϕ50f7 $^{-0.025}_{-0.050}$	ϕ90 ±0.25	8 $^{0}_{-0.03}$	ϕ50 $^{+0.075}_{+0.050}$	ϕ62 $^{+0.060}_{+0.041}$



•Suitable for applications with rotating, oscillating, or reciprocating motion.
•Capable of handling thrust loads simultaneously with just one bushing.

(Unit: mm)

Part Number and Bushing Length Tolerance $^{-0.1}_{-0.3}$								Bushing inner diameter
10	12	14	15	20	25	35	45	
0610	**0612**							6
	0812		**0815**					8
	1012		**1015**	**1020**				10
	1212		**1215**	**1220**	**1225**			12
	1312		**1315**	**1320**	**1325**			13
	1512		**1515**	**1520**	**1525**			15
	1612		**1615**	**1620**	**1625**			16
		1814		**1820**	**1825**			18
		2014		**2020**	**2025**			20
		2514		**2520**	**2525**			25
				3020	**3025**	**3035**		30
				3520	**3525**	**3535**		35
					4025	**4035**	**4045**	40
						5035	**5045**	50

BA DAISLIDE BA Bushing (Bushing Inner Diameter: 12 to 55 mm)

Designation of Part Number

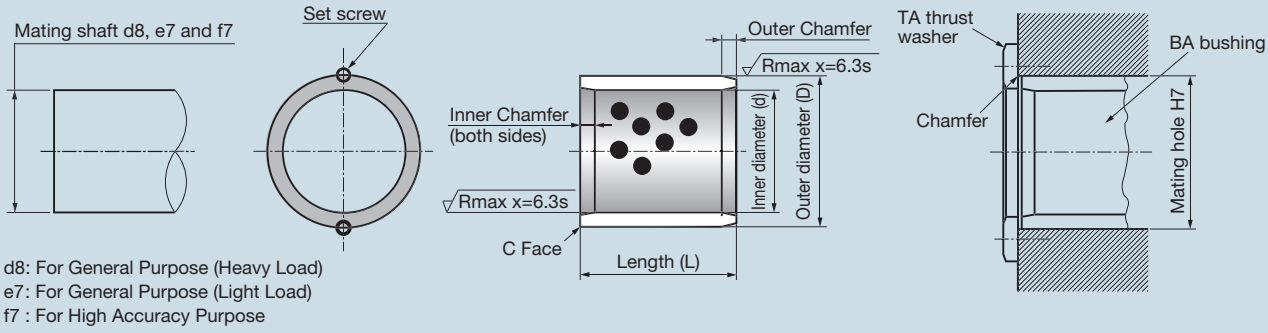
BA ○○ ○○ ○○

- ○○ — Bushing length
- ○○ — Bushing outer diameter
- ○○ — Bushing inner diameter
- BA — Product symbol

BA 121816

Please specify by Part No.
This product is produced on order only.

Bushing inner diameter	Recommended Dimension Mating Part				Bushing Dimensions					
	Housing I.D.	Shaft Dia.			Inner diameter (d)	Outer diameter (D)				
		General Purpose (Heavy Load)	General Purpose (Light Load)	High Accuracy Purpose			15	16	20	25
12	ϕ18H7 $^{+0.018}_{0}$	ϕ12d8 $^{-0.050}_{-0.077}$	ϕ12e7 $^{-0.032}_{-0.050}$	ϕ12f7 $^{-0.016}_{-0.034}$	ϕ12 $^{+0.050}_{+0.032}$	ϕ18 $^{+0.038}_{+0.023}$		121816	121820	121825
15	ϕ21H7 $^{+0.021}_{0}$	ϕ15d8 $^{-0.050}_{-0.077}$	ϕ15e7 $^{-0.032}_{-0.050}$	ϕ15f7 $^{-0.016}_{-0.034}$	ϕ15 $^{+0.060}_{+0.042}$	ϕ21 $^{+0.045}_{+0.028}$	152115		152120	152125
18	ϕ24H7 $^{+0.021}_{0}$	ϕ18d8 $^{-0.050}_{-0.077}$	ϕ18e7 $^{-0.032}_{-0.050}$	ϕ18f7 $^{-0.016}_{-0.034}$	ϕ18 $^{+0.060}_{+0.042}$	ϕ24 $^{+0.045}_{+0.028}$	182415		182420	182425
20	ϕ30H7 $^{+0.021}_{0}$	ϕ20d8 $^{-0.065}_{-0.098}$	ϕ20e7 $^{-0.040}_{-0.061}$	ϕ20f7 $^{-0.020}_{-0.041}$	ϕ20 $^{+0.071}_{+0.050}$	ϕ30 $^{+0.045}_{+0.028}$		203016	203020	203025
25	ϕ33H7 $^{+0.025}_{0}$	ϕ25d8 $^{-0.065}_{-0.098}$	ϕ25e7 $^{-0.040}_{-0.061}$	ϕ25f7 $^{-0.020}_{-0.041}$	ϕ25 $^{+0.081}_{+0.060}$	ϕ33 $^{+0.055}_{+0.034}$		253316	253320	253325
25	ϕ35H7 $^{+0.025}_{0}$	ϕ25d8 $^{-0.065}_{-0.098}$	ϕ25e7 $^{-0.040}_{-0.061}$	ϕ25f7 $^{-0.020}_{-0.041}$	ϕ25 $^{+0.081}_{+0.060}$	ϕ35 $^{+0.055}_{+0.034}$		253516	253520	253525
30	ϕ38H7 $^{+0.025}_{0}$	ϕ30d8 $^{-0.065}_{-0.098}$	ϕ30e7 $^{-0.040}_{-0.061}$	ϕ30f7 $^{-0.020}_{-0.041}$	ϕ30 $^{+0.081}_{+0.060}$	ϕ38 $^{+0.055}_{+0.034}$			303820	303825
30	ϕ40H7 $^{+0.025}_{0}$	ϕ30d8 $^{-0.065}_{-0.098}$	ϕ30e7 $^{-0.040}_{-0.061}$	ϕ30f7 $^{-0.020}_{-0.041}$	ϕ30 $^{+0.081}_{+0.060}$	ϕ40 $^{+0.055}_{+0.034}$			304020	304025
31.5	ϕ40H7 $^{+0.025}_{0}$	ϕ31.5d8 $^{-0.080}_{-0.119}$	ϕ31.5e7 $^{-0.050}_{-0.075}$	ϕ31.5f7 $^{-0.025}_{-0.050}$	ϕ31.5 $^{+0.085}_{+0.060}$	ϕ40 $^{+0.055}_{+0.034}$				
35	ϕ44H7 $^{+0.025}_{0}$	ϕ35d8 $^{-0.080}_{-0.119}$	ϕ35e7 $^{-0.050}_{-0.075}$	ϕ35f7 $^{-0.025}_{-0.050}$	ϕ35 $^{+0.085}_{+0.060}$	ϕ44 $^{+0.055}_{+0.034}$				
35	ϕ45H7 $^{+0.025}_{0}$	ϕ35d8 $^{-0.080}_{-0.119}$	ϕ35e7 $^{-0.050}_{-0.075}$	ϕ35f7 $^{-0.025}_{-0.050}$	ϕ35 $^{+0.085}_{+0.060}$	ϕ45 $^{+0.055}_{+0.034}$			354520	354525
40	ϕ50H7 $^{+0.025}_{0}$	ϕ40d8 $^{-0.080}_{-0.119}$	ϕ40e7 $^{-0.050}_{-0.075}$	ϕ40f7 $^{-0.025}_{-0.050}$	ϕ40 $^{+0.091}_{+0.066}$	ϕ50 $^{+0.055}_{+0.034}$			405020	405025
40	ϕ55H7 $^{+0.030}_{0}$	ϕ40d8 $^{-0.080}_{-0.119}$	ϕ40e7 $^{-0.050}_{-0.075}$	ϕ40f7 $^{-0.025}_{-0.050}$	ϕ40 $^{+0.091}_{+0.066}$	ϕ55 $^{+0.066}_{+0.041}$				
45	ϕ55H7 $^{+0.030}_{0}$	ϕ45d8 $^{-0.080}_{-0.119}$	ϕ45e7 $^{-0.050}_{-0.075}$	ϕ45f7 $^{-0.025}_{-0.050}$	ϕ45 $^{+0.091}_{+0.066}$	ϕ55 $^{+0.066}_{+0.041}$				
45	ϕ60H7 $^{+0.030}_{0}$	ϕ45d8 $^{-0.080}_{-0.119}$	ϕ45e7 $^{-0.050}_{-0.075}$	ϕ45f7 $^{-0.025}_{-0.050}$	ϕ45 $^{+0.091}_{+0.066}$	ϕ60 $^{+0.066}_{+0.041}$				
50	ϕ60H7 $^{+0.030}_{0}$	ϕ50d8 $^{-0.080}_{-0.119}$	ϕ50e7 $^{-0.050}_{-0.075}$	ϕ50f7 $^{-0.025}_{-0.050}$	ϕ50 $^{+0.091}_{+0.066}$	ϕ60 $^{+0.066}_{+0.041}$				
50	ϕ65H7 $^{+0.030}_{0}$	ϕ50d8 $^{-0.080}_{-0.119}$	ϕ50e7 $^{-0.050}_{-0.075}$	ϕ50f7 $^{-0.025}_{-0.050}$	ϕ50 $^{+0.091}_{+0.066}$	ϕ65 $^{+0.066}_{+0.041}$				
55	ϕ70H7 $^{+0.030}_{0}$	ϕ55d8 $^{-0.100}_{-0.146}$	ϕ55e7 $^{-0.060}_{-0.090}$	ϕ55f7 $^{-0.030}_{-0.060}$	ϕ55 $^{+0.100}_{+0.070}$	ϕ70 $^{+0.068}_{+0.043}$				



d8: For General Purpose (Heavy Load)
e7: For General Purpose (Light Load)
f7 : For High Accuracy Purpose

(Unit: mm)

Part Number & Bushing Length Tolerance $^{-0.1}_{-0.3}$								Outer chamfer		Inner chamfer	Bushing inner diameter
30	35	40	50	60	70	80	100	C Face	Press fit		
121830								C0.5	2.0×15°	2.0×10°	12
								C0.5	2.0×15°	2.0×10°	15
182430								C0.5	2.0×15°	2.0×10°	18
203030	**203035**	**203040**						C0.5	2.0×15°	2.0×10°	20
253330	**253335**	**253340**	**253350**					C0.5	2.5×15°	2.5×10°	25
253530	**253535**	**253540**	**253550**					C0.5	2.5×15°	2.5×10°	25
303830	**303835**	**303840**	**303850**	**303860**				C0.5	3.0×15°	3.0×10°	30
304030	**304035**	**304040**	**304050**	**304060**				C0.5	3.0×15°	3.0×10°	30
314030		**314040**						C0.5	3.0×15°	3.0×10°	31.5
354430	**354435**	**354440**	**354450**	**354460**				C0.5	3.0×15°	3.0×10°	35
354530	**354535**	**354540**	**354550**	**354560**				C0.5	3.0×15°	3.0×10°	35
405030	**405035**	**405040**	**405050**	**405060**	**405070**			C0.5	3.0×15°	3.0×10°	40
405530	**405535**	**405540**	**405550**	**405560**				C0.5	3.0×15°	3.0×10°	40
455530	**455535**	**455540**	**455550**	**455560**				C0.5	3.0×15°	3.0×10°	45
456030	**456035**	**456040**	**456050**	**456060**	**456070**			C0.5	3.0×15°	3.0×10°	45
506030	**506035**	**506040**	**506050**	**506060**				C0.5	4.0×15°	4.0×10°	50
506530		**506540**	**506550**	**506560**	**506570**	**506580**	**5065100**	C0.5	4.0×15°	4.0×10°	50
		557040	**557050**	**557060**	**557070**			C0.5	4.0×15°	4.0×10°	55

* Sizes not shown in the dimensional tables can also be manufactured.

BA DAISLIDE BA Bushing (Bushing Inner Diameter: 60 to 160 mm)

Designation of Part Number

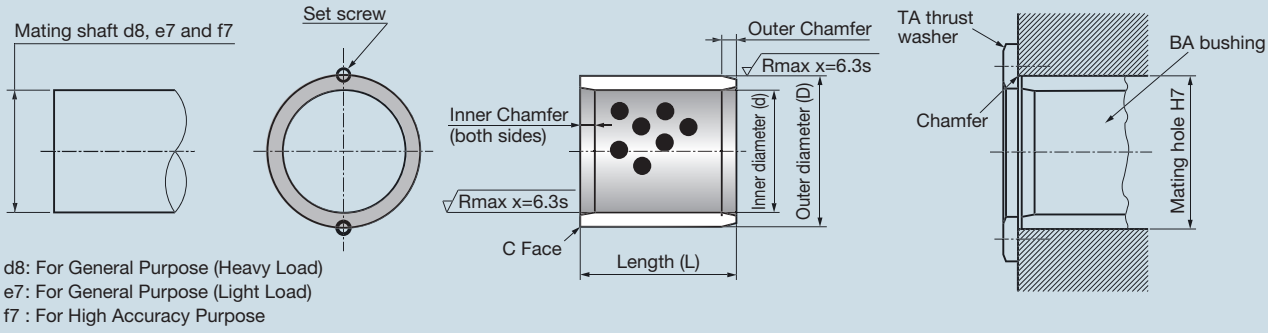
BA ○○ ○○ ○○

- ○○ — Bushing length
- ○○ — Bushing outer diameter
- ○○ — Bushing inner diameter
- BA — Product symbol

BA 607430

Please specify by Part No.
This product is produced on order only.

Bushing inner diameter	Recommended Dimension Mating Part				Bushing Dimensions					
	Housing I.D.	Shaft Dia.			Inner diameter (d)	Outer diameter (D)				
		General Purpose (Heavy Load)	General Purpose (Light Load)	High Accuracy Purpose			30	35	40	50
60	ϕ74H7 $^{+0.030}_{0}$	ϕ60d8 $^{-0.100}_{-0.146}$	ϕ60e7 $^{-0.032}_{-0.050}$	ϕ60f7 $^{-0.030}_{-0.060}$	ϕ60 $^{-0.100}_{-0.070}$	ϕ74 $^{-0.038}_{-0.023}$	**607430**	**607435**	**607440**	**607450**
60	ϕ75H7 $^{+0.030}_{0}$	ϕ60d8 $^{-0.100}_{-0.146}$	ϕ60e7 $^{-0.032}_{-0.050}$	ϕ60f7 $^{-0.030}_{-0.060}$	ϕ60 $^{-0.100}_{-0.070}$	ϕ75 $^{-0.045}_{-0.028}$	**607530**	**607535**	**607540**	**607550**
63	ϕ75H7 $^{+0.030}_{0}$	ϕ63d8 $^{-0.100}_{-0.146}$	ϕ63e7 $^{-0.032}_{-0.050}$	ϕ63f7 $^{-0.030}_{-0.060}$	ϕ63 $^{-0.100}_{-0.070}$	ϕ75 $^{-0.045}_{-0.028}$				
65	ϕ80H7 $^{+0.030}_{0}$	ϕ65d8 $^{-0.100}_{-0.146}$	ϕ65e7 $^{-0.032}_{-0.050}$	ϕ65f7 $^{-0.030}_{-0.060}$	ϕ65 $^{-0.100}_{-0.070}$	ϕ80 $^{-0.045}_{-0.028}$				**658050**
70	ϕ85H7 $^{+0.035}_{0}$	ϕ70d8 $^{-0.100}_{-0.146}$	ϕ70e7 $^{-0.032}_{-0.050}$	ϕ70f7 $^{-0.030}_{-0.060}$	ϕ70 $^{-0.111}_{-0.081}$	ϕ85 $^{-0.045}_{-0.028}$		**708535**	**708540**	**708550**
70	ϕ90H7 $^{+0.035}_{0}$	ϕ70d8 $^{-0.100}_{-0.146}$	ϕ70e7 $^{-0.040}_{-0.061}$	ϕ70f7 $^{-0.030}_{-0.060}$	ϕ70 $^{-0.111}_{-0.081}$	ϕ90 $^{-0.045}_{-0.028}$				**709050**
75	ϕ90H7 $^{+0.035}_{0}$	ϕ75d8 $^{-0.100}_{-0.146}$	ϕ75e7 $^{-0.040}_{-0.061}$	ϕ75f7 $^{-0.030}_{-0.060}$	ϕ75 $^{-0.111}_{-0.081}$	ϕ90 $^{-0.045}_{-0.028}$				
75	ϕ95H7 $^{+0.035}_{0}$	ϕ75d8 $^{-0.100}_{-0.146}$	ϕ75e7 $^{-0.040}_{-0.061}$	ϕ75f7 $^{-0.030}_{-0.060}$	ϕ75 $^{-0.111}_{-0.081}$	ϕ95 $^{-0.055}_{-0.034}$				
80	ϕ96H7 $^{+0.035}_{0}$	ϕ75d8 $^{-0.100}_{-0.146}$	ϕ80e7 $^{-0.040}_{-0.061}$	ϕ80f7 $^{-0.030}_{-0.060}$	ϕ80 $^{-0.111}_{-0.081}$	ϕ96 $^{-0.055}_{-0.034}$			**809640**	**809650**
80	ϕ100H7 $^{+0.035}_{0}$	ϕ80d8 $^{-0.100}_{-0.146}$	ϕ80e7 $^{-0.040}_{-0.061}$	ϕ80f7 $^{-0.030}_{-0.060}$	ϕ80 $^{-0.111}_{-0.081}$	ϕ100 $^{-0.055}_{-0.034}$			**8010040**	**8010050**
90	ϕ110H7 $^{+0.035}_{0}$	ϕ90d8 $^{-0.120}_{-0.174}$	ϕ90e7 $^{-0.040}_{-0.061}$	ϕ90f7 $^{-0.036}_{-0.071}$	ϕ90 $^{-0.117}_{-0.082}$	ϕ110 $^{-0.055}_{-0.034}$				
100	ϕ120H7 $^{+0.035}_{0}$	ϕ100d8 $^{-0.120}_{-0.174}$	ϕ100e7 $^{-0.050}_{-0.075}$	ϕ100f7 $^{-0.036}_{-0.071}$	ϕ100 $^{-0.117}_{-0.082}$	ϕ120 $^{-0.055}_{-0.034}$				
110	ϕ130H7 $^{+0.040}_{0}$	ϕ110d8 $^{-0.120}_{-0.174}$	ϕ110e7 $^{-0.050}_{-0.075}$	ϕ110f7 $^{-0.036}_{-0.071}$	ϕ110 $^{-0.132}_{-0.097}$	ϕ130 $^{-0.055}_{-0.034}$				
120	ϕ140H7 $^{+0.040}_{0}$	ϕ120d8 $^{-0.120}_{-0.174}$	ϕ120e7 $^{-0.050}_{-0.075}$	ϕ120f7 $^{-0.036}_{-0.071}$	ϕ120 $^{-0.132}_{-0.097}$	ϕ140 $^{-0.055}_{-0.034}$			**354520**	**354525**
125	ϕ145H7 $^{+0.040}_{0}$	ϕ125d8 $^{-0.145}_{-0.208}$	ϕ125e7 $^{-0.050}_{-0.075}$	ϕ125f7 $^{-0.043}_{-0.083}$	ϕ125 $^{-0.135}_{-0.095}$	ϕ145 $^{-0.055}_{-0.034}$			**405020**	**405025**
130	ϕ150H7 $^{+0.040}_{0}$	ϕ130d8 $^{-0.145}_{-0.208}$	ϕ130e7 $^{-0.050}_{-0.075}$	ϕ130f7 $^{-0.043}_{-0.083}$	ϕ130 $^{-0.135}_{-0.095}$	ϕ150 $^{-0.066}_{-0.041}$				
140	ϕ160H7 $^{+0.040}_{0}$	ϕ140d8 $^{-0.145}_{-0.208}$	ϕ140e7 $^{-0.050}_{-0.075}$	ϕ140f7 $^{-0.043}_{-0.083}$	ϕ140 $^{-0.135}_{-0.095}$	ϕ160 $^{-0.066}_{-0.041}$				
150	ϕ170H7 $^{+0.040}_{0}$	ϕ150d8 $^{-0.145}_{-0.208}$	ϕ150e7 $^{-0.050}_{-0.075}$	ϕ150f7 $^{-0.043}_{-0.083}$	ϕ150 $^{-0.135}_{-0.095}$	ϕ170 $^{-0.066}_{-0.041}$				
160	ϕ180H7 $^{+0.040}_{0}$	ϕ160d8 $^{-0.145}_{-0.208}$	ϕ160e7 $^{-0.050}_{-0.075}$	ϕ160f7 $^{-0.043}_{-0.083}$	ϕ160 $^{-0.135}_{-0.095}$	ϕ180 $^{-0.066}_{-0.041}$				



d8: For General Purpose (Heavy Load)
e7: For General Purpose (Light Load)
f7 : For High Accuracy Purpose

(Unit: mm)

Part Number & Bushing Length Tolerance $^{-0.1}_{-0.3}$								Outer chamfer		Inner chamfer	Bushing inner diameter
60	70	80	100	120	130	140	150	C Face	Press fit		
607460	**607470**	**607480**						C0.5	4×15°	4×10°	60
607560	**607570**	**607580**	**6075100**					C0.5	4×15°	4×10°	60
637560	**637570**	**637580**						C0.5	4×15°	4×10°	63
658060	**658070**	**658080**						C0.5	4×15°	4×10°	65
708560	**708570**	**708580**	**7085100**					C0.5	4×15°	4×10°	70
709060	**709070**	**709080**						C0.5	4×15°	4×10°	70
759060	**759070**	**759080**	**7590100**					C0.5	4×15°	4×10°	75
759560	**759570**	**759580**	**7595100**					C0.5	4×15°	4×10°	75
809660	**809670**	**809680**	**8096100**	**8096120**				C0.5	4×15°	4×10°	80
8010060	**8010070**	**8010080**	**80100100**	**801100120**				C0.5	4×15°	4×10°	80
9011060		**8011080**	**90110100**					C1	5×15°	5×10°	90
10012060	**10012070**	**10012080**	**100120100**	**100120120**				C1	5×15°	5×10°	100
		10013080	**110130100**	**110130120**				C1	5×15°	6×10°	110
		10014080	**120140100**	**120140120**				C1	5×15°	6×10°	120
			125145100	**125145120**				C1	5×15°	6×10°	125
			130150100		**130150130**			C1	5×15°	6×10°	130
			140160100			**140160140**		C1	5×15°	6×10°	140
			150170100				**150170150**	C1	5×15°	6×10°	150
			160180100				**160180150**	C1	5×15°	6×10°	160

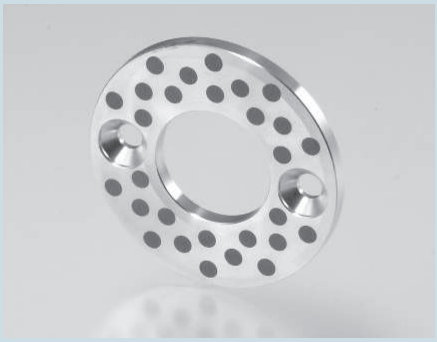
* Sizes not shown in the dimensional tables can also be manufactured.

