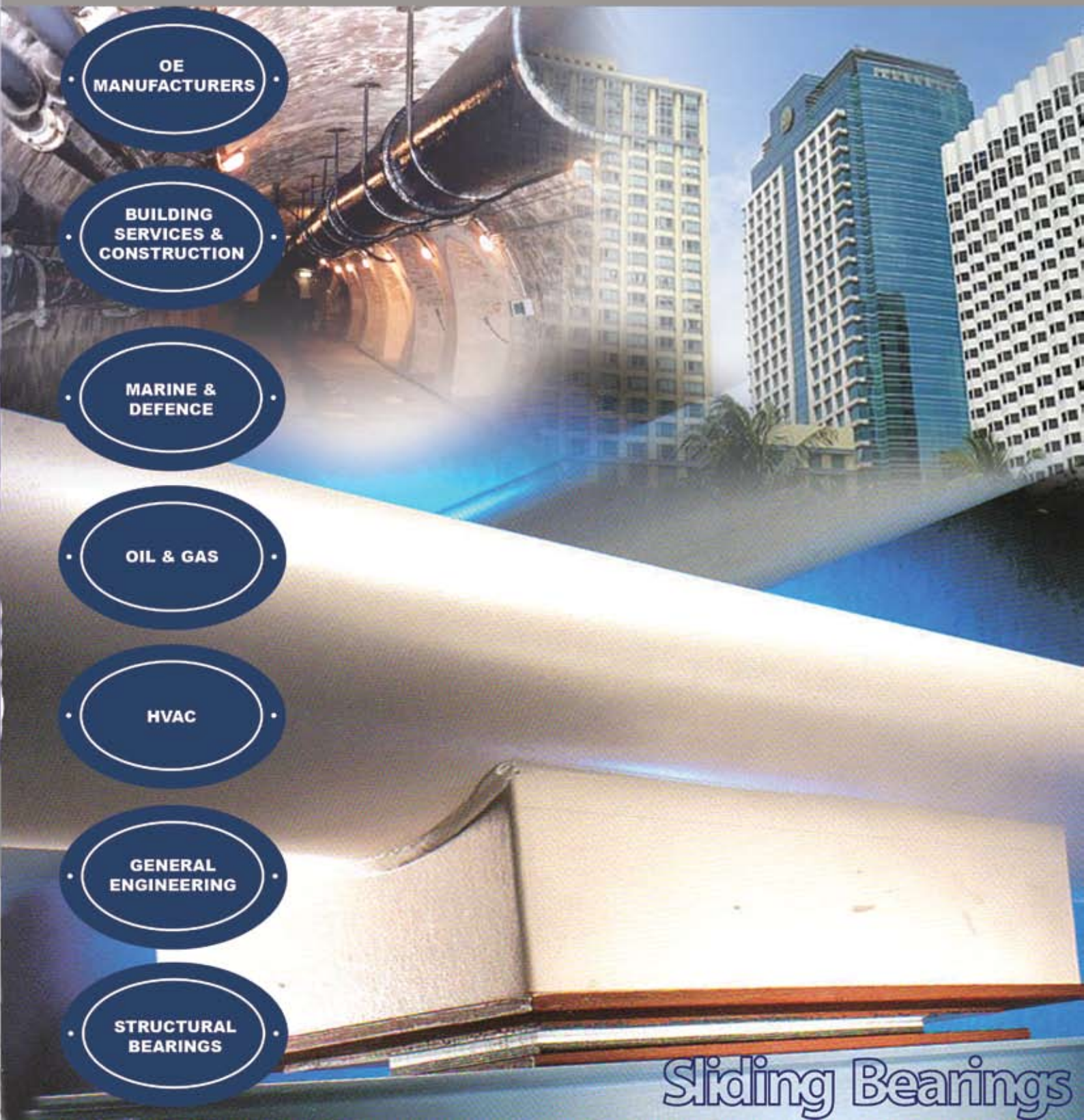
TICO Bondslip Units



TICO Bondslip Units Sliding Bearings

Introduction and Applications

TICO Bond Slip units provide a simple, economical, easy to install solution to the problem of accommodating movements in structures, for example due to expansion, contraction, settlement and variations in loading that might otherwise result in the development of high stresses and potential damage.

Typical applications of TICO Bond Slip units include:

- Low friction supports in mechanical and pipework installations
- Low friction guide restraints
- Temporary bearings employed during construction

TICO Bond Slip units have been developed over many years of involvement with petrochemical and industrial clients, and proven in thousands of applications worldwide.

