

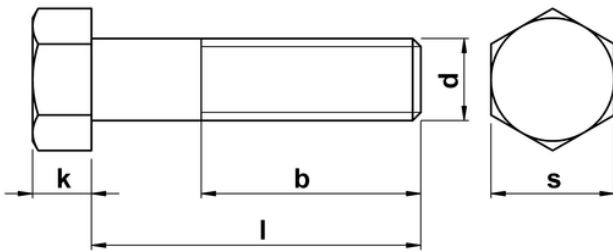
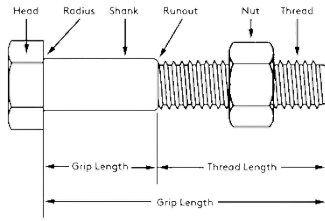


# FASTENERS BOLTS

Product Sheet



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## Features

**Corrosion Resistance:** All specified stainless steel grades offer notable corrosion resistance. Grades such as 316/317 and 904L excel in chloride-prone environments.

**Heat Resistance:** Certain grades, including 310, 321, and 347, demonstrate exemplary heat and oxidation resistance, ideal for heat-intensive applications.

**Heat Treatment:** The majority of these grades, particularly 15-5 PH and 17-4 PH, can undergo heat treatment to significantly increase strength and hardness.

**Solution Treatment (Annealing):** Annealing processes, involving heating and rapid cooling, are applicable to these grades to improve ductility and alleviate hardness.

# Stainless Steel Bolts

**Description** - Our range of stainless steel bolts, available in different grades, provide exceptional durability and adaptability for a variety of applications. These bolts, which exhibit noteworthy corrosion resistance, guarantee excellent performance in a range of temperatures. They are perfect for both industrial and general application because of their high strength, great formability, weldability, and improved resistance to stress corrosion cracking. Our wide range of grades ensures that we can satisfy all of your requirements while maintaining uncompromised quality.

## Stainless Steel Bolt Specifications

Stainless Steel Grade	Bolt Standards	Universal Bolt Standards	Length	Bolt Size
SS 304	ASTM A193, F593 / ASME SA193	DIN, ASTM, BS and all International Standards	3 mm to 200 mm	M3 - M56, 3/6" to 2", Custom Sizes
SS 310				
SS 316				
SS 317				
SS 321				
SS 347	ASTM A193 / ASME SA193			
SS 410	ASTM A193, F593 / ASME SA193			
SS 904L	ASTM A193 / A194, ASME SA193 / SA194			
SS 17-4 PH	ASTM A193, F593 / ASME SA193			
SS 15-5 PH	ASTM A193 / A194, ASME SA193 / SA194			
SS 18-8	ASTM A193, F593 / ASME SA193,			

**Welding:** Grades 304 and 904L, among others, exhibit commendable weldability, allowing for sturdy, clean welds.

**Machining:** Although all listed grades are machinable, grades like 410 and the PH series outperform due to heightened hardness and strength.

**Typical Applications:** The comprehensive properties of these stainless steel grades facilitate their wide range of applications. From general use (304, 18-8) and high-temperature environments (310, 321, 347), to scenarios demanding high strength (410, 15-5 PH, 17-4 PH) and exceptional corrosion resistance (316/317, 904L), the suitability of these bolts is vast.

## Chemical Composition

Stainless Steel Grade	Cr (%)	Ni (%)	Mo (%)	Mn MAX (%)	Si MAX (%)	C MAX (%)	P MAX (%)	S MAX (%)	Fe (%)	Other
SS 304	18 - 20	8 - 10.5	-	2	0.75	0.08	0.045	0.03	Balance	-
SS 310	24 - 26	19 - 21	0.1 max	2	0.15	0.015	0.020	0.015	54.7 min	-
SS 316	16 - 18	11 - 14	2 - 3	2	1	0.08	0.045	0.03	67.8 min	-
SS 317	18 - 20	11 - 15	3 - 4	2	1	0.08	0.045	0.03	57.8 min	-
SS 321	17 - 19	9 - 12	-	2	1	0.08	0.045	0.03	Balance	0.7 Ti
SS 347	17 - 20	9 - 13	-	2	1	0.08	0.045	0.03	62.7 min	1 Nb + Ta
SS 410	17 - 20	9 - 13	-	1	1	0.08	0.04	0.03	Balance	-
SS 904L	19 - 23	23 - 28	4 - 5	2	1	0.02	0.04	0.03	Balance	1-2 Cu
SS 15-5 PH	14 - 15.5	3.5 - 4.5	0.5	1	1	0.07	0.03	0.015	Balance	2 - 5 Cu
SS 17-4 PH	15 - 17.5	3 - 5	-	1	1	0.07	0.04	0.03	Balance	3 - 5 Cu
SS 18-8	18	8	-	2	1	0.08	0.045	0.03	Balance	-

