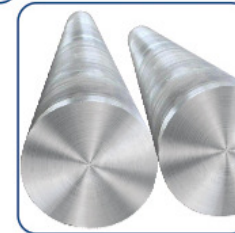
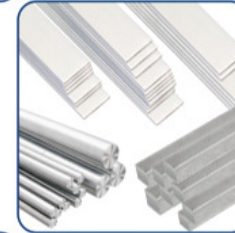


**Corporate Office :**  
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**Registered Office & Works :**  
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Ph. : +91-2763-284481, 284943  
Fax : +91-2763-284552

**Email :**  
mail@ratneshmetal.com  
info@ratneshmetal.com



Manufacturers & Exporters of  
Stainless Steel, Alloy Steel,  
Carbon Steel & Duplex Steel in  
Hot Rolled Bars, Bright Bars,  
Hexagonal Bars, Squares Bars,  
Angles, Flats, Hot Forged Machined Bars  
and Hot Forged Fasteners.



09 / 2013



### What we are

We Ratnesh Metal Industries Pvt Ltd is a steel integrated plant established in 1999. It was a part of parent group having an experience of producing various products in steel industry since 1970. The company specializes in manufacturing of stainless steel hot rolled black bars and bright bars in round, hexagon, squares, angles, flats, hot forged machined bars and various other sections. The manufacturing unit spread in the area of 2,00,000 sq/mtr, with the production capacity of 50000 mt per annum, possesses in house production facilities like steel melting with AOD & continuous casting machine, rolling mills, annealing furnace, bright bar & fastener unit. We are an ISO 9001-2008 & PED-97/23/EC certified company. We have achieved a position of repute in domestic as well as international market and come a long way, building worldwide clientele.

### CORE VALUES PHILOSOPHY

#### What we stand for

We at Ratnesh strive for the delivery of quality and reliable products on time as per customer requirement at competitive prices.

The team at Ratnesh shares the noble vision of leading the world stainless steel industry by producing products of the best quality, at the most competitive prices, satisfying our customers worldwide and ensuring timely delivery.

- Constant improvement of our products and processes
- Production of the best quality products
- Competitive pricing of products
- Ensuring timely delivery
- Creating and maintaining a world class team of professionals
- Minimizing the environmental impact of production
- Providing a challenging working environment for employees
- Updating our employees from time to time by arranging training programs
- Ensuring employee satisfaction and safety at various levels
- Carrying out ethical production and trade
- Surpassing the expectations of our customers in quality and service
- Building long-lasting relations with customers, employees and suppliers





## What we do

We produce Steels, Special Steels, Alloy Steels, Duplex Steels in hot rolled black and bright bars in rounds, square, hexagonal, RCS, flats, angles & hot forged machined bars in different sizes according to international standards or as per customer requirements.



### Round Bars

Size Range (mm)	Size Range (inch)	Supply Condition	Tolerance
3 to 10	1/8" to 3/8"	Cold Drawn + Polished	h8, h9, h10, h11, ASTM A-484
11 to 16	7/16" to 5/8"	Cold Drawn + Centerless Ground + Polished	h8, h9, h10, h11, ASTM A-484
17 to 50	5/8" to 2"	Peeled + Centerless Ground + Polished	h8, h9, h10, h11, ASTM A-484
50 to 100	2" to 4"	Peeled + Polished	h10, h11, ASTM A-484
100 to 130	4" to 5"	Peeled + Polished	h11, ASTM A-484
135 to 500	5.1/2" to 20"	Forged + Machined	+/- 2.50 mm

### Square Bars

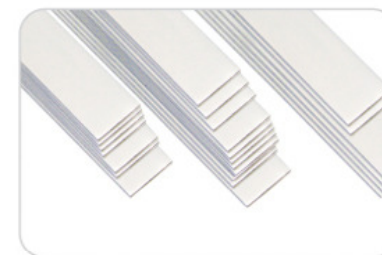
Size Range (mm)	Size Range (inch)	Supply Condition	Tolerance
5 to 60	3/16" to 2.1/4"	Cold Drawn	h11, ASTM A-484
5 to 60	3/16" to 2.1/4"	Cold Drawn + Ground + polished	h11, ASTM A-484

### Hexagonal Bars

Size Range (mm)	Size Range (inch)	Supply Condition	Tolerance
5 to 60	3/16" to 2.1/4"	Cold Drawn	h11, ASTM A-484
5 to 60	3/16" to 2.1/4"	Cold Drawn + Ground + polished	h11, ASTM A-484

### Supply Conditions

- Annealed / Solution Annealed • Pickled • Hardened & Tempered • Centerless Ground • Smooth Turned Centerless Ground and Polished • Cold Drawn • Buffed (Mirror Polished) • Forged & Machined • Belt polished as per customer requirement.



