



SIAG (E)



Sheets, Plates,
Ferrous &
Non-Ferrous
Metal etc.

SHEET, PLATE & COILS



Eckhardt[®]
Steel & Alloys

Technical Guide
Version 6.0



Eckhardt[®]
Steel & Alloys

ISO 9001:2015, ISO 14001:2015,
ISO 45001:2018 & PED 2014/68/EU
Certified Manufacturing Company

One Stop Solution

About ECKHARDT

"Many factors combine to archive the success of business i.e. the right product mix, a broad knowledge of products & their application, good business relationships, logistics & financials expertise, proximity to the customer and last but not the least the appropriate range of support service. At 'Eckhardt', all these have been combined to create a new dimension."

Formed by a group of young professionals Eckhardt is one of the leading Manufacturer & Exporter of Stainless Steel, Carbon Steel, Alloy Steel, Nickel Alloys, Aluminum, Copper, Cupro Nickel, Brass, Phosphorus Bronze, Lead, Zinc, Monel[®], Inconel[®], Hastalloy[®] & other Ferrous and Non Ferrous Metals in form of :

Pipes & Tubes, Line Pipes OCTG & Drill Pipes : In Seamless and Welded in all Grades (IBR & NON IBR),

Buttwelded Pipe Fittings, Socket welded, Screwed Fittings : Such as Elbow, Return Bend, Straight and Reducing Tee, Crosses, Lap Joint Stubend, Reducers, Unions, Caps, Bush, Plug, Nipples, Couplings, Threadolets, Weldolets Elbowlets etc.

Flanges & Forging : Such WNRF, SORF, SOFF, BLRF, SWRF, LAP JOINT, WNRTJ, BLRTJ, SPECTACLE BLIND, SPADE etc.

Tube Fitting & Ferrules Fittings; Hose assembly & hydraulic Fittings

Long Radius Bends : 1/2" NB to 32" NB in 5mm to 50mm Thk RADIUS 2, 5 D / 3D / 5D / 10D UPTO 22D For Pig Launching stream & general Purpose Fittings.

Plate / Sheet / Coils / Round Bars : CromeMoly (SA387 Gr. 11/22/91/5) Nickel & Nickel Alloys / Mild Steel / Boiler Quality / Corten / Hardox / Dillidur 400v / Sailma / Ship Building with class approval etc.

Fasteners & Gaskets : Such as nuts, Bolts, studs, washers, Valves & all project reuriment at one stop etc.

We are approved suppliers to various Govt. Departments & public sector all over the country & abroad regularly supplying to them for a long time. We have got ready stock of the above items in various sizes as per National / International Standards and specification and the same shall be supplied as per your requirements at very reasonable rates. We can arrange any third party inspection agency like LRS, DNV-GL, ABS, IRS, IBR, TUV, BVQI, RINA, MECON, TCS, PDIL, GOLF, LLOYDS etc.

Quality Policy

"We at ECKHARDT STEEL & ALLOYS, Manufacturers, Exporter of Ferrous and Non Ferrous metals in the Form of Pipes, Tubes, Pipe Fittings, Flanges, Sheets, Plates & Rods are Committed to Increase our market share by satisfying Our customers Requirements through offering Products at Best Prices, on timely Delivery and Better Support. We shall Continually Improve in Knowing our customer needs and Proactively acting on things required to satisfy the same."



The quality assurance system assures every product to go through the following Quality systems.

- Material Control System
- Certification & Supplementary Test
- Process Control System
- Machining & Dimensional Control
- Finishing & Marking & Packing

As we are very much interested to do business with you on long term basis, we request you to please enlist our name in your approved vendor list and send us your valued purchase inquire from time to so as to enable us to our most competitive rates and terms.



PRODUCT RANGE



Pipes :-

Stainless Steel : ASTM A312 TP 304/ 304L/ 304H/ 316/ 316L/ 317/ 317L/ 321/310/ 347/ 904L etc.

Carbon Steel : ASTM A53 GR. B/ A106 GR. B/ API 5L GRADE B/ API 5L GR.X42/46/52/56/60/65/70/ A333 Gr.3/ Gr.6 etc.