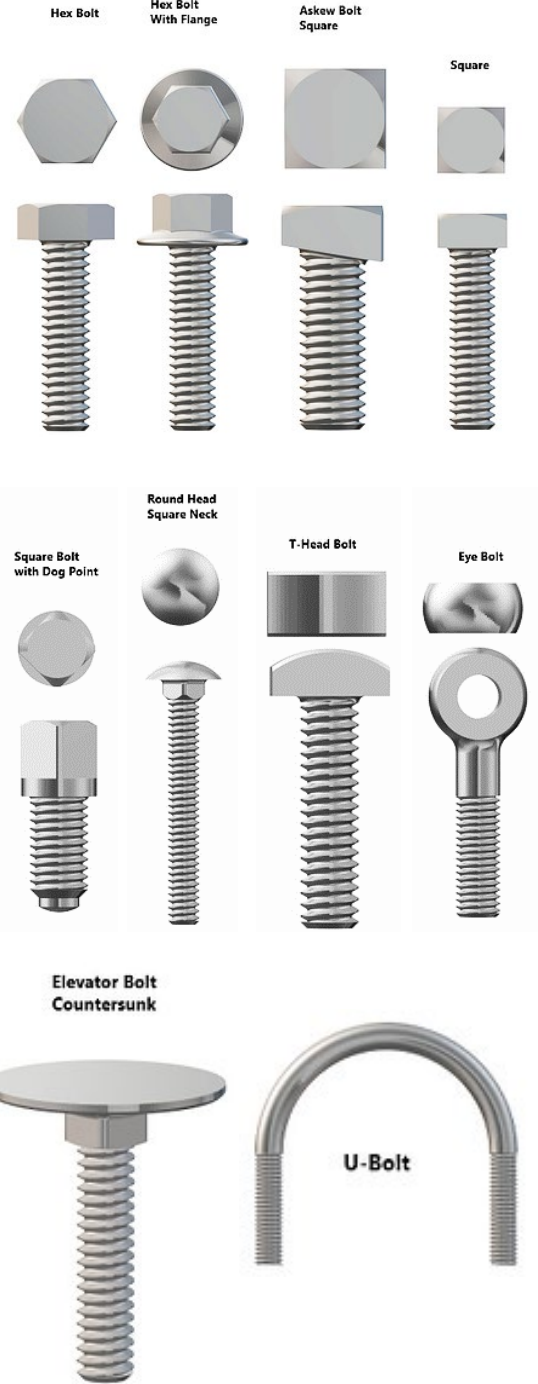
## Mechanical Properties

Stainless Steel Grade	Tensile Strength (MPa)	Yield Strength 0.2% Proof (MPa)	Elongation (% in 50mm)	Hardness Rockwell B (HR B)	Hardness Brinell (HB)
SS 304	515	205	40	92	201
SS 310	515	205	40	95	217
SS 316	515	205	35	95	217
SS 317	515	205	35	95	217
SS 321	515	205	35	95	217
SS 347	515	205	35	95	201
SS 410	480	275	16	95	201
SS 904L	490	220	36	70-90	150-166
SS 15-5 PH	1311	1173	10	388	-
SS 17-4 PH	1103	1000	5	-	-
SS 18-8	515	205	40	92	201