TA DAISLIDE TA Thrust Washer (Bushing Inner Diameter: 10.2 to 120.5 mm)

Designation of Part Number

TA ○○ ○○

- Thickness (t)
- Nominal inner diameter
- Product symbol



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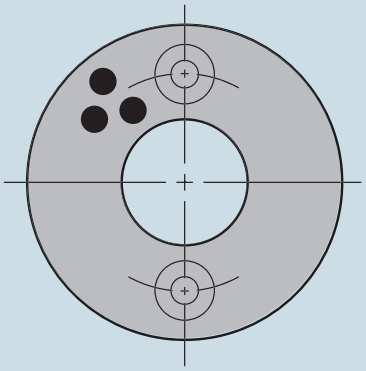
ELV

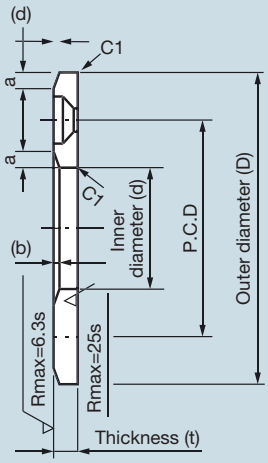
TA 1003

Please specify by part number.

Dimensions (mm)		Thickness (t) $^{0}_{-0.1}$					
Inner diameter (d)	Outer diameter (D)	3	5	7	8	10	
10.2	30	**TA1003**					
12.2	40	**TA1203**					
12.2	40	**TA1203N**					
13.2	40	**TA1303**					
14.2	40	**TA1403**					
15.2	50	**TA1503**					
16.2	50	**TA1603**					
16.2	50	**TA1603N**					
18.2	50	**TA1803**					
20.2	50		**TA2005**				
25.2	55		**TA2505**				
30.2	60		**TA3005**				
35.2	70		**TA3505**				
40.2	80			**TA4007**			
45.2	90			**TA4507**			
50.3	100				**TA5008**		
55.3	110				**TA5508**		
60.3	120				**TA6008**		
65.3	125				**TA6508**		
70.3	130					**TA7010**	
75.3	140					**TA7510**	
80.3	150					**TA8010**	
90.5	170					**TA9010**	
100.5	190					**TA10010**	
120.5	200					**TA12010**	

*Base metal is high-strength phosphor bronze.





(Unit: mm)

	Attachment hole			Chamfer	
	P.C.D	Qty.	Countersunk bolt	a	b
	20	2	M3	1.5	0.3
	28	2	M3	2	0.4
	No countersunk hole			2	0.4
	28	2	M3	2	0.4
	28	2	M3	2	0.4
	35	2	M3	2	0.4
	35	2	M3	2	0.4
	No countersunk hole			2	0.4
	35	2	M3	2	0.4
	35	2	M5	2.5	0.4
	40	2	M5	2.5	0.4
	45	2	M5	2.5	0.4
	50	2	M5	2.5	0.4
	60	2	M6	3	0.5
	70	2	M6	3	0.5
	75	4	M6	4	0.7
	85	4	M6	4	0.7
	90	4	M8	5	0.9
	95	4	M8	5	0.9
	100	4	M8	5	0.9
	110	4	M8	5	0.9
	120	4	M8	5	0.9
	140	4	M10	5	0.9
	160	4	M10	5	0.9
	175	4	M10	5	0.9

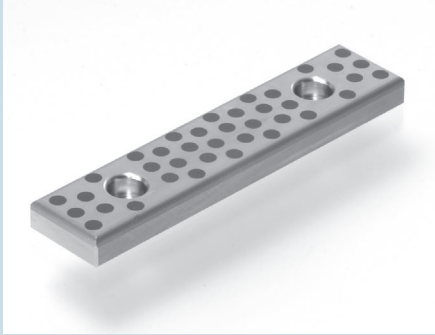
PA DAISLIDE PA plate

Designation of Part Number

PA ○○ ○○
- ○○ — Length
- ○○ — Width
- PA — Product Symbol

PA 1875

Please specify by part number.



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Part Number	Width	Length	Mounting-Hole Pitch					Mounting-Hole Bolt	
	W	L	a	b	c	d	e	Bolt Type	Quantity
PA1875	18 $^{0}_{-0.2}$	75 $^{0}_{-0.2}$	15	45				M6 Hexagon-Socket Head Cap	2
PA18100		100 $^{0}_{-0.2}$	25	50				M6 Hexagon-Socket Head Cap	2
PA18125		125 $^{0}_{-0.2}$	25	75				M6 Hexagon-Socket Head Cap	2
PA18150		150 $^{0}_{-0.2}$	25	100				M6 Hexagon-Socket Head Cap	2
PA2875	28 $^{0}_{-0.2}$	75 $^{0}_{-0.2}$	15	45				M6 Hexagon-Socket Head Cap	2
PA28100		100 $^{0}_{-0.2}$	25	50				M6 Hexagon-Socket Head Cap	2
PA28125		125 $^{0}_{-0.2}$	25	75				M6 Hexagon-Socket Head Cap	2
PA28150		150 $^{0}_{-0.2}$	25	100				M6 Hexagon-Socket Head Cap	2
PA35100	35 $^{0}_{-0.2}$	100 $^{0}_{-0.2}$	20	60				M8 Machine Screw	2
PA35150		150 $^{0}_{-0.2}$	20	55	55			M8 Machine Screw	3
PA35200		200 $^{0}_{-0.3}$	20	55	50	55		M8 Machine Screw	4
PA35250		250 $^{0}_{-0.3}$	20	70	70	70		M8 Machine Screw	4
PA35300		300 $^{0}_{-0.3}$	20	65	65	65	65	M8 Machine Screw	5
PA35350		350 $^{0}_{-0.3}$	20	80	75	75	80	M8 Machine Screw	5
PA3875	38 $^{0}_{-0.2}$	75 $^{0}_{-0.2}$	15	45				M6 Hexagon-Socket Head Cap	2
PA38100		100 $^{0}_{-0.2}$	25	50				M6 Hexagon-Socket Head Cap	2
PA38125		125 $^{0}_{-0.2}$	25	75				M6 Hexagon-Socket Head Cap	2
PA38150		150 $^{0}_{-0.2}$	25	100				M6 Hexagon-Socket Head Cap	2
PA4875	48 $^{0}_{-0.2}$	75 $^{0}_{-0.2}$	15	45				M6 Hexagon-Socket Head Cap	2
PA48100		100 $^{0}_{-0.2}$	25	50				M6 Hexagon-Socket Head Cap	2
PA48125		125 $^{0}_{-0.2}$	25	75				M6 Hexagon-Socket Head Cap	2
PA48150		150 $^{0}_{-0.2}$	25	100				M6 Hexagon-Socket Head Cap	2
PA50100	50 $^{0}_{-0.2}$	100 $^{0}_{-0.2}$	20	60				M8 Machine Screw	2
PA50150		150 $^{0}_{-0.2}$	20	55	55			M8 Machine Screw	3
PA50200		200 $^{0}_{-0.3}$	20	55	50	55		M8 Machine Screw	4
PA50250		250 $^{0}_{-0.3}$	20	70	70	70		M8 Machine Screw	4
PA50300		300 $^{0}_{-0.3}$	20	65	65	65	65	M8 Machine Screw	5
PA50400		400 $^{0}_{-0.5}$	20	90	90	90	90	M8 Machine Screw	5

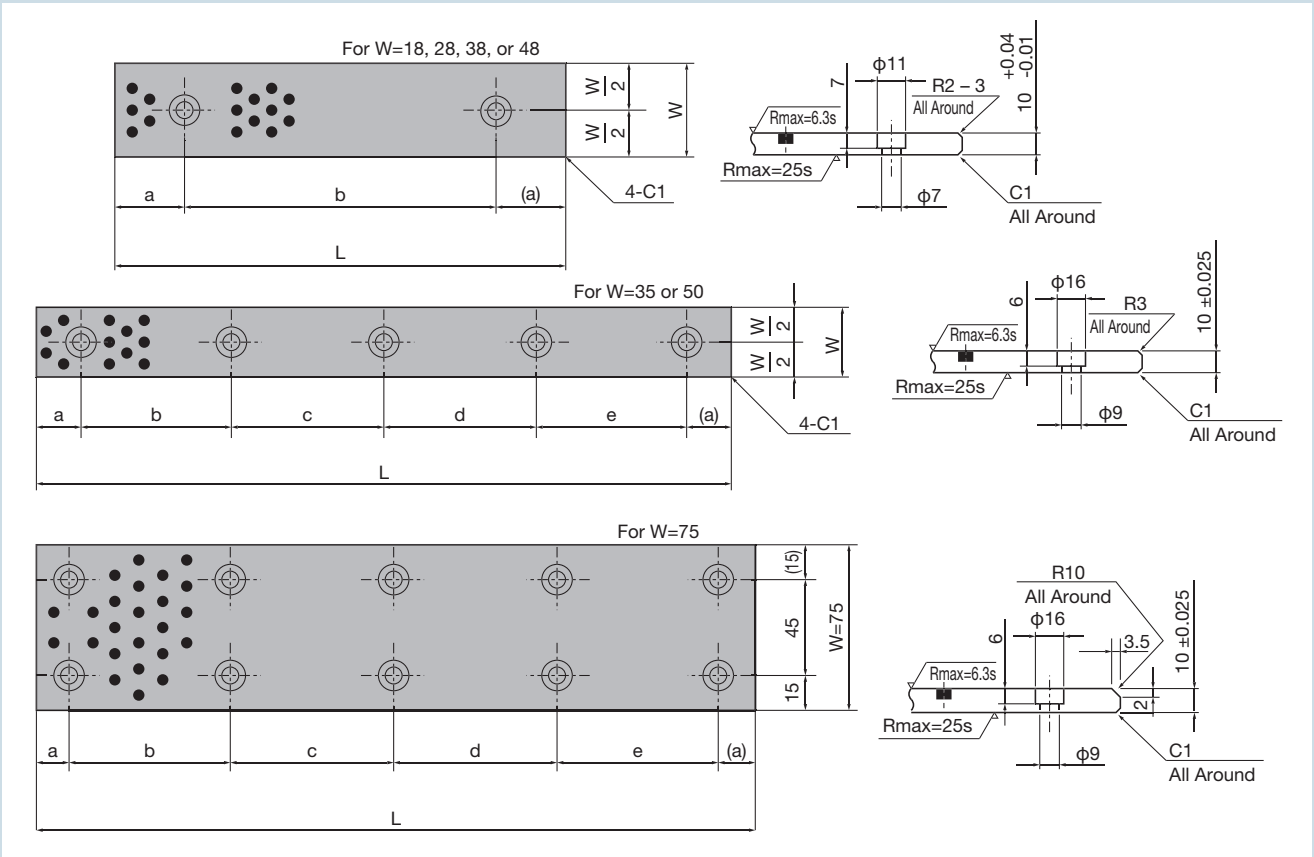
*Base metal is high-strength phosphor bronze.

(Unit: mm)

Part Number	Width	Length	Mounting-Hole Pitch					Mounting-Hole Bolt	
	W	L	a	b	c	d	e	Bolt Type	Quantity
PA75150	75 $^{0}_{-0.2}$	150 $^{0}_{-0.2}$	20	110				M8 Machine Screw	4
PA75200		200 $^{0}_{-0.3}$	20	80	80			M8 Machine Screw	6
PA75250		250 $^{0}_{-0.3}$	20	105	105			M8 Machine Screw	6
PA75300		300 $^{0}_{-0.5}$	20	85	90	85		M8 Machine Screw	8
PA75400		400 $^{0}_{-0.5}$	20	120	120	120		M8 Machine Screw	8
PA75500		500 $^{0}_{-0.5}$	20	115	115	115	115	M8 Machine Screw	10

*Base metal is high-strength phosphor bronze.

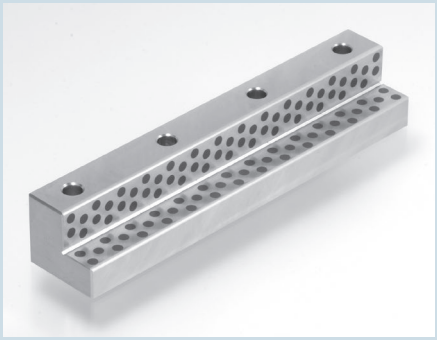
• PA Plate Standard Part Configuration



LA DAISLIDE L-Shaped

Designation of Part Number

LA ○○ ○○ ○
- Type
- Length
- Width
- Product Symbol



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LA 26100C

Please specify by part number.

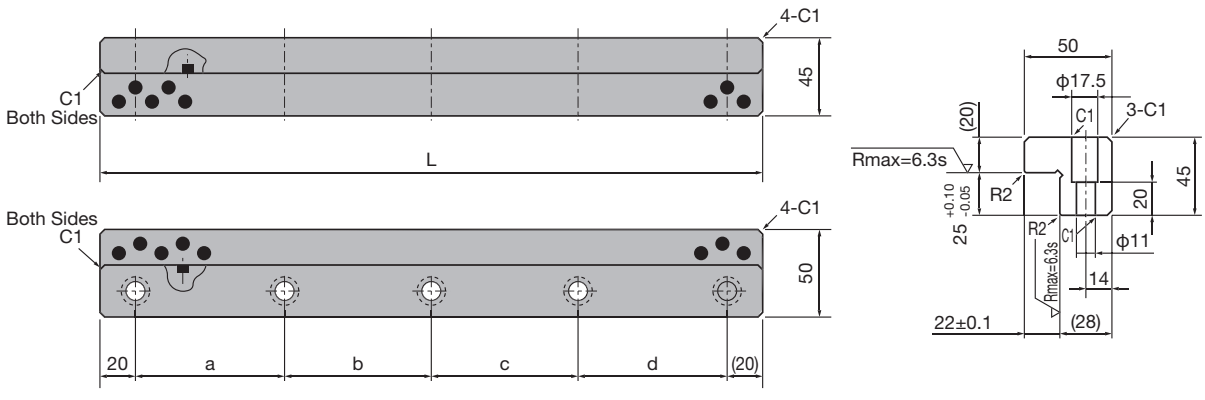
(Unit: mm)

Part Number	Type	Length	Assembling Hole Pitch				Assembling Bolt	
		L	a	b	c	d	Bolt Dia	Q'ty
LA26100C	Type C	100	60				M8	2
LA26150C	Type C	150	55	55			M8	3
LA26200C	Type C	200	55	50	55		M8	4
LA32100B	Type B	100	60				M10	2
LA32150B	Type B	150	55	55			M10	3
LA32200B	Type B	200	55	50	55		M10	4
LA32250B	Type B	250	70	70	70		M10	4
LA50200A	Type A	200	55	50	55		M10	4
LA50250A	Type A	250	70	70	70		M10	4
LA50300A	Type A	300	65	65	65	65	M10	5
LA50350A	Type A	350	80	75	75	80	M10	5

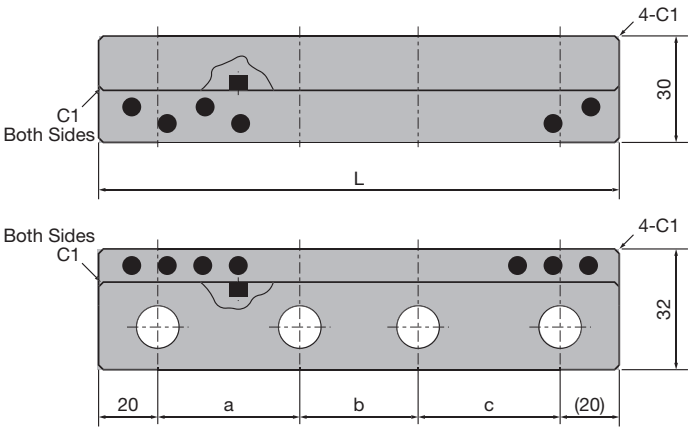
* Base metal is high-strength phosphor bronze.

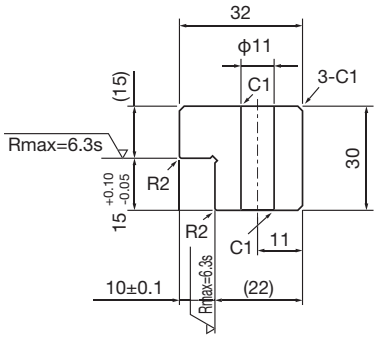
• Shape of Standard LA Plate Product

Type A

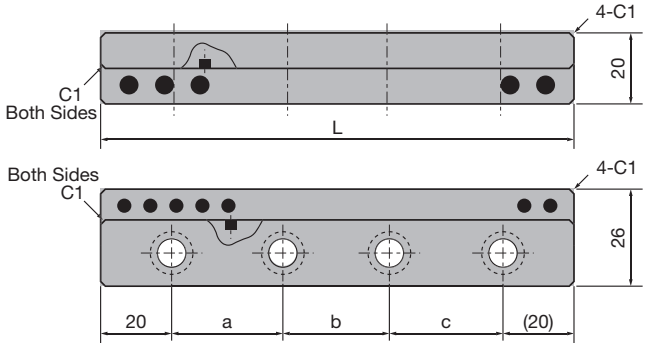


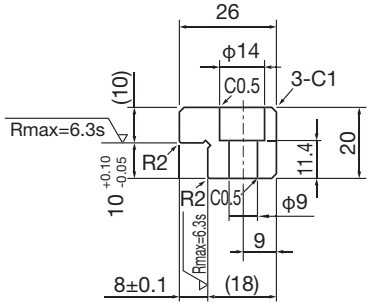
Type B


4-C1
C1
Both Sides
30
L
Both Sides
C1
4-C1
32
20
a
b
c
(20)


32
ϕ11
C1
3-C1
(15)
Rmax=6.3s
30
R2
15 +0.10 -0.05
R2
C1
11
10±0.1
Rmax=6.3s
(22)

Type C


4-C1
C1
Both Sides
20
L
Both Sides
C1
4-C1
26
20
a
b
c
(20)


26
ϕ14
C0.5
3-C1
(10)
Rmax=6.3s
20
R2
10 +0.10 -0.05
11.4
R2
C0.5
ϕ9
9
Rmax=6.3s
8±0.1
(18)

DAILUBO
(oil-impregnated sintered bearings)

Pb Free RoHS 2 ELV

We produce oil-impregnated sintered copper and steel bearings to customer specifications.

