

## DYNO™ STUD BOLTS

**CORROSHIELD® DYNO™** structural stud bolts are commonly used by Oil & Gas industries for their high pressure applications. Examples of some of these applications include securing vessels, valves, flanges and fittings. Critical quality control parameters for this product are focused on material strength consistency as well as coating performance in accordance to ASTM standards. With our guarantee on product stability and performance integrity, our customers can expect **DYNO™** structural stud bolts to be problem free and low in maintenance. **CORROSHIELD® DYNO™** structural stud bolts and its accessories are manufactured using high grade materials selected from specialty steel mills only. This is necessary to meet the demanding performance requirements of the Oil & Gas industries.

## Benefits

- Dimensional and mechanical compliance to international standards
- Certification as per EN10204 or ISO10474
- 100% Traceability from production to retail
- Lower replacement cost, less wastage
- Anti-corrosion performance designed for Oil & Gas applications
- Product specific technical consultation

In Compliance with



Quality Testing Partner



# CORROSHIELD® Corrosion Protection

Corrosion protection is the very core of our business, hence our primary branding **CORROSHIELD®**. With years of experience behind us as specialist for corrosion protection for fastening applications, we have ample experience and production expertise to provide our customers with reliable and problem free corrosion solutions. Two of the most common coatings used in Oil & Gas industries are PTFE and Cadmium coating.

## CORROSHIELD® PTFE

PTFE (Poly Tetra Fluoro Ethylene) is a type of Fluorocarbon coating and is used in application where users seek non-stick, low friction, dry lubrication and high temperature service (up to 300°C). PTFE is combined with resin and other ingredients and is applied via wet spray method. This process requires quality control to focus on consistency of coating thickness and completeness of curing of PTFE coating to ensure its maximum anti-corrosion performance.

General characteristics of PTFE coating

- Non stick plus excellent dry lubricant
- Low surface friction Fluorocarbon coating
- Excellent corrosion protection
- Chemically inert to most solvents and acids

Typical properties of PTFE coating

- Tensile strength of  $2.00 \times 10^3$  @ break @ 25°C
- Elongation at 300% @ 25°C
- Hardness at 58 HRR
- Coefficient of friction against Steel at 0.03 (Dynamic)
- Melting point at 327°C, Continuous operating temperature of 260°C
- <0.01% Water absorption in 24 hours



Results of Neutral Salt Spray Test as per ASTM B117

### CORROSHIELD®

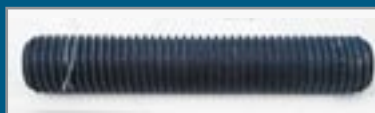


Before Test



After 1000 hours of Salt Spray Fog Exposure

### Competitor



Before Test



After 72 hours of Salt Spray Fog Exposure

## CORROSHIELD® CADMIUM

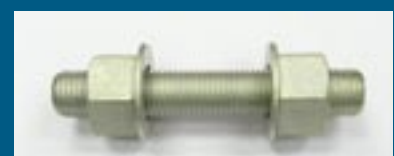
Cadmium is a by-product of zinc production. It can be electro-plated onto steel, brass or aluminum surfaces and it is commonly used where customers seek superior corrosion protection in marine and alkaline environments. Cadmium functions like zinc in corrosion protection. It sacrifices itself by being preferentially corroded to prevent further spreading of rust.

General characteristics of Cadmium plating

- Has good resistance to rural and marine atmospheres, in alkaline conditions and detergents
- Effective barrier to prevent the galvanic/bimetallic reaction
- Low coefficient of friction
- Can easily be soldered without the use of corrosive fluxes



Cadmium Yellow



Cadmium White

# ASTM A193 / A193M

## Stud Bolts

### APPLICATION

For pressure vessels, valves, flanges and fittings for high temperature service.