## Physical Properties

Stainless Steel Grade	Density (G/Cm³)	Melting Point (°C)	Thermal Expansion (Mm/M°C)	Thermal Conductivity (W/M·K)	Electrical Resistivity (NΩ·M)	Specific Heat (J/Kg·K)
SS 304	8.0	1400 - 1455	17.2	16.2	720	500
SS 310	7.9	1400 - 1455	14.2	14.2	720	500
SS 316	8.0	1390 - 1450	15.9	16.3	740	500
SS 317	7.9	1390 - 1450	15.9	14.6	740	500
SS 321	8.0	1450	16.6	16.1	720	500
SS 347	7.96	1450	16.0	16.3	720	500
SS 410	7.74	1400 - 1450	9.9	24.9	570	460
SS 904L	7.98	1300 - 1390	15.0	11.5	950	450
SS 15-5 PH	7.78	1440	10.8	19.0	582	460
SS 17-4 PH	7.78	1400 - 1440	10.8	19.0	582	460
SS 18-8	8.0	1400 - 1455	17.2	16.2	720	500

## Head Shapes



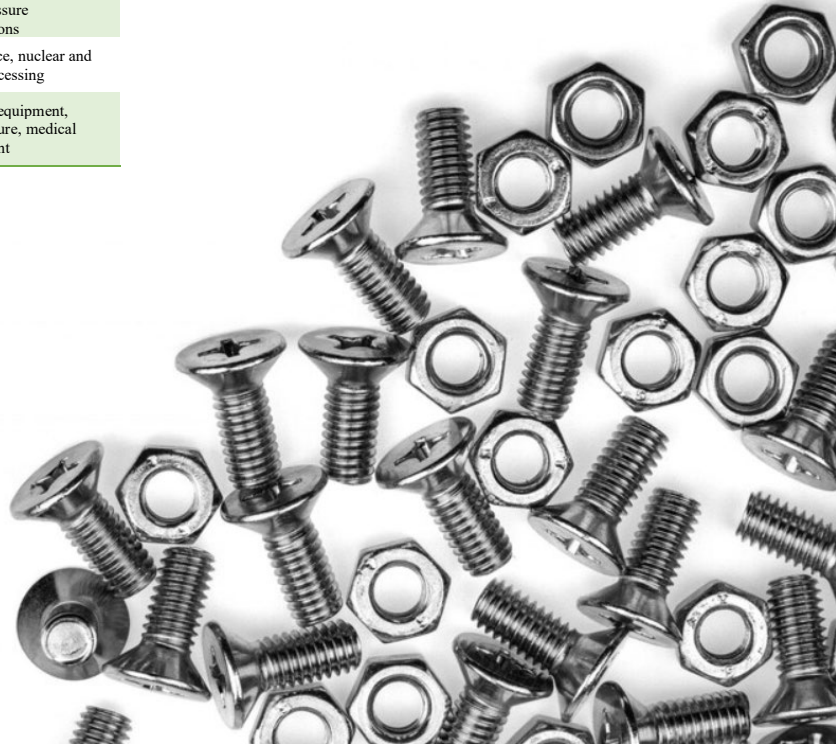
## Comparison of Grades

### Available Bolt Types

- Hex Bolt
- Square Head Bolt
- U Bolt
- Eye Bolt
- T Bolt
- J Bolt
- L Bolt
- Flange Bolt
- Step Bolt
- Elevator Bolt
- Head Plow Bolt
- Lag Bolt
- Shoulder Bolt
- Sex Bolts

- Hanger Bolt
- Square Bolts
- 12 Point Bolts
- Socket Bolt
- Anchor Bolt
- Foundation Bolts
- Structural Bolts
- T-Head Bolts
- Plow Bolt
- Draw Bolt
- Stove Bolt
- Tap Bolt
- Machine Bolt