Material properties and major applications

Materials and symbols		Copper			Steel				
		DLC-00	DLC-07	DLC-15	DLF-98	DLF-98C	DLF-55	DLF-53	DLF-53C
Chemical composition (wt%)	Cu	Residual	Residual	Residual	1–3	1–3	25–35	38–48	38–48
	Sn	8–11	8–11	8–11	–	–	–	2–4	2–4
	C	–	0.5–1	1–2	–	0.2–0.8	–	–	0.2–0.8
	Pb	–	–	–	–	–	–	–	–
	Zn	–	–	–	–	–	–	–	–
	Fe	–	–	–	Residual	Residual	Residual	Residual	Residual
	Other	0.5 or less	0.5 or less	0.5 or less	3 or less	3 or less	3 or less	3 or less	3 or less
Radial crushing strength N/mm^2		150–360	150–200	120–170	200–300	250–350	140–200	150–250	150–250
Density g/cm^3		6.4–7.2	6.2–7.0	6.2–7.0	5.6–6.4	5.6–6.4	5.8–6.5	5.8–6.5	5.8–6.5
Oil content (min. vol%)		12	18	15	18	18	15	15	15
PV value limit in MPa·m/min		80	100	100	100	150	100	120	150
Speed	High speed	×	○	○	○	○	○	○	○
	Medium speed	○	○	◎	○	○	○	○	○
	Low speed	○	○	○	○	○	○	○	○
	Intermittent	×	○	○	○	○	○	○	○
	Oscillating	×	△	○	△	△	○	○	○
Load		High	Medium	Medium	High	High	Medium	Medium	Medium
Acoustics		○	○	○	△	△	○	△	○
Machinability		◎	○	△	○	△	○	○	△

Symbol	Applications	Characteristics
DLC-00	Tape recorders, carriages, miniature motors	Excellent machining and caulking properties
DLC-07	Tape recorders, cash registers, carriages	Excellent caulking properties
DLC-15	Fans, exhaust fans, capstans	Low-noise bearings, general purpose material for oil-impregnated sintered copper bearings
DLF-98	Speed meters, collars, gears, boxes	Excellent machining and caulking properties, suitable for use in mechanical structures
DLF-98C	Geared motors, spacers, steering systems	High strength, general purpose material for oil-impregnated sintered steel bearings
DLF-55	Office automation equipment, AC motors	Low-noise bearing, alternative to copper, excellent conformability
DLF-53	Office automation equipment, AC motors	Excellent conformability
DLF-53C	Office automation equipment, AC motors, stepping motors	

Types of oil impregnation

ISO VG68 turbine oil or equivalent is standard, but other oils can be impregnated per customer specifications.

Dimensional tolerances

JIS B 1581 or equivalent. High-precision bearings are manufactured per customer specifications. Please inquire directly.

Steel bushing
(lubricated metal)

Pb Free RoHS2 ELV

HOISI PRECISION 凱獅精密 ISO 7312 9830

We also manufacture wound bushings made of steel or stainless steel without any slide bearing alloys. Also, DAISULPH surface treatments for enhancing tribological properties of surfaces are also available.

Material properties

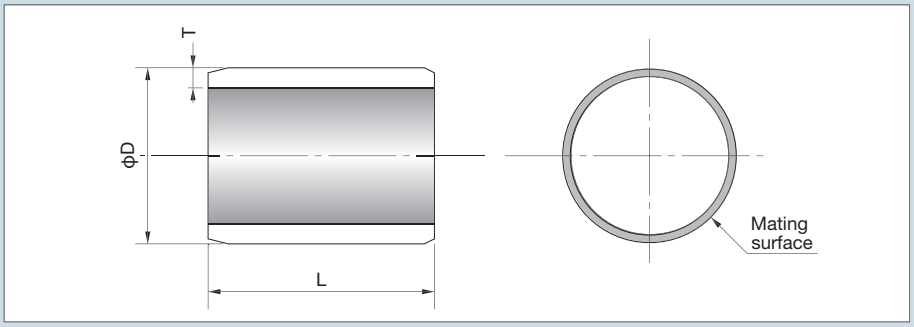
Symbol	Chemical composition (wt%)							
	Fe	C	Ni	Cr	Si	Mn	P	S
SUS304 (18-8 stainless steel)	Residual	0.08 or less	8.00 to 10.50	18.00 to 20.00	1.00 or less	2.00 or less	0.45 or less	0.030 or less
SPCC (cold-rolled narrow steel strip)	Residual	0.08 or less	8.00 to 10.50	18.00 to 20.00	1.00 or less	2.00 or less	0.45 or less	0.030 or less
SAPH (rolled steel)	Residual	0.08 or less	8.00 to 10.50	18.00 to 20.00	1.00 or less	2.00 or less	0.45 or less	0.030 or less

DAISULPH surface treatment

Symbol	Features	Hardness
DSN (carbonitriding)	Wear resistant	Hv700 or higher
DSS (sulphur nitriding)	Non-seizing, wear resistant	Hv600 or higher
DSM (sulphur nitriding plus molybdenum disulfide coating)	Non-seizing, non-lubricated (dry)	(Treated layer) Hv600 or higher

Geometry and dimensions

Wound bushing



Manufacturing range

Outer diameter (D): ϕ5 to 200
Thickness (t): 0.5 to 3.0 mm
Length (L): 5 to 100

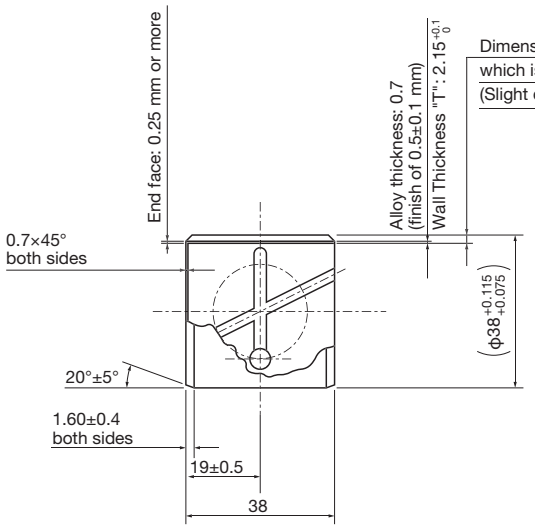
Metal bushing
(lubricated metal)

The use of bimetal or trimetal linings made of bearing alloys on a steel backing provides these lubricated metal bearings with good mechanical strength and makes them suitable for high-speed, high-load applications with proper lubrication.

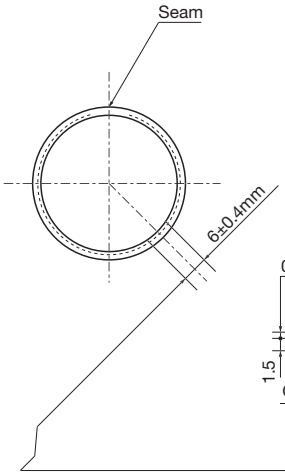
Material properties

Bearing material	Product No.	Equivalent SAE No.	Chemical composition (%)								Characteristics
			Cu	Sn	Pb	Sb	Al	Ni	Si	Graphite	
White metal	**W90**	11	4	Residual		6					Excellent resistance to seizing, emebeddability, and conformability
Copper alloy	**B11**	—	Residual	11							Sintered bronze withstands heavy loads.
	LG21X	—	Residual	3	21						Solid lubricant embedded in bronze for excellent boundary lubrication
	L10	792 797	Residual	10	10			<1			Superior impact load characteristics. Excellent wear resistance and corrosion resistance when using hardened axles.
	L23	794 799	Residual	3	23			<1			Suitable for use at high speeds, with more lead than L10 and excellent tribological properties.
	B5BS		Residual	6						Other Bi:0.5	Lead-free bearing materials with excellent resistance to both wear and seizing.
	NB6X		Residual	6						Other Ni:3	Excellent resistance to both corrosion and wear, especially in high heat at heavy surface pressures.
	CX4		Residual	10						Other Bi:0.5	Excellent resistance to fatigue
Aluminum alloy	**A20**	—	1	20			Residual				Excellent load bearing characteristics
	A17X	—	0.7	12	1.7	0.3	Residual		2.5	Other	Excellent performance non-seizing properties in heavy-duty, high-speed engines
	A66T	—	1	6			Residual		6	Other	Lead-free bearing materials with excellent resistance to both wear and seizing.
	A22E		1	12			Residual				

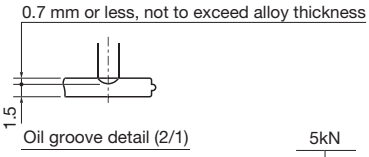
Typical design



Dimensions are given not for the inner diameter but for the thickness.
which is easy to measure and check for eccentricity.
(Slight deviation in wall thickness at seam and other press distortion parts is permissible.)

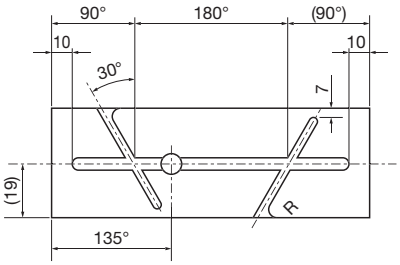


Housing	Diameter	ϕ38H +0.025 0
	Material	cast iron
Shaft diameter (std)		ϕ34e7 -0.025 -0.075
Oil clearance		0.025 to 0.10 mm

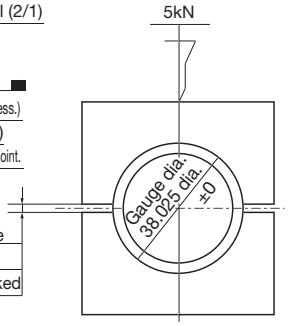


Oil groove detail (2/1)

(Indicates minimum radius when subject to distortion from stamping process.)
(Slot with minor diameter of 6.0±0.4 mm also OK.)
It is important to avoid placing lubricating grooves in the area 60-120° from the joint.



Inside development
(Figures indicate machining dimensions during blanking.
Some discrepancies can be expected with the orthographic view of interior for the finished product.)



The indicator shallbe set to zero with seam size plug as the ϕ38.025 ±0 master block and indcator should be +0.130 +0.065 when bushing is checked

O.D and Measuring method

Note1 : The finished inner diameter after assembly should be 34 +0.025 0
Note2: Indicate clearly the machining process after assembly.
(broaching, boring, reaming, burnishing)

Standard dimensions for metal bushings

Nominal dimensions		Finished dimensions					
Bushing inner diameter	Housing inner diameter	Housing inner diameter H7	Axle diameter f7, e7	Housing inner diameter H7 after assembly	Bushing outer diameter	Bushing length	Thickness (alloy thickness 0.3 mm)
10	**12**	12 $^{+0.018}_{0}$	10 f7 $^{-0.013}_{-0.028}$	10 $^{+0.015}_{0}$	12 $^{+0.068}_{+0.043}$	5. 10. 15	1.0 $^{0}_{-0.015}$
12	**14**	14 $^{+0.018}_{0}$	12 f7 $^{-0.016}_{-0.034}$	12 $^{+0.018}_{0}$	14 $^{+0.068}_{+0.043}$	5. 15. 20	
15	**17**	17 $^{+0.018}_{0}$	15 $^{-0.016}_{-0.034}$	15 $^{+0.018}_{0}$	17 $^{+0.068}_{+0.043}$	10. 15. 20	
18	**20**	20 $^{+0.021}_{0}$	18 $^{-0.016}_{-0.034}$	18 $^{+0.018}_{0}$	20 $^{+0.086}_{+0.056}$	10. 20. 30	
20	**23**	23 $^{+0.021}_{0}$	20 f7 $^{-0.020}_{-0.041}$	20 $^{+0.021}_{0}$	23 $^{+0.086}_{+0.056}$	10. 20. 30	1.5 $^{0}_{-0.015}$
22	**25**	25 $^{+0.021}_{0}$	22 $^{-0.020}_{-0.041}$	22 $^{+0.021}_{0}$	25 $^{+0.086}_{+0.056}$	15. 25. 40	
25	**28**	28 $^{+0.021}_{0}$	25 $^{-0.020}_{-0.041}$	25 $^{+0.021}_{0}$	28 $^{+0.086}_{+0.056}$	15. 30. 40	
28	**32**	32 $^{+0.025}_{0}$	28 $^{-0.020}_{-0.041}$	28 $^{+0.021}_{0}$	32 $^{+0.115}_{+0.075}$	15. 30. 50	2.0 $^{0}_{-0.02}$
30	**34**	34 $^{+0.025}_{0}$	30 $^{-0.020}_{-0.041}$	30 $^{+0.021}_{0}$	34 $^{+0.115}_{+0.075}$	15. 30. 50	
32	**36**	36 $^{+0.025}_{0}$	32 f7 $^{-0.025}_{-0.050}$	32 $^{+0.025}_{0}$	36 $^{+0.115}_{+0.075}$	20. 40. 50	
35	**39**	39 $^{+0.025}_{0}$	35 $^{-0.025}_{-0.050}$	35 $^{+0.025}_{0}$	39 $^{+0.115}_{+0.075}$	20. 40. 60	
38	**42**	42 $^{+0.025}_{0}$	38 $^{-0.025}_{-0.050}$	38 $^{+0.025}_{0}$	42 $^{+0.115}_{+0.075}$	20. 40. 60	
40	**44**	44 $^{+0.025}_{0}$	40 $^{-0.025}_{-0.050}$	40 $^{+0.025}_{0}$	44 $^{+0.115}_{+0.075}$	20. 40. 60	
42	**46**	46 $^{+0.025}_{0}$	42 $^{-0.025}_{-0.050}$	42 $^{+0.025}_{0}$	46 $^{+0.115}_{+0.075}$	20. 40. 60	
45	**50**	50 $^{+0.025}_{0}$	45 $^{-0.025}_{-0.050}$	45 $^{+0.025}_{0}$	50 $^{+0.115}_{+0.075}$	30. 50. 80	2.5 $^{0}_{-0.025}$
48	**53**	53 $^{+0.030}_{0}$	48 $^{-0.025}_{-0.050}$	48 $^{+0.025}_{0}$	53 $^{+0.145}_{+0.095}$	30. 50. 80	
50	**55**	55 $^{+0.030}_{0}$	50 $^{-0.025}_{-0.050}$	50 $^{+0.025}_{0}$	55 $^{+0.145}_{+0.095}$	30. 50. 80	
52	**57**	57 $^{+0.030}_{0}$	52 e7 $^{-0.060}_{-0.090}$	52 $^{+0.030}_{0}$	57 $^{+0.145}_{+0.095}$	30. 60. 80	
55	**60**	60 $^{+0.030}_{0}$	55 $^{-0.060}_{-0.090}$	55 $^{+0.030}_{0}$	60 $^{+0.145}_{+0.095}$	30. 60. 90	
60	**65**	65 $^{+0.030}_{0}$	60 $^{-0.060}_{-0.090}$	60 $^{+0.030}_{0}$	65 $^{+0.145}_{+0.095}$	30. 60. 90	
65	**70**	70 $^{+0.030}_{0}$	65 $^{-0.060}_{-0.090}$	65 $^{+0.030}_{0}$	70 $^{+0.145}_{+0.095}$	30. 70. 100	
70	**76**	76 $^{+0.030}_{0}$	70 $^{-0.060}_{-0.090}$	70 $^{+0.030}_{0}$	76 $^{+0.160}_{+0.095}$	40. 70. 100	3.0 $^{0}_{-0.03}$
75	**81**	81 $^{+0.035}_{0}$	75 $^{-0.060}_{-0.090}$	75 $^{+0.030}_{0}$	81 $^{+0.165}_{+0.100}$	40. 80. 100	
80	**86**	86 $^{+0.035}_{0}$	80 $^{-0.060}_{-0.090}$	80 $^{+0.030}_{0}$	86 $^{+0.165}_{+0.100}$	40. 80. 100	
85	**91**	91 $^{+0.035}_{0}$	85 e7 $^{-0.072}_{-0.107}$	85 $^{+0.035}_{0}$	91 $^{+0.165}_{+0.100}$	40. 90. 100	
90	**96**	96 $^{+0.035}_{0}$	90 $^{-0.072}_{-0.107}$	90 $^{+0.035}_{0}$	96 $^{+0.165}_{+0.100}$	50. 100	
100	**106**	106 $^{+0.035}_{0}$	100 $^{-0.072}_{-0.107}$	100 $^{+0.035}_{0}$	106 $^{+0.180}_{+0.115}$	50. 100	
110	**117**	117 $^{+0.035}_{0}$	110 $^{-0.072}_{-0.107}$	110 $^{+0.035}_{0}$	117 $^{+0.180}_{+0.115}$	60. 100	3.5 $^{0}_{-0.035}$
120	**127**	127 $^{+0.040}_{0}$	120 $^{-0.072}_{-0.107}$	120 $^{+0.035}_{0}$	127 $^{+0.185}_{+0.120}$	60. 100	

This is a made-to-order product, for which we maintain no inventory. Depending upon actual usage conditions, additional design work for oil grooves and lubrication channels might be necessary.
NB1: We make every effort to ensure that the dimensions and geometry of oil grooves and lubrication channels are optimally designed.
NB2: When inner diameter finishing is performed after assembly, we manufacture a semi-product with sufficient finishing allowance built into the upper surface thickness.

When requesting design work, please attach your drawings to the Bearing Specification Sheet for Lubricated Bearings found at the end of this catalog and send both to Daido Metal.

Compact assemblies
(all types of mating parts for bearings)

Daido dry bearings can be applied in the design and manufacture of assemblies suited to the customers' needs.

- **Feel free to consult with us on bearing housing materials that meet your requirements.**
- **We also manufacture insert-molded plastic housing products.**

Geometry

①Cylinder ②Flange cylinder ③Rectangle
④Geared ⑤Spherical
⑥All types of deformed geometries

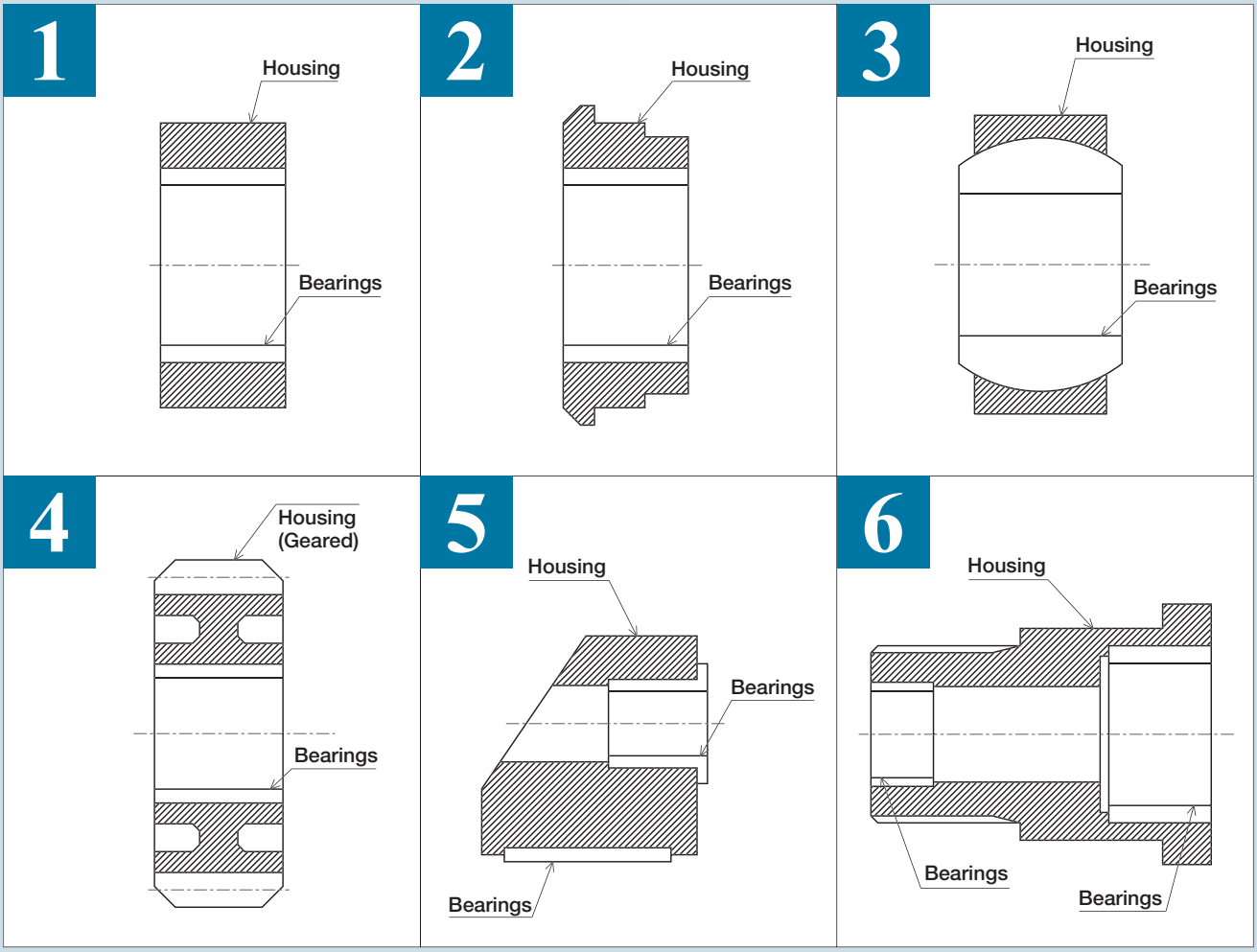
Housing materials

①Steel ②FC ③FCD
④Sintered steel ⑤Aluminum alloy
⑥Plastics (polyoxymethylene (POM), nylon, etc.)

