

TOMBO™ BRAND

July 2021

Maintenance-free bearing plate that smoothly absorbs expansion and contraction of structures and pipes

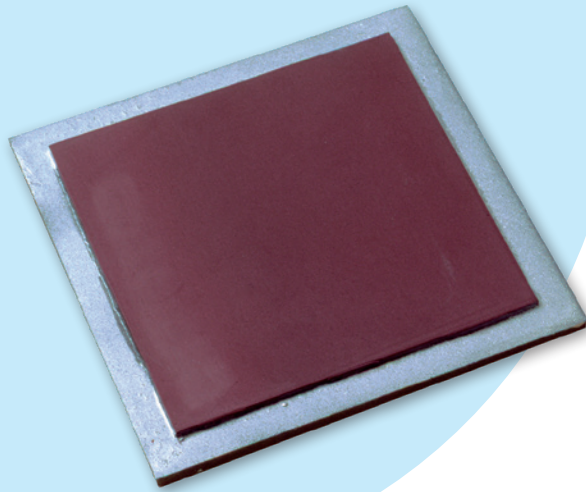
NAFLON™ Sliding Pad



NICHIAS

NAFLON™ Sliding Pad

TOMBO™ No. 9017



Various slide bearing pads (sliding pads) are used to absorb the expansion and contraction that occurs in structures such as bridges or corridors between buildings. NAFLON™ Sliding Pad, which uses filler-filled fluororesin (PTFE), is superior to conventional rubber pads, metal plates, roller bearings, etc. in many aspects such as low friction, high weather resistance and chemical resistance.

Features

• Low friction resistance

PTFE has the lowest friction coefficient of any solid. In addition, slipping is smooth without the stick-slipping caused by metal, thanks to its excellent static and dynamic friction behavior.

• Maintenance-free

PTFE is self-lubricating and requires neither refueling nor maintenance.

• Excellent weather resistance

PTFE, which has excellent weather resistance, can cope with a wide range of temperature and humidity. It also delivers stable performance for long periods even under conditions where freezing may occur because it does not absorb water.

• Excellent chemical resistance

PTFE can be used even in an atmosphere that may corrode metals.

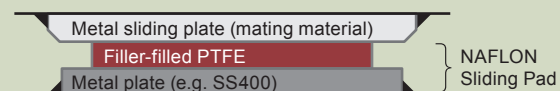
Note, however, that it reacts with the following substances:

- Alkali metals (e.g. sodium, potassium, lithium)
- Extremely powerful oxidants (e.g. fluorine gas (F₂) at high temperature)
- Special compounds that emit active fluorine gas at high temperature (Chlorine trifluoride, bromine trifluoride, iodine pentafluoride, OF₂)
- Hydrofluoric acid

Basic Structure

• Basic Structure

In the NAFLON Sliding Pad, filler-filled PTFE, which is a sliding member, is adhered to a metal plate with an epoxy adhesive. When using it, prepare a metal sliding plate (mating material). Polished stainless steel (SUS304) is recommended as the material for the metal sliding plate.



* When using it, pay special attention to prevent any lifting (partial contact) on the sliding surface.

Applications

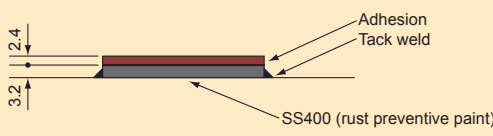
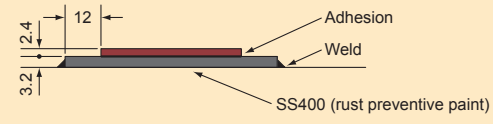
- **General industry:** Pipes, heat exchangers, boilers, tanks, pressure containers, flues, ducts, dust collectors, floodgates, cranes, etc.
- **Bridges:** Road bridges, railway bridges, elevated road bridges, aqueducts, gas pipe bridges, etc.
- **Architectures:** Beam intersections, vibration pads, curtain wall mounting parts, crossing corridors between buildings, etc.