### Angles Bars

Width (mm)	Thickness (mm)	Width (inch)	Thickness (inch)
19 x 19	3 to 4	3/4" x 3/4"	1/8" to 3/16"
20 x 20	3 to 4	-	-
25 x 25	3 to 6	1" x 1"	1/8" to 3/16"
30 x 30	3 to 6	-	-
32 x 32	3 to 6	1-1/4" x 1-1/4"	1/8" to 1/4"
35 x 35	3 to 5	-	-
38 x 38	3 to 6	1-1/2" x 1-1/2"	1/8" to 1/4"
40 x 40	3 to 6	-	-
45 x 45	3 to 5	-	-
50 x 50	3 to 6	2" x 2"	1/8" to 1/4"
60 x 60	5 to 6	2-1/4" x 2-1/4"	3/16" to 1/4"
65 x 65	5 to 10	2-1/2" x 2-1/2"	3/16" to 5/8"
70 x 70	7 to 10	2-3/4" x 2-3/4"	1/4" to 3/8"
75 x 75	6 to 10	3" x 3"	1/4" to 3/8"
80 x 80	6 to 10	3-1/4" x 3-1/4"	1/4" to 3/8"
100 x 100	6 to 10	4" x 4"	1/4" to 3/8"

### Flats Bars

Width (mm)	Thickness (mm)	Width (inch)	Thickness (inch)
20	5 to 10	3/4"	3/16" to 3/8"
25	3 to 12	1"	1/8" to 1/2"
30	3 to 10	1-1/4"	1/8" to 3/8"
32	3 to 16	1-1/2"	1/8" to 1"
40	3 to 25	2"	1/8" to 1-1/4"
50	3 to 32	2-1/2"	3/16" to 1-1/4"
65	6 to 32	3"	3/16" to 1-1/4"
75	7 to 32	3-1/2"	3/16" to 1-1/4"
90	7 to 32	4"	3/16" to 1-1/4"
100	7 to 32		

### Supply Conditions

- Hot Rolled Straightened & Pickled
- Hot Rolled Straightened, Solution Annealed & Pickled (HRAP), Shot Blasting Finish
- Hot Rolled, Straightened, Pickled & Ground
- Cold Drawn Flat Bars

We are pleased to introduce ourselves as one of the leading manufacturers of Stainless Steel & High Tensile Hot Forged Fasteners

RMIPL is well equipped with manufacturing testing facilities with qualified staff. Through the dedicated efforts of our team members and our commitment to excellence we have carved a niche for itself in national and international markets. We export our products to more than 50 countries across the world like Middle east, Europe, South asia, South Africa, Canada, USA, Latin America, South Korea etc. The Company has strong foothold in the Domestic/International market with an established network.

## Socket Head Cap Screws



- Diameter- M16 to M 48. Length from 60 to 500 mm.
- Surface finish , Phosphate coated , Plated ( Zinc / White ) or Xylan coated as per requirement , Buffing & Electro polishing
- Head and Socket forged, Elliptical fillet radius, Better grain flow makes product more stronger.
- Uniform Contour, Perfect root radius runout, imparts high fatigue strength.
- Dimensions, Threads conform to national / international standards or as per customer specification.
- Material of construction and Mechanical properties strictly conform to respective standards.
- Surface finish generally supplied in black oxide coated other types are on specific requirement.
- Product range Includes low head cap screws as per DIN standards.
- Products generally available in 12:9 grade. Other grade can be supplied against specific request.

## Hexagonal Head Bolts Screws



- Diameter- M16 to M 64 and length up to 750 mm.
- Forged head, Uniform fillet radius, Better grain flow makes product more stronger.
- Rolled threads, Uniform Contour, Perfect root radius runout, imparts high fatigue strength.
- Dimensions, Threads conform to national / international standards or as per customer specification.
- Material of construction and Mechanical properties strictly conform to respective standards.
- Surface finish : Phosphate coated, Plated (Zinc / White) or Xylan coated as per requirement.

## Hex. Nuts And Special Nuts



- Product range covers Standard Hex nuts, Square nuts, etc.
- Dimensions, Threads conforms to national / international standards or as per customer specification. Material of construction and Mechanical properties strictly conforms to respective standards.