Applications

①Automotive parts
②Office automation equipment parts
③Industrial machinery parts
④Energy-saving equipment parts

Applications



PLANNING

Designing dry bearings, Part 1

1. What are dry bearings?

Dry bearings are designed to be used under dry operating conditions with no additional lubricant and have been developed to help simplify the construction of the device they are used in and to be suitable for maintenance-free operation.
In recent years, a wide variety of dry bearings have been developed in response to advances in design technology and demands for greater reliability.

2. Types of sliding bearings

Lubrication regimes

Sliding bearings are used under four different lubrication regimes: hydrodynamic, elastohydrodynamic, boundary, and non-lubricated. Dry bearings fall under the non-lubricated regime.

①Hydrodynamic lubrication
Liquid lubrication provides an axle with support from a thin film of liquid lubricant, thereby eliminating wear and providing a semi permanent service life. The service life is determined by fatigue that is a result of dynamic loading. In general, there are no limits on PV or V values, but it is necessary to take care with maximum pressure (Pmax), maximum temperature (Tmax), and the minimum thickness (Hmin) to which the lubricating film is subject.

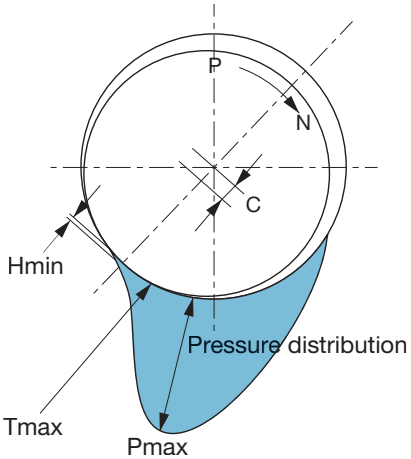


Fig. 1: Formation of lubricating film by liquid lubricants

②Elastohydrodynamic lubrication
This is a field that can still be understood in terms of fluid mechanics. There are limitations placed on PV values, however, because of contact between raised solid features, also called asperities, along the sliding surface. This results in wear and the need to be aware of the potential for seizing.

③Boundary lubrication (semidry)
Loss of lubricating film results in contact between solids, with lubricant remaining in the depressions between asperities. This results in restrictions on PV values and V values, especially. Wear becomes the deciding factor in determining service life.
④Non-lubricated (dry)
Dry friction in the absence of any lubrication except for solid lubricants, which is to say, dry bearings.
PV and V values must be very small and wear determines service life.

Comparison of sliding bearings and rolling bearings

Here is a comparison of sliding bearings with rolling bearings in each of the four lubrication regimes.

①Hydrodynamic lubrication
Resistance to heavy loading

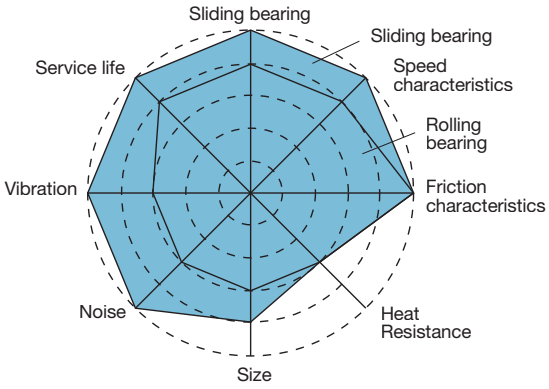


Fig. 2: Comparison under hydrodynamic lubrication

②Elastohydrodynamic lubrication
Example of a DAIDYNE DDK02 sliding bearing

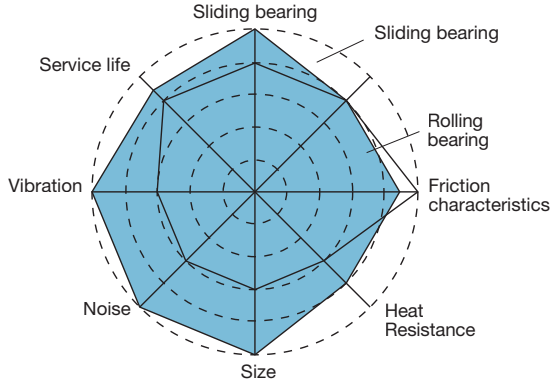


Fig. 3: Comparison under elastohydrodynamic lubrication

③Boundary lubrication
Example of a DAIBEST DBX01 grease-lubricated sliding bearing

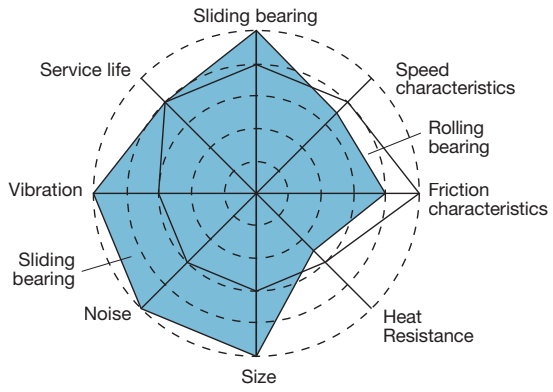


Fig. 4: Comparison under boundary lubrication

④Non-lubricated (dry)
Example of a DAIDYNE DDK05 sliding bearing

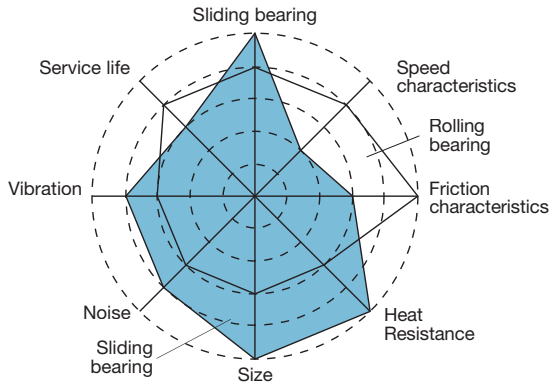


Fig. 5: Comparison under non-lubricated (dry) conditions

Table 1: Comparison of sliding bearings and rolling bearings

Characteristics	Sliding bearing	Rolling bearing
Impact resistance	Superior	Inferior
Corrosion resistance	Generally superior, depending upon type	Inferior
Water resistance	Generally superior, depending upon type	Inferior
Oscillating motion	Significantly superior	Inferior
Reciprocating motion	Superior	Only with linear or stroke ball bearings
Intermittent motion	Superior	Superior
Contamination acceptance	Superior, depending upon selection of materials and processing	Inferior
Weight	Light	Heavy
Availability	Some standard models available.	Standard models available.
Geometry	High degree of freedom	Very low degree of freedom
Price	Standard models are generally less costly than rolling bearings	——

NB: The above stated comparisons are of typical performance levels. Careful design and selection of materials will improve the performance of any type of for sliding bearing.
Please fill out the Bearing Specification Sheet found at the end of this catalog and direct your inquiry to Daido Metal.

Designing dry bearings, Part 2

3. Design of sliding bearings

Design procedure and study items

The procedures and study items necessary to the design of a sliding bearing suitable for the intended application are shown below.

Procedure	Study items
1 Determine specifications for the area surrounding the sliding bearing.	
2 Determine a basic layout for the sliding bearing.	Specify target values for axle diameter, bearing width, outer diameter, housing materials, lubrication regime, and other parameters, as suitable for the object of the design and development.
3 Determine the dimensions of the sliding bearing.	Validate P・V and the maximum allowable PV value. Determine necessity for external lubrication.
4 Determine materials for the sliding bearing.	Operating temperature Ambient conditions for the sliding bearing
5 Compare with existing products and similar products.	Refer to detailed specifications for similar products, if available.
6 Detailed design of sliding bearings	Verify outer diameter of sliding bearing. Validate minimum lubricating film thickness, power loss, heat generation, and other parameters. (lubrication model) Validate necessity for oil grooves, lubrication channels, indents, etc. (lubrication model) Validate clearances.
7 Validate the area around the sliding bearing.	Validate the materials, roughness, rigidity, and other aspects of the housing. Validate materials, roughness, hardness, surface finish, and other aspects of mating surfaces. Validate countermeasures for contamination.
8 Complete design of sliding bearings	

P, V, PV value, and maximum allowable PV value

Here is a comparison of sliding bearings with rolling bearings in each of the four lubrication regimes.

①Specific Load (P)

The term surface pressure refers to the load per unit area applied to a sliding surface.

$$P(MPa) = \frac{W}{d \cdot L} \quad \text{(Equation. 1)}$$

W: the load applied to the bearing in N
d: diameter of the axle in mm, L: width of the bearing in mm

The value d · L is a projected area and larger than the actual area of contact, but is used for practical convenience.

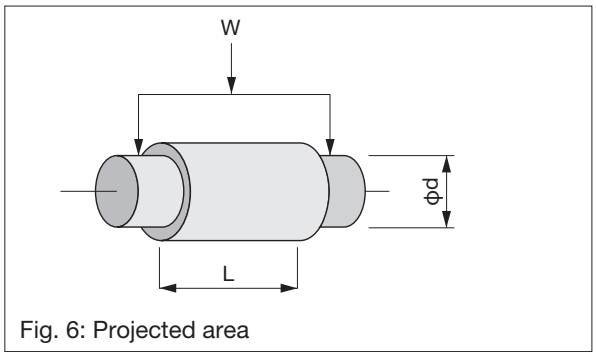


Fig. 6: Projected area

Example:
Find the surface pressure P for a standard K5B2015 bearing to which a load of 6 kN is applied.
Answer:
Axle diameter: 20 mm, axle length: 15 mm

$$P = \frac{6000}{20 \times 15} = 20(MPa)$$

②Sliding speed (V)

The term sliding speed refers to speed of the bearing surface relative to the mating surface.

$$V(m/min) = \frac{\pi \cdot d \cdot N}{1000} \quad \text{(Equation. 2)}$$

V: speed in m/min d: diameter of the axle in mm
N: rotational speed in rpm

Example:
Find the sliding speed for an axle with a 20-mm diameter rotating at a speed of 60 rpm.
Answer:

$$V = \frac{\pi \times 20 \times 60}{1000} \approx 3.8(m/min)$$

③PV value and maximum allowable PV value

Selection of a suitable sliding bearing requires more than just satisfying requirements for P and V. The product of P × V, or PV value, is the key to selecting the right sliding bearing.

Lubrication regimes	PV values in MPa·m/sec	P values in MPa	PV values in MPa·m/sec
Hydrodynamic lubrication	100	High	10
Elastohydrodynamic lubrication	10	↑	1
Boundary lubrication	1	10 ↓	0.1
Non-lubricated (dry)	0.1	Low	0.01

Table 2: Order of PV, P, and V values per lubrication regime

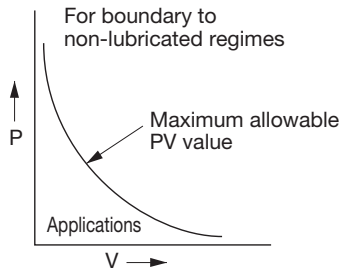


Fig. 7 Maximum allowable PV value

④Slide plate specific Load (P) and sliding speed (V)

$$P\ (MPa) = \frac{W}{B \cdot L} \quad \text{(Equation. 3)}$$

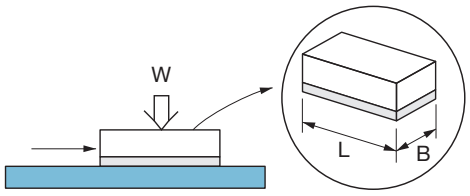


Fig. 8 Slide plate

$$V(m/min) = \frac{S}{T} \cdot \frac{60}{1000} \text{ or } V = \frac{2SC}{1000} \quad \text{(Equation. 4)}$$

V: speed in m/min
W: the load applied to the slide plate in N
B: slide plate width
L: slide plate length
S: stroke in mm
T: time to complete one stroke in seconds
C: number of cycles completed per minute

Example:
Find the surface pressure P for a 50 mm by 30 mm slide plate to which a load of 5 kN is applied.
Answer:

$$P(MPa) = \frac{5000}{50 \times 30} \approx 3.3(MPa)$$

Example:
Find the sliding speed V for a slide plate with a stroke of 20 mm sliding along a mating surface at a rate of 50 cycles per minute.
Answer:

$$V = \frac{2 \times 50 \times 20}{1000} = 2(m/min)$$

⑤Thrust washer specific Load (P) and sliding speed (V)

$$P(MPa) = \frac{W}{\frac{\pi}{4}(D^2 - d^2)} \quad \text{(Equation. 5)}$$

$$V(m/min) = \frac{\pi \cdot \frac{D+d}{2} \cdot N}{1000} \quad \text{(Equation. 6)}$$

NB: The thrust washer sliding speed is calculated based on the mean of the inner and outer diameters.

P: pressure in MPa
V: speed in m/min
W: the load applied to the thrust washer in N
D: outer diameter of the thrust washer in mm
d: inner diameter of the thrust washer in mm

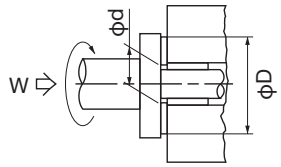


Fig. 9: Thrust washer

Example:
Find the specific Load (P) and sliding speed (V) for a standard K5T20 thrust washer to which a load of 10 kN is applied at 20 rpm.
Answer:

$$P = \frac{10000}{\frac{\pi}{4}(38^2 - 22^2)} \approx 13.3(MPa)$$

$$V = \frac{\pi \times \frac{(38+22)}{2} \times 20}{1000} \approx 1.9(m/min)$$

Designing dry bearings, Part 3

Housing

①All Daido bearings are designed to be press fit into tolerance class H7 housings.
②To prevent scoring during press fitting, chamfer the press fit side as shown in the diagram below.

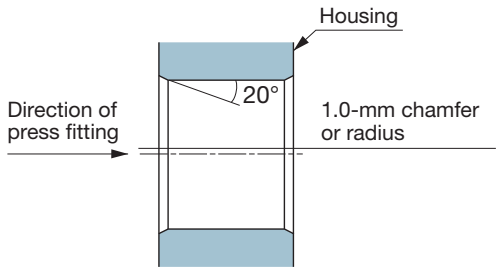


Fig. 10: Housing

③We recommend a normal housing surface roughness of 6.3s, but a roughness of up to 12.5s is acceptable.
④In order to maintain rigidity, the outer diameter of a steel housing is ordinarily at least 150% of the axle diameter, but for aluminum or other light alloys, this should be at least 200%.

Axle (mating surface)

①We recommend a normal axle surface roughness of 0.8-1.6s, but a roughness of up to 3.2s is acceptable. Typical data showing the relationship between surface mating surface roughness and wear for DDK05 dry bearings is shown in Fig. 11.

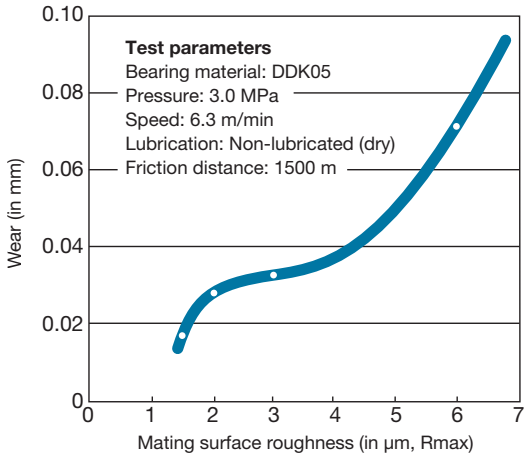
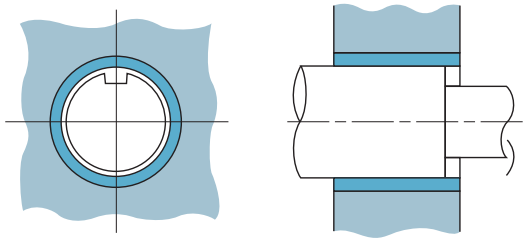


Fig. 11: Surface mating surface roughness and wear

②Do not use the kinds of axles described below.



Keyed axles (which shave away the bearing)

Stepped axles (which cause the bearing to wear unevenly)

Fig. 12: Axles

Thickness

Thickness for all standard products can be found by referring the related pages for that product.
In general, bearings are classified as shown below.

Table 3: The Ratio of Thickness (T) to Outer Diameter (D)

Form	T/D
Thin-walled	0.03 to 0.06
Thick-walled metallic solid	0.08 to 0.12
Thick-walled plastic solid	0.1 to 0.15

Press-fitting margin

Prior to being press fit, the outer diameter of the bushing is larger than the inner diameter of the housing.
This differential is called a press-fitting margin, and the stress produced by pressing the bushing into the housing prevents the bushing from rotating or slipping out of the housing.
Minimum press-fitting margin = Bushing Dmin - Housing dmax
Maximum press-fitting margin = Bushing Dmax - Housing dmin
(Equation. 7)

Example:
Find the press-fitting margin for a standard DDK05 bushing K5B2015 with a $\phi 23H7^{+0.021}_{0}$ housing.
Answer:

Bushing Dmax = ϕ23.081
Bushing Dmin = ϕ23.046
Housing dmax = ϕ23.021
Housing dmin = ϕ23.000
Minimum press-fitting margin = ϕ23.046-ϕ23.021 = 0.025
Maximum press-fitting margin = ϕ23.046-ϕ23.000 = 0.081

Inner diameter after assembly

Knowing the inner diameter after assembly is necessary to obtaining an accurate clearance between the axle and the bushing inner diameter.

❶For bushings that give dimensions for outer diameter and thickness

To ensure that the housing has sufficient rigidity to prevent it from expanding after the press fitting:

Assembled dmin = housing dmin-2·Tmax
Assembled dmax = housing dmax-2·Tmin (Equation. 8)

Example:

Find the assembled inner diameter (d) after press-fitting a standard DDK05 bushing K5B2015 to a housing with an inner diameter of $\phi 23H7^{+0.021}_{0}$.

Answer:

Housing dmax = ϕ23.021
dmin = ϕ23.000
DDK05 bushing thickness Tmax = 1.500
Tmin = 1.470
Assembled dmin = ϕ23.000 - 2×1.500 = ϕ20.000
Assembled dmax = ϕ23.021 - 2×1.470 = ϕ20.081
Assembled d = $\phi 20^{+0.081}_{0}$

❷For bearings that give dimensions for outer diameter and inner diameter

To ensure that the housing has sufficient rigidity to prevent it from expanding after the press fitting:

Assembled dmin = housing dmin - maximum press-fitting margin
Assembled dmax = housing dmax - minimum press-fitting margin (Equation. 9)

Example:

Find the assembled inner diameter (d) after press-fitting a standard THERMALLOY D type bushing DM20815 to a housing with an inner diameter of $\phi 28H7^{+0.021}_{0}$.

