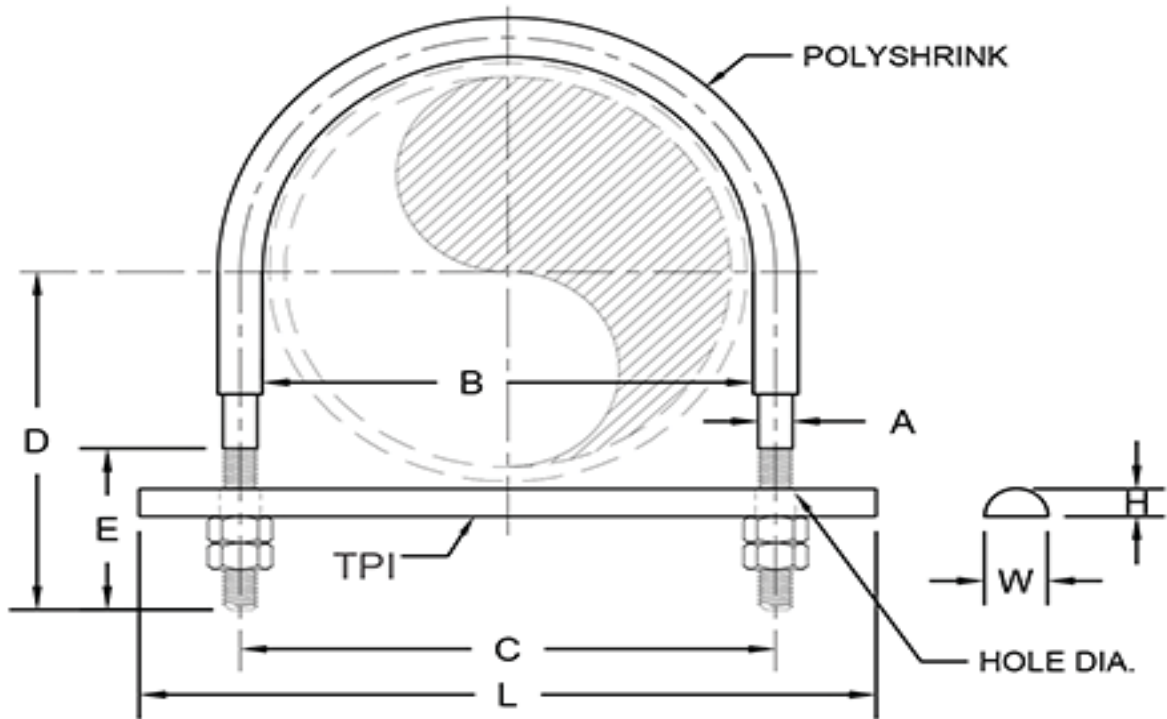


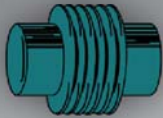
# TECHNICAL BULLETIN



## PIPE SUPPORTS: U-BOLTS Thermoplastic Isolator (TPI)



### PIPING TECHNOLOGY & PRODUCTS, INC.



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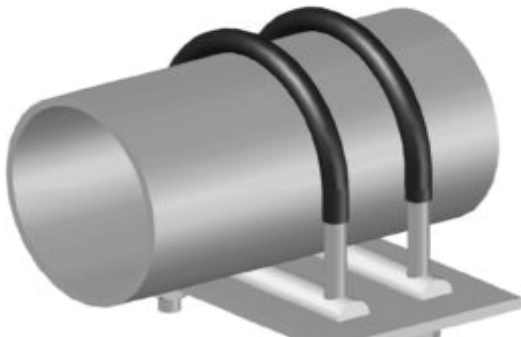
### What is Thermoplastic Isolator (TPI)?

Thermoplastic isolators provide optimum support and eliminate pipe contact with the supporting steel.

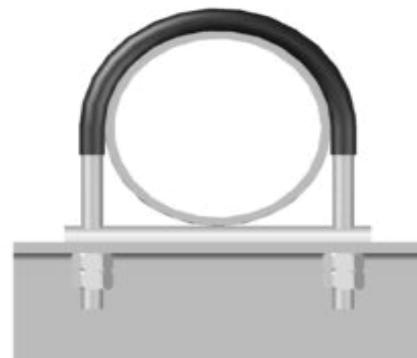
- Moisture/water can be trapped between the pipe and support, which can initiate corrosion of the pipe
- In addition, when TPI is placed between the pipe and the supporting structural steel, it can prevent cathodic reaction

### Iron + Water + Oxygen = Rust Corrosion

Piping Technology & Products can fabricate TPI designed for use with u-bolts. Our u-bolts, have a hot-dipped galvanized finish and are coated with Polyshrink. The Polyshrink acts as a barrier between the u-bolt and the pipe to prevent corrosion, and it also adds protection.