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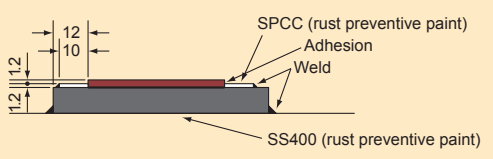
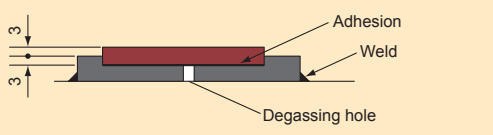
Models

Table 1

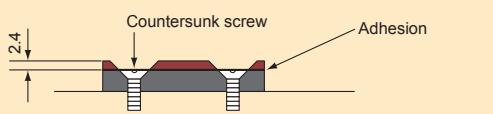
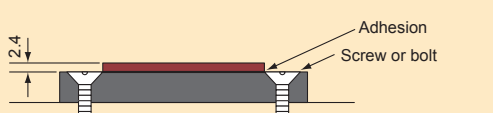
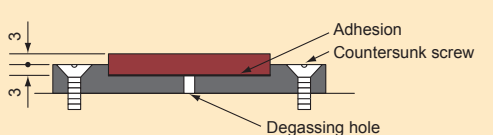
Model A (adhesion model): The sliding plate (i.e. filler-filled PTFE) is attached to the metal plate.

Model and model No.	Specifications	Design allowable surface pressure (MPa) at 25°C ⁽¹⁾
A-1		7.2
A-2		

Model B (inset model): Provided with high surface pressure resistance by machining the metal plate.

Model and model No.	Specifications	Design allowable surface pressure (MPa) at 25°C ⁽¹⁾
B-1		13.9
B-2		

* If the pad cannot be welded or needs to be removed, both models A and B can comply with the **specifications of fastening with screws.**

Model and model No.	Specifications	Design allowable surface pressure (MPa) at 25°C ⁽¹⁾
A-3		7.2
A-4		7.2
B-3		13.9

Note : (1) See Figure 1 on page 2 for the design allowable surface pressure over 25°C.

Design

• Model selection

The sliding pad model depends on your application and usage conditions. Select the model meeting the usage conditions from Table 1.

• Standard material

Contact us for other materials, thicknesses, rust preventive treatment of the metal plate, and painting.

• Design allowable surface pressure

Set the PTFE contact area to be less than or equal to the design allowable surface pressure (see Figure 1).

The design allowable surface pressure is set to 1/2 of the allowable surface pressure (safety factor 2) in consideration of partial contact.

• Heat-resistant temperature

The heat-resistant temperature of the adhesive surface is -50 to 150°C.

Design it so that the adhesive surface temperature will not exceed 150°C. In addition, install a heat-insulating layer (e.g. urethane) also on low-temperature piping, the same as for high-temperature piping.

• Material of sliding mating surface

Polished stainless steel plate (SUS304) is recommended when using a metal plate for the upper sliding plate.

Perform chamfering or curved surface machining (R) on it to prevent damage to the PTFE surface during construction. (See Figure 2.)

• Standard manufacturable dimensions

Max. 500 × 500 mm (dimensions of PTFE section)
Contact us if the dimensions exceed this.

Models	Member name	Material	Remarks
A-1	Sliding member	Filler-filled PTFE	Thickness: 2.4 mm
			Thickness: 3.2 mm
A-2	Metal plate	Carbon steel sheet (SS400) ⁽¹⁾	Rust preventive treatment: Epoxy paint

Note : (1) For outdoor use or under high humidity, specify stainless steel (SUS304).
* The sliding member and the metal plate are adhered with an epoxy adhesive.

