

# Shield Products

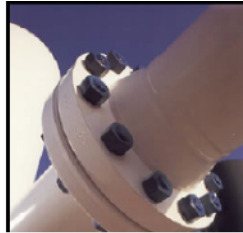
## SUPERIOR SHIELD FLUOROPOLYMERS FOR OFFSHORE AND OIL-GAS INDUSTRIES

HIGH PERFORMANCE CORROSION RESISTANCE — FLUOROPOLYMER / FASTENER  
COATINGS FOR THE 21 CENTURY

### ABSTRACT

Corrosion is a very serious issue in oil and gas companies who are into oil exploration by means of platforms. The damage due to corrosion sometimes accounts to thousands of dollars. For this reason, major metallic equipment and parts must be protected from corrosion resistance.

Although commonly used methods of corrosion protection are there, over years in the market a demand and requirements of coating for specific applications and saline water resistance there is a real need for long term protection. Here emerges the market for Fluoropolymers.



### INTRODUCTION

There are various corrosion levels of saline water immersed offshore structures

1. Buried in Soil
2. Under water Zone ( UZ )
3. Intermediate Zone ( IZ )
4. Splash Zone ( SZ )
5. Atmospheric Zone ( AZ )

The highest level of corrosion is found in the UZ, IZ, and SZ areas of any offshore structure. Corrosion protection is done via Active Protection, Passive Protection and Temporary Protection.

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Active Protection is controlled at the design stage by means of Material Selection and Construction Details. Temporary Protection is done where the equipment is not critical and a change in design is possible. Passive Protections is done via the means of Coatings and Surface Protection Methods.

### **Typical Saline Water Conditions**

1. 3.5 % Sodium Chloride
2. Temperature is around the range of 50 Degree C to 80 Degree C
3. Alternate wetting and drying cycles
4. High concentration of salts
5. Salt deposits – Salts absorbed in moisture is more corrosive as in wet conditions.
6. Presents of oxygen along with salt

### **The problem with Traditional Coating Methods**

Extensive testing and field use have proven that the future of coated fasteners lies with Fluoropolymer Coatings. Previously hot dip galvanized. Cadmium or zinc plated fasteners were considered the standard. But these coatings could not stand up to the corrosive atmospheres prevalent in Many industries. After 500 hours of salt spray testing (ASTM B117), fasteners coated with these Conventional methods showed severe corrosion and. in some cases failure.

Fasteners coated with Superior shield Fluoropolymer coating withstood these harsh conditions with no noticeable deterioration even after as many as 1,000 hours, TEFC01 Fluoropolymer) PTFE coated fasteners still could be easily disassembled.

### **What are Fluoropolymer Coatings?**

Fluoropolymer coatings are blends of high performance resins and Fluoropolymer lubricants. Most of the useful properties of Fluoropolymer are due to fluorine. the most electro-negative element and the most reactive non- metal. Its atomic radius is the smallest next to hydrogen. and it forms extremely strong bonds with other elements. When reacted with carbon in Fluoropolymer. the extremely strong, tight bond produces an extraordinary combination of properties. These single coat thin films provide excellent corrosion and chemical resistance. Other benefits of Fluoropolymer coatings include reduced friction, resistance to galling, non stick, non wetting, electrical resistance and abrasion resistance. Fluoropolymer coatings are applied to fasteners and various OEM components to provide a longer life before replacement.

At present Fluoropolymer PTFE coatings solutions are supplied and marketed Shield Products.

#### **Extraordinary Properties**

- Chemically inert Nontoxic
- Non-wetting
- Nonstick
- Low Coefficient of Friction
- Highly fire resistant
- Low dielectric constant

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- High temperature ratings - 100 Degree C to + 260 Degree C

### Why Would Coating Bolts Make Sense In Some Situations?

1. Cleaning and painting of bare steel bolts in the field is likely to be difficult, expensive, and in some cases, not feasible.
2. The plain bolts, after stuffing in the holes, are expected to sit out in the weather for an extended period of time and get dried out and rusty, making correct tightening difficult or impossible
3. Release or retightening of the bolt within the foreseeable future is necessary  
(Wind turbine support shafts).
4. Atmospheric corrosion is expected to be aggressive.