Answer:

D type bushing Dmax = ϕ28.041
Dmin = ϕ28.028
D type bushing dmax = ϕ20.131
dmin = ϕ20.110

Per Equation. 7
Minimum press-fitting margin = ϕ28.028-ϕ28.021 = 0.007
Maximum press-fitting margin = ϕ28.041-ϕ28.000 = 0.041
Assembled dmin = ϕ20.110 - 0.041 = ϕ20.069
Assembled dmax = ϕ20.131 - 0.007 = ϕ20.124
Assembled d = $\phi 20^{+0.124}_{+0.069}$

Clearance

①Calculating clearances

Minimum clearance =
assembled dmin - maximum axle diameter
Maximum clearance =
assembled dmax - minimum axle diameter (Equation. 10)

Example:

Find the clearance for a standard DDK05 bushing K5B2015 press-fitted to a $\phi 23H7^{+0.021}_{0}$ housing and equipped with a $\phi 20^{-0.025}_{-0.046}$ axle.

Answer:

The assembled d is $\phi 20^{+0.081}_{0}$, per Formula No. 8.
Clearancemin = ϕ20.000 - 19.975 = 0.025
Clearancemax = ϕ20.081 - 19.954 = 0.127
Clearance is between 0.025 to 0.127.

Service life

The service life of a dry bearing is generally determined by wear to the bearing. Specific Load (P), sliding speed, lubrication parameters, surface roughness of the mating material, operating conditions, ambient conditions, and other factors have a major impact, which makes accurate calculation of wear extremely difficult.

The following formula is commonly used to approximate wear.

W = kPVT (Equation. 11)

W: wear in μm
P: specific Load (P) in MPa
k: coefficient of wear, equivalent to μm · cm^2 · min/N · m · H
V: sliding speed in m/min
T: service life in hours

The factors that contribute to wear are shown in Fig. 13, and should be given thorough consideration when designing a sliding bearing.

Designing dry bearings, Part 4

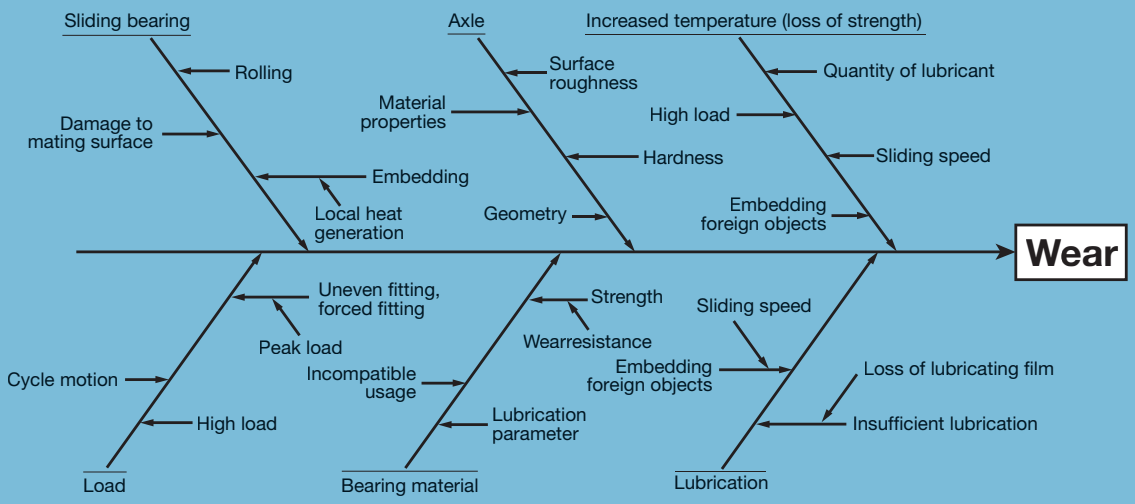


Fig. 13: General wear cause and effect diagram

Coefficient of friction

As shown in the diagram below, the coefficient of friction is the ratio of the force F needed to move the sliding surface to the weight W applied to the sliding surface.

Coefficient of friction: $\mu = \frac{F}{W}$ (Equation. 12)

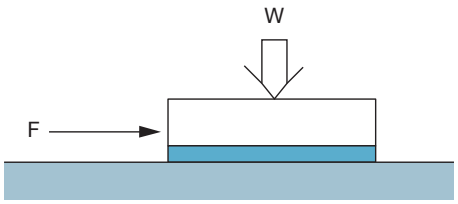


Fig. 14: Coefficient of friction

Obviously, the coefficient of friction for bearings under hydrodynamic lubrication (0.002 to 0.01) is lowest and increases progressively through boundary lubrication (0.01 to 0.08) and non-lubricated (0.08 to 0.3) conditions.

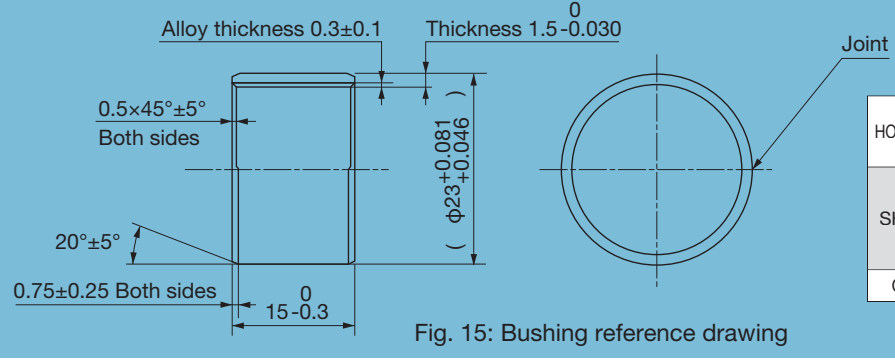
Heat generation

Although friction surfaces are constantly generating heat, this can be ignored when the heat itself is low or heat dissipation is high. The amount of heat generated is equivalent to the friction loss of the bearing: Calorific value = the coefficient of friction · PV value · k (Equation. 13).

For bearings under hydrodynamic lubrication, the lubricant carries away almost all of the generated heat, but for boundary lubrication and non-lubricated bearing, it is necessary to find a way either to reduce the amount of heat generated or improve heat dissipation. Also, it is important to be aware that bearing performance tends to deteriorate as the temperature rises.

Basic production drawings for sliding bearings

A typical production drawing for a sliding bearing detailing parameters finalized per the above is shown in Fig. 15.



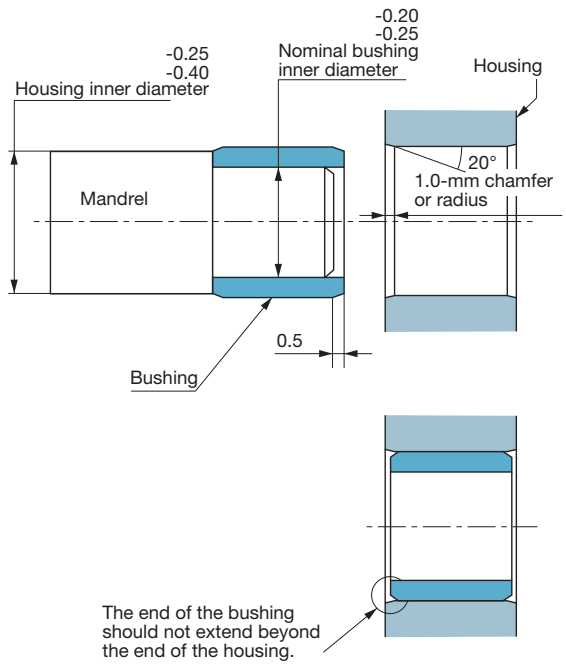
HOUSING	DIAMETER	ϕ23 +0.021 0
	MATERIAL	
SHAFT	DIAMETER	ϕ20 -0.025 -0.046
	MATERIAL	
	HARDNESS	
OIL CLEARANCE		0.025 to 0.127

Fig. 15: Bushing reference drawing

Bushing mounting techniques

❶Press-fitting of bushings

Using a vice or an arbor press, set the bushing in a suitable mandrel and press fit smoothly into the housing. It is extremely important that a bushing be perpendicular to the housing as it is press fit. To facilitate press-fitting of bushing, chamfer the edge of the inner diameter at the end of the housing and lubricate slightly with oil. Also, use a stepped mandrel, as shown in Fig. 16, and take care not to damage the soft bearing surface as the busing is press fit. Never press fit a bushing by hitting it on the end with a hammer. We recommend using a mandrel and chamfer dimensions, as shown in Fig. 16.



NB: In cases where a long housing is press fit with two or more bushings, ensure that adjacent bushings do no contact each other by press fitting the first bushing all the way to its final position and leaving a small clearance between it and the following bushing.

Fig. 16: Press-fitting of bushings

❷Calculating the force F required for press-fitting

$F = 0.9tL\phi (\delta/D)$ (Formula No. 14)

F: force in newtons
T: thickness of the backing in mm
L: width of the bushing in mm
ϕ: Coefficient of stress or 1.9 × 105 MPa
δ: fitting margin in mm
D: outer diameter of the bushing in mm

NB: The coefficient of friction for the back of the bushing and the housing is assumed to be 0.15

Example:

Find the force F required for press-fitting a standard K5B2015 into a $23^{+0.021}_{0}$ diameter housing.

Answer:

Thickness = 1.5
Alloy thickness = 0.3, therefore thickness of the backing T is 1.5 - 0.3 = 1.2
Bushing length = 15
Fitting marginmin = 0.025
Fitting marginmax = 0.081
(per Formula No. 7)
Bushing Dmin = ϕ23

$Fmin = 0.9 \times 1.2 \times 15 \times 1.9 \times 10^5 \times (0.025 \div 23) \approx 3{,}350$ (N)

$Fmax = 0.9 \times 1.2 \times 15 \times 1.9 \times 10^5 \times (0.081 \div 23) \approx 10{,}840$ (N)

Mounting solid plastic bearings

Solid plastic bearings are subject to extreme fluctuations in temperature, thermal expansion and contraction could result in the bearing separating from the housing.

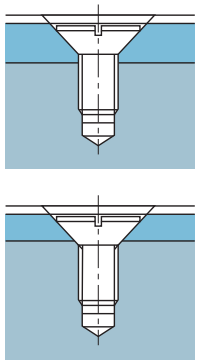
In such cases, apply the following countermeasures:

①Use a flanged bushing and fix the flange in place.
②Provide the outer diameter with a geometry that prevents rotation.
③Fix in place with an adhesive.

Designing dry bearings, Part 5

Mounting slide plates

❶Using flat head screws
The head of the screw must be sunk below the surface of the bearing alloy.



When the mounting surface does not need to be machined

When the mounting surface does need to be machined

Fig. 17: flat head screws

❷Using Allen head bolts or cheese head screws
We recommend rounding or a 10 to 30° chamfer at A.

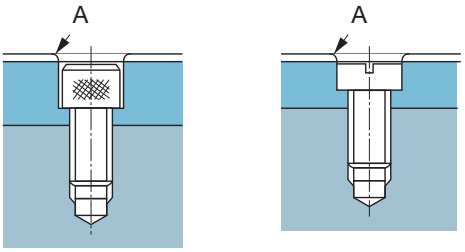


Fig. 18: Attachment bolts

❸Using dowel pins
The hole should be countersunk and the head of the pin caulked to ensure it is fixed in place.

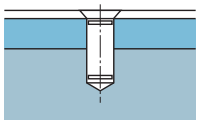


Fig. 19: Dowel pin

❹Using adhesives
Although a variety of adhesives are permissible, we recommend the used of epoxy glue. Also, be sure to select an adhesive suitable for the ambient conditions of the application.

Mounting thrust washers

❶Using flat head screws
Just as with slide plates, the head of the screw must be sunk below the surface of the bearing alloy.

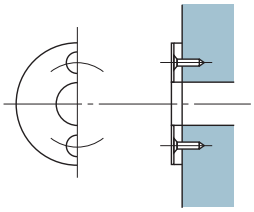


Fig. 20: Mounting washers 1

❷Using dowel pins
Just as with slide plates, the hole should be countersunk and the head of the pin caulked to ensure it is fixed in place.

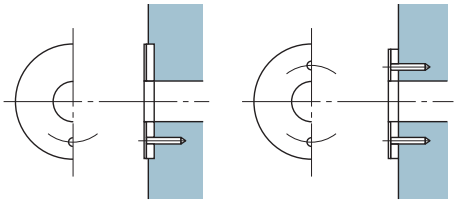


Fig. 21: Mounting washers 2

❸Using adhesives
Although a variety of adhesives are permissible, we recommend the used of epoxy glue. Also, be sure to select an adhesive suitable for the ambient conditions of the application.

Breaking in bearings

We recommend breaking in the bearings as described below prior to full time use.
①Be sure that the surface of the sliding bearing and its mating surface are both smooth.
②Able to alleviate localized interference due to misalignment.

Storing sliding bearings

Avoid the following when storing sliding bearings.
①Avoid exposure to direct sunlight.
②Avoid exposure to high temperatures or humidity.
③Avoid exposure to moisture, alkaline, or acid.
④Avoid exposure to dust or other foreign substances.

Plastic flow analysis

Plastic flow analysis is performed using computer software to simulate the flow of plastic during injection molding.
This simulation predicts the behavior of molten plastic inside the mold and is useful in analyzing the molding process in order to select materials, verify product geometry, and design the placement of gates and runners as well as to determine suitable manufacturing parameters and design countermeasures for short shots, weld lines, warping, sink marks, and other defects.
Also, structural analysis software enables evaluation of warping in parts made by insert molding processes.

A typical analysis

This is an analysis of a tip seal used in a scroll compressor.
The product was modeled using 3D CAD.
The STL and IGES data for the model was then read into the plastic flow analysis software and to create a mesh.
Material and forming parameters were input and an analysis performed.
The results included a filling analysis, a cooling analysis, a contraction and warping analysis, and a stress analysis.

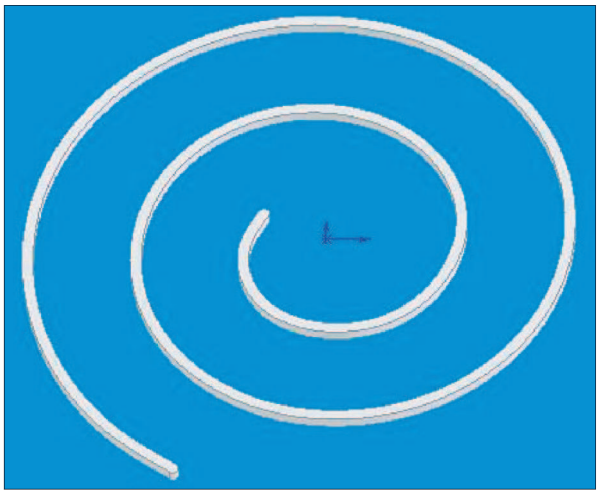


Fig. 1: 3D model of the tip seal

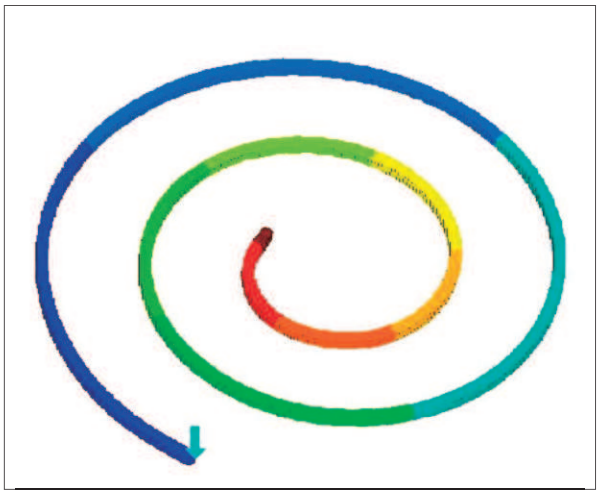


Fig. 2: Filling analysis results (filling pattern)

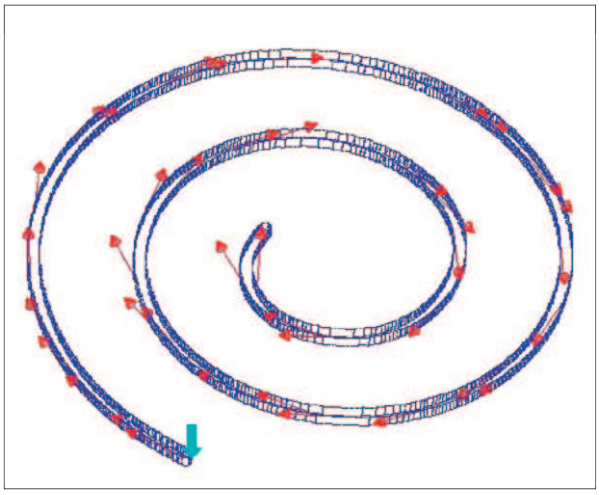


Fig. 3: Filling analysis results (fiber orientation)

Designing dry bearings, Part 6

4. Approximate conversion values for Vickers hardness of steel

Vickers hardness	Brinell hardness 10-mm ball, 3000 kgf		Rockwell hardness			Superficial Rockwell hardness Diamond pyramid			Shore hardness
	Standard ball	Tungsten carbide ball	A-scale, 60 kgf Diamond pyramid	B-scale, 100 kgf 1.6-mm (1/16") ball	C-scale, 150 kgf Diamond pyramid	15N scale, 15 kgf	30N scale, 30 kgf	45N scale, 45 kgf	
940	–	–	85· 6	–	68· 0	93· 2	84· 4	75· 4	97
920	–	–	85· 3	–	67· 5	93· 0	84· 0	74· 8	96
900	–	–	85· 0	–	67· 0	92· 9	83· 6	74· 2	95
880	–	(767)	84· 7	–	66· 4	92· 7	83· 1	73· 6	93
860	–	(757)	84· 4	–	65· 9	92· 5	82· 7	73· 1	92
840	–	(745)	84· 1	–	65· 3	92· 3	82· 2	72· 2	91
820	–	(733)	83· 8	–	64· 7	92· 1	81· 7	71· 8	90
800	–	(722)	83· 4	–	64· 0	91· 8	81· 1	71· 0	88
780	–	(710)	83· 0	–	63· 3	91· 5	80· 4	70· 2	87
760	–	(698)	82· 6	–	62· 5	91· 2	79· 7	69· 4	86
740	–	(684)	82· 2	–	61· 8	91· 0	79· 1	68· 6	84
720	–	(670)	81· 8	–	61· 0	90· 7	78· 4	67· 7	83
700	–	(656)	81· 3	–	60· 1	90· 3	77· 6	66· 7	81
690	–	(647)	81· 1	–	59· 7	90· 1	77· 2	66· 2	–
680	–	(638)	80· 8	–	59· 2	89· 8	76· 8	65· 7	80
670	–	630	80· 6	–	58· 8	89· 7	76· 4	65· 3	–
660	–	620	80· 3	–	58· 3	89· 5	75· 9	64· 7	79
650	–	611	80· 0	–	57· 8	89· 2	75· 5	64· 1	–
640	–	601	79· 8	–	57· 3	89· 0	75· 1	63· 5	77
630	–	591	79· 5	–	56· 8	88· 8	74· 6	63· 0	–
620	–	582	79· 2	–	56· 3	88· 5	74· 2	62· 4	75
610	–	573	78· 9	–	55· 7	88· 2	73· 6	61· 7	–
600	–	564	78· 6	–	55· 2	88· 0	73· 2	61· 2	74
590	–	554	78· 4	–	54· 7	87· 8	72· 7	60· 5	–
580	–	545	78· 0	–	54· 1	87· 5	72· 1	59· 9	72
570	–	535	77· 8	–	53· 6	87· 2	71· 7	59· 3	–
560	–	525	77· 4	–	53· 0	86· 9	71· 2	58· 6	71
550	(505)	517	77· 0	–	52· 3	86· 6	70· 5	57· 8	–
540	(496)	507	76· 7	–	51· 7	86· 3	70· 0	57· 0	69
530	(488)	497	76· 4	–	51· 1	86· 0	69· 5	56· 2	–
520	(480)	488	76· 1	–	50· 5	85· 7	69· 0	55· 6	67
510	(473)	479	75· 7	–	49· 8	85· 4	68· 3	54· 7	–
500	(465)	471	75· 3	–	49· 1	85· 0	67· 7	53· 9	66
490	(456)	460	74· 9	–	48· 4	84· 7	67· 1	53· 1	–
480	448	452	74· 5	–	47· 7	84· 3	66· 4	52· 2	64
470	441	442	74· 1	–	46· 9	83· 9	65· 7	51· 3	–
460	433	433	73· 6	–	46· 1	83· 6	64· 9	50· 4	62
450	425	425	73· 3	–	45· 3	83· 2	64· 3	49· 4	–
440	415	415	72· 8	–	44· 5	82· 8	63· 5	48· 4	59
430	405	405	72· 3	–	43· 6	82· 3	62· 7	47· 4	–
420	397	397	71· 8	–	42· 7	81· 8	61· 9	46· 4	57

