PRODUCT DATA SHEETS

TECHNOLOGIES INNOVATION
TECH-i

www.tech-i.us

ABOUT OUR **COMPANY**

TECH-i Corp is a dynamic industrial group specializing in **mechanical production** and service at the companies.

The management has **30 years of experience** in the industrial market as oil&gas-automotive-hydropower-mechanical-agriculture and HVAC and more.

TECH-i carried out an **intensive research program**, which, combined with considerable investments, have enabled it to develop the state-of-the-art technologies currently adopted on the production lines around the world with **warehouse and office in New Jersey**.

From 1986 the management started a **collaboration in production and service wide-scale marketing of different products** as: control devices for fluids, o-ring, lip seal, flange seat, pipe for gas and water, heating exchange, bushing, bearings, cam follower, rod end, bolt, and more.

SLIDING **BEARING** OR **BUSHING**

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Product Data Sheet
Advance Information

HiT-316
Self Lubricated Sliding Bearings

Description:

HiT-316 identify a new generation of Sliding Bearings dedicated at high temperature. This bearings can be used from –198°C to +450°C. Made in Stainless Steel Aisi-316 with a special coating treatment "Duritex ML". With this material we obtained Plain Sliding Bearings, Washers and special parts based on customer drawings.

Structure of the composite material:

Layer	*Average analyses of the material*	*Thickness of layer*
Sliding Surface	Special Surface Treatment "Duritex ML"	15 µm (Min)
Supporting Shell	Stainless Steel (Aisi 316) Cr = 16 ÷ 18 % Ni = 10 ÷ 13 % Mo = 2 ÷ 2,5 % Si = 1 % Max Mn = 2 % Max C = 0,060 % Max P = 0,045 % Max S = 0,030 % Max	0,50 ÷ 2,70 mm (Depending on the Dimensions of Bearing).

Characteristics:

- High load capacity in low temperature
- Self lubricating
- Low Static and Dynamic friction factor
- Minimum wear and excellent life services
- Easy to mount
- High chemical inertia

Available Products:

The available products made in *HiT-316* are the Plain Bearings (Bush) ISO 3547 (DIN 1494), thrust washers and strips on customer drawing. *HiT-316* material can also be manufactured in:

- Bearing and washers with dimensions on request
- Special part on customer drawing.

Technical Data:

Maximum Specific Load	Static	200 N/mm²	
Maximum Specific Load	Dynamic	100 N/mm²	
Maximum Sliding Speed	Dry	0,5 m/s	*(100 fpm)*
Friction Factor	Dry	0,07 ÷ 0,13	
Minimum Temperature	t	-198 °C	*(-324°F)*
Maximum Temperature	t	+450 °C	*(+840°F)*
Shaft (Suggested)		Chromium-Plated Alloy Steel	
Shaft Roughness (Suggested)	Ra	0,8	

The "Duritex ML" special treatment is resistant to all the oils, solvent, petrol and alcohol, and can stand alkaline and acid solutions.

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HiT-625
Self Lubricated Sliding Bearings

Description:

HiT-625 identify a new generation of Sliding Bearings dedicated at high temperature. This bearing can be used from –190°C to +600°C. Made in Inconel 625 with a special coating treatment. With this material we obtained Plain Sliding Bearings, Washers and special parts based on customer drawings.

Structure of the composite material:

Layer	*Average analyses of the material*	*Thickness of layer*
Sliding Surface	Special Surface Treatment	15 µm (Min)
Supporting Shell	Inconel 625 C = 0,10% Max Mn = 0,05% Max Cr = 20 ÷ 23 % Mo = 8 ÷ 10 % Co = 1% Max Ta + Nb = 3.15 ÷ 4.15 % Ni = Resto	0,50 ÷ 2,70 mm (Depending on the Dimensions of Bearing).

Characteristics:

- High load capacity at high temperature
- Self lubricating
- Low Static and Dynamic friction factor
- Minimum wear and excellent life services
- Easy to mount
- High chemical inertia

Available Products:

The available products made in *HiT-625* are the Plain Bearings (Bush) ISO 3547 (DIN 1494), the thrust washers and the strips on customer drawing. The material *HiT-625* can also be manufactured in other different items:

- Bearing and washers with dimensions on request
- Special part on customer drawing.

Technical Data:

Maximum Specific Load	Static	200 N/mm²	
Maximum Specific Load	Dynamic	100 N/mm²	
Maximum Sliding Speed	Dry	0,5 m/s	*(100 fpm)*
Friction Factor	Dry	0,07 ÷ 0,13	
Minimum Temperature	t	-190 °C	*(-310°F)*
Maximum Temperature	t	+600 °C	*(+1100°F)*
Shaft (Suggested)		Stainless Steel chromium plated	
Shaft Roughness (Suggested)	Ra	0,8	

The special treatment is resistant to all the oils, solvent, petrol and alcohol, and can stand alkaline and acid solutions.

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SS316+PTFE
Self Lubricated Sliding Bearings

Description:

The self lubricated *SS316+PTFE* material has been developed to obtain a material with good capacity of load and a maximum resistance to the corrosion. The Sliding layer in PTFE is applied with a special treatment and technique directly on the Stainless Steel. Study to work in static and semi static application, where a very high resistance to chemical acid, alcohol aggressions and oxidation is needed. His best performance is given on closed ambient, like valves that are difficult to be opened for maintenance. For production reasons the sliding surface of the bearing is black, but can be also supplied in different colours, usually in black.

Structure of the composite material:

Layer	*Material*	*Thickness of layer*
Sliding Surface	PTFE	20 µm (Aprox)
Supporting Shell	Stainless Steel (Aisi 316) Cr = 16 ÷ 18 % Ni = 10 ÷ 13 % Mo = 2 ÷ 2,5 % Si = 1 % Max Mn = 2 % Max C = 0,060 % Max P = 0,045 % Max S = 0,030 % Max	0,50 ÷ 2,90 mm (Depending on the Dimensions of Bearing).

Characteristics:

- Good load capacity
- Self lubricating
- Low Static and Dynamic friction factor
- Minimum wear and excellent life services
- Easy to mount
- High chemical inertia and good compatibility with fluids
- Small overall dimensions
- High resistance to corrosion
- Wide range of service temperature

Available Products:

The available products made in *SS316+PTFE* are Plain Bearings (Bush) ISO 3547 (DIN 1494), thrust washers and strips on customer drawing. The *SS316+PTFE* material can also be manufactured in other different items:

- Bush and washers with dimensions on request
- Special part on customer drawing.