Stainless Steel Grade	Advantages	Disadvantages	Typical Applications
SS 304	Excellent corrosion resistance, good formability, good weldability	Lower strength at high temperatures, not suitable for extremely corrosive environments	Kitchen equipment, architecture, medical equipment
SS 310	High temperature resistance, excellent toughness at cryogenic temperatures	More expensive, less readily available	Heat treatment industry, furnace parts
SS 316	Excellent corrosion resistance, especially against chlorides and other industrial solvents	More expensive than SS 304	Marine applications, chemical processing
SS 317	More resistant to corrosion and pitting than 316, especially in chloride environments	High cost, less readily available	Chemical and petrochemical processing
SS 321	Improved intergranular corrosion resistance due to added titanium	Not as readily available as 304, more expensive	Aerospace, high temperature applications
SS 347	Enhanced high-temperature service due to the addition of columbium and tantalum	High cost, less readily available	Aerospace, high temperature applications
SS 410	Excellent hardness after heat treatment, good corrosion resistance for a martensitic stainless steel	Poor corrosion resistance compared to austenitic grades, must be hardened for maximum effectiveness	Cutlery, dental and surgical instruments
SS 904L	Super austenitic, hence improved resistance to strong reducing acids, particularly sulfuric acid	More expensive, less readily available	Chemical processing, pollution control equipment
SS 15-5 PH	High strength and toughness, good corrosion resistance	Must be heat treated for optimal performance, more expensive	Aerospace applications, high pressure applications
SS 17-4 PH	High strength, good corrosion resistance, maintains properties at high temperatures	Requires precise heat treatment, not as corrosion resistant as austenitic grades	Aerospace, nuclear and food processing
18-8	Excellent corrosion resistance, good formability, good weldability	Lower strength at high temperatures, not suitable for extremely corrosive environments	Kitchen equipment, architecture, medical equipment



# Material Options

## High Nickel Bolts

**Description** - A versatile range of high-grade industrial bolts. Crafted to meet various needs, these bolts offer outstanding quality and features, including excellent resistance to corrosive environments, high tensile strength, stress resistance, and remarkable performance in extreme conditions. With customizable options available, our high-graded bolts ensure reliable performance and durability for diverse applications.

### Features

**High-Tensile Strength in Extreme Temperatures:** Monel 400 Hex Bolts and Inconel 625 Bolts show exceptional tensile strength even at sub-zero and elevated temperatures respectively.

**Superior Corrosion Resistance:** Monel K-500 bolts, Incoloy 825 Bolts, and Titanium Grade 2 Bolts offer outstanding resistance against corrosion, making them ideal for challenging environments.

**Enhanced Resistance to Pitting and Crevice Corrosion:** Hastelloy C22 Bolts and Incoloy 925 Bolts exhibit enhanced resistance to pitting and crevice corrosion.

**Resistance to High-Temperature and Aqueous Corrosion:** Incoloy 800HT Bolt is designed to withstand high-temperature and aqueous corrosion.

**Exceptional Finishing and Longevity:** Inconel 718 bolts and Titanium Grade 5 Bolts offer excellent finishing and longevity.

**Reduced Carbide Precipitation:** Hastelloy C276 bolts maintain their hardenability due to reduced carbide precipitation during welding.

**Effective Stress Corrosion Cracking Resistance:** Incoloy 825 Bolts showcase impressive stress corrosion cracking resistance.

**Outstanding Performance in Saltwater Applications:** Titanium Grade 5 Bolts are ideal for saltwater applications due to their superior corrosion resistance.

### High Nickel Bolt Specifications

High Nickel Group	Bolt Standards	Universal Bolt Standards	Length	Bolt Size
Ni 200/201	ASTM B166,160 / ASME SB 166,160			
Monel 400	ASTM B 166,164 / ASME SB 166,164			
Monel K500				
Inconel 600/601/625	ASTM B 166, ASME SB 166			
Inconel 718	ASTM B 166,637 / ASME SB 166,637			
Incoloy 800/800H/ 800HT	ASTM B 166,408,564 / ASME SB 166,408,564	DIN, ASTM, BS and all International Standards	3 mm to 200 mm	M3 - M56, 3/6" to 2", Custom Sizes
Incoloy 825	ASTM B 425 / ASME SB 425			
Incoloy 925	ASTM B 425 / ASME SB 425			
Hastelloy C276	ASTM B 574 / ASME SB 574			
Hastelloy C2000	ASTM B 574 / ASME SB 574			
Hastelloy C22	ASTM B 166 / ASME SB 166			
Titanium 2	ASTM F 467 / ASME SF 467			
Titanium 5	ASTM B 348 / ASME SB 348			



# High Tensile Bolts

**Description** - Introducing our High Tensile Bolts, a perfect blend of strength, precision, and longevity. Built from grade 8.8 high tensile steel, these bolts guarantee robust performance under heavy use. With extraordinary corrosion resistance, these bolts offer a variety of finishes and customized options. The B7, B8, B8M, A4-70, and A2-70 variants cater to diverse needs, offering excellent heat treatment, resistance to stress corrosion, and a visually appealing finish. Our rigorous quality checks ensure impeccable standards, providing reliable and long-lasting solutions for your bolting needs.