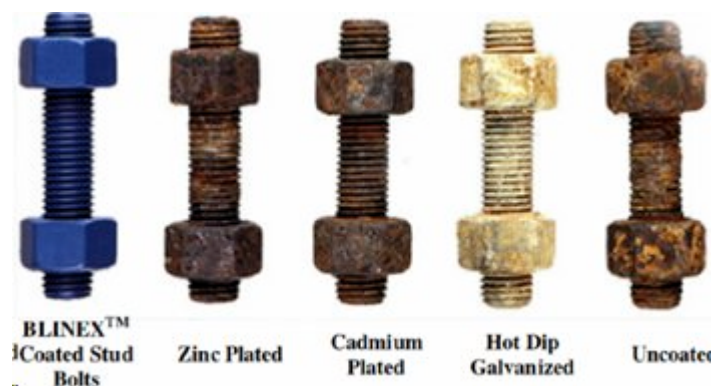
### Coating Process

**SUPERIOR SHIELD** has perfected the Fluoropolymer fastener coating process. Surface preparation of the fastener prior to coating is a very important step. We use the latest industry accepted methods to thoroughly clean all contaminants from the fasteners. Manufacturing oils, rust and scale are removed to ensure the highest quality coating.

Superior corrosion resistance is created by the application of a series of coatings. A metallic base coat is applied first, followed by an adhesion coat. The adhesion coat creates a chemical bond between the base coat and the top coat. The top coat, a heat cured Fluoropolymer coating containing Superior Shield, is used to seal the two under coatings and give easy on/easy off characteristics.

### Comparisons with other Coatings

Black, cadmium plated, and hot dipped galvanized bolts will freeze when subjected to the corrosive environments found in manufacturing plants, offshore oil rigs etc. Most often removing the nuts requires a cutting torch. With Superior shield Fluoropolymer coating these same nuts and bolts exhibit easy on and easy off characteristics increasing worker safety.



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Cadmium plated and hot dipped galvanized bolts provide similar corrosion resistance. These coatings have undergone the standard salt fog test (ASTM B117) and have been rated at 96 hours of corrosion resistance. With a **Superior shield** Fluoropolymer coated bolt that rating jumps to as much as 1000 hours, The additional corrosion resistance allows fasteners to be disassembled quickly, saving lost down time and man-hours.

Galvanizing produces a coating that is uneven, rough and thick. The rough surfaces make assembly difficult and a tight even tension on each bolt impossible. If used in sealing joints such as flanges, heads or inspection covers, the inconsistent tension forms an uneven fit resulting in a high probability of leaks. With a **Superior shield** Fluoropolymer coated bolt, tighter more consistent tensions are achieved with less required torque.

### **Technical Data —Fluoropolymer Coatings**

**Use Temperatures:** -100° C to + 260°C

**Corrosion Resistance:**

**Salt Spray** (ASTM B117) ...up to 4000 hrs (Nuts not frozen)

**Tensile Strength:** 4,000 psi

**Pencil Hardness:** 9 H (ASTM D3363-92A)

**Operating Pressure:** Up to 100.000 psi

**Kinetic Friction** Coefficient: 0.06-0.08

**Kesternich** Test:

**Impact:** 160 in. lb. (ASTM D2794-93)

**Adhesion:** 5B (ASTM D3359-95)

**Dielectric** Strength: 500 volts per mil

**Elongation:** 50%

**Thread Fit:** Over tapping of nuts 0.010"

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## **Where Fluoropolymer Coatings Works?**

Superior shield Fluoropolymer has solved problems in many industries and applications. Due to its unique benefits, Fluoropolymer Coating has been applied to various types and grades of fasteners. The water works industry takes advantage of the superior corrosion resistance properties by coating Hex-head bolts for underground service. Stainless steel fasteners, used in many different industries, are coated for lubricity and anti-galling. The most widely used application is on B7 studs with 2H nuts. These fasteners are commonly used by turnaround groups, operations and maintenance departments, and contractors at many chemical plants, refineries, and offshore platforms. The coating's chemical resistance, and easy on/easy off characteristics are perfect for these environments.

## **CONCLUSION**

The costs entailed with other bolt coatings can be staggering when factors such as man-hours, down time, safety and equipment damage are considered. Bolts coated with Superior shield Fluoropolymer coating prove to be longer lasting, safer and more cost effective than any other coated bolt. The properties frequently make Fluoropolymer the product of choice when metals and less expensive plastics fail or where long term reliability is required. Fluoropolymer are often used to solve existing problems or to develop new technology. Despite a relatively extra cost, Fluoropolymer have frequently been used to substantially reduce overall system cost.

Superior shield Fluoropolymers can be used on most metals including, Stainless, Aluminum, all types steel, galvanize, gold, silver, bronze. Prevents rust and corrosion. Last for years.

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