## Full Threaded & Double Ended Studs



- Dimensions-As per national / international standard such as ASTM A 193 or ASTM 320 etc. with Standard threads or Special threads.
- Studs as per customer specifications.
- Diameter- Up to 64 mm. Length up to 3 meters.
- Supplied with Suitable grade Nuts and Washers.

## Special Fasteners



- T head bolt, Bi hexagonal head bolts, Square head bolts, Collar bolts etc.
- Manufactured in Alloy steels, Stainless steels, Heat resistant steels or as per customer requirement.

## Fasteners for Marine Fenders



## High Tensile Fasteners

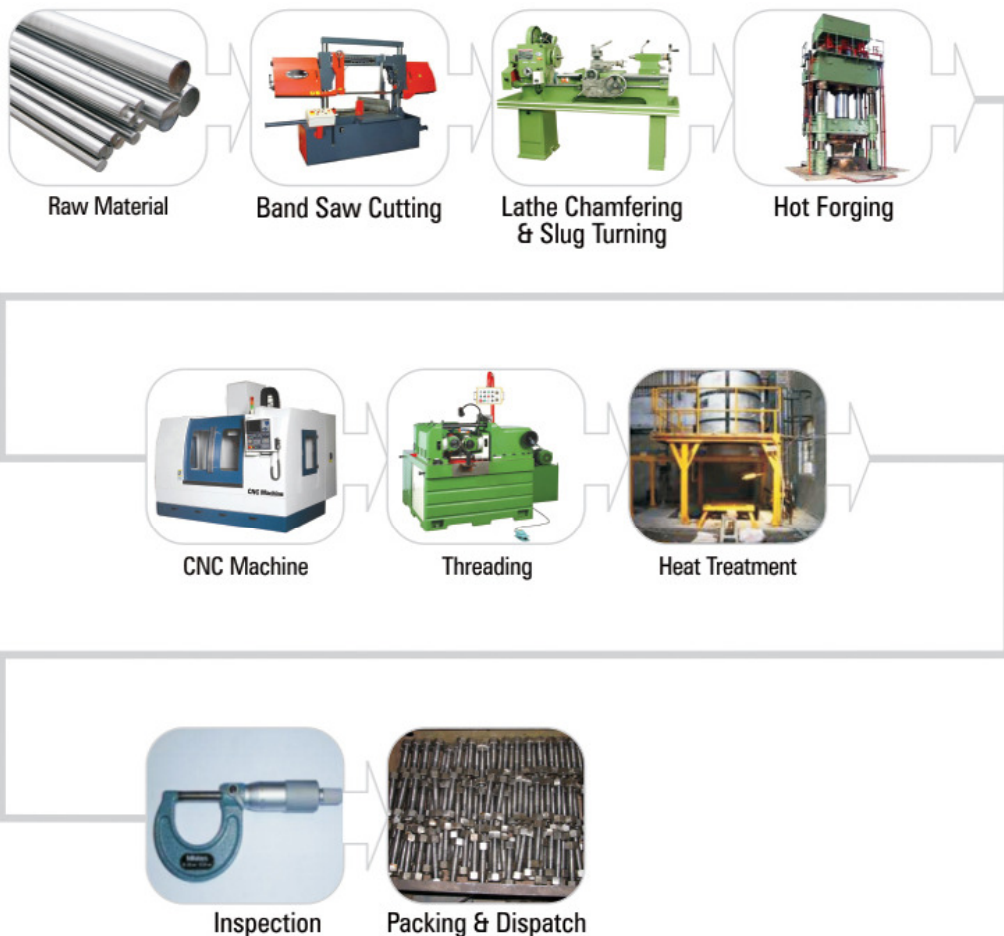


## Approval List in Government Organization

- IBR (INDIAN BOILER REGULATION) • BHEL • CENTRAL RAILWAY • NPCIL • WESTERN RAILWAY
- WEST CENTRAL RAILWAY • VFJ • RASHTRIYA ISPAT NIGAM LIMITED • KOCHIN SHIPYARD • ADANI POWER etc.



## Manufacturing Process



## Application

- Heavy Engineering Industries
- Earth Moving Equipment Manufacturers
- Indian Railways
- Locomotive Manufacturers
- Petro-Chemical Industries
- Fertilizers Plants
- Power Generation units, Nuclear, Hydro, or thermal
- Ship Building Industries
- Steel Plants
- Civil Construction Industries
- Mining Industries
- Elevators Manufacturers
- Oil Exploration Project
- Defence Organizations
- Pre Engineered Buildings and other application.