### PRODUCT DESCRIPTION

Stud Bolts ASTM A193 / A193M

### THREAD STANDARDS

ANSI/ASME B1.1  
ANSI/ASME B1.13M

### DIMENSIONAL STANDARDS

ANSI/ASME B18.2.1  
ANSI/ASME B18.2.3.1M  
ANSI/ASME B18.3  
ANSI/ASME B18.3.1M

### AVAILABLE MATERIALS AND GRADES

(Subject to Material Availability)

Ferritic Steel B5, B6, B6X, B7, B7M and B16

Austenitic Steel B8, B8A, B8C, B8CA, B8M, B8MA, B8M2 B8M3, B8P, B8PA, B8N, B8NA, B8MN, B8MNA, B8MLCuN, B8MLCuNA, B8T B8TA, B8R, B8RA, B8S, B8SA, B8LN, B8LNA B8MLN and B8MLNA

### MECHANICAL STANDARDS as per ASTM A193

#### Ferritic Steel

Material Grade	Diameter (Inches)	Tensile Strength, min, ksi	Yield Strength, min, 0.2% offset, ksi	Elongation in 4D, min, %	Reduction Area, min, %	Hardness, Max	
B5	up to 4, incl	100	80	16	50	-	-
B6	up to 4, incl	110	85	15	50	-	-
B6X	up to 4, incl	90	70	16	50	26 HRC	-
B7	2½ and under	125	105	16	50	35 HRC	321 HB
	over 2½ to 4	115	95	16	50	35 HRC	321 HB
	over 4 to 7	100	75	18	50	35 HRC	321 HB
B7M <sup>a</sup>	4 and under	100	80	18	50	99 HRB	235 HB
	over 4 to 7	100	75	18	50	99 HRB	235 HB
B16	2½ and under	125	105	18	50	35 HRC	321 HB
	over 2½ to 4	110	95	17	45	35 HRC	321 HB
	over 4 to 8	100	85	16	45	35 HRC	321 HB

#### Austenitic Steel

Material Grade	Diameter (Inches)	Tensile Strength, min, ksi	Yield Strength, min, 0.2% offset, ksi	Elongation in 4D, min, %	Reduction Area, min, %	Hardness, Max	
Class 1 - B8, B8M	All Diameters	75	30	30	50	96 HRB	223 HB <sup>b</sup>
Class 2 - B8 <sup>c</sup>	¾ and under	125	100	12	35	35 HRC	321 HB
	over ¾ to 1, incl	115	80	15	35	35 HRC	321 HB
	over 1 to 1¼, incl	105	65	20	35	35 HRC	321 HB
	over 1¼ to 1½, incl	100	50	28	45	35 HRC	321 HB
Class 2 - B8M <sup>c</sup>	¾ and under	110	96	15	45	35 HRC	321 HB
	over ¾ to 1, incl	100	80	20	45	35 HRC	321 HB
	over 1 to 1¼, incl	95	65	25	45	35 HRC	321 HB
	over 1¼ to 1½, incl	90	50	30	45	35 HRC	321 HB
Class 2B - B8 <sup>c</sup>	2 and under	95	75	25	40	35 HRC	321 HB
	over 2 to 2½, incl	90	65	30	40	35 HRC	321 HB
	over 2½ to 3, incl	80	55	30	40	35 HRC	321 HB

a To meet the tensile requirements, the hardness shall be over 93 HRB or 200 HB.

b For sizes ¾ inches in diameter and smaller, a maximum hardness of 100 HRB or 241 HB is permitted.

c For diameter 1½ and over, core properties may be lower than indicated by test reports which are based on values determined at ½ radius.



# ASTM A320 / A320M

## Stud Bolts

### APPLICATION

For pressure vessels, valves, flanges and fittings for low temperature service.

### PRODUCT DESCRIPTION

Stud Bolts ASTM A320 / A320M

### THREAD STANDARDS

ANSI/ASME B1.1  
ANSI/ASME B1.13M

### DIMENSIONAL STANDARDS

ANSI/ASME B18.2.1  
ANSI/ASME B18.2.3.1M  
ANSI/ASME B18.3  
ANSI/ASME B18.3.1M

### AVAILABLE MATERIALS AND GRADES

(Subject to Material Availability)

Ferritic Steel L7, L7A, L7B, L7C, L70, L71, L72, L73, L43, L1, L7M

Austenitic Steel B8, B8C, B8M, B8P, B8F, B8T, B8LN B8MLN, B8A, B8CA, B8MA, B8PA, B8FA, B8TA, B8TA, B8LNA, B8MLNA