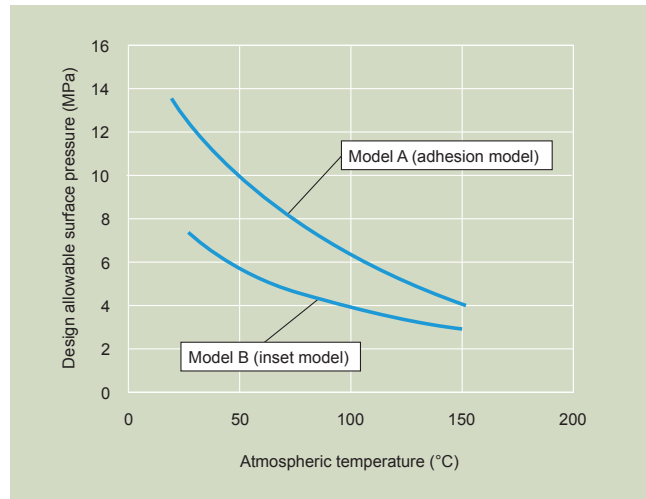


Figure 1 Temperature and design allowable surface pressure

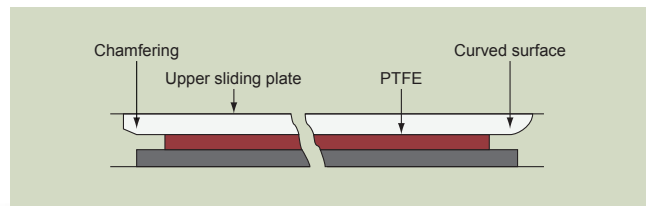


Figure 2 Chamfering and curved surface machining of sliding plate



Performance

• Physical property values of the sheet

Table 3 lists the physical property values of the filler-filled PTFE used in the NAFLON sliding pad sheet.

• Sheet compression characteristics

Figures 3 and 4 show the deformation rate for PTFE with a thickness of 2.4 mm.

Figure 3 shows the relationship between the compressive deformation rate of PTFE and the surface pressure, and Figure 4 shows the relationship between the time and creep deformation rate.

• Friction coefficient

The friction coefficient varies depending on the surface pressure, speed, and surface finish condition, but does not vary with temperature. As for the relationship with the surface pressure, as shown in Figure 5, the friction coefficient decreases as the surface pressure increases.

The friction coefficient increases with an increase in the slip speed or surface finish roughness. Especially at low surface pressure, this difference is large and the surface should be finished well.

• Adhesive portion peel strength

If the pad is exposed to rising temperature or load, the PTFE section may exhibit a flow phenomenon. When the flowing force exceeds the adhesive force, it separates from the metal plate and loses its sliding pad function. (See Figure 6.)

• Adhesive strength

Table 4 summarizes the adhesive strength of PTFE sheet and metal plate.

Test conditions:

Normal condition: After being left for 24 hours at a temperature of 20±3°C and a humidity of 55±5%, it was pulled in the direction indicated in Figures 7 and 8 and the value was obtained.

Thermal cycle: After it was left at -30°C for 2 hours, a cycle of 80°C for 2 hours was repeated for 500 cycles; then, it was pulled in the direction indicated in Figure 8 and the value was obtained.

Table 3 Physical property values of filler-filled PTFE

Properties	Unit	Lining direction	Perpendicular to the lining direction
Tensile strength	MPa	22	24
Elongation	%	312	319
Compressive strength	0.2% offset	MPa	10
	1% deformation	MPa	6
	25%	MPa	26
Compressive modulus of elasticity	MPa	602	579
Thermal expansion coefficient (50 to 100°C)	°C	12×10 ⁻⁵	7×10 ⁻⁵
Hardness (Shore D)	—	64	62
Thermal conductivity	W/(m·K)	0.34	
Specific gravity	—	2.23	
Wear coefficient	mm		
	MPa·cm/sec·hr	8×10 ⁻⁶	

