# **The Solution**

Corrosion at pipe supports is one of the leading causes of process piping failures, which can have potentially catastrophic results.

Beam supports, saddle supports and pipe shoes create crevices where water is trapped and held in constant contact with the pipe surface. Under these conditions, crevice corrosion quickly undercuts the coating and causes rapid wall loss.

## Crevice Corrosion

Deepwater developed the I-Rod brand of pipe supports specifically to combat crevice corrosion and ensure a long, safe life for pipelines by eliminating the crevice between the pipe and the support.

I-Rod is a durable extruded thermoplastic cut into a half-round rod. It is the key component in all of Deepwater's I-Rod pipe supports.

The way that I-Rod works is simple:

1. The half-round shape minimizes contact between the pipe and the support, eliminating the crevice.

2. It also provides an electrically isolated stand-off between the pipe and the supporting beam or saddle clamp. This allows for easy maintenance and inspection while preventing galvanic corrosion between dissimilar metals (the pipe and support).

3. I-Rod has excellent compressive strength and a very low friction coefficient, making it ideal as a beam dressing. Pipe damage during new construction is reduced when I-Rod is used to assist in pipe fitting.

I-Rod is available for most pipe support configurations, including beam supports (Nu-Bolt assembly), pipe shoes and saddle clamps (I-Rod Clip), and even for stainless steel process tubing.

I-Rod brand pipe supports have been in service since 1989, when a new offshore structure specified I-Rod by name. Since then, I-Rod has been specified by all of the major operators in the Gulf of Mexico and many others worldwide. The product has also successfully entered the midstream and downstream sectors onshore in the U.S. and in Europe.

The I-Rod pipe support family has grown to include several varieties of the original product, but all still utilize the original I-Rod thermoplastic as the basis of their success. Other materials have been used in an attempt to copy or improve upon I-Rod, but none has achieved the success of the original.

# Be Aware of Imposters

Other products that mimic I-Rod have been the cause of many problems. Authentic I-Rod has a batch number printed directly on the surface, and only licensed agents of Deepwater are authorized to sell I-Rod. Go to www.stoprust.com for a list of approved agents.

## Below

This imposter product fails under the weight of the pipe; others may be crushed completely. Left:

Crevice corrosion can be eliminated with I-Rod supports (middle).







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# I-Rod Anti-Corrosion Pipe Supports / Deepwater Corrosion Services / www.stoprust.com

# How to order I-Rod

# 1. Size:

Provide the appropriate dimensions.

Nu-Bolt - Nominal pipe size (A)



# 2. Temperature:

Select the appropriate material based on operating temperature.

Material	Max Operating Temp. (L Term) °F / °C	Melting Point °F / °C	Comp. Strength kai / MPa	Max Load Ibs / kg
HEREPWATER CORROS LON SERVICES, INF. HALOR COMAL 1-ROM	181 / 83	329 / 165	15 / 103	7,986 / 3,630
I-Rod HT (Amber)	340 / 171	410 / 210	22 / 151	11,000 / 5,000
PEEK (Tan)	480 / 249	644 / 340	26 / 179	10,010 / 4,550

# **Contact Details**



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b. I-Rod Clip - Nominal pipe size (A), Clamp width (B)





Please also specify the type of clamp: Grinnell / Pipe Shoe (360 degrees) or Saddle (120 - 180 degrees). This will determine the number of clips required.







www.stoprust.com

Eliminate Corrosion Problems at Pipe Supports





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# Way ahead in corrosion control

## The Problem

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## Crevice Corrosion

Actual times to failure will vary from case to case, but the progression of events always follows the same basic sequence:

**1.** A crevice is created which does not allow water to escape or evaporate. Water is trapped in close proximity to the pipe for long periods of time.

**2.** The paint system on the pipe is now placed in continuous immersion service rather than the intermittent immersion service anticipated by the paint specifications. As a result, the paint system softens and fails prematurely. This begins with a pinhole defect.

**3.** The steel is now directly exposed to moisture and the oxidation (corrosion) process begins, consuming oxygen from the water. Crevice corrosion works quickly as long as moisture is trapped. It is vital for the life of the pipe to ensure that it stays as dry as possible.