Tiflex are committed to supporting our customers with:

- Quality assurance to BS 9001
- Over 60 years of manufacturing experience
- Full technical support at all phases of design and installation

Product overview – what are they?

Typically a TICO Bond Slip unit provides consists of two components – an upper and a lower member – both of which have a low friction bearing surface.

The two components of the Bond Slip unit are installed so that the two low friction surfaces are in contact with one another, normally with the lower member attached to the fixed part of the structure, and the upper member attached to the part of the structure which is free to move.

In service the interface between the two components acts as a low friction sliding surface which takes up movement of the upper part of the structure with minimal transfer of shear force into the lower part.

Advantages & Benefits

The key advantages of TICO Bond Slip units include:

- Simplicity and flexibility of design and installation
- Maintenance free
- Very low coefficient of friction, typically less than 0.1
- Smooth movement without the occurrence of ‘stick slip’
- Thermally stable and resistant to most environmental conditions likely to be encountered in service
- Can be designed to accommodate rotational movement
- Bondable substrate which accommodates surface irregularities in the structure
- Materials can be supplied factory bonded to steel backing plates under controlled conditions

Design Considerations

The two components of a TICO Bond Slip unit are carefully selected to accommodate the anticipated loads and movements when in service. The key factors affecting design are:

- The space available to place the bearing (plan dimensions and height)
- Service load on the bearing
- Degree of planar movement required
- Degree of rotation (if any)

It should also be considered at an early stage what the method of attachment of the bearings will be and particularly if any backing plates are required. If backing plates are required for the purposes of attaching the units to the structure by welding, then these should be at least 25 mm larger all round than the TICO pad which they are attached to allow for heat dissipation.

A key design principle is that the upper member TICO material must always be larger than the lower member by an amount such that, at the limit of the expected movement, the lower member sliding face does not become exposed. This arrangement ensures that the lower component surface is always kept clean and free of debris that could otherwise cause wear or reduce efficiency of movement, and also ensures that the lower member does not become locally overstressed which might cause damage or impaired movement.

For standard TICO Bondslip Units, the normal operating temperature range is -40^{O}C to +100^{O}C, however special TICO Bondslip units can be manufactured to cater for higher temperatures if required.

The vertical deflection of the bearing under compressive load should be taken into consideration when selecting the thickness of the lower member.

Component parts

TICO Bondslip components are available in several different grades and thicknesses to accomodate a wide range of loads and movements.

The typical upper member component of a TICO Bondslip unit is TICO S/NG/PA – a molybdenum disulphide loaded nylon low friction material with a thin backing of TICO S which acts as a bondable substrate.

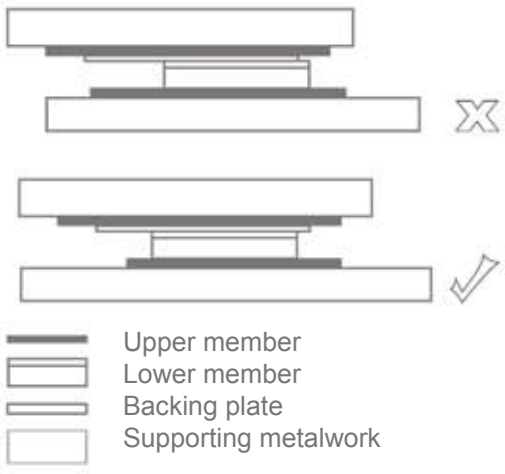
There are a number of standard lower member TICO materials available to cater for different loading conditions, for example:

Grade	S/PT/PA	B/PT/PA	Z/PT/PA	RF/PT/PA	PF/PT/PA
Load Bearing Capacity	0.5	1	1.4	7	15.5

These materials are all specially engineered TICO elastomers of varying stiffness which are provided with one surface of virgin PTFE. The elastomer backing provides a conformable and bondable substrate in addition to attenuating shock and vibration through the support. Careful selection of the lower member grade and thickness enables TICO Bondslip units to accommodate rotational as well as planar movement.