Technical Data:

Maximum Specific Load	Static	100 N/mm²	
Maximum Specific Load	Dynamic	4 N/mm²	
Maximum Sliding Speed	Dry	0,5 m/s	*(100 fpm)*
Friction Factor	Dry	< 0,10	
Minimum Temperature	t	-190 °C	*(-310°F)*
Maximum Temperature	t	+260 °C	*(+500°F)*
Shaft (Suggested)		Chromium-Plated Alloy Steel	
Shaft Roughness (Suggested)	Ra	0,4 ÷ 0,8	

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TBM
Pre-Lubricated Sliding Bearings

Description:

TBM identifies an entire sliding bearing family constituted from a low carbon steel support over lined by a second layer of thermally sintered bronze. The lubricated bronze surface is the sliding side of the bearings. With oil or grease lubrication these bearings are ideal for all the applications where high strength, minimum dimensions and low friction factor are required.
This material is produced in according to ISO 3547-4 Key S6 Designation CuPb10Sn10.
The sintered layer is generally of lead bronze (CuSnPb10) which is ideal for sliding couplings with steel. Standard bronze thickness is 0,30 mm (nominal) which may be increased to 0,40 mm (nominal) and more for extra thickness bearings *(TBM-4 bearing line).*

Structure of the composite material:

Layer	*Average analyses of the material*	*Thickness of layer*
Sliding layer	Sinter Bronze (UNI ISO 4383) Cu Rest Sn 9 ÷ 11 % Pb 8 ÷ 11 %	200 ÷ 350 µm Std. (Special = Depending on the Drw.)
Connecting layer	Cu	1 ÷ 3 µm
Supporting shell	DC 04 (EN 10139) C = 0,080 Max Mn = 0,40 Max P = 0,03 Max S = 0,03 Max	0,50 ÷ 2,70 mm (Depending on Dim. of the Bearing)
External Protective Layer	Cu	1 ÷ 3 µm (Protective Oil on the chamfers)

Characteristics:

The *TBM* sliding bearings family is broken down into four product lines which differ from the finishing and from the thickness of the bronze layer; the identifications are the following:
TBM-1 = sliding surface with spherical cup lubricant pockets dedicated to applications without constant lubrication, the surface pockets accumulate and progressively release the lubricant. *TBM-3* = plain bronze surface to be applied where constant lubrication is foreseen, in this sense, according to customer specification, the bronze surface can be stamped or machined to obtain lubricant channels.
TBM-4 = plain surface with 0,10÷0,15 mm extra nominal thickness of bronze layer, it has an increased bronze thickness which is requested for all the applications with "in seat" final machining; typical case is the "in seat" machining of bushings for close tolerance alignment.

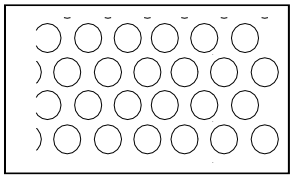
Main items for all the *TBM* range are the cylindrical bushings ISO 3547 (DIN 1494) and the flanged cylindrical bushings, metric and imperial; there are also thrust washers, support strips and a wide range of special items to customer drawings.
TBM sliding bearings offer many advantages, including the following :

- easy installation and maintenance
- high load capacity
- very compact dimensions
- high thermal conductibility
- wide range of working temperature
- wide availability of standard bushings
- possibility for special items

Sliding Surface:

TBM sliding bearings must always be used with lubrication. For the applications where the lubrication can only be periodic grease must be adopted. Where the lubrication can be continuous a lubricant oil can be chosen. The lubricant pockets and channel grooves reduce the working surface so the loading capabilities of the *TBM* bearings. Top performances are obtained with *TBM-3* and *TBM-4* having plain surface; with these it is possible to reach the hydrodynamic running at high load factor (Speed x Load). *TBM* standard working surfaces are the following :

TBM-1



TBM-3 & 4

The presence of the pockets reduces the working surfaces by the following percentages :

- *TBM-1* SPHERICAL CAP POCKETS 21% reduction
- *TBM-3 & 4* the reduction, with channel grooves, must be calculated case by case.

TBM-1 with the spherical pockets ensure an optimum lubricant release and it can be used with oil and grease. We can offer *TBM* bushings and all other sliding bearing types with different lubricant pockets and channel grooves according to customer drawing.

Design Data:

The design with the *TBM* bearings must consider the sliding speed, the type of lubrication, the hardness and the roughness of the counter pieces; after that the design data are the followings:

Maximum Work Load Static		310 N/mm²	
Maximum Work Load Dynamic		150 N/mm²	
Maximum PV Factor (with oil or grease)		2,7 N/mm² · m/s	
Maximum Speed	(with Oil or Grease)	2,5 m/s	*(500 fpm)*
Coefficient of friction		0.04 ÷ 0.15	
Maximum Temperature	t	+250°C	*(500°F)*
Minimum Temperature	t	-40°C	*(-40°F)*
Hardness (Bronze Side)	HB 2,5/62,5/10	80 – 100	
Roughness	Ra	0,6 ÷ 2 μm	
Thermal Conductibility	λ	46 W/mK	

For the frequent case where a *TBM* cylindrical bushing is to apply, it's important to remember that the working area on which to calculate the Specific Load is the internal projected surface (d·L). This surface must than be reduced by the extension of the lubricant grooves.

Lubrication:

Lubrication is compulsory for the correct use of *TBM* sliding bearings, lubrication is also useful to prevent corrosion on the counter pieces. When the coupling is exposed to atmosphere or to aggressive environments it's advisable to adopt lubricant seals which always improve coupling service life.

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TBR-10/80
Pre-Lubricated Sliding Bearings

Description:

TBR-10/80 introduces a range of full bronze sliding bearings. Bronze specification is according to UNI EN 1652 (CuSn8P) which is particularly suitable for sliding couplings with steel. This characteristic is highly improved by stamping and/or machine working the surface obtaining lubricant pockets, holes or channels to distribute and maintain the lubricant film between the pieces.
Central items of *TBR-10/80* range are the cylindrical bushings (ISO 3547), plain or flanged; in a difference wall thicknesses. *TBR-10/80* series includes all the sliding bearings normally used like thrust washers, sliding strips and in addition to these we can offer a wide variety of special items to customer's drawings.

Structure of the material:

Layer	*Average analyses of the material*	*Nominal Thickness*
Supporting shell Sliding Layer	CuSn8 / CuSn6	0,50 ÷ 3,00 mm (Depending on Dim. of the Bearing)

Characteristics:

TBR-10/80 sliding bearings offer many advantages, including the following :

- high load capacity
- very compact dimensions
- high chemical resistance to aggressive environments
- high thermal conductibility
- wide range of working temperature
- easy installation and maintenance
- wide availability of standard bushings
- possibility for special items

Design Data:

To choose the right *TBR-10/80* sliding bearing one must know the maximum applicable load, the sliding speed, the type and the intensity of the lubrication, the hardness and the roughness of the counter piece surface; after that the mechanical characteristics to consider are listed here below.