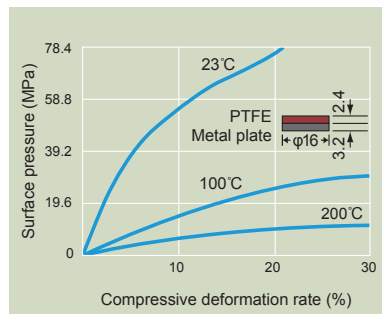


Figure 3 Compressive deformation rate

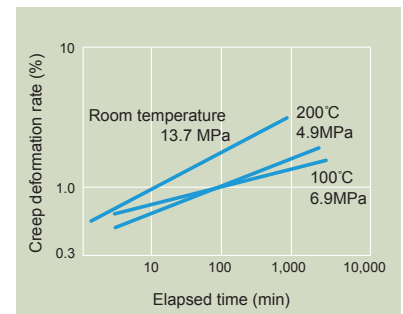


Figure 4 Creep deformation rate

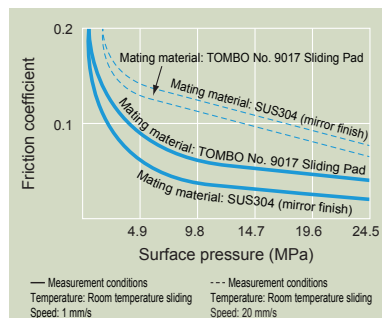


Figure 5 Friction coefficient

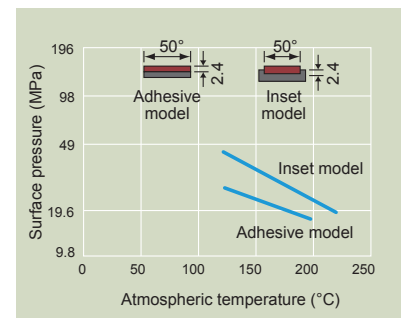


Figure 6 Adhesive portion peel strength

Table 4 Adhesive strength

	Tensile shear strength MPa	90° peeling N/20mmW
Normal state	7.6	204
Thermal cycle	—	200
Test		

Figure 7 Tensile shear test

Figure 8 90° peeling test

* The above are our actual measurement values, not standard values.

Measured by NICHIAS

Mounting

There are two ways to mount the NAFLON Sliding Pad:

- (1) Fastening with bolts or screws (see Figure 9)
- (2) Fastening by welding (see Figure 10)

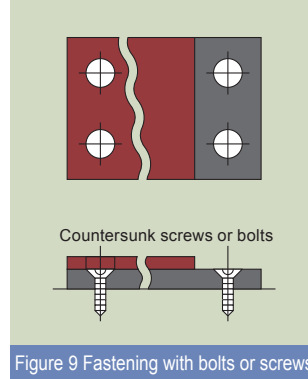


Figure 9 Fastening with bolts or screws

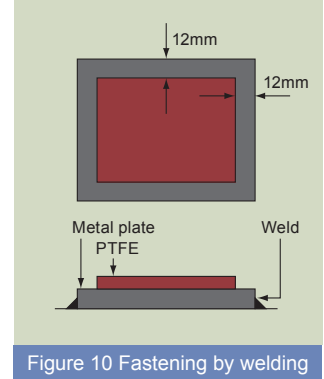


Figure 10 Fastening by welding

Mounting Precautions

• Weld

The sliding pad uses a special heat-resistant adhesive, and can withstand temperatures up to 150°C.

Note the following to prevent the temperature of the PTFE adhesive surface exceeding 150°C during welding (see Figure 11).

- (1) Before welding, moisten with water the packaging protective paper for the PTFE, or cover the entire surface of the PTFE with a wet waste cloth.
- (2) Perform electric welding, not gas welding.
- (3) For welding, use a mild steel welding rod ($\phi 2.6$ or $\phi 3.2$ mm).
- (4) Spot welding is recommended considering the effects of heat on PTFE.
- (5) For full welding, keep a distance of at least 12 mm (normally about 20 mm) from the metal plate edge to the PTFE.
- (6) For full welding, after welding each piece, allow it to cool sufficiently before welding the next one.