Alloy Steel : ASTM A335 GR. P1/ P5/ P9/ P11/ P22/ P91/ P92 etc.

High Nickel Alloys : Monel[®], Nickel, Inconel[®], Hastelloy[®], Copper, Brass, Bronze, Titanium, Tantalum, Bismuth, Aluminium, High Speed Steel, Zinc, Lead etc.

Types : Round , Square, Rectangular.

Size : 1/4" NB to 32" NB (Seamless & Welded)

Wall Thickness : Sch. 5S to Sch. XXS

Size : 1/4" OD to 6"OD

Wall Thickness : 22SWG to 10SWG



Butt-Weld Fittings :-

Stainless Steel : ASTM A403 WP 304/ 304L/ 304H/316/ 316L/ 317/ 317L/ 321/ 310/ 347/904L etc.

Carbon Steel : ASTM A234 WPB/A420 WPL3/A420 WPL6/ MSS-SP-75 WPHY 42/46/52 / 56/60/65/70

Alloy Steel : ASTM A234 WP1/ WP5/ WP9/ WP11/ WP22/ WP91 / WP92 etc.

Duplex & Super Duplex Steel : UNS S31803, UNS S32750, UNS S32760, 904L, Alloy 20, 254 SMO

High Nickel Alloy : Monel[®], Nickel, Inconel[®], Hastelloy[®], Copper, Brass, Bronze, Titanium, Tantalum, Bismuth, Aluminium, High Speed Steel, Zinc, Lead, etc.

Types : Elbow, Tee, Reducer, Return Bends, Stub-Ends, Cap, Collar, Cross, Insert etc.

Size : 1/4" NB TO 32" NB. (Seamless & Welded)

Wall Thickness : Sch. 5S To Sch. XXS.



Screwed & Forged Fittings :-

Stainless Steel : ASTM A182 F304/ 304L/ 304H/ 316/ 316L/ 317/ 317L/ 321/310/ 347/ 904L etc.

Carbon Steel : ASTM A105 / A694 F42/46/ 52/56/ 60/ 65/70 / A350 LF3/ A350 LF2.

Alloy Steel : ASTM A182 F1/ F5/ F9/ F11/ F22/ F91 etc.

Others : Monel[®], Nickel, Inconel[®], Hastelloy[®], Copper, Brass, Bronze, Titanium, Tantalum, Bismuth, Aluminium, High Speed Steel, Zinc, Lead, etc.

Types : Elbow, Tee, Union, Cross, Coup, Bushing , Plug, Swage Nipple, Welding Boss, Hexagon Nipple, Barrel Nipple, Welding Nipple, Parraler Nipple, Street Elbow, Hexagon Nut, Hose Nipple, Bend, Adapter, Insert, Weldolet, Elbowlet, Sockolet, Thredolet, Nipolet, Letrolet, etc.

Size : 1/4" NB TO 4" NB. (Socketweld & Threaded)

Class : 3000#, 6000#, 9000#.

PRODUCT RANGE



Flanges :-

Stainless Steel Flanges : ASTM A182 F304/304L/304H/316/316L/317/317L/321/310/347/904L etc.

Carbon Steel Flanges: ASTM A105/A694F42/46/52/56/60/65/70/A350 LF3/A350 LF2, etc.

Alloy Steel Flanges : ASTM A182 F1/F5/F9/F11/F22/F91 etc.

Duplex Steel Flanges : 2205 (Duplex[®]), 2507 (Super Duplex) UNS - 31803, 32750, 32990

Others: Monel[®], Nickel, Inconel[®], Hastelloy[®], Copper, Brass, Bronze, Titanium, Tantalum, Bismuth, Aluminium, High Speed Steel, Zinc, Lead, etc.

Types : Weldneck, Slipon, Blind, Socket Weld, Lap Joint, Spectacles, Ring Joint, Oriface, Long Weldneck, Deck Flange, etc.

Size : 1/2" NB TO 48" NB.

Class : 150#, 300#, 400#, 600#, 900#, 1500# & 2500#. also as per National & International Standard.