### ASTM A194 / 194M HEX NUT COMPATIBLE GRADES

Ferritic Steel Grade 4 or 7  
Grade 7M (For Grade L7M stud bolts only)

Austenitic Steel Grade 8, 8C, 8T, 8F, 8M, 8LN and 8MLN

### MECHANICAL STANDARDS as per ASTM A320

#### Ferritic Steel

Material Grade	Diameter (Inches)	Tensile Strength, min, ksi	Yield Strength, min, 0.2% offset, ksi	Elongation in 4D, min, %	Reduction Area, min, %	Hardness, Max	
L7	2½ and under <sup>a</sup>	125	105	16	50	-	-
L7M	2½ and under <sup>a</sup>	100	80	18	50	99 HRB	235 HB <sup>b</sup>

#### Austenitic Steel

Material Grade	Diameter (Inches)	Tensile Strength, min, ksi	Yield Strength, min, 0.2% offset, ksi	Elongation in 4D, min, %	Reduction Area, min, %	Hardness, Max	
Class 1 - B8, B8M	All Diameters	75	30	30	50	96 HRB <sup>c</sup>	223 HB <sup>c</sup>
Class 2 - B8	¾ and under	125	100	12	35	35 HRC	321 HB
	over ¾ to 1, incl	115	80	15	30	35 HRC	321 HB
	over 1 to 1¼, incl	105	65	20	35	35 HRC	321 HB
	over 1¼ to 1½, incl <sup>a</sup>	100	50	28	45	35 HRC	321 HB
Class 2 - B8M	¾ and under	110	95	15	45	35 HRC	321 HB
	over ¾ to 1, incl	100	80	20	45	35 HRC	321 HB
	over 1 to 1¼, incl	95	65	25	45	35 HRC	321 HB
	over 1¼ to 1½, incl <sup>a</sup>	90	50	30	45	35 HRC	321 HB

<sup>a</sup> These upper diameter limits were established on the basis that these were the largest sizes commonly available that consistently met specification property limits. They are not intended as absolute limits beyond which bolting materials could no longer be certified to the specification.

<sup>b</sup> To meet the tensile requirements, the hardness shall not be less than 93 HRB or 200 HB.

<sup>c</sup> For sizes ¾ inches in diameter and smaller, a maximum hardness of 100 HRB or 241 HB is permitted.



# ASTM A194 / A194M

## Hex Nuts

### APPLICATION

For high pressure or high temperature service, or both, covering nut size 1/4 inches through 4 inches and metric M6 through M100 nominal

### PRODUCT DESCRIPTION

Hex Nuts ASTM A194 / A194M

### THREAD STANDARDS

ANSI/ASME B1.1  
ANSI/ASME B1.13M

### DIMENSIONAL STANDARDS

ANSI/ASME B18.2.2  
ANSI/ASME B18.2.4.6M

### AVAILABLE MATERIAL AND GRADES

(Subject to Material Availability)

Ferritic Steel Grade 1, 2, 2HM, 2H and 4

Austenitic Steel Grade 3, 6, 6F, 7, 7M, 8, 8A, 8C, 8CA, 8M, 8MA, 8T 8TA, 8F, 8FA, 8P, 8PA, 8M, 8NA, 8LN, 8LNA, 8MN 8MNA, 8MLN, 8MLNA, 8R, 8RA, 8S, 8SA, 8MLCuNA, 8MLCuNA, 9C, 9CA and 16

### HARDNESS STANDARDS as per ASTM A194

Material Grade	Internal Diameter (Inches)	Rockwell Hardness		Brinell Hardness
		C-Scale	B-Scale	
2	All Diameters	-	84 min	159 to 352
2H	up to 1½, incl	24 to 38	-	248 to 352
	over 1½	38 max	95 min	212 to 352
2HM and 7M	All Diameters	22 max	-	159 to 237
4, 7 and 16	All Diameters	24 to 38	-	248 to 352
8	All Diameters	-	60 to 105	126 to 300