## Features

**Robust Thermal Durability:** High Tensile 5.6 and Grade 8.8 Bolts offer impressive tensile strength, regardless of temperature fluctuations.

**Corrosion Defense:** B7 and B8 Bolts deliver exceptional corrosion resistance, assuring durability in challenging environments.

**Superior Corrosion Resistance:** B8M Bolts exhibit advanced resistance to pitting and stress-induced corrosion.

**Heat & Oxidative Resistance:** High Tensile A4-70 Bolts are engineered for superior performance in high-temperature and oxidative conditions.

**Unmatched Finish & Longevity:** A2-70 and High Tensile 5.6 Bolts are distinguished by their exceptional finishing and extended lifespan.

**Strain Resilience:** Grade 8.8 Bolts maintain tensile strength even under significant strain or pressure.

**Stress Corrosion Resistance:** B7 Bolts show remarkable resilience against stress corrosion cracking.

**High Pressure Performance:** B8M Bolts deliver optimal performance in high-pressure and high-temperature conditions.

Mild and Carbon Steel	Bolt Standards	Universal Bolt Standards	Length	Bolt Size
HT 5.6	ASTM A193, ASME SA193	DIN, ASTM, BS and all International Standards	3 mm to 200 mm	M3 -
HT 8.8				M56,
HT B7				3/6" to
HT B8				2",
HT B8M				Custom
HTS A40-70				Sizes
HT A2-70				

## High Tensile Bolt Specifications

# Duplex & Super Duplex Steel Bolts

**Description** - Our bolts are designed and manufactured to serve in diverse environments, especially those prone to wet and corrosive atmospheres. We take pride in using top-tier raw materials for the fabrication of these bolts, ensuring durability, flexibility, formability, and longevity. Our bolts are available in a variety of dimensions, sizes, shapes, and specifications, aligning with both national and international standards. Notably, our Super Duplex 32760 bolts, Super Duplex zeron 100 bolts, and Super Duplex F55 bolts can be customized to meet specific requirements.

## Features

**Superior Quality Raw Materials and Dimensional Accuracy:** The Duplex F51 and Duplex 31803 bolts are fabricated from superior-quality raw materials, offering robustness, longevity, and precise dimensions to meet exact specifications.

**Versatile Specifications:** All our bolt grades - Duplex F51, Duplex 31803, Duplex Steel 32205, Duplex F60, Super Duplex 32750, Super Duplex F53, Super Duplex S32760, Super Duplex zeron 100, and Super Duplex F55 - are available in various standards, dimensions, sizes, and shapes.

**High Formability, Ductility, and Weldability:** The Duplex F51, Duplex 31803, Duplex Steel 32205, Duplex F60, and Super Duplex grades all offer high formability and ductility, allowing for easy fabrication, welding, and formability.

**Corrosion and Enhanced Resistance:** The Duplex F51, Duplex 31803, Duplex Steel 32205, Duplex F60, Super Duplex 32750, Super Duplex F53, Super Duplex S32760, Super Duplex zeron 100, and Super Duplex F55 bolts are highly resistant to corrosion, chloride attack, pitting, crevice corrosion, general corrosion, and stress corrosion cracking.

**High Strength and Toughness:** Duplex Steel 32205, Duplex F60, and Super Duplex grades are recognized for their superior strength and toughness, enabling them to withstand heavy loads, high temperatures, and pressures.

**Customization:** Super Duplex S32760, Super Duplex zeron 100, and Super Duplex F55 bolts offer customization options to meet specific demands and requirements.

**Increased Tensile and Yield Strength:** Super Duplex 32750, Super Duplex F53, Super Duplex S32760, Super Duplex zeron 100, and Super Duplex F55 bolts demonstrate higher tensile and yield strength compared to conventional austenitic or ferritic grades.