Flanges such as SORF, SOFF, SOLI SWRF, SWFF, WNRF, WNFF, WNRTJ, LWNRF, BLRF, BLFF, BLRTJ, Treaded, Spectacle Blind, Orifice & Studding Outlet are manufactured according to ANSI B 16.5, B 16.47 Series A (MSS SP-44), B 16.47 Series B (API 605), MSS SP-43, DIN 2527, DIN 2566, DIN 2576, DIN 2632, DIN 2633, DIN 2634, DIN 2635, DIN 2642, BS 10, IS 1538 & IS 6392, etc.



Sheet, Plates & Coils

S. S. Sheets & Plates as per ASTM A240, Gr. TP 304, 304L, 304LN, 309, 309S, 309H, 310H, 316, 316L, 316H, 316LN, 316Ti, 317, 317L, 321, 321H, 347, 348, 3487H, 409, 410, 416, 420, 430 etc.

Alloy Steel Plates : as per ASTM A387 Gr.2, 5, 9, 11, 12 & 22, 91 in class 1 & 2 ASTM A 204 Gr. A & B, DIN 17175 Gr. 15Mo3 & 16Mo3 with IBR Test Certificate.

Carbon Steel / Boiler Quality Plates : as per IS 2062 Gr. A, B & C, IS 2002 Gr. 1 & 2 ASTM A516 Gr. 60 & 70, ASTM A 515 Gr. 70, A572 Gr. 50 etc.



Rods / Bars & Wires

Material Grade : Stainless Steel, Nickel Alloys, Carbon Steel, Alloy Steel, IBR Non IBR.

High Nickel Alloy : Monel[®], Nickel, Inconel[®], Hastelloy[®], Copper, Brass, Bronze, Titanium, Tantalum, Bismuth, Aluminium, High Speed Steel, Zinc, Lead, etc.

Types : Rods, Hex, Square, Wires, Billets, etc.

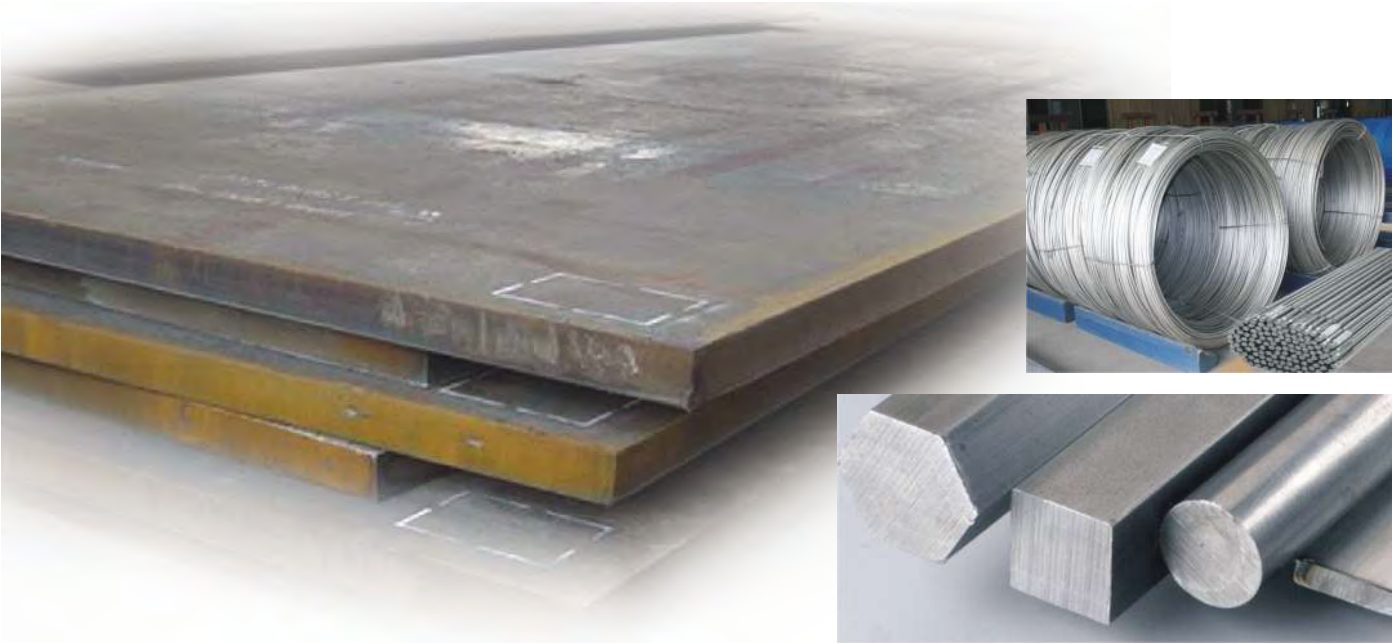


Ship Building Plates

LRS/ABS/DNV GL/IRS/RINA/BV Class Approved Marine Grade Plates / Bulb Flats / Angle / Channel / Pipes etc.