- Hardness HB 2,5/ 62,5/10 — 110 -140
- Roughness Ra — < 0.5 µm
- Thermal conductibility — 60 W/m·K
- Coefficient of thermal expansion — 20 x 10^{-5}/°C
- Coefficient of friction (with oil or grease) — 0.06 ÷ 0.17
- Service Temperature — -40°C to 150°C *(-40°F to 300°F)*
- Maximum Speed (with oil or grease) — 2.5 m/s *(500 fpm)*
- Maximum PV factor (with oil or grease) — 2.7 $N/mm^2 \cdot m/s$
- Maximum work load Static — 150 N/mm^2
- Maximum work load Dynamic — 60 N/mm^2

Sliding Surface:

TBR-10/80 sliding bearings must always be used with lubrication. For the applications where the lubrication can just be periodic grease must be adopted, while where the lubrication can be continuous a lubricant oil can be chosen. The different type of lubricant involves a different type of *TBR-10/80* bearing sliding surface. When grease is adopted the bearing sliding surface must be requested with lubricant pockets, while with oil the sliding surface can be plain or with lubricant channels.

Lubrication:

Lubrication is strictly needed for the correct use of *TBR-10/80* sliding bearings; lubrication is also useful to prevent corrosion on the counter pieces. When the coupling is exposed to atmosphere or to aggressive environments it's advisable to adopt lubricant seals which always improve coupling service life.

Mounting:

Base procedure for bushings mounting is to force them into their seats; there are same suggestion to follow:

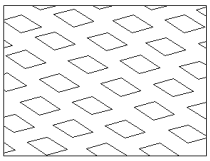
- Machine a 1 mm seat lead - in with an angle of 20° (±5°)
- Clean and burr the pieces to couple
- Lubricate external bushing surface before mounting
- Check alignment between seat and bushing centre lines
- When 2 bushing are needed their junctions must be aligned
- Use a proper sized mandrel when possible.
- Mounting can be done with hydraulic or mechanical tools.

The mounting force (**F**) in Newton is shown in the attached table.

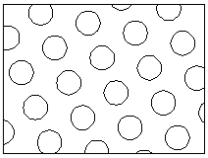
Bushing Nominal Thickness 0,50 ÷ 1,00 mm	F = 300 x L (Length of bush)
Bushing Nominal Thickness 1,00 ÷ 1,50 mm	F = 500 x L (Length of bush)
Bushing Nominal Thickness 1,50 ÷ 2,00 mm	F = 700 x L (Length of bush)
Bushing Nominal Thickness 2,00 ÷ 2,50 mm	F = 900 x L (Length of bush)

When mounting larger bushes it is advisable to use a mounting tool to support the bush. The tool diameter should be 0,3 ÷ 0,4 mm more than the bush diameter.
If the bush is secured by using an adhesive, care must be taken to ensure that good quality adhesive are used and that it does not get onto the sliding surface.

Sliding Surface:



TBR-10 (Lozenge Pockets)



TBR-80 (Through Holes)

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TBS-500
Self Lubricated Sliding Bearings

Description:

TBS-500 is a material suitable for heavy loads at low sliding speed, solid lubricant is provided by Graphite with additive, which is inserted into the bronze structure of the bearings.
The base material are CuZn25Al 5. The available items in this material are the cylindrical and flanged bush, washers, strips, and special part on customer requests.

Material Structure:

Supporting Shell:	Cu Zn 25 Al 5 Cu = Over 60% Fe = 2.0 ÷ 4.0 % Al = 5.0 ÷ 7.5 % Mn = 2.5 ÷ 5.0 % Sn = 0.5 % Pb = 0.2 % Si = 0.1 % Zn = Rest
Lubricant:	Grafhite + additive

Characteristics:

- High load capacity
- Self-lubricating under dry operation
- Possibility to use in presence of fluids
- Good chemical inertia to corrosive agents
- Wide range of operating temperature
- Flameproof
- Easy to mount
- Standard items widely available
- Special items on demand

Properties:

Maximum Specific Load	*Static*	*p*	100 N/mm²
Maximum PxV Factor	*Dry*		3.8 N/mm² · m/s
Maximum Sliding Speed	*Dry*	*v*	0,4 m/s
Maximum Sliding Speed	*with Oil*	*v*	5 m/s
Temperature	*Max*	*t*	+300° C
Tensile strength	*N/mm²*		770
Elongation	*%*		12
Hardness	*HB*		230
Friction Factor			<0,16

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TFX-316
Self Lubricated Sliding Bearings

Description:

Multilayer bushing (Dry Sliding Bearing) *TFX-316* is a three layer composite product.

- PTFE Fabric with special fibres of 0,40 mm thickness.
- Special Adhesive 60µm thickness.
- Stainless Steel (AISI 316 L) from 0,50 to 2,70 mm thick depending on the size of the bush.

Structure of the composite material:

Layer	*Average analyses of the material*	*Thickness of layer*
Sliding layer	PTFE Fabric	0,40 mm
Intermediate layer	Special Adhesive	60µm
Supporting shell	Stainless Steel AISI 316 L (1.4404) C = 0,030 Max Mn = 2 Max P = 0,045 Max S = 0,030 Max Si = 1 Max Cr = 16.5-18.5 Ni = 10-13 Mo = 2 Max	0,50 ÷ 2,70 mm (Depending on Dimension of the Bearing)

Characteristics:

TFX-316 Structure combines in the best way the mechanical strength and chemical resistance of the Stainless Steel (AISI 316 L), with PTFE low friction characteristic. The performance given without lubricants are the following:

- Working surface acceptable specific static pressure until 400 N/mm^2
- Working surface acceptable specific dynamic pressure until 180 N/mm^2
- Maximum sliding speed: 0,5 m/s *(100 fpm)*
- Working temperature from: -180°C to +260° C *(-292°F to +500°F)*
- Friction factor from 0,03 ÷ 0,15
- High chemical resistance to industrial fluids and gases. The sliding layer can resist to the oils, sulphuric acid, solvents, idrossid of ammonium and sodium, hydrocarbons and alcohol. The fluid that can damage the material are solvent and chloridric acid. In case of uses of other kind of fluid , we recommend to make previous test.

Special Items:

Apart from bushings and thrust washers the *TFX-316* can be supplied as many other technical items, between them we indicate the followings:

- Bushings and washers with request dimension
- Special items at customer's drawing.

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TFX-625
Self Lubricated Sliding Bearings

Description:

Multilayer bushing (dry Sliding Bearings) *TFX-625* is a three layer composite product.

- PTFE Fabric with special fibres of 0,40 mm thickness.
- Special Adhesive 60µm thickness.
- Inconel-625 from 0,50 to 2,70 mm thick depending on the size of the bush.