## Fasteners Product Range And Quick Selection Guide

PRODUCT	SIZE RANGE				PROPERTY CLASS		EQUIVALENT STANDARDS				
	DIAMETER METRIC	DIAMETER INCH	LENGTH METRIC	LENGTH INCH	METRIC	INCH	IS	ISO	DIN	BS	ANSI / ASME
High Tensile Hex Head Screws / Bolts	M16 to M64	5/8" to 2.1/2"	25 mm to 750 mm	1" to 30"	8.8, 10.9, Also in 9.8 & 12.9, 14.9, B7,B16 etc	Grade R,S,V,X & Gr 5 , Gr 8	1364	4014 4017	931 933	BS 1768	B18.2.1 / B18.2.1M ASTM 193 / 307
High Tensile Hex Nuts	M16 to M64	5/8" to 2.1/2"			Gr 8, Gr 10, Gr 12, Gr 2H, Gr 4 etc	Gr 5, Gr 8, Gr R	1364	4032	934	BS 1768	B18.2.4.1M / B18.2.2 ASTM 194
Stainless Steel SS-304 Hex Head Screws/Bolts	M16 to M64	5/8" to 2.1/2"	25 mm to 750 mm	1" to 30"	A2 - 50,70,80, B8	Equivalent to A2 - 50,70,80	1364	4014 4017	931 933	BS 1768	B18.2.1 / B18.2.1M ASTM 193 / 307
Stainless Steel SS-316 Hex Head Screws/Bolts	M16 to M64	5/8" to 2.1/2"	25 mm to 750 mm	1" to 30"	A4 - 50,70 80, B8M C11 / C12	Equivalent to A4 - 50, 70, 80	1364	4014 4017	931 933	BS 1768	B18.2.1 / B18.2.1M ASTM 193 / 307
Stainless Steel Hex Nuts in SS-304 and SS-316	M16 to M64	5/8" to 2.1/2"			A2-50,70, 80 , B8 A4 -50,70,80, B8M	Equivalent Property Class	1364	4032	934	BS 1768	B18.2.4.1M / B18.2.2 ASTM 194
High Tensile and Stainless Steel Socket Head Cap Screws	M16 to M52	5/8" to 2"	25 mm to 700 mm	1" to 24"	8.8,10.9, 12.9, A2-50, 70, 80, A4-50, 70, 80	Equivalent Property Class	2269	4762	912	BS 4168 (Metric), BS 2470 (Inch)	B18.3.1M / B18.3
High Tensile and Stainless Steel Fully Threaded Studs	M16 to M100	5/8" to 4"	1 Meter, 2 Meter, 3 Meter	3 Feet, 6 Feet, 9 Feet	8.8, 10.9 , A2-70, A4-70	Equivalent Property Class		7412	975 / 976		B16.5.1
High Tensile and Stainless Steel Double Ended Studs	M16 to M64	5/8" to 2.1/2"	25 mm to 750 mm	1" to 30"	8.8, 10.9 , A2-70, A4-70	Equivalent Property Class	1862		939 / 835 940		
High Strength Structural Bolts, Nuts and Washers	M16 to M36	1/2" to 1.1/2"	40 mm to 300 mm	1.1/2" to 12"	8.8 S, 10.9 S Or Equivalent	Equivalent Property Class	3757, 6623, 6649		6913, 6914, 6915	BS 4395	ASTM 325,A563,F436/ ASTM A 450, ASTM 307
Stud Bolts with 2 Heavy Hex Nuts	M16 to M100	5/8" to 4"	25 mm to 3000 mm	1" to 120"	As per Std eg. B7/B8/ B8M C11/C12 /B16 etc						A 193 /A 320 / A 194 /A 307

Special Products As per Customer Drawings / Samples and Specifications

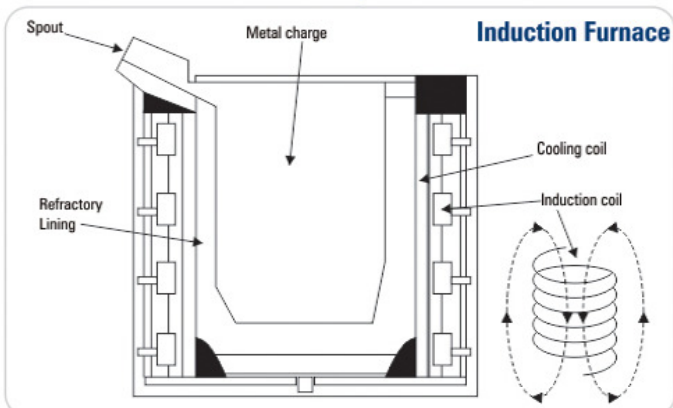
Above details are indicative & are subject to change without notice.