Ship Building Copper / Cupro Nickel (CuNi) / Brass/ Bronze/ Admiralty brass Products in form of Pipe, Fittings, Flanges, Sheet, Plates, Ship Shafts, Propellor & Other marine equipments etc widely used in marine industries.

SHEET, PLATE & COILS, RODS, BARS, WIRE



SHEET, PLATE & COILS

S.S. Sheets & Plates as per ASTM A240, Gr. TP 304, 304L, 304LN, 309, 309S, 309H, 310H, 316, 316L, 316H, 316LN, 316Ti, 317, 317L, 321, 321H, 347, 348, 348H, 409, 410, 420, 430 etc.

Alloy Steel Plates : as per ASTM A387 Gr. 2, 5, 9, 11, 12 & 22 in class 1 & 2 ASTM A204, Gr. A & B, DIN 17175 Gr. 15Mo3 & 16Mo3 with IBR Test Certificate.

Carbon Steel / Boiler Quality Plates : as per IS 2062, Gr. A, B & C, IS 2002 Gr. 1 & 2 ASTM A516 Gr. 60 & 70, ASTM A515 Gr. 70, Ship Building Grade ABS / LR / DNVGL/ IRS / R1n4, Gr. A, B, D, E, AH / EH / DH / FH / 32, 36, 40.

RODS / BARS & WIRES

Material Grade : Stainless Steel, Nickel Alloys, Carbon Steel, Alloy Steel, IBR & Non IBR.

High Nickel Alloy : Monel[®], Nickel, Inconel[®], Hastelloy[®], Copper, Brass, Bronze, Titanium, Tantalum, Bismuth, Aluminium, High Speed Steel, Zinc, Lead etc.

Types : Rods, Hex, Square, Wires, Billets, etc.

SHEET, PLATE & COILS

ISO 9001:2015, ISO 14001:2015, ISO 45001:2018
 & PED 2014/68/EU Certified Manufacturing Company

STAINLESS STEEL PLATES CHEMICAL COMPOSITIONS (%)

Type	C*	Mn*	P*	S*	Si*	Cr	Ni	Others
304	0.08	2.00	0.045	0.030	0.75	18.0-20.0	8.0-10.5	N0.25
304L	0.03	2.00	0.045	0.030	0.75	18.0-20.0	8.0-12.0	N0.25
309S	0.08	2.00	0.045	0.030	0.75	22.0-24.0	12.0-15.0	
310S	0.08	2.00	0.045	0.030	1.50	24.0-26.0	19.0-22.0	
314	0.15	1.5	0.045	0.030	1.5-2.5	23-27	19-23	
316	0.08	2.00	0.045	0.030	0.75	16.0-18.0	10.0-14.0	Mo 2.0-3.0, N0.10
316L	0.03	2.00	0.045	0.030	0.75	16.0-18.0	10.0-14.0	Mo 2.0-3.0, -0.10
316Ti	0.08	2.00	0.045	0.030	0.75	16.0-18.0	10.0-14.0	N0.10Ti5(C+N)Min0.70Max
317L	0.03	2.00	0.045	0.030	0.75	18.0-20.0	11.0-15.0	Mo 3.0-4.0, N0.10
321	0.08	2.00	0.045	0.030	0.75	17.0-19.0	9.0-12.0	Ti5 (C+N)Min, 0.70 Max
330	0.08	2.00	0.030	0.030	0.75-1.5	17.0-20.0	34.0-37.0	GUI
347	0.08	2.00	0.045	0.030	0.75	17.0-19.0	9.0-13.0	Cb 10XC Min, 1.0 Max
409	0.03	1.00	0.030	0.040	1.00	10.5-11.75	0.5Max	Ti 6(C) Min-0.75 Max
410	0.15	1.00	0.030	0.030	1.00	11.5-13.5	0.75	
420	0.15Min	1.00	0.030	0.040	1.00	12.0-14.0		
430	0.12	1.00	0.030	0.040	1.00	16.0-18.0		
431	0.2	1.00	0.04	0.030	1.00	15.0-17.0	12.5-2.50	EN 57
440C	0.95-1.0	1.00	0.04	0.03	1.00	16.0-18.0		
446	0.2	1.5	0.04	0.03	1.00	23.0-27.0	0.60Max	
17-4PH	0.07	1.0	0.04	0.03	1.0	15-17.50	3.0-5.0	CU 3.0-5.0
904L	0.02	2.00	0.030	0.045	1.00	19.0-23.0	23.0-28.0	Mo 4.0-5.0, CUL,0-2.0*= Max