Structure of the composite material:

Layer	*Average analyses of the material*	*Thickness of layer*
Sliding layer	PTFE Fabric	0,40 mm
Intermediate layer	Special Adhesive	60µm
Supporting shell	Inconel-625 C = 0,10 % Max Mn = 0,05 % Max Cr = 20 ÷ 23 % Ni = Rest Mo = 8÷10 % Cobalt = 1 % Max Tentalum + Niobium = 3,15 ÷ 4,15 %	0,50 ÷ 2,70 mm (Depending on Dim. of the Bearing)

Characteristics:

TFX-625 Structure combines in the best way the mechanical strength and chemical resistance of Inconel-625, with PTFE low friction characteristic. The performance given without lubricants are the following:

- Working surface acceptable specific static pressure until 400 N/mm^2
- Working surface acceptable specific dynamic pressure until 180 N/mm^2
- Maximum sliding speed: 0,5 m/s *(100 fpm)*
- Working temperature from: -180°C to +260° C *(-292°F to +500°F)*
- Friction factor from 0,03 ÷ 0,15
- High chemical resistance to industrial fluids and gases. The sliding layer can resist to the oils, sulphuric acid, solvents, idrossid of ammonium and sodium, hydrocarbons and alcohol. The fluid that can damage the material are solvent and chloridric acid. In case of uses of other kind of fluid , we recommend to make previous test.

Special Items:

Apart from bushings and thrust washers the *TFX-625* can be supplied as many other technical items, between them we indicate the followings:

- Bushings and washers with dimension on request
- Special items at customer's drawing.

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TFX-C
Self Lubricated Sliding Bearings

Description:

Multilayer bushing (Dry Sliding Bearings) *TFX-C* bearing is a three layer composite product.

- PTFE Fabric with special fibres of 0,40 mm thickness.
- Special Adhesive 60µm thickness.
- Low carbon steel from 0,50 to 2,70 mm thick depending on the size of the bush.

Structure of the composite material:

Layer	*Average analyses of the material*	*Thickness of layer*
Sliding layer	PTFE Fabric	0,40 mm
Intermediate layer	Special Adhesive	60µm
Supporting shell	Low Carbon Steel (EN 10139) C = 0,080 Max Mn = 0,40 Max P = 0,03 Max S = 0,03 Max	0,50 ÷ 2,70 mm (Depending on Dim. of the Bearing)
Protective Layer	Sn or Zn	2 ÷ 8 µm

Characteristics:

TFX-C Structure combines in the best way the mechanical strength of steel, with PTFE low friction characteristic. The performance given without lubricants are the following:

- Working surface acceptable specific static pressure until 300 N/mm^2
- Working surface acceptable specific dynamic pressure until 180 N/mm^2
- Maximum sliding speed: 0,5 m/s *(100 fpm)*
- Working temperature from: -100°C to +260° C *(-148°F a +500°F)*
- Friction factor from 0,03 ÷ 0,15
- High chemical resistance to industrial fluids and gases. The sliding layer can resist to oils, sulphuric acid, solvents, idrossid of ammonium and sodium, hydrocarbons and alcohol. The fluid that can damage the material are solvent and chloridric acid. In case of use in presence of other kind of fluid , we recommend to make previous test.

Special Items:

Apart from bushings and thrust washers the *TFX-C* can be supplied as many other technical items, between them we indicate the followings:

- Bushings and washers with request dimensions
- Special items at customer's drawing.

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TM-G
Polymer Sliding Bearings

Description:

TM-G is a thermoplastic material with a wire of fibers mixed with solid lubricants. The product shows a good wear proofing feature, the solid lubricants reduces the friction factor and form, by micro abrasion, an excellent sliding surface with the counter-piece. There are several applications, ranging from office supplies, to medical equipment, pneumatic cylinders, hinges, rudder bars, etc. The *TM-G* series includes cylindrical and flanged bearings as well as washers, and special parts are available on demand.

Characteristics:

- Dry self-lubrications
- Low friction factor, either static or dynamic
- Minimized wear and excellent service life
- Good chemical strength
- Ideal for rotary, swinging or linear movements
- Good abrasion resistance
- Easy to assembly
- Wide range of standard items available
- Special items on demand

General Properties

Density	DIN 53479 ASTM D792	g/cm³	1,44
Max moisture absorption in water at 24h (23°C)	ISO 62	%	0,70
Coefficient of sliding friction dynamic			0,08 – 0,20
P x V Value	(dry)	N/mm² · m/s	0,42
Colour			Dark Grey

Mechanical properties

Tensile strength (23 °C)	ISO 527	N/mm²	142
Modulus of elasticity (23 °C)	ISO 527 R	N/mm²	7900
Elongation at break (23 °C)	ISO 527	%	3,60
Izod – Impact strength (notched) (23 °C)	ASTM D256-A	J/m	88
Charpy – Impact strength (unnotched) (23 °C)	ISO 179-1	KJ/m²	74
Charpy – Impact strength (notched) (23 °C)	ISO 179-1	KJ/m²	7,8
Max surface speed (rotating)		m/s	1
Max surface speed (linear)		m/s	4,0
Max static surface pressure		N/mm²	80

Physical and thermal properties

Max long term application temperature		°C	+ 130
Min long term application temperature		°C	- 40
Coefficient of thermal expansion (+30°C +100°C)	DIN 53752	$K^{-1} \cdot 10^{-5}$	4

Electrical properties

Specific volume resistance	DIN 53482	Ω cm	$>10^{13}$
Surface resistance	DIN 53482	Ω	$>10^{12}$

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TU
Self Lubricated Sliding Bearing

Description:

Multilayer bushing (dry Sliding Bearings) *TU* bearings are self lubricated material and are a three layer composite product.

- PTFE Modified antifriction surface layer 0,01 ÷ 0,05 mm thick (without lead, complying with the European Parliament's "ELV" directive 2000/53/Ec).
- Porous bronze layer 0,20 ÷ 0,35 mm thickness.
- Low carbon steel supporting strip 0,50 to 2,70 mm thick depending on the size of the bush. The steel is plated for corrosion protection (Tin or Zinc 2÷8 µm)

Structure of the composite material:

Layer	*Average analyses of the material*	*Thickness of layer*
Sliding layer	PTFE Modified	10 µm *(Minimum)*
Intermediate layer	CuSn11 Sintered	200 ÷ 350 µm *(Average Peak)*
Connecting layer	Cu	1 ÷ 3 µm
Supporting shell	Low Carbon Steel (EN 10139) C = 0,080 Max Mn = 0,40 Max P = 0,03 Max S = 0,03 Max	0,50 ÷ 2,70 mm (Depending on Dim. of the Bearing)
Protective Layer	Sn or Zn	2 ÷ 8 µm

Characteristics:

TU structure combines in the best way the mechanical strength of the steel, the bronze thermal conductivity and PTFE low friction. The performance given without lubricants are the following:

- Working surface acceptable specific static pressure: Max 250 N/mm^2
- Working surface acceptable specific dynamic pressure: Max 140 N/mm^2
- Maximum sliding speed (dry): 2,5 m/s *(500 fpm)*
- Maximum sliding speed (oil): 10 m/s *(2000 fpm)*
- Working temperature from: -200°C to +280° C *(-328°F to +536°F)*
- Friction factor from 0,03 to 0,20
- Clear fluids like oil or water permit higher values for speed and specific pressure
- Friction factor not affected by "stick - slip" effect
- High chemical resistance to industrial fluids and gases.