Excerpted from SAE J 417

Excerpted from JISB0401 (1986)

Vickers hardness	Brinell hardness 10-mm ball, 3000 kgf		Rockwell hardness			Superficial Rockwell hardness Diamond pyramid			Shore hardness
	Standard ball	Tungsten carbide ball	A-scale, 60 kgf Diamond pyramid	B-scale, 100 kgf 1.6-mm (1/16") ball	C-scale, 150 kgf Diamond pyramid	15N scale, 15 kgf	30N scale, 30 kgf	45N scale, 45 kgf	
410	388	388	71· 4	–	41· 8	81· 4	61· 1	45· 3	–
400	379	379	70· 8	–	40· 8	81· 0	60· 2	44· 1	55
390	369	369	70· 3	–	39· 8	80· 3	59· 3	42· 9	–
380	360	360	69· 8	(110· 0)	38· 8	79· 8	58· 4	41· 7	52
370	350	350	69· 2	–	37· 7	79· 2	57· 4	40· 4	–
360	341	341	68· 7	(109· 0)	36· 6	78· 6	56· 4	39· 1	50
350	331	331	68· 1	–	35· 5	78· 0	55· 4	37· 8	–
340	322	322	67· 6	(108· 0)	34· 4	77· 4	54· 4	36· 5	47
330	313	313	67· 0	–	33· 3	76· 8	53· 6	35· 2	–
320	303	303	66· 4	(107· 0)	32· 2	76· 2	52· 3	33· 9	45
310	294	294	65· 8	–	31· 0	75· 6	51· 3	32· 5	–
300	284	284	65· 2	(105· 5)	29· 8	74· 9	50· 2	31· 1	42
295	280	280	64· 8	–	29· 2	74· 6	49· 7	30· 4	–
290	275	275	64· 5	(104· 5)	28· 5	74· 2	49· 0	29· 5	41
285	270	270	64· 2	–	27· 8	73· 8	48· 4	28· 7	–
280	265	265	63· 8	(103· 5)	27· 1	73· 4	47· 8	27· 9	40
275	261	261	63· 5	–	26· 4	73· 0	47· 2	27· 1	–
270	256	256	63· 1	(102· 0)	25· 6	72· 6	46· 4	26· 2	38
265	252	252	62· 7	–	24· 8	72· 1	45· 7	25· 2	–
260	247	247	62· 4	(101· 0)	24· 0	71· 6	45· 0	24· 3	37
255	243	243	62· 0	–	23· 1	71· 1	44· 2	23· 2	–
250	238	238	61· 6	99· 5	22· 2	70· 6	43· 4	22· 2	36
245	233	233	61· 2	–	21· 3	70· 1	42· 5	21· 1	–
240	228	228	60· 7	98· 1	20· 3	69· 6	41· 7	19· 9	34
230	219	219	–	96· 7	(18· 0)	–	–	–	33
220	209	209	–	95· 0	(15· 7)	–	–	–	32
210	200	200	–	93· 4	(13· 4)	–	–	–	30
200	190	190	–	91· 5	(11· 0)	–	–	–	29
190	181	181	–	89· 5	(8· 5)	–	–	–	28
180	171	171	–	87· 1	(6· 0)	–	–	–	26
170	162	162	–	85· 0	(3· 0)	–	–	–	25
160	152	152	–	81· 7	(0· 0)	–	–	–	24
150	143	143	–	78· 7	–	–	–	–	22
140	133	133	–	75· 0	–	–	–	–	21
130	124	124	–	71· 2	–	–	–	–	20
120	114	114	–	66· 7	–	–	–	–	–
110	105	105	–	62· 3	–	–	–	–	–
100	95	95	–	56· 2	–	–	–	–	–
95	90	90	–	52· 0	–	–	–	–	–
90	86	86	–	48· 0	–	–	–	–	–
85	81	81	–	41· 0	–	–	–	–	–

Excerpted from SAE J 417

Designing dry bearings, Part 7

5. Dimensional tolerances for holes used for normal fit

Dimensions (in mm)		Hole tolerance class																	
more than	or less	B10	C7	C8	C9	C10	D8	D9	D10	E7	E8	E9	F6	F7	F8	G6	G7	H6	H7
–	3	+180 +140	+70 +60	+74 +60	+85 +60	+100 +60	+34 +20	+45 +20	+60 +20	+24 +14	+28 +14	+39 +14	+12 +6	+16 +6	+20 +6	+8 +2	+12 +2	+6 0	+10 0
3	6	+188 +140	+82 +70	+88 +70	+100 +70	+118 +70	+48 +30	+60 +30	+78 +30	+32 +20	+38 +20	+50 +20	+18 +10	+22 +10	+28 +10	+12 +4	+16 +4	+8 0	
6	10	+208 +150	+95 +80	+102 +80	+116 +80	+138 +80	+62 +40	+76 +40	+98 +40	+40 +25	+47 +25	+61 +25	+22 +13	+28 +13	+35 +13	+14 +5	+20 +5	+9 0	+15 0
10	14	+220 +150	+113 +95	+122 +95	+138 +95	+165 +95	+77 +50	+93 +50	+120 +50	+50 +32	+59 +32	+75 +32	+27 +16	+34 +16	+43 +16	+17 +6	+24 +6	+11 0	+18 0
14	18																		
18	24	+244 +160	+131 +110	+143 +110	+162 +110	+194 +110	+98 +65	+117 +65	+149 +65	+61 +40	+73 +40	+92 +40	+33 +20	+41 +20	+53 +20	+20 +7	+28 +7	+13 0	+21 0
24	30																		
30	40	+270 +170	+145 +120	+159 +120	+182 +120	+220 +120	+119 +80	+142 +80	+180 +80	+75 +50	+89 +50	+112 +50	+41 +25	+50 +25	+64 +25	+25 +9	+34 +9	+16 0	+25 0
40	50	+280 +180	+155 +130	+169 +130	+192 +130	+230 +130													
50	65	+310 +190	+170 +140	+186 +140	+214 +140	+260 +140	+146 +100	+174 +100	+220 +100	+90 +60	+106 +60	+134 +60	+49 +30	+60 +30	+76 +30	+29 +10	+40 +10	+19 0	+30 0
65	80	+320 +200	+180 +150	+196 +150	+224 +150	+270 +150													
80	100	+360 +220	+205 +170	+224 +170	+257 +170	+310 +170	+174 +120	+207 +120	+260 +120	+107 +72	+126 +72	+159 +72	+58 +36	+71 +36	+90 +36	+34 +12	+47 +12	+22 0	+35 0
100	120	+380 +240	+215 +180	+234 +180	+267 +180	+320 +180													
120	140	+420 +260	+240 +200	+263 +200	+300 +200	+360 +200	+208 +145	+245 +145	+305 +145	+125 +85	+148 +85	+185 +85	+68 +43	+83 +43	+106 +43	+39 +14	+54 +14	+25 0	+40 0
140	160	+440 +280	+250 +210	+273 +210	+310 +210	+370 +210													
160	180	+470 +310	+270 +230	+293 +230	+330 +230	+390 +230													
180	200	+525 +340	+286 +240	+312 +240	+355 +240	+425 +240	+242 +170	+285 +170	+355 +170	+146 +100	+172 +100	+215 +100	+79 +50	+96 +50	+122 +50	+44 +15	+61 +15	+29 0	+46 0
200	225	+565 +380	+306 +260	+332 +260	+375 +260	+445 +260													
225	250	+605 +420	+326 +280	+352 +280	+395 +280	+465 +280													
250	280	+690 +480	+352 +300	+381 +300	+430 +300	+510 +300	+271 +190	+320 +190	+400 +190	+162 +110	+191 +110	+240 +110	+83 +56	+108 +56	+137 +56	+49 +17	+69 +17	+32 0	+52 0
280	315	+750 +540	+382 +330	+411 +330	+460 +330	+540 +330													

Dimensions (in mm)		Hole tolerance class																	
more than	or less	H8	H9	H10	JS6	JS7	K6	K7	M6	M7	N6	N7	P6	P7	R7	S7	T7	U7	X7
–	3	+14 0	+25 0	+40 0	±3.0	±5	0 -6	0 -10	-2 -8	-2 -12	-4 -10	-4 -14	-6 -12	-6 -16	-10 -20	-14 -24	–	-18 -28	-20 -30
3	6	+18 0	+30 0	+48 0	±4.0	±6	+2 -6	+3 -9	-1 -9	0 -12	-5 -13	-4 -16	-9 -17	-8 -20	-11 -23	-15 -27	–	-19 -31	-24 -36
6	10	+22 0	+36 0	+58 0	±4.5	±7	+2 -7	+5 -10	-3 -12	0 -15	-7 -16	-4 -19	-12 -21	-9 -24	-13 -28	-17 -32	–	-22 -37	-28 -43
10	14	+27 0	+43 0	+70 0	±5.5	±9	+2 -9	+6 -12	-4 -15	0 -18	-9 -20	-5 -23	-15 -26	-11 -29	-16 -34	-21 -39	–	-26 -44	-33 -51
14	18																		-38 -56
18	24	+33 0	+52 0	+84 0	±6.5	±10	+2 -11	+6 -15	-4 -17	0 -21	-11 -24	-7 -28	-18 -31	-14 -35	-20 -41	-27 -48	–	-33 -54	-46 -67
24	30																-33 -54	-40 -61	-56 -77
30	40	+39 0	+62 0	+100 0	±8.0	±12	+3 -13	+7 -18	-4 -20	0 -25	-12 -28	-8 -33	-21 -37	-17 -42	-25 -50	-34 -59	-39 -64	-51 -76	–
40	50																-45 -70	-61 -86	
50	65	+46 0	+74 0	+120 0	±9.5	±15	+4 -15	+9 -21	-5 -24	0 -30	-14 -33	-9 -39	-26 -45	-21 -51	-30 -60	-42 -72	-55 -85	-76 -106	–
65	80														-32 -62	-48 -78	-64 -94	-91 -121	
80	100	+54 0	+87 0	+140 0	±11.0	±17	+4 -18	+10 -25	-6 -28	0 -35	-16 -38	-10 -45	-30 -52	-24 -59	-38 -73	-58 -93	-78 -113	-111 -146	–
100	120														-41 -76	-66 -101	-91 -126	-131 -166	
120	140	+63 0	+100 0	+160 0	±12.5	±20	+4 -21	+12 -28	-8 -33	0 -40	-20 -45	-12 -52	-36 -61	-28 -68	-48 -88	-77 -117	-107 -147	–	–
140	160														-50 -90	-85 -125	-119 -159		
160	180														-53 -93	-93 -133	-131 -171		
180	200	+72 0	+115 0	+185 0	±14.5	±23	+5 -24	+13 -33	-8 -37	0 -46	-22 -51	-14 -60	-41 -70	-33 -79	-60 -106	-105 -151	–	–	–
200	225														-63 -109	-113 -159			
225	250														-67 -113	-123 -169			
250	280	+81 0	+130 0	+210 0	±16.0	±26	+5 -27	+16 -36	-9 -41	0 -52	-25 -57	-14 -66	-47 -79	-36 -88	-74 -126	–	–	–	–
280	315														-78 -130				

Reference: The upper figure in each cell indicates the upper tolerance and the lower figure in each cell indicates the lower tolerance for the given class.

Designing dry bearings, Part 8

6. Dimensional tolerances for shafts used for normal fit

Excerpted from JISB0401 (1986)

Units: μm

Dimensions (in mm)		Shaft tolerance class																
more than	or less	b9	c9	d8	d9	e7	e8	e9	f6	f7	f8	g5	g6	h5	h6	h7	h8	h9
–	3	-140 -165	-60 -85	-20 -34	-20 -45	-14 -24	-14 -28	-14 -39	-6 -12	-6 -16	-6 -20	-2 -6	-2 -8	0 -4	0 -6	0 -10	0 -14	0 -25
3	6	-140 -170	-70 -100	-30 -48	-30 -60	-20 -32	-20 -38	-20 -50	-10 -18	-10 -22	-10 -28	-4 -9	-4 -12	0 -5	0 -8	0 -12	0 -18	0 -30
6	10	-150 -186	-80 -116	-40 -62	-40 -76	-25 -40	-25 -47	-25 -61	-13 -22	-13 -28	-13 -35	-5 -11	-5 -14	0 -6	0 -9	0 -15	0 -22	0 -36
10	14	-150 -193	-95 -138	-50 -77	-50 -93	-32 -50	-32 -59	-32 -75	-16 -27	-16 -34	-16 -43	-6 -14	-6 -17	0 -8	0 -11	0 -18	0 -27	0 -43
14	18																	
18	24	-160 -212	-110 -162	-65 -98	-65 -117	-40 -61	-40 -73	-40 -92	-20 -33	-20 -41	-20 -53	-7 -16	-7 -20	0 -9	0 -13	0 -21	0 -33	0 -52
24	30																	
30	40	-170 -232	-120 -182	-80 -119	-80 -142	-50 -75	-50 -89	-50 -112	-25 -41	-25 -50	-25 -64	-9 -20	-9 -25	0 -11	0 -16	0 -25	0 -39	0 -62
40	50	-180 -242	-130 -192															
50	65	-190 -264	-140 -214	-100 -146	-100 -174	-60 -90	-60 -106	-60 -134	-30 -49	-30 -60	-30 -76	-10 -23	-10 -29	0 -13	0 -19	0 -30	0 -46	0 -74
65	80	-200 -274	-150 -224															
80	100	-220 -307	-170 -257	-120 -174	-120 -207	-72 -107	-72 -126	-72 -159	-36 -58	-36 -71	-36 -90	-12 -27	-12 -34	0 -15	0 -22	0 -35	0 -54	0 -87
100	120	-240 -327	-180 -267															
120	140	-260 -360	-200 -300	-145 -208	-145 -245	-85 -125	-85 -148	-85 -185	-43 -68	-43 -83	-43 -106	-14 -32	-14 -39	0 -18	0 -25	0 -40	0 -63	0 -100
140	160	-280 -380	-210 -310															
160	180	-310 -410	-230 -330															
180	200	-340 -455	-240 -355	-170 -242	-170 -285	-100 -146	-100 -172	-100 -215	-50 -79	-50 -96	-50 -122	-15 -35	-15 -44	0 -20	0 -29	0 -46	0 -72	0 -115
200	225	-380 -495	-260 -375															
225	250	-420 -535	-280 -395															
250	280	-480 -610	-300 -430	-190 -271	-190 -320	-110 -162	-110 -191	-110 -240	-56 -88	-56 -108	-56 -137	-17 -40	-17 -49	0 -23	0 -32	0 -52	0 -81	0 -130
280	315	-540 -670	-330 -460															

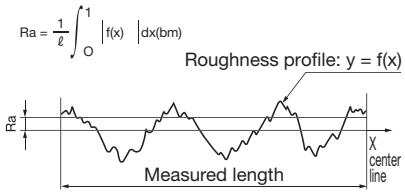
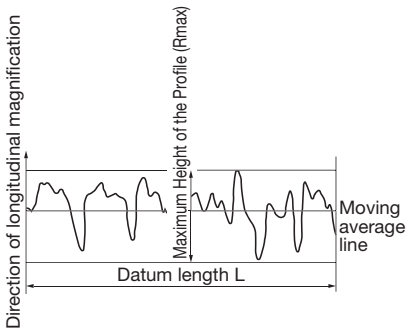
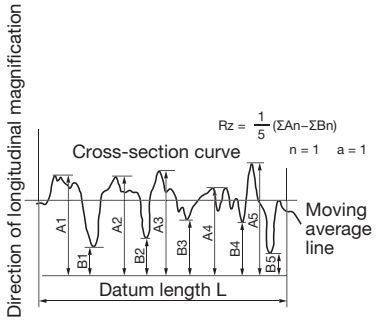
Dimensions (in mm)		Shaft tolerance class												
more than	or less	js5	js6	js7	k5	k6	m5	m6	n6	p6	r6	s6	t6	u6	x6
–	3	±2.0	±3.0	±5	+4 0	+6 0	+6 +2	+8 +2	+10 +4	+12 +6	+16 +10	+20 +14	–	+24 +18	+26 +20
3	6	±2.5	±4.0	±6	+6 +1	+9 +1	+9 +4	+12 +4	+16 +8	+20 +12	+23 +15	+27 +19	–	+31 +23	+36 +28
6	10	±3.0	±4.5	±7	+7 +1	+10 +1	+12 +6	+15 +6	+19 +10	+24 +15	+28 +19	+32 +23	–	+37 +28	+43 +34
10	14	±4.0	±5.5	±9	+9 +1	+12 +1	+15 +7	+18 +7	+23 +12	+29 +18	+34 +23	+39 +28	–	+44 +33	+51 +40
14	18														+56 +45
18	24	±4.5	±6.5	±10	+11 +2	+15 +2	+17 +8	+21 +8	+28 +15	+35 +22	+41 +28	+48 +35	–	+54 +41	+67 +54
24	30												+54 +41	+61 +48	+77 +64
30	40	±5.5	±8.0	±12	+13 +2	+18 +2	+20 +9	+25 +9	+33 +17	+42 +26	+50 +34	+59 +43	+64 +48	+76 +60	–
40	50												+70 +54	+86 +70	
50	65	±6.5	±9.5	±15	+15 +2	+21 +2	+24 +11	+30 +11	+39 +20	+51 +32	+60 +41	+72 +53	+85 +66	+106 +87	–
65	80										+62 +43	+78 +59	+94 +75	+121 +102	
80	100	±7.5	±11.0	±17	+18 +3	+25 +3	+28 +13	+35 +13	+45 +23	+59 +37	+73 +51	+93 +71	+113 +91	+146 +124	–
100	120										+76 +54	+101 +79	+126 +104	+166 +144	
120	140	±9.0	±12.5	±20	+21 +3	+28 +3	+33 +15	+40 +15	+52 +27	+68 +43	+88 +63	+117 +92	+147 +122	–	–
140	160										+90 +65	+125 +100	+159 +134		
160	180										+93 +68	+133 +108	+171 +146		
180	200	±10.0	±14.5	±23	+24 +4	+33 +4	+37 +17	+46 +17	+60 +31	+79 +50	+106 +77	+151 +122	–	–	–
200	225										+109 +80	+159 +130			
225	250										+113 +84	+169 +140			
250	280	±11.5	±16.0	±26	+27 +4	+36 +4	+43 +20	+52 +20	+66 +34	+88 +56	+126 +94	–	–	–	–
280	315										+130 +98	–			

Excerpted from JISB0401 (1986)

Reference: The upper figure in each cell indicates the upper tolerance and the lower figure in each cell indicates the lower tolerance for the given class.

7. Defining and indicating surface roughness

Excerpted from JISB0601

Center Line Average Roughness (Ra)	Maximum Height of the Profile (Rmax)	Ten Point Average Roughness (Rz)
A value in micrometers (μm) found using the formula below when sampling along the center line of a roughness profile with the center line taken as the x-axis and the longitudinal magnification taken as the y-axis to display the roughness profile y = f(x). $Ra = \frac{1}{\ell}\int_{o}^{\ell} \lvert f(x) \rvert dx$	A value in micrometers (μm) found by measuring the distance between two straight lines that are parallel to the moving average line when sampling along a datum length of the cross-section curve, and which are respectively tangent to the highest peak and the lowest valley of the cross-section curve.	A value in micrometers (μm) found by averaging the height of the five highest peaks and the five lowest valleys when sampling along the datum length, as measured from the moving average line.
		