**High-Grade Finishing:** All our bolt grades have an impressive finishing and exactness to meet the highest expectations, providing both functionality and aesthetic appeal.

## Duplex and Super Duplex Steel Specifications

D and Super D Steel Bolts	Bolt Standards	Universal Bolt Standards	Length	Bolt Size
D S31803 (F51)	ASTM A182, A479 / ASME SA 182, SA 479	DIN, ASTM, BS and all International Standards	3 mm to 200 mm	M3 - M56,
D S32205 (F60)	ASTM A479, ASME SA479			3/6" to 2",
SD S32750 (F53)				Custom
SD S32760 (F55)				Sizes



# Mild Steel & Carbon Steel Bolts

**Description** - Mild Steel Bolts, praised for their corrosion resistance and high tensile strength, are preferred for their ductility and malleability in the piping and petrochemical industries. They offer excellent finish, durability, and strength, ensuring high quality.

In contrast, Carbon Steel Bolts, crafted from steel with up to 2.1% carbon content, gain enhanced strength and toughness after heat treatment. They offer robustness at the cost of reduced weldability and slightly lower melting points, providing a variety of applications due to multiple available grades.



## Features

**Corrosion Resistance:** Mild Steel Bolts demonstrate excellent resistance to corrosion, pitting, and crevice corrosion, guaranteeing longevity in different conditions.

**Tensile Strength and Thermal Resilience:** Both types of bolts exhibit high tensile strength, with Mild Steel Bolts being particularly resistant to high temperatures.

**Ductility and Malleability:** Mild Steel Bolts are known for their ductility and malleability, making them versatile for various industrial uses.

**Heat Treatment Enhancement:** Carbon Steel Bolts, when subjected to heat treatment, display significantly improved toughness and strength due to the higher carbon content.

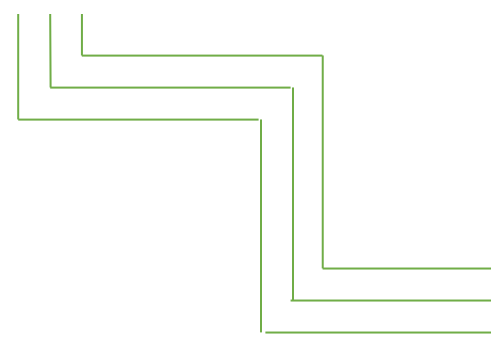
**Quality and Durability:** Both Mild Steel and Carbon Steel Bolts are manufactured to the highest quality standards, offering great finishing, durability, and strength.

**Variety of Grades:** Carbon Steel Bolts are available in multiple grades, providing flexibility for diverse applications.

**Enhanced Strength:** The higher carbon content in Carbon Steel Bolts results in enhanced strength, despite a slight reduction in weldability and the melting point.

Mild & Carbon Steel	Bolt Standards	Universal Bolt Standards	Length	Bolt Size
Mild Steel	ASTM A194, ASME SA194	DIN, ASTM, BS and all International Standards	3 mm to 200 mm	M3 - M56, 3/6" to 2", Custom Sizes
Carbon Steel	ASTM A193, ASME SA 193			

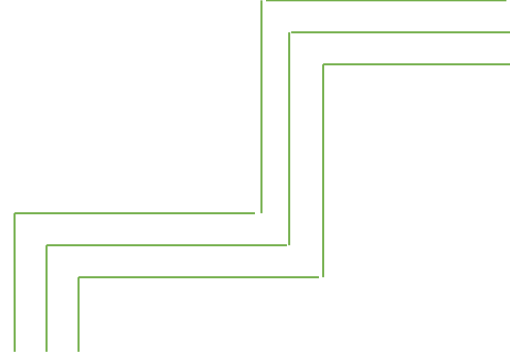
## Mild & Carbon Steel Bolt Specifications





# Alloy 20, SMO 254 and Grade 660

**Description** - Alloy 20 Bolts, composed of a robust niobium-stabilized austenitic alloy, provide extraordinary resistance to corrosive substances and environments. Their exceptional resilience and versatility make them suitable across numerous industries. SMO 254 Bolts, an amalgamation of Nickel, Chromium, and Molybdenum, offer both efficient performance and outstanding durability. Their non-corrosive nature and stringent quality standards ensure long-lasting usage. Available in various sizes and shapes, they cater to an array of applications. ASTM A453 Grade 660 Bolts are specifically designed for usage in high atmospheric environments. They provide impressive tensile strength, elongation, and hardness, making them ideal for bolting boilers, pressure vessels, valves, and pipeline flanges.