Special Items:

Apart from bushings ISO 3547 (DIN 1494) and thrust washers, the *TU* can be supplied as many other technical items, between them we indicate the followings:

- Bushings and washers at customer request measures
- Counter - roller bushings with the sliding surface on the outside diameter
- Special items at customer's drawing.

Design Data:

TU bushing service life depend mainly from the load factor P x V ($N/mm^2 \cdot m/s$). Practical cases have shown that a working load factor of 2.5 to 3,6 ($N/mm^2 \cdot m/s$) is admissible for short periods. Long service life are suited with load factors ranging from 0.2 to 1.8 for continuous loads and 0.1 to 0.9 ($N/mm^2 \cdot m/s$) for alternating loads.

Friction:

TU friction factor principally depends from the specific load, the sliding speed and from the working temperature; very important it is also the material and the counter piece superficial degree of finishing.

Sliding Speed V (m/s)	Specific Load P (N/mm^2)	Friction Factor
up to 0,001	140	0,03
from 0,001 to 0,005	from 140 to 62	from 0,04 to 0,07
from 0,005 to 0,05	from 62 to 11	from 0,07 to 0,1
from 0,05 to 0,5	from 11 to 1	from 0,1 to 0,15
from 0,5 to 2,5	1	from 0,15 to 0,20

Wear:

During operation the *TU* bushing shows a first running - in phase when some of PTFE compound transfers on counter piece which normally is of steel alloy. Other counter pieces of stainless steel, chrome plated steel and hard anodised aluminium can improve *TU* service life. As counter piece have to be avoided bronze, aluminium, phosphatized and nickel plated steel to optimise *TU* durability surface roughness must not exceed 0.4 um. Where possible *TU* bushing preliminary tests have to be carried out to make sure about the influencing factors of each application; our technical department is willing to supply additional information and data request.

Mounting:

Base procedure for bushings mounting is to force them into their seats; there are same suggestion to follow:

- Machine a 1 mm seat lead - in with an angle of 20° (±5°)
- Clean and burr the pieces to couple
- Lubricate external bushing surface before mounting
- Check alignment between seat and bushing centre lines
- When 2 bushing are needed their junctions must be aligned
- Use a proper sized mandrel when possible.
- Mounting can be done with hydraulic or mechanical tools.

The mounting force (**F**) in Newton is shown in the attached table.

Bushing Nominal Thickness 0,50 ÷ 1,00 mm	F = 300 x L (Length of bush)
Bushing Nominal Thickness 1,00 ÷ 1,50 mm	F = 500 x L (Length of bush)
Bushing Nominal Thickness 1,50 ÷ 2,00 mm	F = 700 x L (Length of bush)
Bushing Nominal Thickness 2,00 ÷ 2,50 mm	F = 900 x L (Length of bush)

When mounting larger bushes it is advisable to use a mounting tool to support the bush. The tool diameter should be 0,3 ÷ 0,4 mm more than the bush diameter.
If the bush is secured by using an adhesive, care must be taken to ensure that good quality adhesive are used and that it does not get onto the sliding surface.

TECHNOLOGIES INNOVATION
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Product Data Sheet
Advance Information

TU-316
Self Lubricated Sliding Bearings

Description:

Multilayer bushing (dry Sliding Bearings) *TU-316* bearings are self lubricated material and are a three layer composite product.

- PTFE Modified antifriction surface layer 0,01 ÷ 0,05 mm thickness (Without lead, complying with the European Parliament's "ELV" directive 2000/53/Ec).
- Porous bronze layer 0,20÷0,35 mm thickness
- AISI 316 L steel supporting strip 0,70 to 2,20 mm thickness (depending on the size of the bush).

Structure of the composite material:

Layer	*Average analyses of the material*	*Thickness of layer*
Sliding layer	PTFE Modified	10 µm *(Minimum)*
Intermediate layer	CuSn11 Sintered	200 ÷ 350 µm *(Average Peak)*
Connecting layer	Cu	Depending of wall thickness
Supporting shell	AISI 316 L Stainless Steel (1.4404) C = 0.030 % Max Mn = 2.00 % Max P = 0.045 % Max S = 0.030 % Max Si= 1 % Max Cr= 16.5 - 18.5 % Ni= 10.00-13.00 % Mo= 2.0 % Max	0,70 ÷ 2,20 mm (Depending on Dim. of the Bearing)

Characteristics:

TU-316 structure combines in the best way the mechanical strength of the steel, the bronze thermal conductivity and PTFE low friction. The performance given without lubricants are the following:

- Working surface acceptable specific static pressure: Max 250 N/mm^2
- Working surface acceptable specific dynamic pressure: Max 140 N/mm^2
- Maximum sliding speed (dry): 2,5 m/s *(500 fpm)*
- Maximum sliding speed (oil): 10 m/s *(2000 fpm)*
- Working temperature from: -200 to +280° C *(-328°F to +536°F)*
- Friction factor from 0,03 to 0,20
- Clear fluids like oil or water permit higher values for speed and specific pressure
- Friction factor not affected by "stick - slip" effect
- High chemical resistance to industrial fluids and gases.
- High resistance to corrosion

Special Items:

Apart from plain bushings ISO 3547 (DIN 1494) and thrust washers the *TU-316* can be supplied as many other technical items, between them we indicate the followings:

- Bushings and washers at customer request measures
- Counter - roller bushings with the sliding surface on the outside diameter
- Special items at customer's drawing.

Design Data:

TU-316 bushing service life depend mainly from the load factor P x V (N/mm^2 x m/s). Practical cases have shown that a working load factor of 2.5 to 3.6 (N/mm^2 x m/s) is admissible for short periods. Long service life are suited with load factors ranging from 0.2 to 1.8 for continuous loads and 0.1 to 0.9 (N/mm^2 x m/s) for alternating loads.

Friction:

TU-316 friction factor principally depends from the specific load, the sliding speed and from the working temperature; very important it is also the material and the counter piece superficial degree of finishing.

Sliding Speed V (m/s)	Specific Load P (N/mm^2)	Friction Factor
up to 0,001	140	0,03
from 0,001 to 0,005	from 140 to 62	from 0,04 to 0,07
from 0,005 to 0,05	from 62 to 11	from 0,07 to 0,1
from 0,05 to 0,5	from 11 to 1	from 0,1 to 0,15
from 0,5 to 2,5	1	from 0,15 to 0,20

Wear:

During operation the *TU-316* bushing shows a first running - in phase when some of PTFE compound transfers on counter piece which normally is of steel alloy. Other counter pieces of stainless steel, chrome plated steel and hard anodised aluminium can improve *TU-316* service life. As counter piece have to be avoided bronze, aluminium, phosphatized and nickel plated steel to optimise *TU-316* durability surface roughness must not exceed 0.4 um. Where possible *TU-316* bushing preliminary tests have to be carried out to make sure about the influencing factors of each application; our technical department is willing to supply additional information and data request.