TPI Pipe



TPI Pipe Front

### PT&P's TPI - The Lowest Cost, Most Comprehensive Solution for Corrosion at Pipe Supports

PT&P has consulted with hundreds of customers on one of the most common problems for operating plants – corrosion at the point of contact between the steel pipe and the steel pipe support. As seen in Figure 1, a crevice is formed at the point of contact. When water accumulates in the crevice, the oxygenation level of the water at the surface is higher than the water at the depth of the crevice.

# Benefits of Thermoplastic Isolator (TPI):

## FIGURE 1 CREVICE CORROSION

PT&P has used its 40+ years of experience as a leader in pipe supports in designing our TPI solution to be the most effective and easiest to deploy solution in the market. Key advantages of PT&P's TPI offering include:

**Economical Pricing** – PT&P's TPI offering is priced to be highly cost-effective compared to other providers

**Highly Customizable** – Our unique manufacturing approach allows us to customize far more easily than any other provider. Customization options include height/width/length of TPI, hole sizes, hole locations, and special shapes. [\\*View more on manufacturing](#)

**Complete Assemblies** – PT&P reduces complexity in product selection by offering complete assemblies rather than just individual components. We are the only provider of TPI type of solutions that is not a "point solution" provider. Also, we are the ONLY global provider to integrate vibration pads and TPI into our assemblies. If you wanted to purchase a configuration for a clamp with both TPI equivalent and vibration pads, you would have to develop the design, source the materials with requests for customization, and assemble it yourself.

## Assemblies Include:

**U-Bolts** – including the addition of vibration pads (optional) – see Figure 2

**Clamps** – PT&P's entire range of clamps can be integrated with TPI Clips as well as vibration pads – see Figure 3

**Hold-Downs** – PT&P's entire range of Hold-Downs can be integrated with TPI clips and rods as well as vibration pads – see Figure 4

The water in the crevice has more oxygen at the top surface because oxygen from the air can enter the water.

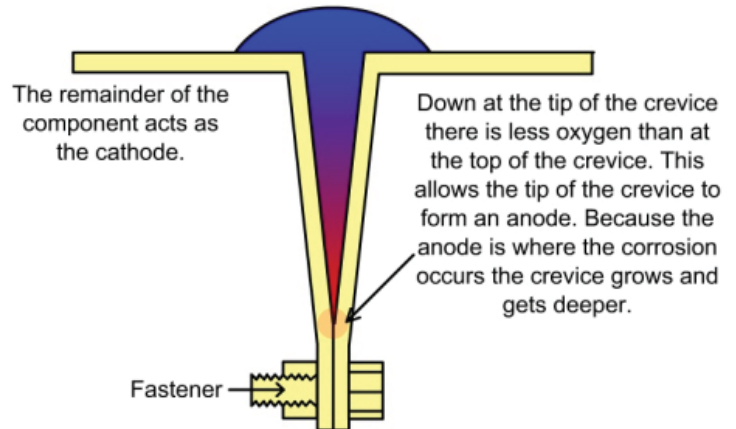


FIGURE 2 – PT&P SUPER U-BOLT WITH TPI AND VIBRATION PAD



FIGURE 3 – PT&P PRE-ASSEMBLED PIPE CLAMP WITH TPI CLIPS AND VIBRATION PAD



FIGURE 4 – PT&P PRE-ASSEMBLED HOLD-DOWN PIPE CLAMP WITH TPI

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**Extreme Loads and Temperature Requirements** – PT&P has extensive experience supporting custom requirements. We can develop solutions for unique scenarios by selecting different materials and developing a custom design. [\\*View more on Finite Element Analysis \(FEA\)](#)

**Proven Performance** – the performance of PT&P TPI is comparable to or superior to other providers. We have supplied solutions to the largest Engineering, Procurement, and Construction (EPC) in the US as well as many major Oil and Gas and Chemical operating companies.

For PT&P U-Bolts, Clamps, and Hold-Downs, all items in the PT&P catalog can be ordered with TPI. However, the addition of TPI will alter the clamp or hold-down sizing requirement. PT&P simplifies the process by taking care of all the work in terms of designing the appropriate clamp sizing to accommodate the TPI and vibration pad if that is added.

PT&P needs the following information for completed assemblies:

**U-Bolts** – specify U-Bolt figure and whether a vibration pad should be added  
[\\*View Super U-Bolts](#)

**Clamps** – specify clamp type, pipe size and whether a vibration pad should be added

**Hold-Downs** – specify pipe size and Hold-Down type and whether vibration pad should be added

TPI can also be ordered stand-alone. It is also offered in strip format, clips, or pre-configured to be part of a U-Bolt. TPI Strips are offered in the sizes shown below. PT&P will cut to length per the customer request with lengths up to 10 feet.