## Metal to Metal Contact:

A major misconception within the industry is that the primary corrosion reaction between pipe and support is galvanic, driven by metal-to-metal contact. This is incorrect. Though two dissimilar metals connected within an electrolyte will create a galvanic cell, the primary corrosion mechanism at work is actually crevice corrosion, which creates a localized cell on the pipe surface and accelerates oxidation much more quickly.

Some pipe support designs, which seek only to eliminate metal-to-metal contact (specifically the use of rubber pads), actually accelerate crevice corrosion. This is because the pads do nothing to address water accumulation. In some cases, the pads deform and actually "cup" the water to the pipe.

## Inspection Difficulties

Most "standard" piping designs do very little to prevent corrosion failure at the support, and some solutions even make it impossible to inspect the pipe surface. Inspection is the only way to verify that a crevice has not been created.

Refineries have been using contoured pads made from FRP (fiberglass) or steel for many years. The purpose of these pads is to eliminate wear to the pipe at supports, which move due to thermal cycling. These pads are not an effective guard against crevice corrosion; adhesion cannot be guaranteed and the pads make inspection for corrosion impossible.

If adhesion is lost between pad and pipe, a large crevice will form and trap water inside the gap. An aggressive corrosion cell will begin to corrode a large area of the pipe beneath the pad. Without inspection, the problem will likely go undiagnosed until failure. Moisture penetration is virtually unavoidable in most instances and the resulting failure can be dramatic.







## **Nu-Bolt Assembly**

Designed by Deepwater's NACE-certified corrosion engineers, the Nu-Bolt assembly combines I-Rod with a modified pipe-U-bolt. A variety of corrosion-resistant treatments can be applied to the bolt to ensure long-term service in the most corrosive operating environments. For higher-temperature applications, the I-Rod may be replaced with I-Rod HT, which provides higher melting temperatures and compressive strength. For the most extreme conditions, PEEK can be substituted to withstand temperatures up to 249°C (480°F).

## Bolt Coating

The standard U-bolt comes in galvanized black steel (GPS). You can also choose from 316 stainless steel (S6PS) or SermaGard®, a superior corrosion coating that endures the harshest conditions with excellent results.

## PolyShrink

PolyShrink is applied over the shank of the U-bolt to protect the paint system during installation; it is not designed to protect the U-bolt. The material is a crosslinked polyolefin that is strong, UV-stable and rated for service in temperatures up to 110°C (230°F).

## I-Rod, I-Rod HT & PEEK

For 90% of applications, standard I-Rod Thermoplastic is the best material choice. With excellent compressive strength and low creep, it provides excellent support. If constant operating temperatures get above 180°F, then I-Rod HT (amber-colored) or PEEK (tan-colored) can be substituted, depending on the requirements of the environment.













## I-Rod Clip

The I-Rod Clip was designed to eliminate crevice corrosion at saddle clamp supports, Grinnell clamps and pipe shoes, all of which tend to trap water.

The I-Rod Clip snaps into the inside diameter of the support, providing a low-profile standoff. This configuration allows ventilation and drainage that prevents water accumulation. An adhesive strip can be applied to the rear of the clip to help secure it during installation.

I-Rod Clips can be made from I-Rod, I-Rod HT or PEEK material, and therefore maintain the same properties. The clips can be manufactured to fit any support, provided we know the nominal pipe size and the thickness of the saddle or pipe shoes to be fitted.

## Top:

I-Rod Clip in a 4" thick saddle to support a 12" nominal diameter pipe Bottom: I-Rod Clip in a 2" pipe shoe to support a 12" nominal diameter pipe





I-Rod has been incorporated in multiple solutions for stainless steel process tubing, which has shown a tendency to corrode badly at supports. Many products have arrived on the market to combat this problem, and the most successful have utilized I-Rod.

Stainless steel corrodes differently than carbon steel, resulting in simultaneous failures throughout the length of these tubes. Once this occurs, replacement and redesign is the only option for the operator. Stainless steel tubing runs should never be installed unprotected from crevice corrosion

T-SEP is a product designed in tubing trays with spacers and I-Rod to support the tubing

## Bottom:

STS is a product that incorporates I-Rod with special curved notches to support tubing











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