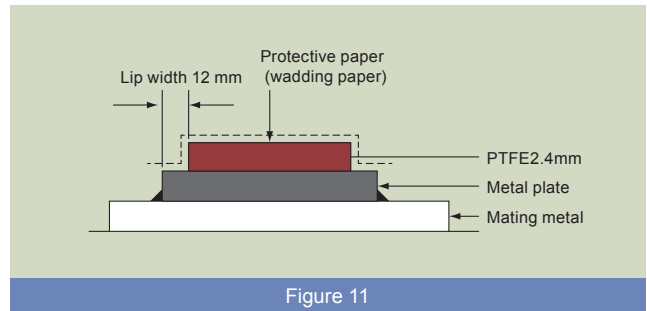


Figure 11

• Others

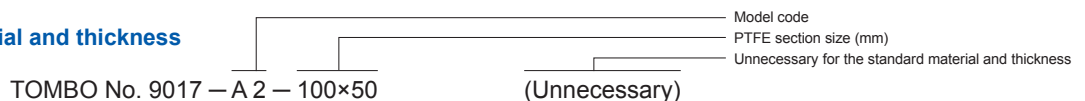
- (1) For fastening with screws or bolts, mount it so that the head of the screw does not protrude over the sliding surface.
- (2) For cutting, use a contour machine or sawing machine rather than gas cutting or shirring.
- (3) After welding, apply sufficient rust preventive coating to it.

Ordering and Specification Method

To order the NAFLON Sliding Pad, specify it as shown below.

However, for non-standard models, specify the dimensions, materials, and other requirements in drawings.

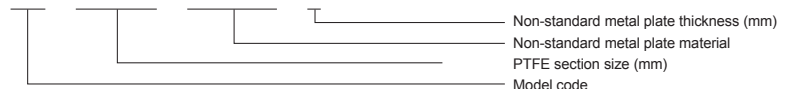
• For the standard material and thickness



Product number – Model – Size – Metal plate material and thickness

TOMBO No. 9017 – A 2 – 100×50 – SUS304 – 6

• For non-standard material and thickness





Frequently Asked Questions

Q1 | Can the purchaser adhere the sliding member (i.e. filler-filled PTFE)?
Is there a manual describing how to adhere it?

A1 | In the adhesion process, the adhesive surface of PTFE undergoes special machining, but its effect decreases with time. Therefore, it is recommended to purchase a product that is already adhered.

Q2 | Can we also purchase the metal sliding plate (i.e. mating material)?
What sort of material is good?

A2 | You can also purchase the metal sliding material. The recommended material is a polished stainless steel plate. Do not use steel plate SS400 because it may rust, increasing the friction coefficient.

Precautions for handling fluoropolymer products

DANGER

- Never allow the product to come into direct contact with body tissues or fluids.
- Never administer (including by mistake) to humans.

CAUTION

- Do not use any product for any purpose other than those described in the catalog and specification.
- For disposal, follow local regulations.

Handling precautions

Please note the following points in order to maintain the original function of the product.

- Use products within the service temperature range specified in the catalogue.
- In cases when using or processing the product at above the maximum service temperature, fluorinated gas will be generated. The room must be adequately ventilated so as to prevent inhalation of gas.
- Do not bring the product close to open flame or weld. It may cause damage to the product or cause leakage.

Please note the following points in order to maintain the original function of the product.

- Technical data given in this catalogue (to show the performance of the product) are all actual values measured in experiments or representative values; they are not guaranteed values. Please carefully consider in advance the suitability of the product for your intended purpose.

- Especially careful consideration is required when using acid, alkali, or other poisonous fluids. Please contact our technical staff for advice.
- Because of the nature of the materials, repeated loading, highly concentrated loading, or bending loading could affect the durability of the product. Always check the usage environment in advance.
- Fluoropolymer is self-lubricating by nature, but does become worn after some time. Periodical replacement is recommended for the parts where much friction is observed.
- Due to the nature of fluoropolymer, curing and change in size could occur or fluid could penetrate the fluoropolymer depending on the usage environment, which may not comply with the general specifications. Always check the usage environment in advance.

If you are unsure about any other issues, please contact our sales or technical staff for advice.

Using this product as part of a heat exchanger and exporting it may infringe upon security export controls. Please contact us for advice.



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⚠ Cautions

- The products included in this catalog are intended for common use, including those presented in the catalog. If you intend to use any of the products in a way that requires extremely high quality and reliability such that any possible defect may directly affect the safety of human lives, please make sure to consult with our company in advance and take necessary measures at your responsibility.
- Because the stated material values may vary according to actual usage environments or circumstances, please consider such figures as indications for reference.
- The content of the catalog explains the features of the products when they are used alone. When actually using the products, please start using them after testing them under the actual usage environment.
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 - Damage arising due to reasons that are not attributable to our company.