## Alloy 20, SMO 254 & Grade 660 Specifications

Other Types	Bolt Standards	Universal Bolt Standards	Length	Bolt Size
Alloy 20	ASTM B473, ASME SB 473	DIN, ASTM, BS and all International Standards	3 mm to 200 mm	M3 - M56,
SMO 254	ASTM A193 / A194, ASME SA193 / SA194			3/6" to 2",
Grade 660	ASTM A453, ASME SA453			Custom Sizes

## Features

**Superior Corrosion Resistance:** Alloy 20 Bolts offer unparalleled resistance to acidic solutions, ensuring their durability and longevity.

**Optimal Performance and Durability:** SMO 254 Bolts deliver high-performing, non-corrosive service, maintaining their quality over an extended period.

**Dimensional Flexibility:** The wide range of sizes, shapes, and dimensions of SMO 254 Bolts cater to diverse industrial needs.

**High Tensile Strength and Hardness:** Both Alloy 20 Bolts and Grade 660 Bolts provide robust tensile strength, capable of withstanding high pressure and temperature conditions. Grade 660 Bolts, in particular, are known for their hardness and elongation.

**Design for High-Pressure Environments:** Grade 660 Bolts are tailored for high atmospheric conditions, offering reliable and resilient service in various critical bolting applications.

**Comprehensive Industrial Application:** From power generation to petrochemicals and food processing, the Alloy 20 and SMO 254 bolts are widely used in an array of industries due to their superior characteristics and adaptable nature.

**Maintenance and Flexibility:** Alloy 20 bolts require minimal maintenance, thanks to their sturdy structure, and offer operational flexibility, contributing to their broad industrial appeal.



## Coating Solutions

We provide a wide range of coating solutions designed to enhance the performance and longevity of various industrial components. Our offerings include a variety of metallic coatings and PTFE coatings, each tailored to meet specific operational requirements and environmental conditions.

### Metallic Coatings

Metallic coatings, including Nickel, Zinc, Chromium, Gold, and Silver, offer corrosion resistance and other beneficial properties. They are widely used across various industries.

**Hot-Dip Galvanized Coatings:** These coatings provide dual corrosion protection for steel: barrier and galvanic. They act as a semi-impermeable barrier against corrosion-causing environmental elements.

**Mechanical Galvanizing:** This process, similar to hot-dip galvanizing, applies a zinc coating on bare steel, offering protective benefits.

**Silver-Plating:** Ideal for applications where lubricants can't be used or galling is a risk. Silver plating acts as a solid lubricant, reducing friction when used dry.

#### Types of Metallic Coatings

- Electro Zinc Plating (UNI 4721 - ASTM B633 - BS 1706)
- Hot-Dip Galvanizing (ASTM A153 - ISO 1461- UNI 3740- BS 729)
- Aluminizing (ISO 2063)
- Nickel Plating (ASTM B689)
- Silver Plating (ASTM B254 - B700)
- Chromium / Zinc Coating (Dacromet 320 / 500 - ASTM F1136)
- Electro Cadmium Plating (ASTM B766)
- Electroless Nickel Plating (ASTM B733)
- Zinc Phosphate Coating / Manganese Phosphate Coating (ASTM F1137)
- Electro Zinc/Nickel Plating (ASTM B841)
- Mechanical Zinc Coating (ASTM B695)

### PTFE Coatings

PTFE (Polytetrafluoroethylene) coatings, including Xylan, Teflon, and Fluorocarbon, are known for their corrosive chemical and heat resistance, and their low friction surface. PTFE coated bolts offer:

- Low Coefficient of Friction
- Nonwetting properties
- Heat Resistance up to 260°C/ 500 °F
- Cryogenic Stability down to -270°C/ -454 °F
- Chemical Resistance, except against molten alkali metals and highly reactive fluorinating agents.