Mounting:

Base procedure for bushings mounting is to force them into their seats; there are same suggestion to follow:

- Machine a 1 mm seat lead - in with an angle of 20° (±5°)
- Clean and burr the pieces to couple
- Lubricate external bushing surface before mounting
- Check alignment between seat and bushing centre lines
- When 2 bushing are needed their junctions must be aligned
- Use a proper sized mandrel when possible.
- Mounting can be done with hydraulic or mechanical tools.

The mounting force (**F**) in Newton is shown in the attached table.

Bushing Nominal Thickness 0,50 ÷ 1,00 mm	F = 300 x L (Length of bush)
Bushing Nominal Thickness 1,00 ÷ 1,50 mm	F = 500 x L (Length of bush)
Bushing Nominal Thickness 1,50 ÷ 2,00 mm	F = 700 x L (Length of bush)
Bushing Nominal Thickness 2,00 ÷ 2,50 mm	F = 900 x L (Length of bush)

When mounting larger bushes it is advisable to use a mounting tool to support the bush. The tool diameter should be 0,3 ÷ 0,4 mm more than the bush diameter.
If the bush is secured by using an adhesive, care must be taken to ensure that good quality adhesive are used and that it does not get onto the sliding surface.

TECHNOLOGIES INNOVATION
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Product Data Sheet
Advance Information

TU-625
Self Lubricated Sliding Bearings

Description:

TU-625 Dry Sliding Bearings is a three layer composite product.

- PTFE Modified antifriction surface layer 0,01÷0,04 mm thick (without lead, complying with the European Parliament's "ELV" directive 2000/53/Ec).
- Porous bronze layer 0,05 ÷ 0,10 mm thickness.
- Inconel-625 from 0,50 to 2,70 mm thick depending on the size of the bearing.

Structure of the composite material:

Layer	*Average analyses of the material*	*Thickness of layer*
Sliding layer	PTFE Modified	40 ÷ 80 µm (Colour Black or Green)
Intermediate layer	Bronze Cu 86÷96% Sn 3÷11% Other <2%	50 ÷ 100 µm
Supporting shell	Inconel-625 C = 0,10 % Max Mn = 0,05 % Max Cr = 20 – 23 % Ni = Rest Mo = 8 – 10 % Cobalt = 1 % Max Tentalum + Niobium = 3,15 - 4,15 %	0,25 ÷ 2,70 mm (Depending on Dim. of the Bearing)

Characteristics:

TU-625 structure combines in the best way the mechanical strength of steel, bronze thermal conductivity and PTFE low coefficient of friction. The performance given without lubricants are the following:

- Working surface acceptable specific static pressure: Max 250 N/mm^2
- Working surface acceptable specific dynamic pressure: Max 140 N/mm^2
- Working surface acceptable specific alternative pressure: Max 60 N/mm^2
- Maximum sliding speed (dry): 2,5 m/s *(500 fpm)*
- Maximum Load Factor (PxV): 1,8 $N/mm^2 \cdot m/s$
- Working temperature from: -190°C to +280° C *(-310°F to +536°F)*
- Friction factor from 0,03 to 0,20
- Clear fluids like oil or water permit higher values for speed and specific pressure
- Friction factor not affected by "stick - slip" effect
- High chemical resistance to industrial fluids and gases. (The sliding layer can resist to the oils, sulphuric acid, solvents, hydrossid of ammonium and sodium, hydrocarbons and alcohol. The fluid that can damage the material are solvent and chloridric acid. In case of uses of other kind of fluid , we recommend to make previous test.

Special Items:

Apart from bushings ISO 3547 (DIN 1494) and thrust washers, the *TU-625* can be supplied as many other technical items, between them we indicate the followings:

- Bushings and washers with dimensions on request
- Counter - roller bushings with the sliding surface on the outside diameter
- Special items based on customer's drawing.

Friction:

TU-625 friction factor principally depends from the specific load, the sliding speed and from the working temperature; also very important is counter piece material superficial degree of finishing.

Sliding Speed V (m/s)	Specific Load P (N/mm^2)	Friction Factor
up to 0,001	140	0,03
from 0,001 to 0,005	from 140 to 62	from 0,04 to 0,07
from 0,005 to 0,05	from 62 to 11	from 0,07 to 0,1
from 0,05 to 0,5	from 11 to 1	from 0,1 to 0,15
from 0,5 to 2,5	1	from 0,15 to 0,20

Wear:

During operation the *TU-625* bushing shows a first running - in phase when some of PTFE compound transfers on counter piece which normally is of steel alloy. Other counter pieces of stainless steel, chrome plated steel and hard anodised aluminium can improve *TU-625* service life. As counter piece have to be avoided bronze, aluminium, phosphatized and nickel plated steel to optimise *TU-625* durability surface roughness must not exceed 0.4 um. Where possible *TU-625* bushing preliminary tests have to be carried out to make sure about the influencing factors of each application; our technical department is willing to supply additional information and data request.

Mounting:

Base procedure for bushings mounting is to force them into their seats; there are some suggestion to follow:

- Machine a 1 mm seat lead - in with an angle of 20° (±5°)
- Clean and burr the pieces to couple
- Lubricate external bushing surface before mounting
- Check alignment between seat and bushing centre lines
- When 2 bushing are needed their junctions must be aligned
- Use a proper sized mandrel when possible.
- Mounting can be done with hydraulic or mechanical tools.

The mounting force (**F**) in Newton is shown in the attached table.

Bushing Nominal Thickness 0,50 ÷ 1,00 mm	F = 300 x L (Length of bush)
Bushing Nominal Thickness 1,00 ÷ 1,50 mm	F = 500 x L (Length of bush)
Bushing Nominal Thickness 1,50 ÷ 2,00 mm	F = 700 x L (Length of bush)
Bushing Nominal Thickness 2,00 ÷ 2,50 mm	F = 900 x L (Length of bush)

When mounting larger bushes it is advisable to use a mounting tool to support the bush. The tool diameter should be 0,3 ÷ 0,4 mm more than the bush diameter.
If the bush is secured by using an adhesive, care must be taken to ensure that good quality adhesive are used and that it does not get onto the sliding surface.

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Product Data Sheet
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TU-B
Self Lubricated Sliding Bearings

Description:

Multilayer bushing (dry Sliding Bearings) *TU-B* bearings are self lubricated material and are a three layer composite product.

- PTFE Modified antifriction surface layer 0,01÷0,05 mm thickness (Without lead, complying with the European Parliament's "ELV" directive 2000/53/Ec).
- Porous bronze layer 0,20÷0,35 mm thickness.
- Bronze supporting strip 0,50 to 2,70 mm thickness depending on the size of the bush.