**FIGURE 5 PT&P TPI STRIP OPTIONS**

TPI Width	TPI Height	TPI Length
3/4"	5/16"	Customer Specified up to 10 ft
1"	7/16"	Customer Specified up to 10 ft
1-1/2"	11/16"	Customer Specified up to 10 ft
2"	1"	Customer Specified up to 10 ft
Custom per Request	Custom per Request	

**FIGURE 6 PT&P CLIP OPTIONS**

Pipe Size	Clips Per Clamp	Width
3"	4	Customer Specified
4"	4	Customer Specified
6"	6	Customer Specified
8"	8	Customer Specified
10"	8	Customer Specified
12"	8	Customer Specified
14"	8	Customer Specified
16"	10	Customer Specified
20"	10	Customer Specified
24"	12	Customer Specified
26"	14	Customer Specified
28"	14	Customer Specified
30"	16	Customer Specified
36"	16	Customer Specified
>36"	Custom Designed	Customer Specified

For TPI U-Bolts Strips (e.g. PT&P does not supply U-Bolt, just TPI), Figure 6 shows PT&P options.

**FIGURE 7 TPI U-BOLT STRIP OPTIONS**

Pipe Size	Bolt Dia.	TPI Length	TPI Hold Dia.	TPI Width	TPI Height
1/2"	1/4"	2-1/2"	3/8"	3/4"	5/16"
1/2"	3/8"	2-1/2"	1/2"	1"	7/16"
3/4"	1/4"	3"	3/8"	3/4"	5/16"
3/4"	3/8"	3"	1/2"	1"	7/16"
1"	1/4"	3"	3/8"	3/4"	5/16"
1"	3/8"	3"	1/2"	1"	7/16"
1-1/4"	3/8"	3-1/2"	1/2"	1"	7/16"
1-1/2"	3/8"	4"	1/2"	1"	7/16"
2"	3/8"	4-1/2"	1/2"	1"	7/16"
2-1/2"	1/2"	5"	5/8"	1"	7/16"
3"	1/2"	6"	5/8"	1"	7/16"
4"	1/2"	7"	5/8"	1"	7/16"
5"	1/2"	8"	5/8"	1"	7/16"
6"	5/8"	9"	11/16"	1"	7/16"
8"	5/8"	11"	11/16"	1"	7/16"
10"	3/4"	13-1/2"	7/8"	1-1/2"	11/16"
12"	7/8"	16"	1"	1-1/2"	11/16"
14"	7/8"	17"	1"	1-1/2"	11/16"
16"	7/8"	19"	1"	1-1/2"	11/16"
18"	1"	21-1/2"	1-1/8"	1-1/2"	11/16"
20"	1"	23-1/2"	1-1/8"	1-1/2"	11/16"
24"	1"	27-1/2"	1-1/8"	1-1/2"	11/16"
28"	1"	31-1/2"	1-1/8"	1-1/2"	11/16"
30"	1"	33-1/2"	1-1/8"	1-1/2"	11/16"
36"	1"	39-1/2"	1-1/8"	1-1/2"	11/16"

**Installation of TPI:**

TPI can be placed or attached on structural steel by three different methods.

- Self tapping screw or bolting
- Double sided adhesive tape
- With u-bolt

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## Types of TPI:

There are total 3 different types of TPI available based on thermal properties.

- TPI White – Maximum Service Temperature 181°F
- TPI Amber – Maximum Service Temperature 340°F
- TPI Tan – Maximum Service Temperature 480°F



## TPI (Thermoplastic Isolator): Properties & Various Grades

		TPI White	TPI Amber	TPI Tan
Property Value	ASTM Test	Imperial	Imperial	Imperial
Density	D792	0.0516 lb/in 3	0.0458 lb/in 3	0.047 lb/in 3
Tensile Strength	D638	11,000 psi	17,000 psi	16,000 psi
Tensile Modules of Elasticity	D638	450 ksi	500 ksi	630 ksi
Elongation (At Break)	D638	30%	60%	40%
Flexural Modules of Elasticity	D790	450 ksi	500 ksi	600ksi
Flexural Strength	D790	13 ksi	20ksi	25ksi
Compressive Stress	D695	16 ksi	22 ksi	20 ksi
Coefficient of Friction	QTM 55007	0.25	0.42	0.32
iZod Impact (Notched)	D256	1 ft-lb/in	0.5 ft-lb/in	0.6 ft-lb/in
Rockwell Hardness	D785	M 88	M 115	M 105
Maximum Service Temperature	(Long Term)	181 F	340 F	480 F
Melting Point	D3418	347 F	410 F	644F
Coefficient of Linear Expansion	E831	47 uin/in/F	31 uin/in/F	-
Flammability Rating	UL94	HB	V-0	V-0
Electric Strength	D149	450 V/mil	830 V/mil	480 V/mil