8. Standard sequences and datum lengths for surface roughness

Center Line Average Roughness (Ra)		Maximum Height of the Profile (Rmax)		Ten Point Average Roughness (Rz)	
Standard sequences	Cutoff value (mm)	Standard sequences	Datum length L (mm)	Standard sequences	Datum length L (mm)
0.013a 0.025a 0.05a 0.1a 0.2a	0.8	0.05s 0.1s 0.2s 0.4s 0.8s	0.25	0.05z 0.1z 0.2z 0.4z 0.8z	0.25
0.4a 0.8a 1.6a		1.6s 3.2s 6.3s	0.8	1.6z 3.2z 6.3z	0.8
3.2a 6.3a		12.5s 25.0s	2.5	12.5z 25.0z	2.5
12.5a 25.0a		50.0s 100.0s	8.0	50.0z 100.0z	8.0
50.0a 100.0a	2.5	200.0s 400.0s	25.0	200.0z 400.0z	25.0
Measurement length: At least 300% of the cutoff value.					

Designing dry bearings, Part 9

9. International System of Units (SI)

The world's industries presently use the International System of Units as a common system of measurement. This catalog utilizes SI units almost exclusively, but also presents units from earlier systems of measurement side by side for convenience.

(Showing only related units)

Classification	Conventional units	SI units*
Weight or Force	1.0kgf	9.8N
Specific load	1.0kgf/cm^2	9.8×10^{-2}MPa
	1.0kgf/cm^2	9.8×10^{-2}N/mm^2
PV value	1.0kgf/cm^2 · m/min	9.8×10^{-2}MPa · m/min
Stress	1.0kgf/mm^2	9.8MPa
	1.0kgf/mm^2	9.8N/mm^2

*NB: Figures are rounded to two decimal places.

Other SI units

A.1 Force

To convert from kgf to N: 1 kgf = 9.80665 N
To convert from N to kgf: 1 N = 0.101972 kgf
Ref: to convert from dyn to kN: 1 dyn = 1×10^{-2} kN

A.2 Pressure

To convert from mm H_2O to Pa: 1 mm H_2O = 9.80665 Pa
To convert from Pa to mm H_2O: kPa = 0.101972 mm H_2O
To convert from kgf/cm^2 to MPa: 1 kgf/cm^2 = 0.0980665 MPa
To convert from MPa to kgf/cm^2: 1 MPa = 10.1972 kgf/cm^2
To convert m H_2O to kPa: 1 m H_2O = 9.80665 kPa
To convert kPa to m H_2O: 1 kPa = 0.101972 m H_2O
To convert atm to MPa: 1 atm = 0.101325 MPa
To convert MPa to atm: 1 MPa = 9.86923 atm
To convert mm Hg to kPa: 1 mm Hg = 0.133322 kPa
To convert kPa to mm Hg: 1 kPa = 7.50062 mm Hg
Ref: to convert bar to Pa: 1 bar = 1×105 Pa

A.3 Stress

To convert kgf/cm^2 to MPa: 1 kgf/cm^2 = 0.0980665 MPa
To convert MPa to kgf/cm^2: 1 MPa = 10.1972 kgf/cm^2
To convert kgf/mm^2 to MPa: 1 kgf/mm^2 = 9.80665 MPa
To convert MPa to kgf/mm^2: 1 MPa = 0.101972 kgf/mm^2
Ref: to convert N/mm^2 to MPa: 1 N/mm^2 = 1 MPa

A.4 Work and Energy

To convert from kgf · m to J: 1 kgf · m = 9.80665 J
To convert J to kgf · m: 1 J = 0.101972 kgf· m/s

A.5 Power

To convert kgf · m/s to W: 1 kgf · m/s = 9.80665 W
To convert W to kgf · m/s: 1 W = 0.101972 kgf · m/s

B.1 Work and Energy

To convert kW·h to MJ: 1 kW · h = 3.6 MJ
To convert MJ to kW · h: 1 MJ = 0.277778 kW · h

B.2 Power

To convert PS to kW: 1 PS = 0.7355 kW
To convert kW to PS: 1 kW = 1.35962 PS

B.3 Heat

To convert kcal to kJ: 1 kcal = 4.18605 kJ
To convert kJ to kcal: 1 kJ = 0.238889 kcal

B.4 Heat flow

To convert kcal/h to W: 1 kcal/h = 1.16279 W
To convert W to kcal/h: 1 W = 0.860 kcal/h

B.5 Thermal conductivity

To convert kcal/h (h · m · °C) to W/(m · K):
1 kcal/h (h · m · °C) = 1.16279 W/(m · K)
To convert W/(m · K) to kcal/h(h · m · °C):
1 W/(m · K) = 0.860 kcal/(h · m · °C)

B.6 Coefficient of heat transfer

To convert kcal/(h · m · °C) to W/(m · K):
1 kcal/(h · m · °C) = 1.16279 W/(m · K)
To convert W/(m · K) to kcal/(h · m · °C):
1 W/(m · K) = 0.860 kcal/(h · m · °C)

B.7 Specific heat

To convert kcal/(kg · °C) to kJ/(kg · K):
1 kcal/(kg · °C) = 4.18605 kJ/(kg · K)
To convert kJ/(kg · K) to kcal/(kg · °C):
1 kJ/(kg · K) = 0.238889 kcal/(kg · °C)

Reference **1. Viscosity**
1 cP = 1×10^{-3}Pa · s (1 Pa · s = 1×10^3 cP)
1 P = 1×10^{-1}Pa · s (1 Pa · s =10 P)
2. Dynamic viscosity
1 cSt = 1×10^{-6}m^2/s (1 m^2/s = 1×10^6 cSt)
1 St = 1×10^{-4}m^2/s (1 m^2/s = 1×10^4 cSt)

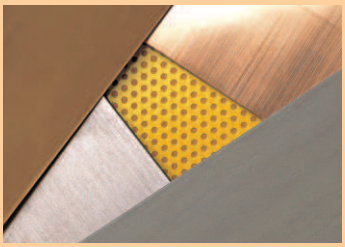
CORPORATE PROFILE

Core Technologies

Our Core Technologies
Create Strong Trust and Unlimited Possibilities.

Daido Metal's Unique Technology

1
Bimetal Technology

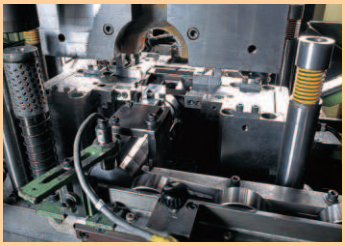


Various bimetals

The term "bimetal" refers to a composite material made by bonding one of a variety of special bearing layers onto a base of steel plate. Daido Metal has established sophisticated bonding technology that extends to the atomic level and includes sintering, pressure welding, casting, and impregnation. We manufacture bimetals of all characteristics, using copper alloys, aluminum alloys, polymers, and other materials. Our starting point for high-quality bearings is the development of the bimetal. This attitude is the main reason that the Daido Metal brand is so well trusted.

Daido Metal's Unique Technology

2
Precision Processing Technology

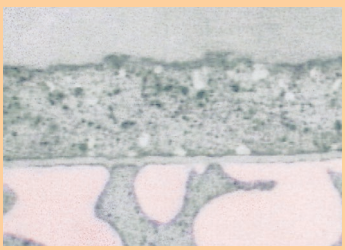


Forming

The bimetal must be subjected to forming technology in order to generate a product. High-precision machining is required in all processes at this stage, whether we are using press cutting technology for precision cutting, press working to bend parts into half-bearing or cylindrical shapes, or finishing to the optimum thickness in the final process. In order to make these kinds of work possible, we design and manufacture our own press molds and dedicated machinery in-house. Because we are backed up by technology accurate to the micron level, we are able to manufacture high quality bearings with constant reliability.

Daido Metal's Unique Technology

3
Surface Treatment Technology



Addition of hard particles to the film.

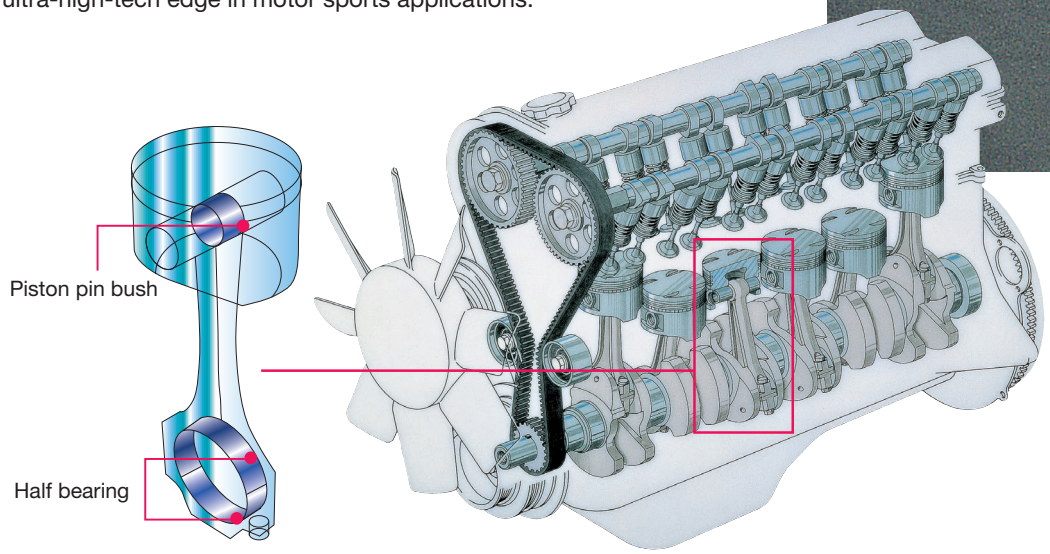
This technology significantly enhances the wear resistance of the overlay by dispersing hard micro-particles uniformly throughout the film.

Smooth motion depends on the condition of the surfaces where friction occurs. This means that the overlay that covers the surface of the bearing layer plays a crucial role. Daido Metal is continually developing overlays and improving manufacturing methods, and has established its "surface treatment technology" to create a uniform film to high precision. We are also actively engaged in the development of new surface treatment technologies such as surface treatment, coating, and PVD (physical vapor deposition)

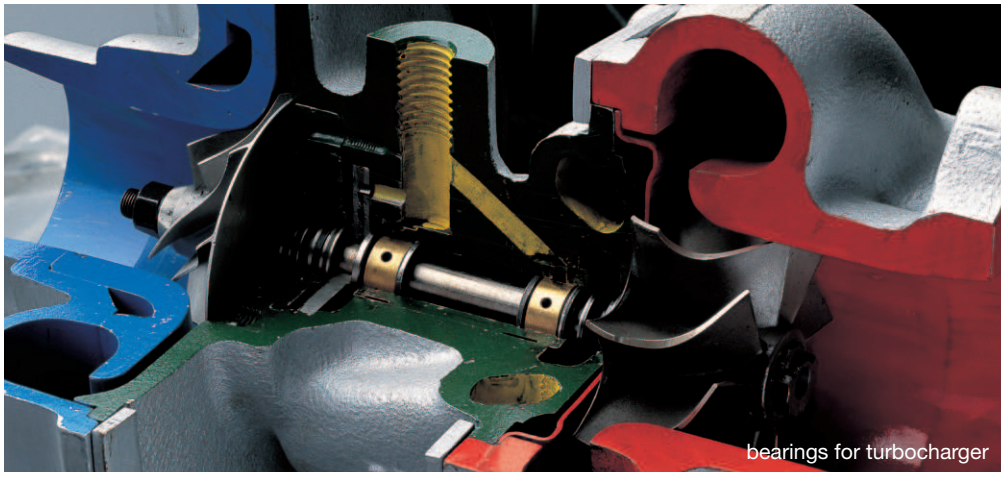
Bearings for Automobiles

Quality Others Cannot Match Creates the World Standard

Automobile bearings are the cornerstone of Daido Metal's operations and have been adopted by all Japanese automobile manufacturers and the main manufacturers in other countries. And we have the top market share in Japan for plain bearings for engines. The high-technology engines of today impose sophisticated demands as high performance and high efficiency. Over one hundred different Daido Metal parts of thirty different types may be used for a single automobile: these are mainly engine-related but include other parts such as bushes for the power steering pump. These products of exceptional technical standards and reliability are not used only for passenger cars, buses and construction machinery. They are also used for the high-speed engine bearings of racing cars, including Formula 1 cars, and give an ultra-high-tech edge in motor sports applications.



Bearings for automobile engines


bearings for turbocharger


Floating bearings
for turbochargers


Thrust bearings for turbochargers


Tip seals for air conditioners
(scroll compressor)


Rack and pinion steering
bushes


Strut-type shock absorber
bushes


Starter bushes


Trunk lid bearings/
engine hood bearings

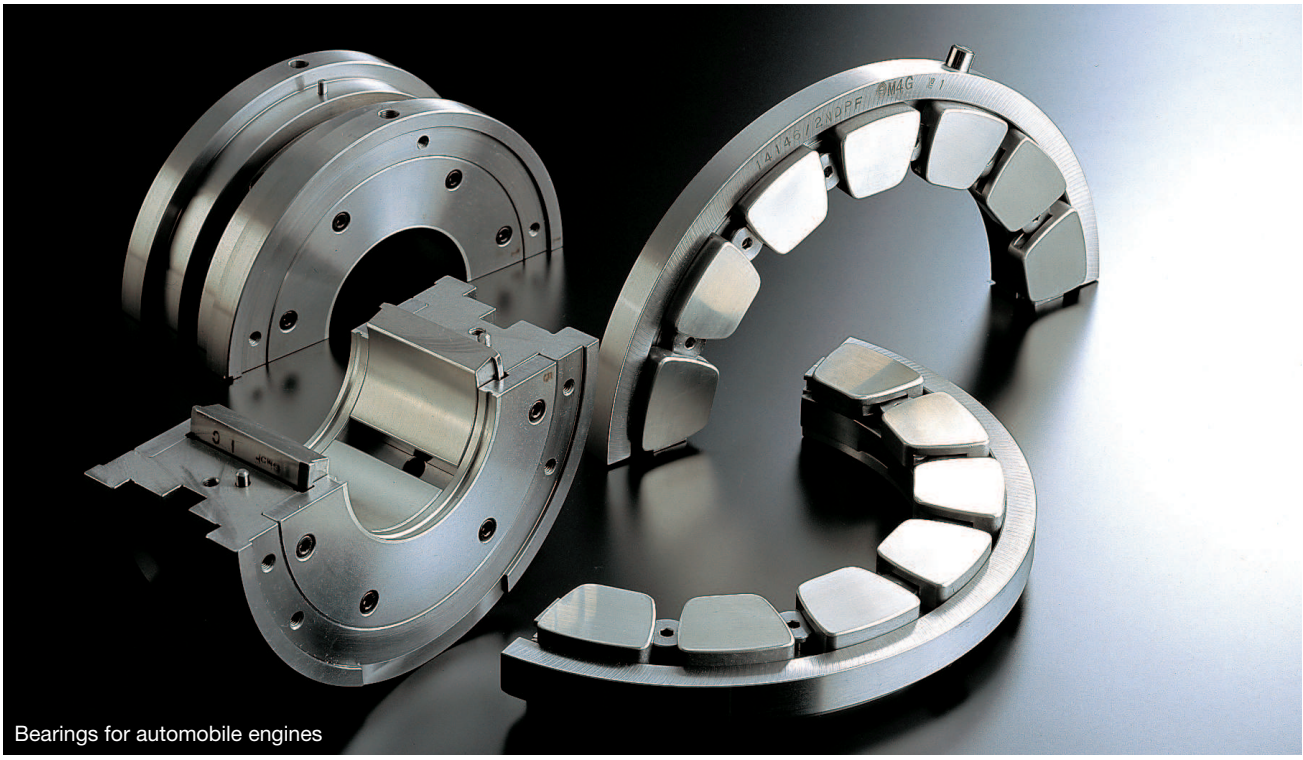

Throttle Body bushes


Pump bushes for power
steering units

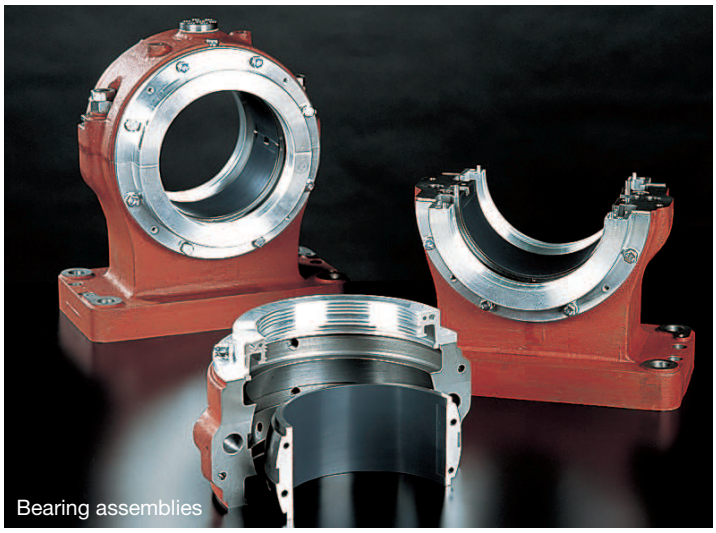

Mechanical part bushes
for front reclining seat

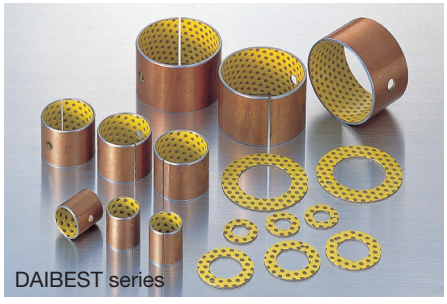
Exceptional Technology is Applied Wherever there are Moving Parts


THERMALLOY series

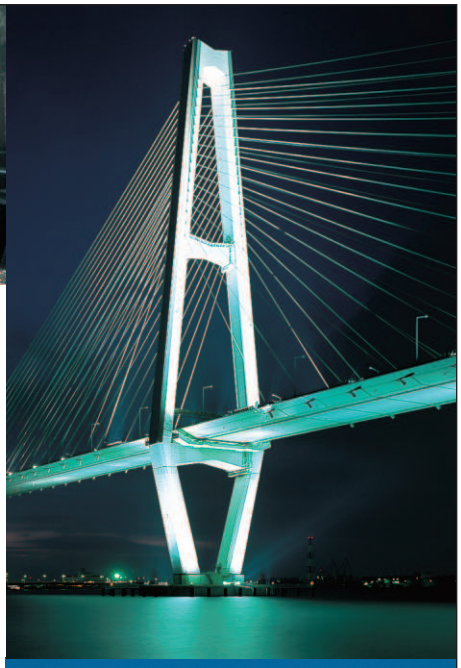

Bearings for automobile engines

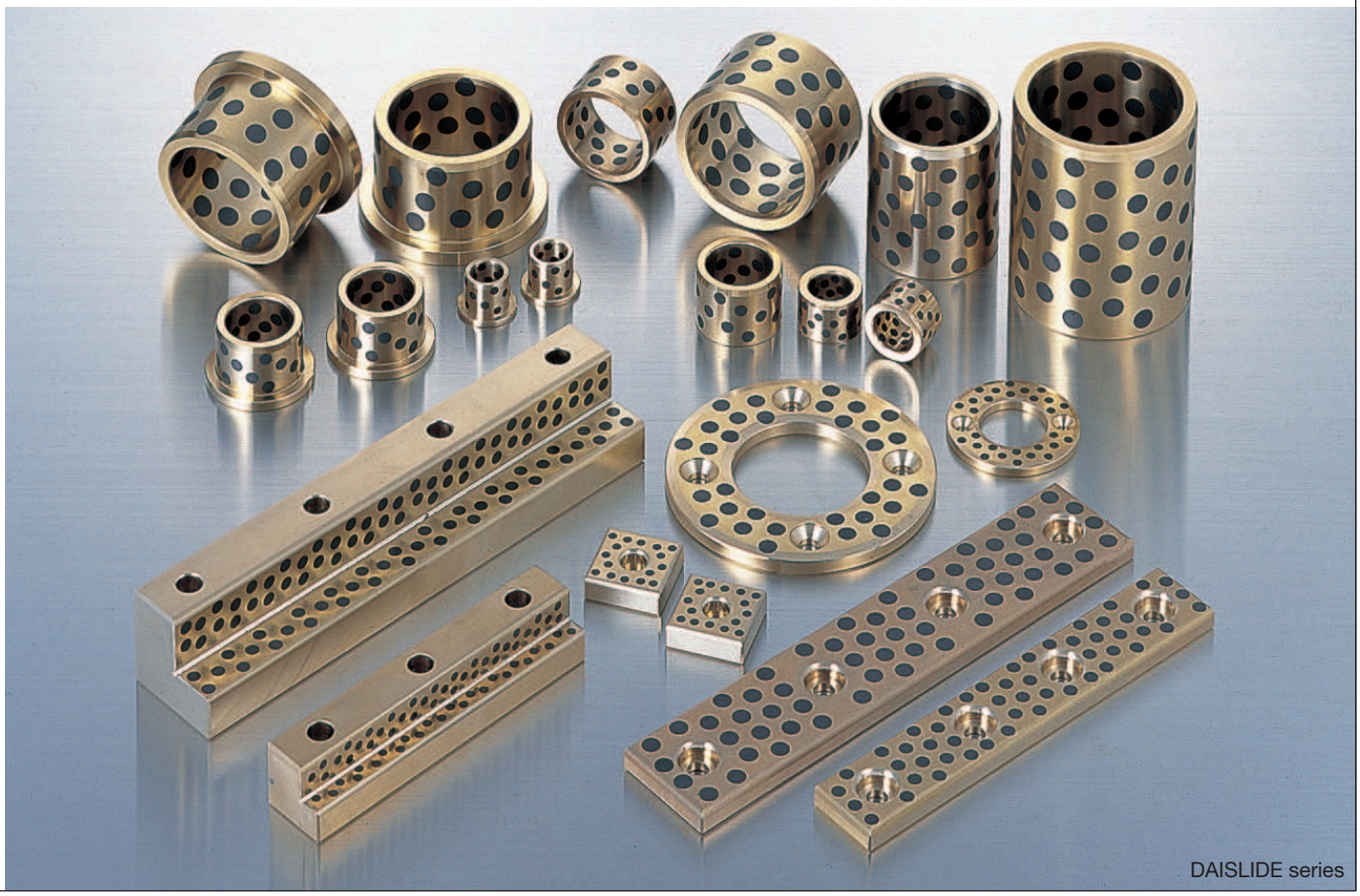
The bearings made by applying our core technology are not limited to the automotive field; they support all areas of industry. Dry bearings, which have exceptional resistance to wear and strength without the use of lubricant are used in many Field, as office equipment, water power, thermal power, nuclear power generation facilities, high-speed vehicles, rail applications, seismic isolation, system, vibration control device damping equipment, the construction of dome-type stadia, and so on. Daido Metal's bearings are used in all areas where there is “movement,” and in this way we contribute to the prosperity of society.