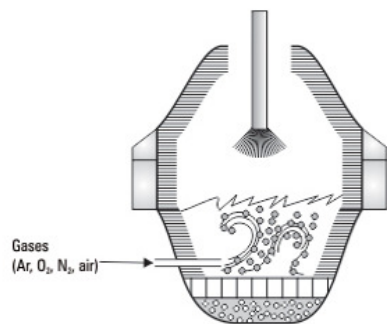
### Manufacturing Process

The companies state of the art manufacturing plant is equipped with in-house Melting Shop, Rolling Mills, Bright bar unit, Fastener unit, Heat treatment facility & fully equipped laboratory for testing physical, mechanical & chemical properties. We produce steels as per specific requirements and roll it in to the required shapes with close dimensions to reduce the wastage and thus make products available at competitive rates.

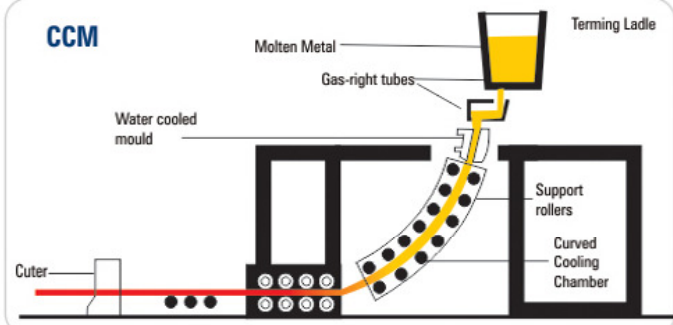
#### Steel Melting Process



#### AOD

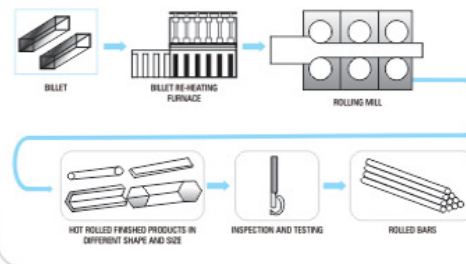


#### CCM

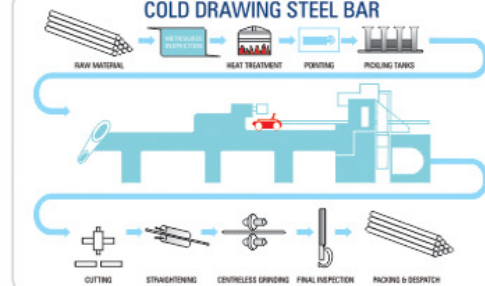


### Manufacturing Process

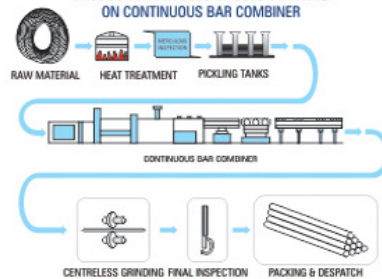
#### ROLLING MILL PROCESS



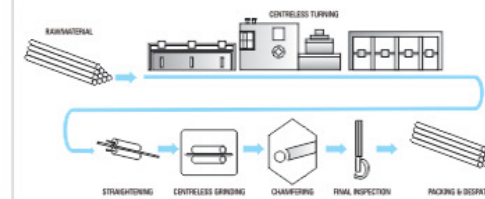
#### COLD DRAWING STEEL BAR



#### PRODUCTION PROCESS OF COLD DRAWING ON CONTINUOUS BAR COMBINER



#### TURNING & GRINDING OF STEEL BAR



### Testing Facilities



- Spectroscope
- Hardness Tester
- Universal Tensile Testing Machine
- Impact Testing Machine
- Microscope for Grain Testing
- Salt Spray Testing
- Ultrasonic Testing
- Extensometer
- Profile Projector to verify thread form
- Inter granular Corrosion Testing
- Magnetic Particle inspection
- Liquid Penetration Test
- Jominy Hardenability Test
- Torque Testing
- Positive Material Identification
- Surface Roughness Tester
- Wet Analysis Laboratory

### Packaging

Bars are packed in 500 - 1000 kgs bundles & then wrapped with HDPE cloth & metal strapped at four places. Identification labels are tagged according to standard specification and bars are colour coded at both ends.