Structure of the composite material:

Layer	*Average analyses of the material*	*Thickness of layer*
Sliding layer	PTFE Modified	10 µm *(Minimum)*
Intermediate layer	CuSn11 Sintered CuSn8 / CuSn6	200 ÷ 350 µm *(Average Peak)*
Supporting shell	Bronze (CuSn8P) Cu = Rest Sn = 7,5 / 8,5 Max P = 0,40 Max	0,50 ÷ 2,70 mm (Depending on Dim. of the Bearing)

Characteristics:

TU-B structure combines in the best way the mechanical strength of the steel, the bronze thermal conductivity and PTFE low friction. The performance given without lubricants are the following:

- Working surface acceptable specific static pressure: Max 250 N/mm^2
- Working surface acceptable specific dynamic pressure: Max 140 N/mm^2
- Maximum sliding speed (dry): 2,5 m/s *(500 fpm)*
- Maximum sliding speed (oil): 10 m/s *(2000 fpm)*
- Working temperature from: -200 to +280° C *(-328°F to +536°F)*
- Friction factor from 0,03 to 0,20
- Clear fluids like oil or water permit higher values for speed and specific pressure
- Friction factor not affected by "stick - slip" effect
- High chemical resistance to industrial fluids and gases.

Special Items:

Apart from bushings ISO 3547 (DIN 1494) and thrust washers the *TU-B* can be supplied as many other technical items, between them we indicate the followings:

- Bushings and washers at customer request measures
- Counter - roller bushings with the sliding surface on the outside diameter
- Special items at customer's drawing.

Design Data:

TU-B bushing service life depend mainly from the load factor P x V (N/mm^2 x m/s). Practical cases have shown that a working load factor of 2.5 to 3.6 (N/mm^2 x m/s) is admissible for short periods. Long service life are suited with load factors ranging from 0.2 to 1.8 for continuous loads and 0.1 to 0.9 (N/mm^2 x m/s) for alternating loads.

Friction:

TU-B friction factor principally depends from the specific load, the sliding speed and from the working temperature; very important it is also the material and the counter piece superficial degree of finishing.

Sliding Speed V (m/s)	Specific Load P (N/mm^2)	Friction Factor
up to 0,001	140	0,03
from 0,001 to 0,005	from 140 to 62	from 0,04 to 0,07
from 0,005 to 0,05	from 62 to 11	from 0,07 to 0,1
from 0,05 to 0,5	from 11 to 1	from 0,1 to 0,15
from 0,5 to 2,5	1	from 0,15 to 0,20

Wear:

During operation the *TU-B* bushing shows a first running - in phase when some of PTFE compound transfers on counter piece which normally is of steel alloy. Other counter pieces of stainless steel, chrome plated steel and hard anodised aluminium can improve *TU-B* service life. As counter piece have to be avoided bronze, aluminium, phosphatized and nickel plated steel to optimise *TU-B* durability surface roughness must not exceed 0.4 um. Where possible *TU-B* bushing preliminary tests have to be carried out to make sure about the influencing factors of each application; our technical department is willing to supply additional information and data request.
The base structure made of CuSn8 makes the bearings suitable for corrosive applications.

Mounting:

Base procedure for bushings mounting is to force them into their seats; there are same suggestion to follow:

- Machine a 1 mm seat lead - in with an angle of 20° (±5°)
- Clean and burr the pieces to couple
- Lubricate external bushing surface before mounting
- Check alignment between seat and bushing centre lines
- When 2 bushing are needed their junctions must be aligned
- Use a proper sized mandrel when possible.
- Mounting can be done with hydraulic or mechanical tools.

The mounting force (**F**) in Newton is shown in the attached table.

Bushing Nominal Thickness 0,50 ÷ 1,00 mm	F = 300 x L (Length of bush)
Bushing Nominal Thickness 1,00 ÷ 1,50 mm	F = 500 x L (Length of bush)
Bushing Nominal Thickness 1,50 ÷ 2,00 mm	F = 700 x L (Length of bush)
Bushing Nominal Thickness 2,00 ÷ 2,50 mm	F = 900 x L (Length of bush)

When mounting larger bushes it is advisable to use a mounting tool to support the bush. The tool diameter should be 0,3 ÷ 0,4 mm more than the bush diameter.
If the bush is secured by using an adhesive, care must be taken to ensure that good quality adhesive are used and that it does not get onto the sliding surface.

TECHNOLOGIES INNOVATION
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Pine Brook, NJ 07058

Product Data Sheet
Advance Information

TVM
Self Lubricated Sliding Bearings

Description:

TVM identifies an entire sliding bearing family constituted from a complex fibre-winding technique. The highstrength backing consists of glass fibres and the sliding surface is made of PTFE and polymer fibres. Both layers are embedded in an epoxy resin matrix. This material selection combines the special mechanical properties of glass fibres with the outstanding tribological properties of PTFE and the high-strength polymer fibres.

Characteristics:

TVM benefits are for extreme operating conditions, most plain bearings need premature maintenance or replacement, *TVM* bushing are typically still operational.

- Excellent sliding property;
- High load carrying capacity;
- Long service life;
- Maintenance-free;
- Insensitivity to edge loading and misalignment;
- Good impact resistance;
- Good noise and vibration damping;
- Excellent resistance to corrosive media, even to salt water, and many chemicals;
- Good insulator preventing passage of eletric current.

Properties:

	Value	*Unit*	
Maximum Specific Load Static	250	N/mm²	*(36260 psi)*
Maximum Specific Load Dynamic	140	N/mm²	*(20300 psi)*
Maximum Sliding Speed	0,10	m/s	*(20 fpm)*
Maximum PxV Factor	1,05	N/mm² · m/s	
Maximum PxV Factor (short period)	1,50	N/mm² · m/s	
Break Straw	400	N/mm²	
Max Moisture Absorption (23°C)	ASTM D570	0,35 %	
Maximum Temperature	+150	°C	*(+302°F)*
Minimum Temperature	-50	°C	*(-58°F)*
Shaft Finish Ra (Advised)	0,2÷0,8 Ra	µm	
Shaft Hardness (Advised)	>350	HB	

Operating Conditions:

Dry	***
Oil	****
Grease	****
Water	*
Process Fluid	*

***** = Excellent*
*** = Good*
* = Fair*

Dimensions:

The dimensions of *TVM* bushing correspond to ISO 4379 (1993). This provides full interchangeability with other bushings, e.g. bronze bushings. The tolerances after fitting into housing bore with H7 tolerance, will be within D11.

Mounting:

Base procedure for bushings mounting is to force them into their seats; there are same suggestion to follow:

- Machine a 1 mm seat lead - in with an angle of 20° (±5°)
- Check alignment between seat and bushing centre lines
- Use a proper sized mandrel when possible.
- Mounting can be done with hydraulic or mechanical tools.
- We suggest to lubricate the internal surface just in start-up fazes.

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Product Data Sheet
Advance Information

TX
Pre-Lubricated Sliding Bearings

Description:

Multilayer bushing (Pre-Lubricated Sliding Bearings)
TX bearings are Pre-lubricated material and are a three layer composite product.