Bearing assemblies


DAIBEST series


Insert moldings





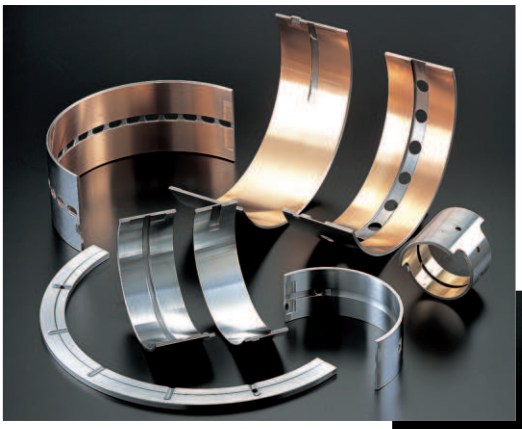
DAISLIDE series

Bearings for Marine and Industrial Use

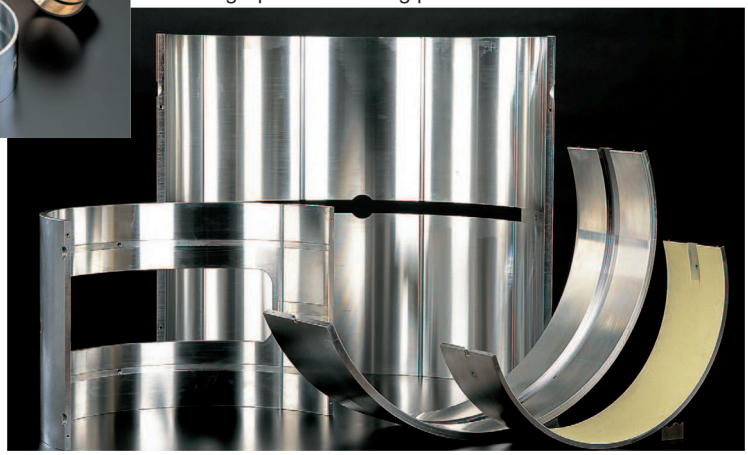
Supporting the World's Ultra-high-output Engines with Bearing Diameters in the 1200 mm range

Bearings for marine engines are required to have exceptional load carrying characteristics. They must have a long life and must be reliable. Daido Metal is one of the few bearing makers in the world that can make super-large bearings with diameters in the 1200 mm range, starting right from the material: we have the largest scale of production and market share in this area.

Large-diameter borings
Inner diameters of 1000 mm or more are achieved using a high-precision boring process.



Bearings for medium-speed engines

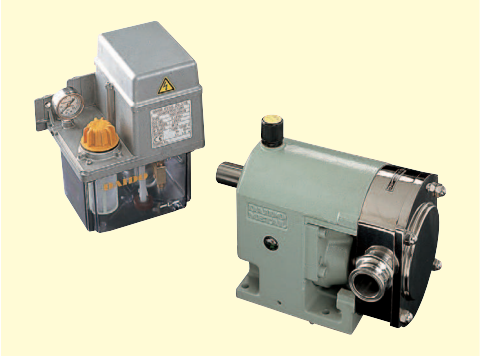


Bearings for low-speed engines

Lubrication Technology Products

New Products Stemming from Tribology

Making use of the high-level research and technology that we have fostered in our pursuit of Tribology, we also develop products other than bearings that require the application of lubrication technology, such as rotary pumps and centralized lubrication equipment.



Rotary type RP pumps
centralized lubrication equipment MR-LUB

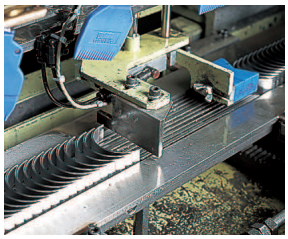
Quality Control

The Test of Complete Product Technology: its Confirmation of Our Motto "Quality is Life"

The concept that underpins Daido Metal's entire organization and all its activities is "Quality is Life." We carry out our original production activities and quality control activities based on this principle. Starting with our in-house design and manufacture of tools and fixtures, molds, and production equipment, and our introduction of the latest MECHATRONICS, we implement thorough "in-line assurance," where all of the production staff take responsibility for quality control.
We also promote environmental management, including energy savings, recycling, and reduction of waste from production, in the processes that lead up to the birth of a product. In these ways we are concentrating knowledge in all the production processes and continually striving to make innovations in production technology in accordance with market needs.

In-house Vocational Skills Testing

We implement our own vocational skills tests with the aim of passing on skills, and improving the level of skill of each employee. They are implemented on a regular basis, with the human resources planning division assuming the key role.



Permanent Environmental Management System

Daido Metal considers the global environment to be common property of human races. Thus, we are actively working on environmental protection as the most important subject. As a part of this activity, we perceive environmental management systems such as ISO 14001 as an effective tool to continuously reduce environmental impacts. All facilities in Japan as well as many overseas subsidiaries have already acquired certification ISO 14001.

Manufacturing Plants

Creating Corporate Value on the Global Level Dreams and Responsibility As a Global Enterprise

The basic principle of Daido Metal's global strategy is to carry out production as near to the customer as possible while offering products and services of the same quality as in Japan. In response to reorganization of the industry in the international community and other upheavals in the market, we have already established production bases and joint-venture companies overseas.

Nagoya Headquarters

Tokyo Headquarters

Production (JAPAN)

Inuyama Site

Gifu Factory

DAIDO PLAIN BEARINGS CO., LTD.

DAIDO INDUSTRIAL BEARINGS JAPAN CO., LTD.

NDC CO., LTD. (Narashino Factory)

NDC CO., LTD. (Kozaki Factory)

Production (Overseas)

DONGSUNG METAL CO., LTD. (KOREA)

DAIDO PRECISION METAL (SUZHOU) CO., LTD. (CHINA)

DYNA METAL CO., LTD. (THAI)

PT.DAIDO METAL INDONESIA

DAIDO INDUSTRIAL BEARINGS EUROPE LTD. (UK)

DAIDO METAL CZECH s.r.o

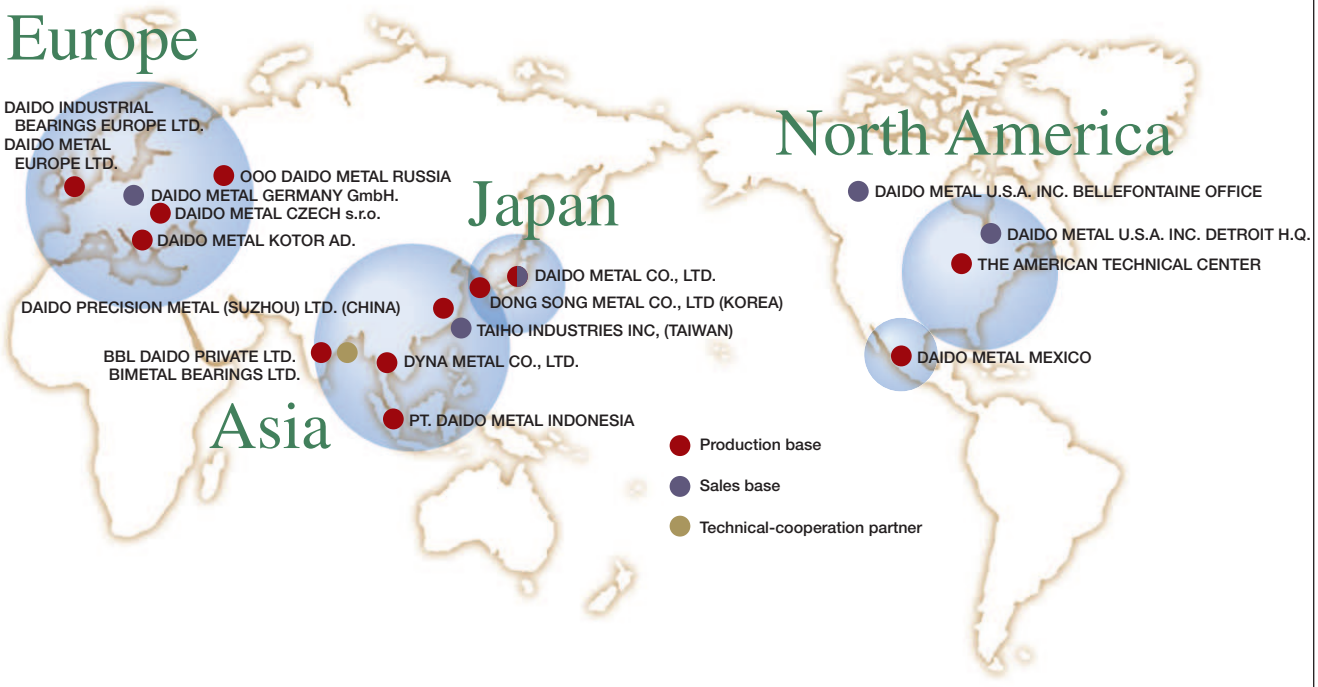
DAIDO METAL KOTOR AD (MONTENEGRO)

DAIDO METAL RUSSIA LLC

DAIDO METAL MEXICO S.A.DE C.V.

BBL DAIDO PRIVATE LTD.

Global Network



North America, & Canada

■ Sales and North American Headquarters

DAIDO METAL U.S.A. INC. DETROIT H.Q.
33533 West 12 Mile Road, Suite 301, Farmington Hills,
Michigan 48331, U.S.A.
Tel: +1-248-893-2454 **Fax:** +1-248-893-2456

■ Customer Service and Warehouse

DAIDO METAL U.S.A. INC. BELLEFONTAINE OFFICE
1215 Greenwood Street, Bellefontaine, Ohio 43311-1692, U.S.A.
Tel: +1-937-592-5010 **Fax:** +1-937-592-2662

South America

■ Sales and Plant

DAIDO METAL MEXICO SALES
Carretera San Isidro Mazatepec No. 7501 Col. Santa Cruz de las Flores C.P.45640
Tlajomulco de Zúñiga, Jalisco, Mexico
Tel: +52-33-1454-5000 **Fax:** +52-33-1454-5030

Europe

■ Sales

DAIDO METAL EUROPE GmbH
Curiestrasse 5, 70563 Stuttgart, Germany
Tel: +49-711-2525250 **Fax:** +49-711-25252590

■ Customer Service and Warehouse

Winterhay Lane, Ilminster Somerset, TA19 9PH, United Kingdom
Tel: +44-1460-53221 **Fax:** +44-1460-256217

Asia

■ China Sales and Plant

DAIDO PRECISION METAL (SUZHOU) CO., LTD.
No.246, Qing Qiu Street, Suzhou Industrial Park 215126 China
Tel: +86-512-6283-3531 **Fax:** +86-512-6283-3003

■ Taiwan Sales

CHUNG YUAN DAIDO (GUANGZHOU) CO., LTD.
Sales for Automobile Engine Bearings, Automobile Bearings (excl. engine) and Non-Automobile Bearings 4F-B01,
No111, Jichang Road, Baiyun District, Guangzhou City,
Guangdong Province, China
Tel: +86-20-8634-7509 **Fax:** +86-20-3676-0093

■ South Korea Sales and Plant

DONGSUNG METAL CO., LTD.
160, Backjajeon-ri, Yongsan-myun, Youngdong-kun, Chungbuk 370-912 Korea
Tel: +82-43-742-8446 **Fax:** +82-43-742-8448

■ Thailand Sales and Plant

DYNA METAL CO., LTD.
Wellgrow Industrial Estate 101 Moo9, Wellgrow Rd. 14 Bangwoa Bangpakong District Chachoengsao 24180, Thailand
Tel: +66-38-57-0611 to 4 **Fax:** +66-38-57-0027

■ Indonesia Sales and Plant

PT.DAIDO METAL INDONESIA
Kawasan Industri P.T.MMID 2100 Blok M25-26.Cikarang Barat,
Bekasi 17520, Indonesia
Tel: +62-21-8980038 **Fax:** +62-21-8980036

■ India Sales and Plant

BBL DAIDO PRIVATE LTD.
RS No.19, Vandalur Kelambakkam Road, Pudupakkam Village, Kelambakkam,
Kancheepuram District, 603103 India
Tel: +91-44-6740-2807

URL https://www.daidometal.com/

Index

Overview of products in order of appearance

Dimensions and technical documentation in order of appearance

Alphabetically

Alphabetically for each code

•Polymer dry bearings

•Metallic dry bearings

SPECIFICATION SHEET

Fill out the necessary items and send to the relevant Daido department.

(For customer)

To DAIDO METAL Co.,Ltd. Polymer Bearing Co.

BEARING SPECIFICATIONS

Machine/ Equipment Name		Part Name	

Planned Dimensions and Quantity	Planned Part Number	Form	Inner Dia.	Outer Dia.	Length		Quantity/Month

Note) Form means classification of cylindrical bushing, flanged bushing, thrust washer and plate, etc. Enter quantity/month without fail, because the quantity influences the material to be selected.

Rough Interface Illustration around Bearing

1. Load Condition: Enter Check Mark in ☐.

Type	☐ Static	☐ Dynamic
	☐ Shock	☐ Vibration
	☐ Repeated	
Motion Form	☐ Revolution	☐ Reciprocating
	☐ Swing	
	☐ Shaft moves	☐ Bearing moves

2. Operation Time

Operation	☐ Continuous	
	☐ Intermittent	Hour/Day
	☐ Frequency	Cycle/min
	☐ Interval	Times/Day

3. RPM or Swing Angle

☐ RPM: N	rpm
☐ Swing Angle: θ	± Degrees
☐ Stroke: S	± mm

4. Slide Speed or Swing Cycle ☐Swing ☐Reciprocal

☐ Rev. speed: V	m/min
☐ Swing Cycle: C	cpm
☐ Recipro. Cycle: C	cpm

5. Load

☐ Load: W	KN

6. Specific Load

☐ Specific Load: P	MPa

7. Mating Shaft: Change of Shaft Dia. ☐OK ☐NO

☐ Shaft Diameter	ϕ mm
☐ Material	
☐ Surface Roughness/Finish	
☐ Hardness	
☐ Surface Treatment	
☐ Desired Clearance	mm

8. Housing: Change of I.D. ☐OK ☐NO

☐ Housing I.D.	ϕ mm
☐ Material	
Young's Modulus	MPa
Poison's Ratio	

9. Working Atmosphere

☐ There is Material in the Clearance.

☐ Oil → ☐ For Lubrication

☐ Water ☐ Foreign Material

☐ Others

10. Attached Documents

☐ Drawing ☐ Specification

☐ Others

11. Remarks

☐ New Design

☐ Modification → Existing Bearing

Date

Company Name

Phone Number

Fax Number

Title

Name

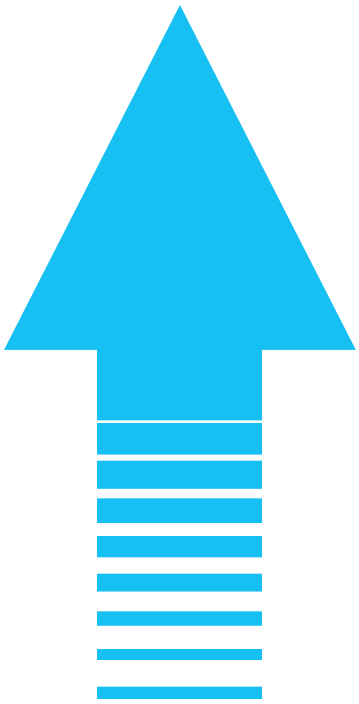
E-mail

Please contact DAIDO PRECISION METAL

URL/http://www.daidometal.com

mail: overseas_sales_group3@daidometal.com

Head Office Company in Charge Phone 81-568-61-4920 FAX 81-568-61-1465



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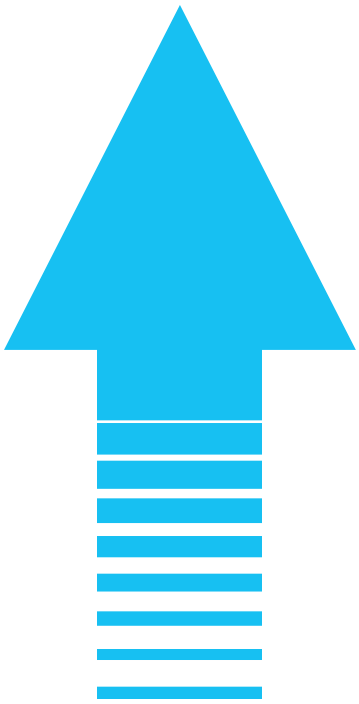

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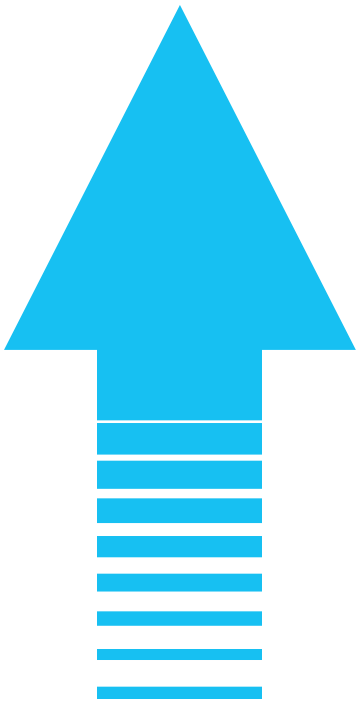

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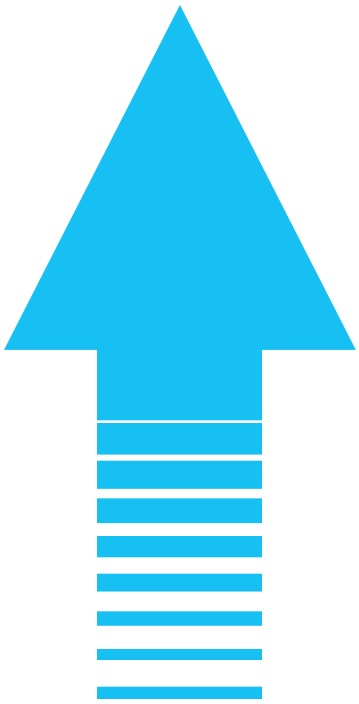

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