**Application**

- Fasteners
- Automobiles
- Machine Components
- Pumps
- Surgical and Medical Equipments
- Valves
- Architectural Articles
- Couplings
- Connectors

**We can Meet the Requirement for Following Standards :**

- For Mechanical & Chemical requirements :**
- ASTM A-276, ASTM A-479, ASTM A-582, ASTM A-240, ASTM A-313, ASTM A-29, ASTM A-193.
  - DIN EN-10088-3, DIN EN-10272, AD200W2/W10, PED-97/23/EC ETC.
- FOR DIMENSIONS :**
- EN-10278, ASTM A-484, DIN-1028, DIN-10056, DIN-10058, DIN10059, DIN-10060, DIN-10061 ETC.

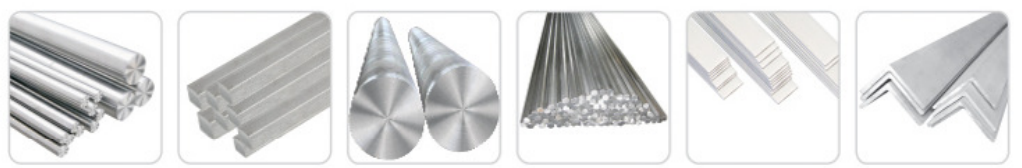
**Mechanical Properties**

CARBIDE SOLUTION TREATED & STAIN HARDENED BARS														
GRADE	%C	%Mn	%Si	%P	%S	%Ni	%Cr	Size (in.)	TENSILE STRENGTH (MPA)	0.2% YIELD STRENGTH (MPA)	% ELO	% RA	HARDNESS BHN	
B8 / 304 CLASS II	0.08	2	1	0.045	0.03	8.00-10.5	18.00-20.00	BELOW 3/4" OVER 3/4" TO 1" 1" TO 1 1/4" 1 1/4" TO 1 1/2"	860 795 725 690	690 550 450 345	12 15 20 28	35 35 35 45	321 321 321 321	
B8M / 316 CLASS II	0.08	2	1	0.045	0.03	10.00-14.00 %Mo=2.00-3.00	16.00-18.00	BELOW 3/4" 3/4" TO 1" 1" TO 1 1/4" 1 1/4" TO 1 1/2"	760 690 655 620	665 550 450 354	15 20 25 30	45 45 45 45	321 321 321 321	
(CARBIDE SOLUTION TREATED)									SIZE (in.)	TENSILE STRENGTH (MPA)	0.2% YIELD STRENGTH (MPA)	% ELO	% RA	HARDNESS BHN
B8 / 304 & B8M / 316 CLASS I									ALL SIZE LESS THAN M20	515	205	30	50	223
A2 - 70									BETWEEN M20 - M30	700	450	0.4D		
A4 - 70									LESS THAN M20	500	250	0.4D		
A4 - 80									LESS THAN M20	800	600	0.3D		

QUENCHED & TEMPERED ALLOY STEEL (Fasteners Application)													
GRADE	%C	%Mn	%Si	%P	%S	%Cr	%Mo	Size (in.)	TENSILE STRENGTH (MPA)	0.2% YIELD STRENGTH (MPA)	% ELO	% RA	HARDNESS BHN
B7	0.37-0.49	0.65-1.1	0.15-0.35	0.035	0.04	0.75-1.20	0.15-0.25	UPTO 2 1/2"	860	720	16	50	321
A193								OVER 2 1/2" TO 4"	795	655	16	50	302
B16	0.36-0.47	0.45-0.07	0.15-0.35	0.035	0.04	0.80-1.15	0.50-0.65	UPTO 2 1/2"	860	725	18	50	321
A193								UPTO 2 1/2"	860	725	18	50	321
%AL=0.015 MIN													
L7	%V=0.25-0.35	0.75-1	0.15-0.35	0.035	0.04	0.80-1.10	0.15-0.25	UPTO 2 1/2"	860	720	16	50	321
A320	0.38-0.48	0.75-1	0.15-0.35	0.035	0.04	0.80-1.10	0.15-0.25	UPTO 2 1/2"	860	720	16	50	321

IMPACT PROPERTIES: AVERAGE OF THE = 27J MIN; ONE SPECIMEN=20J MIN; TEST TEMP = 101 °C

QUENCHED & TEMPERED STAINLESS STEEL (Martensitic)													
GRADE	%C	%Si	%Mn	%P	%S	%Ni	%Cr	Size (in.)	TENSILE	0.2% YIELD	% ELO	% RA	HARDNESS BHN
A101	0.15	1.00	1.00	0.04	0.03		11.50-13.50	16-130					
416	0.15	1.00	1.25	0.06	0.15MIN		12.00-14.00	16-130					
420	0.15	1.00	1.00	0.04	0.03		12.00-14.00	16-130					
420 B	0.26-0.35	1.00	1.50	0.04	0.03		12.00-14.00	16-130	As per Customer requirement				
420 C	0.43-0.50	1.00	1.00	0.04	0.03		12.50-14.00	16-130					
431	0.20	1.00	1.00	0.04	0.03	1.25-2.50	15.00-17.00	16-130					