### PROOF LOAD using Threaded Mandrel as per ASTM A194

Note: Proof Loads are not design loads

Nominal Size (Inches)	Threads per Inch	Stress Area (In. <sup>2</sup> )	Proof Load, lbf <sup>a</sup>					
			Grades 2, 2HM, 7M		Grades 2H, 4, 7, 16		Grade 8	
			Heavy Hex <sup>b</sup>	Hex <sup>c</sup>	Heavy Hex <sup>d</sup>	Hex <sup>e</sup>	Heavy Hex <sup>f</sup>	Hex <sup>g</sup>
¼	20	0.0316	4770	4300	5570	4770	2540	2380
⅜	16	0.0774	11620	10460	13560	11620	6200	5810
½	13	0.1419	21280	19160	24830	21280	11350	10640
⅝	11	0.226	33900	30510	39550	33900	18080	16950
¾	10	0.334	50100	45090	58450	50100	26720	25050
7/8	9	0.462	69300	62370	80850	69300	36960	34650
1	8	0.606	90900	81810	106000	90900	48480	45450
1 1/8	8	0.790	118500	106700	138200	118500	63200	59250
1 1/4	8	1.000	150000	135000	175000	150000	80000	75000
1 3/8	8	1.233	185000	166500	215800	185000	98640	92450
1 1/2	8	1.492	223800	201400	261100	223800	119360	111900

a Proof load testing of nuts is achieved by a proof load of over 120 000 lbf.

b Based on proof stress of 150 000 psi.

c Based on proof stress of 135 000 psi.

d Based on proof stress of 175 000 psi.

e Based on proof stress of 150 000 psi.

f Based on proof stress of 80 000 psi.

g Based on proof stress of 75 000 psi.





## ENGINEERING EDGE

We are the leading manufacturer of construction and industrial fasteners. With production, research and development experience since 1989, we have established our **CORROSHIELD®** branding as the premium fastening choice. Our reputation is built on quality and we have collaborated with several clients on extensive R & D to develop unique fastening solutions that far exceeds conventional designs.

Our ISO certified manufacturing facilities are located in Taiwan and China, and we are equipped with modern machineries and high-end quality control laboratories to churn out one of the finest fasteners in the world.

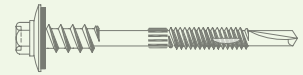
Global customers will receive sales and technical support from our team of engineers and authorised distributors located in more than 20 countries around the world. We provide professional consultation to architects, consultants and engineers on fastening solutions on project basis. We also provide fastening cost evaluation and fastener corrective proposal to manufacturing plants.

Our business motto: "Creating an Edge" is reflective of our attitude towards our customers as well. We aim to provide our customers with fastening solutions that gives them an edge over their competition

## CORROSHIELD® Products

### STEELTAPP® Series

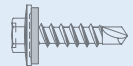
Carbon Steel fasteners for Roof and Wall



<b>METAPP®</b>	Steel sheets to steel substrates
<b>TIMTAPP®</b>	Steel sheets to timber substrates
<b>DUOTAPP®</b>	Steel sheets to steel or timber substrates
<b>POLYTAPP®</b>	Skylights to steel or timber substrates
<b>FIBRETAPP®</b>	Cogurated fibre-cement sheets to steel or timber substrates
<b>BOTAPP®</b>	Fasteners for drywall applications
<b>CONTAPP®</b>	Fasteners for concrete or masonry
<b>WINTAPP®</b>	Fasteners for window frame assembly
<b>TRUSTAPP®</b>	Fasteners for light-gauge steel trusses

### ALUTAPP® Series

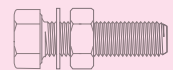
Stainless Steel fasteners for Roof and Wall



<b>304TAPP®</b>	S/S Gr 304 Fasteners – Aluminium sheets to steel or timber substrates
<b>410TAPP®</b>	S/S Gr 410 Fasteners – Aluminium sheets to steel or timber substrates
<b>BIMATAPP®</b>	Stainless steel shank with carbon steel drill point

### DYNO® Structural Fasteners

Carbon Steel or Stainless Steel fasteners for structures



<b>HEX BOLTS</b>	For structural joint applications
<b>HEX NUTS</b>	For bolt tightening applications
<b>WASHERS</b>	For surface bearing applications
<b>ANCHORS</b>	For foundation applications
<b>SHEAR CONNECTORS</b>	For steel decking applications
<b>STUD BOLTS</b>	Fasteners for Oil & Gas applications



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