Typical values for the coefficient of friction between the PTFE faced lower members above and TICO S/NG/PA are given in the table below:

Stress kN/m^2	700	1400	3500	7000
Coefficient of Friction	0.09	0.07	0.05	0.04



Above: diagram showing a correct and an incorrect design for a Bondslip bearing

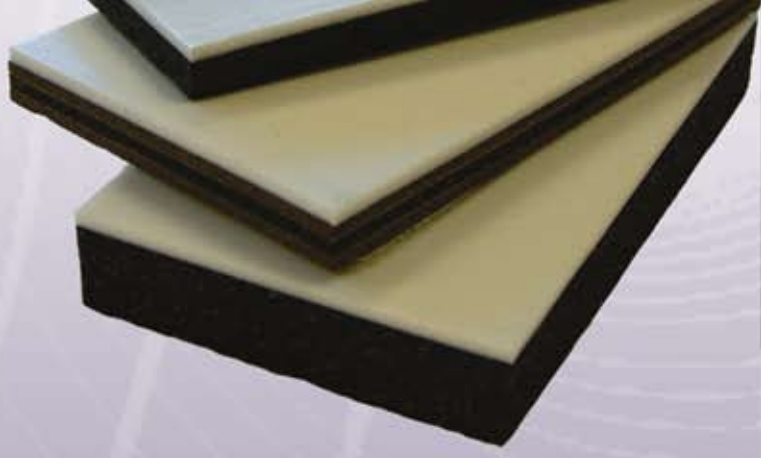
Tiflex appreciate the wide variety of applications for TICO Bondslip Units and the differing requirements of each, and hence have made the design of these units as flexible as possible.
Tiflex are able to offer custom units incorporating:

- Steel backing plates for easy installation, or units without backing plates for bonding directly to the structure on site. Steel thickness can be varied to suit the application.
- Polished stainless steel plates in place of the standard TICO upper member. Such plates can also be supplied pre-welded to steel backing plates.
- Backing plates to the customers specific requirements, e.g. carbon steel to BSEN 10025, stainless steel 316L or 304.
- Steelwork coatings to customers specific requirements e.g. painted with red oxide primer or other paint systems, hot dip galvanized or plain unpainted.
- Slots and holes within each member to provide positive location and restraint in one or more directions
- One member only, for example for use as a guide stop restraint.
- Hypalon edge proofing on the resilient TICO components for additional protection in aggressive environments
- Wiper seals for areas heavily contaminated with abrasive dusts and powders to maintain the cleanliness of the sliding faces
- Custom shapes and sizes which may not necessarily be square or rectangular
- Thermal insulation layers
- Different thickness components to suit rotational movements or space restrictions.
- Specialist material grades to cope for exceptional loading conditions or elevated temperatures

Installation

Tiflex typically supply the TICO materials pre-bonded to steel backing plates. This is done under controlled factory conditions of temperature and pressure and ensures an exceptionally strong bond. These pre-bonded units can then be simply tack welded in place in the correct position. In some cases however it is not possible to weld and alternative methods must be used.

TICO Bondslip Units can be supplied without metal backing plates and bonded on site directly using Tiflex Marine Epoxy Adhesive. This method will give good results provided the areas to be bonded are clean (including removal of paint etc.) and fully degreased.



A cure time of at least 48 hours should be allowed before placing the TICO Bondslip Unit under load, longer if the ambient temperature is very low. Full data sheets on the use of the adhesive are available on request from our Technical Department.

TICO Bondslip Units can be supplied with the metal plates pre-drilled to accept bolts or screws. In some cases the bolts must be countersunk to avoid interference with the opposing member .
Where it is necessary to provide lateral restraint, units can be pre-drilled with holes and slots to accommodate restraining dowels.

Supply details

Tiflex normally supply units cut to size and bonded to backing plates where required.
For guidance, the maximum sheet sizes and standard thicknesses of materials are given in the table below:

Material	Thickness (mm)	Max Sheet Size
S/NG/PA	2.5	1200 x 600 mm
S/PT/PA	2.5 / 8	1200 x 1000 mm
B/PT/PA	8	1200 x 1000 mm
Z/PT/PA	8 / 14 / 27	1200 x 1000 mm
RF/PT/PA	8 / 14 / 27	1200 x 1200 mm
PF/PT/PA	8 / 14 / 27	1200 x 1200 mm

Non-standard thicknesses are available on request.

Where materials are bonded in place on site we recommend Tiflex Marine Epoxy adhesive:
Marine Epoxy Adhesive 600g Coverage ~ 1 m^2

Tiflex are pleased to offer assistance with all aspects of the design of TICO Bondslip units to ensure that the correct and most appropriate product is specified for your application. Please contact our Technical Department for a full design service.

Tiflex

A member of the James Walker Group

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