**Chemical Composition**

CHEMICAL COMPOSITION FOR STAINLESS STEEL & APPLICATION OF VARIOUS STEEL													
STAINLESS STEEL (AUSTENITIC)													
GRADE	DIN	%C	%Si	%Mn	%P	%S	%Ni	%Cr	%Cu	OTHERS	COMPARISON B.S	JIS	APPLICATION
201		0.15	1.00	7.00-9.00	0.10	0.03	0.40-1.00	14.00-16.00	1.50-2.50		SUS 201	SUS 201	Furniture & decorative items, baskets & architectural products
202		0.15	1.00	7.50-10.00	0.06	0.03	4.00-6.00	17.00-19.00	1.50-2.50		SUS 202	SUS 202Cu	Shafts, Grills and Racks
204 Cu	1.4597	0.09	1.00	6.50-8.50	0.06	0.03	1.50-3.00	16.00-17.00	2.00-3.00		SUS 204Cu	SUS 303	Precision Components & Shafts
302	1.4312	0.15	1.00	2.00	0.05	0.03	8.00-10.00	17.00-19.00			302S25	SUS 302	Precision Components & Shafts
303	1.4305	0.15	1.00	2.00	0.20	0.15-0.30	8.00-10.00	17.00-19.00		MO=0.60 MAX	303S31	SUS 303	
303 Cu		0.15	1.00	2.00	0.15	0.10 MIN	6.00-10.00	17.00-19.00		Cu=2.50-4.00	303S30	SUS 304	General all purpose, Kitchen Equipments, Food production facilities
304	1.4301	0.08	1.00	2.00	0.05	0.03	8.00-10.50	18.00-20.00			304S15	SUS 304	
304 L	1.4306	0.03	1.00	2.00	0.05	0.03	8.00-12.00	18.00-20.00			304S11	SUS 304L	General all purpose, Kitchen Equipments, Food production facilities
304L HS		0.03	1.00	2.00	0.05	0.023-0.030	8.00-12.00	18.00-20.00		N=10ppm MAX		SUS 304L	
310	1.4841	0.25	1.50	2.00	0.05	0.03	19.00-22.00	24.00-26.00			310s24	SUS 310	Heat exchangers & Gas turbines
310 S	1.4845	0.06	1.50	2.00	0.05	0.03	19.00-22.00	24.00-26.00				SUS 310S	
316	1.4401	0.08	1.00	2.00	0.05	0.03	10.0-14.0	16.00-18.00		Mo=2.00-3.00	316S16	SUS 316	Anticorrosion parts, valves & components in petro chemical & dying industry
316 L	1.4404	0.03	1.00	2.00	0.05	0.03	10.00-14.00	16.00-18.00		Mo=2.00-3.00 & N=10ppm MAX	316S11	SUS 316L	
316L HS		0.03	1.00	2.00	0.05	0.023-0.030	10.00-14.00	16.00-18.00		Mo=2.00-3.00 & N=10ppm MAX		SUS 316L	
316 Ti	1.4571	0.08	1.00	2.00	0.05	0.03	10.00-14.00	16.00-18.00		Mo=2.00-3.00 & N=10ppm MAX	320S31	SUS 316Ti	Anti corrosion parts, Car Mufflers
321	1.4541	0.06	1.00	2.00	0.05	0.03	9.00-12.00	17.00-19.00		Ti=5x(C+N) min to 0.70	321S31	SUS 321	Aircraft Engine, Vent pipes, Heat exchangers
321 H		0.04-0.1	1.00	2.00	0.05	0.03	9.00-12.00	17.00-19.00		Ti=5x(C+N) min to 0.70		SUS 321	Aircraft Engine, Vent pipes, Heat exchangers
630 / 174PH	1.4542	0.07	1.00	1.00	0.04	0.03	3.00-5.00	15.00-17.50				SUS 321	