## Key Factors in choosing PT&P’s Thermoplastic Isolator over Competitors:

- All suppliers of plastic components for these types of supports, purchase raw materials from some of the same sources
- PT&P’s TPI is equivalent to competitors, but the price of TPI is much lower
- In addition, TPI can be tested in any independent lab

## Comparison between PT&P's TPI White VS Leading Competitor

Property Value	ASTM Test	TPI-White	Competitor
Density	D792	0.0516 lb/in <sup>3</sup>	0.0509 lb/in <sup>3</sup>
Tensile Strength	D638	11,000 psi	9,400 psi
Tensile Modules of Elasticity	D638	450 ksi	380 ksi
Elongation (At Break)	D638	0.3	30-60%
Flexural Modules of Elasticity	D790	450 ksi	400 ksi
Flexural Strength	D790	13 ksi	13 ksi
Compressive Stress	D695	16 ksi	15 ksi
Coefficient of Friction	QTM 55007	0.25	0.25
iZod Impact (notched)	D256	1 ft-lb/in	1 ft-lb/in
Rockwell Hardness	D785	M 88	M 88
Maximum Service Temperature	(Long Term)	181 F	181 F
Melting Point	D3418	347 F	329 F
Coefficient of Linear Expansion	E831	47 uin/in/F	54 uin/in/F
Heat Deflection Temperature, 264 psi	D648	250 F	220 F
Flammability Rating	UL94	HB	HB
Electric Strength	D149	450 V/mil	420 V/mil

Result from above comparison, both products are equivalent.

## Comparison between PT&P's TPI Amber VS Leading Competitor

Property Value	ASTM Test	TPI - Amber	Competitor
Density	D792	0.0485 lb/in <sup>3</sup>	0.0462 lb/in <sup>3</sup>
Tensile Strength	D638	17,000 psi	16,500 psi
Tensile Modules of Elasticity	D638	500 ksi	500 ksi
Elongation ( At Break)	D638	0.6	30-60%
Flexural Modules of Elasticity	D790	500 ksi	500 ksi
Flexural Strength	D790	20 ksi	20 ksi
Compressive Stress	D695	22 ksi	22 ksi
Coefficient of Friction	QTM 55007	0.42	0.42
iZod Impact (Notched)	D256	0.5 ft-lb/in	0.5 ft-lb/in
Rockwell Hardness	D785	M 115	M 112
Maximum Service Temperature	(Long Term)	340 F	340 F
Melting Point	D3418	410 F	410 F
Coefficient of Linear Expansion	E831	31 uin/in/F	31 uin/in/f
Heat Deflection Temperature, 264 psi	D648	400F	400F
Flammability Rating	UL94	V-0	V-0
Electric Strength	D149	8320 V/mil	830 V/mil

Result from above comparison, both products are equivalent.



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Comparison between PT&P's TPI Tan VS Leading Competitor

Property Value	ASTM Test	TPI -Tan	Competitor
Density	D792	0.047 lb/in <sup>3</sup>	0.047 lb/in <sup>3</sup>
Tensile Strength	D638	16 ksi	16 ksi
Tensile Modules of Elasticity	D638	630 ksi	500 ksi
Elongation (At Break)	D638	0.4	0.2
Flexural Modules of Elasticity	D790	600 ksi	1000 ksi
Flexural Strength	D790	25 ksi	25 ksi
Compressive Stress	D695	20 ksi	20 ksi
Coefficient of Friction	QTM 55007	0.32	0.4
iZod Impact (Notched)	D256	0.6 ft-lb/in	1.0 ft-lb/in
Rockwell Hardness	D785	M 105	M 103
Mamimum Service Temperature	(Long Term)	480 F	480 F
Melting Point	D3418	644 F	644 F
Coefficient of Linear Expansion	E831	-	-
Heat Deflection Temperature, 264 psi	D648	320 F	320 F
Flammability Rating	UL94	V-0	V-0
Electric Strength	D149	480 V/mil-	480 V/mil-

Result from above comparison, both products are equivalent.

Common Industry Application:

- Petrochemical plants
- Refineries
- LNG plants
- Offshore platforms
- Waste water plants
- Parking garage
- Marine pipelines



Adjustable Pipe Supports with U-Bolt & TPI



U-Bolt with TPI

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