Mechanical Properties of wrought Stainless Steel (All properties minimum specified as per code)

Type	UNS Designation	Condition	Tensile Strength Mpa	0.2% Proof Strength Map	Elongation % in 50mm	Hardness Brinell	ASTM Specification
301	S30100	Annealed	515	205	40	201	A167
302	S30200	Annealed	515	205	40	201	A167
304	S30400	Annealed	515	205	40	201	A240
304L	S30403	Annealed	485	170	40	202	A240
309S	S30908	Annealed	515	205	40	217	A167
310S	S31008	Annealed	515	205	40	217	A167
316	S31600	Annealed	515	205	40	217	A240
316L	S31603	Annealed	485	205	40	217	A240
316Ti	S31635	Annealed	515	205	30	217	A167
317L	S31703	Annealed	515	205	40	217	A240
321	S32100	Annealed	515	205	40	217	A240
300	N08330	Annealed	480	210	30	75	B536
347	S34700	Annealed	515	205	40	201	A240
409	S40900	Annealed	380	205	22	179	A176
410	S41000	Annealed	450	205	20	217	A176
420	S42000	Annealed	860*	-	-	-	A580
430	S43000	Annealed	450	205	22	183	A176
431	S43100	Annealed	965*	-	-	-	A580
440C	S44004	Annealed	760	450	14	223	A276
446	S44600	Annealed	515	275	20	217	A176
17-4PH	S17400	H1025	1070	1000	12	331	-
904L	-	Annealed	490	220	35	90	-

DUPLEX & SUPER DUPLEX STEEL
DUPLEX & SUPER DUPLEX STEEL PLATES - CHEMICAL COMPOSITION

UNS Designation ^b	Type ^c	Carbon ^d	Manganese	Phosphorus	Sulphur	Silicon	Chromium	Nickel	Molybdenum	Nitrogen	Copper	Other Elements ^{ef}
S31200	...	0.030	2.00	0.045	0.030	1.00	24.0-26.0	5.5-6.5	1.20-2.00	0.14-0.20	...	...
S31260	...	0.030	1.00	0.030	0.030	0.75	24.0-26.0	5.5-7.5	2.5-3.50	0.10-0.300	0.20-0.80	W 0.10-0.50
S31803	...	0.030	2.00	0.030	0.020	1.00	21.0-23.0	4.5-6.5	2.5-3.5	0.08-0.20	...	...
S32001	...	0.030	4.0-6.0	0.040	0.030	1.00	19.5-21.5	1.00-3.00	0.60	0.05-00.17	1.00	...
S32205	2205 ^e	0.030	2.00	0.030	0.020	1.00	22.0-23.0	4.5-6.5	3.0-3.5	0.14-0.20	...	...
S32304	2304 ^e	0.030	2.50	0.040	0.030	1.00	21.5-24.5	3.0-5.5	0.05-0.60	0.05-0.60	0.05-0.60	...
S32520	...	0.030	1.50	0.035	0.020	0.80	24.0-26.0	5.5-8.0	3.0-4.0	0.20-0.35	0.50-2.00	...
S32550	255 ^e	0.040	1.50	0.040	0.030	1.00	24.0-27.0	4.5-6.5	2.9-3.9	0.10-0.25	1.50-2.50	...
S32750	2507 ^e	0.030	1.20	0.035	0.020	0.80	24.0-26.0	6.0-8.0	3.0-5.0	0.24-0.32	0.50	...
S32760	...	0.030	1.00	0.030	0.010	1.00	24.0-26.0	6.0-8.0	3.0-4.0	0.20-0.30	0.50-1.00	W 0.50-1.00
S32900	329	0.080	1.00	0.040	0.030	0.75	23.0-28.0	2.0-5.00	1.00-2.00	...	...	...
S32950	...	0.030	2.00	0.035	0.010	0.060	26.0-29.0	3.5-5.2	1.00-2.50	0.15-0.35	...	...