- Pom-C layer 0,25 ÷ 0,50 mm thickness
- Porous bronze layer 0,20 ÷ 0,35 mm thickness
- Low carbon steel supporting strip 0,50 to 2,70 mm thick depending on the size of the bush. The steel is plated for corrosion protection (Tin or Zinc 2÷8 µm).

Structure of the composite material:

Layer	*Average analyses of the material*	*Thickness of layer*
Sliding layer	Pom-C (DIN 7728)	250 ÷ 450 µm *(Average Peak)*
Intermediate layer	CuSn10 Sintered	200 ÷ 350 µm *(Average Peak)*
Connecting layer	Cu	1 ÷ 3 µm
Supporting shell	Low Carbon Steel (EN 10139) C = 0,080 Max Mn = 0,40 Max P = 0,03 Max S = 0,03 Max	0,50 ÷ 2,70 mm (Depending on Dim. of the Bearing)
Protective Layer	Sn or Zn	2 ÷ 8 µm

A porous layer of bronze is sintered onto a steel backing. The purpose of this layer is to bond the upper acetal co-polymer sliding layer and to facilitate heat dissipation. The polymeric surface is indented so that the lubricating grease is collected and released gradually to minimize friction and protect the mating surface.
The *TX* range of products includes bushes, thrust washers and strips both in metric and imperial sizes. Furthermore, *TX* bearings can be supplied, on request, in metric or imperial sizes. *TX* is supplied in the pre-finished version, ready for use.

Characteristics:

TX structure combines in the best way the mechanical strength of the steel, the bronze thermal conductivity and POM-grease low friction. The performance are the following:

- Working surface acceptable specific static pressure max 140 N/mm^2
- Working surface acceptable specific dynamic pressure max 70 N/mm^2
- Maximum sliding speed with grease: 2,5 m/s *(500fpm)*
- Working temperature from: -40°C to +130° C *(-40°F to +266°F)*

TX is produced in coils of various thicknesses from which the sliding bearings such as bushes, thrust washers, strips and special parts for lubricated applications are manufactured.
TX bearings can be used in a wide range of applications, from civil and industrial vehicles to machine tools and wherever there are articulated joints that require minimum periodic lubrication. The lubricant guarantees very low coefficients of friction and consequently, a reduced amount of wear with an anti-corrosive protection of the mechanical parts.
Use of the *TX* bearings is continuing to expand because of a need both to overcome problems of wear between two metal mating surfaces and to reduce costs by substituting rolling bearings wherever possible. *TX* provides an answer to these requirements while offering greater compactness and ease of fitting at the same time.
Lubrication is always necessary and if grease is used, it is essential to establish beforehand whether the grease will be applied only initially or if regular maintenance operations will be carried out. Further details concerning maintenance are provided further on.

Special Items:

Apart from bushings and thrust washers the *TX* can be supplied as many other technical items, between them we indicate the followings:

- Bushings and washers at customer request measures
- Counter - roller bushings with the sliding surface on the outside diameter
- Special items at customer's drawing.

Performance:

The load capacity of *TX* bearings is expressed by the load factor p x v (N/mm² x m/s) where p is the specific load and v is the speed. The maximum value of the specific load that can be applied under static and ideal conditions is 140 x N/mm². For the bushes, the internal semi-surface, which is given by the result of the internal diameter multiplied by the length Di x L, must be considered. The value of the specific load is reduced to 130 N/mm² under dynamic conditions (with grease lubrication)
Higher temperatures reduce the load factor by 20% at 50°C, by 50% at 70°C and by 80% at 100°C. The performance of the bearings in the *TX* range is improved with grease lubrication that allows for P x V factors of up to 5 (N/mm² x m/s) with maximum speed of 2.5 m/s.
The *TX* series of bearings can be used without maintenance and with just a first initial greasing. However, where possible, re-greasing should be carried out to increase the operating life of the bearing.
The outside of the bearings is protected with a Tin Plating.

Friction:

The particular characteristic of the acetal co-polymer sliding lining of *TX* bearings is that it creates a pseudo-binding with the lubricants to form an excellent and very long-lasting sliding surface. Apart from the considerations referred to above, the dynamic coefficient of friction under lubricated operating conditions is greatly influenced, both positively and negatively, by the same factors that determine the operating life of the bearing. With a grease based lubrication, the coefficient of friction varies between the values of 0.05 - 0.012. The lowest values are reached with a high specific load. Oil lubrication further reduces friction and at high speeds hydrodynamic lubrication is attained that lowers the coefficient of friction to values close to 0.002. For *TX* bearings, the static coefficient of friction is not much higher than the dynamic one and therefore, the annoying “stick-slip” phenomenon, i.e. the sticking of the bearing when still, does not occur.

Wear:

The wear rate of *TX* bearings for greased applications is difficult to calculate in advance owing to other factors that must be taken into consideration apart from the temperature, such as the roughness of the mating surface, the alignment of the mating, the presence of pollutants in the lubricant and other elements.
The operating life is also affected by the way in which the load is applied. With an equal specific load, the operating life is longer if the application has a rotating load, while it is shorter (-30% approximately) with a unidirectional load, while thrust washers have the shortest operating life (-50% approximately).
The amount of wear on *TX* bearings is very small especially for specific loads from 10 to 20 N/mm². Even for loads of up to 120 N/mm², the amount of wear remains low as long as the lubricant is well-distributed, but the amount of wear increases enormously as soon as the lubricant runs dry. The bearing must be regreased before wear begins due to a lack of lubricant and, generally, the amount of wear between one lubrication and the next should not exceed 0,0025 mm. When the amount of wear reaches 0,15 mm., the bearing is normally considered to have exceeded its operating life

Mounting:

Base procedure for bushings mounting is to force them into their seats; there are same suggestion to follow:

- Machine a 1 mm seat lead - in with an angle of 20° (±5°)
- Clean and burr the pieces to couple
- Lubricate external bushing surface before mounting
- Check alignment between seat and bushing centre lines
- When 2 bushing are needed their junctions must be aligned
- Use a proper sized mandrel when possible.
- Mounting can be done with hydraulic or mechanical tools.

The mounting force (**F**) in Newton is shown in the attached table.

Bushing Nominal Thickness 0,50 ÷ 1,00 mm	F = 300 x L (Length of bush)
Bushing Nominal Thickness 1,00 ÷ 1,50 mm	F = 500 x L (Length of bush)
Bushing Nominal Thickness 1,50 ÷ 2,00 mm	F = 700 x L (Length of bush)
Bushing Nominal Thickness 2,00 ÷ 2,50 mm	F = 900 x L (Length of bush)

When mounting larger bushes it is advisable to use a mounting tool to support the bush. The tool diameter should be 0,3 ÷ 0,4 mm more than the bush diameter.
If the bush is secured by using an adhesive, care must be taken to ensure that good quality adhesive are used and that it does not get onto the sliding surface.