STAINLESS STEEL (FERRITIC)													
GRADE	DIN	%C	%Si	%Mn	%P	%S	%Ni	%Cr	%Cu	OTHERS	COMPARISON B.S	JIS	APPLICATION
430	1.4016	0.12	1.00	1.00	0.04	0.03	0.50	16.00-18.00			430S15	SUS 430	Kitchen Equipment, material for construction
430F		0.12	1.00	1.25	0.06	0.15MIN		16.00-18.00				SUS 430F	Components, Nozzles for Fuel Injection
430F	1.4104	0.10-0.17	1.00	1.50	0.04	0.15-0.35	0.50	15.50-17.50		Mo=0.20-0.60		SUS 430F	Components, Nozzles for Fuel Injection
	1.4105	0.08	1.50	1.50	0.04	0.15-0.35		16.00-18.00		Mo=0.20-0.60		SUS 430F	

STAINLESS STEEL (MARTENSITIC)													
GRADE	DIN	%C	%Si	%Mn	%P	%S	%Ni	%Cr	%Cu	OTHERS	COMPARISON B.S	JIS	APPLICATION
A101	1.4024	0.15	1.00	1.00	0.04	0.03		11.50-13.00			420S29	SUS 403	Shafts, Shaft keys, QA Devices
410	1.4006	0.15	1.00	1.00	0.04	0.03		11.50-13.50			410S21	SUS 410	Machined components for various industry levels, various shafts
416	1.4005	0.15	1.00	1.25	0.06	0.15MIN		12.00-14.00			416S21	SUS 416	
420	1.4021	0.15	1.00	1.00	0.04	0.03		12.00-14.00			420S37	SUS 420J1	Machined components for various industry levels, various shafts
420 B	1.4028	0.26-0.35	1.00	1.50	0.04	0.03		12.00-14.00			420S45	SUS 420J2	
420 C	1.4034	0.43-0.50	1.00	1.00	0.04	0.03		12.50-14.00				SUS 420C	
431		0.20	1.00	1.00	0.04	0.03	1.25-2.50	15.00-17.00			431S29	SUS 431	Marine shafts, Aircraft parts
431	1.4057	0.12-0.22	1.00	1.50	0.04	0.03	1.50-2.50	15.00-17.00				SUS 431	

FREE CUTTING STEEL													
GRADE	STD.	%C	%Si	%Mn	%P	%S	%Ni	%Cr	%Cu	OTHERS	COMPARISON SAE	JIS	APPLICATION
EN1A	BS	0.07-0.15	0.10	0.80-1.20	0.07	0.2-0.3							High machinability, used in automatic & CNC machines in mass production of components like Engine shafts, connecting components like connecting rods, spindles
EN1A(L)	BS	0.07-0.15	0.10	0.80-1.20	0.07	0.2-0.3				Pb=0.15-0.35			
EN8M	BS	0.35-0.45	0.25	1.00-1.30	0.06	0.12-0.20							
EN15AM	BS	0.3-0.4	0.25	1.3-1.7	0.06	0.02-0.2							

ALLOY STEEL													
GRADE	STD.	%C	%Si	%Mn	%P	%S	%Ni	%Cr	%Cu	OTHERS	COMPARISON B.S	JIS	APPLICATION
16MnCr5	IS	0.14-0.19	0.15-0.40	1.00-1.30	0.04	0.04		0.8-1.1					Diverse applications in manufacture of components for automobiles like piston rods, crank shafts, axle, steering components etc.
20MnCr5	IS	0.17-0.22	0.15-0.40	1.10-1.40	0.04	0.04		1.00-1.30					
EN14B	BS	0.20-0.30	0.10-0.35	1.30-1.70	0.06	0.06	0.40						
EN15B	BS	0.35-0.40	0.05-0.35	1.10-1.30	0.06	0.06							
EN19A	BS	0.36-0.44	0.10-0.35	0.70-1.00	0.05	0.05		0.90-1.20		Mo=0.15-0.25			
EN19C	BS	0.40-0.45	0.10-0.35	0.70-1.00	0.05	0.05		0.90-1.20		Mo=0.15-0.25			
EN24	BS	0.35-0.45	0.10-0.35	0.45-0.70	0.05	0.05	1.3-1.8	0.9-1.4		Mo=0.2-0.35			
EN353	BS	0.20	0.35	0.5-1.0	0.05	0.05	1.00-1.50	0.75-1.25		Mo=0.08-0.15			
EN354	BS	0.20	0.35	0.5-1.00	0.05	0.05	1.5-2.0	0.75-1.25		Mo=0.1-0.2			
4140	SAE	0.38-0.43	0.15-0.3	0.75-1.00	0.35	0.40		0.8-1.10		Mo=0.15-0.25			
52100	SAE	0.98-1.1	0.15-0.30	0.25-0.45	0.025	0.025		1.3-1.6					