MECHANICAL TEST REQUIREMENTS

UNS Designation ^b	Type ^a	Tensile Strength, min		Yield Strength, min		Elongation in 2 in. or 50mm, min, %	Hardness, max ^c		Cold Bend ^{oo}
		Ksi	MPa	Ksi	MPa		Brinell	Rockwell B	
S31200	...	100	690	65	450	25.0	293	31 ^j	not required
S31260	...	100	690	70	485	20.0	290	...	...
S31803	...	90	620	65	450	25.0	293	31 ^j	not required
S32001	...	90	620	65	450	25.0	...	25 ^e	not required
S32205	2205 ^f	90	620	65	450	25.0	293	31 ^j	not required
S32304	2304 ^f	87	600	58	400	25.0	290	32J	not required
S32520	...	112	760	80	550	25.0	310	...	not required
S32550	255 ^f	110	760	80	550	15.0	302	32	not required
S32750	2507 ^f	116	795	80	550	15.0	310	32J	not required
S32760	...	108	750	80	550	25.0	270	...	not required
S32900	329	90	620	70	485	15.0	269	28	not required
S32950 ^M	...	100	690	70	485	15.0	293	32	not required



EXOTIC GRADES / NICKEL ALLOYS PIPES / PLATES / ROUNDS / FORGINGS & FITTINGS

Exotic Grades

Table with columns: Exotic, UNS No., W.NR, C(Max), Mn(Max), S(Max), S(Max), Cr, Ni, Mo, Cu, Fe, Ti, Al, Other. Lists various alloy grades and their chemical compositions.

Age Hardening Martensitic Steels

Table with columns: Common Grade, UNS, C, Mn, P, S, Si, Cr, Ni, Mo, N, Other. Lists martensitic steel grades and their chemical compositions.

CARBON STEEL: CHEMICAL COMPOSITION OF STANDARD GRADES

Grades	% Chemical Composition									Deoxidation
	C	Mn	Si	S	P	Al	Cu	Nb+V+Ti	Ce	
IS 1079 Gr O	0.15 max	0.60 max	-	0.055 max	0.055 max	-	-	-	-	Semi Killed / Killed
IS 1079 Gr D	0.12 max	0.50 max	-	0.040 max	0.040 max	-	-	-	-	Semi Killed / Killed
IS 1079 Gr DD	0.10 max	0.40 max	-	0.035 max	0.035 max	0.02 min	-	-	-	Al Killed
IS 1079 Gr EDD	0.08 max	0.40 max	-	0.030 max	0.030 max	0.02 min	-	-	-	Al Killed
IS 2062 E 250 A	0.23 max	1.50 max	0.40 max	0.045 max	0.045 max	-	-	0.25	0.25	Semi Killed / Killed
IS 2062 E 250 B	0.22 max	1.50 max	0.40 max	0.045 max	0.045 max	-	-	0.25 max	0.41 max	Killed
IS 2062 E250 C	0.20 max	1.50 max	0.04 max	0.040 max	0.040 max	-	0.20-0.35	0.25 max	-	Killed
IS 2062 E 250 Cu C	0.20 max	1.60 max	0.45 max	0.045 max	0.045 max	-	-	0.25 max	0.44 max	Killed
IS 2062 E410	0.20 max	1.60 max	0.45 max	0.045 max	0.045 max	-	-	0.25 max	0.44 max	Killed
IS 2060 E450 D	0.22 max	1.60 max	0.45 max	0.045 max	0.045 max	-	-	0.25 max	0.45 max	Killed
IS 2062 E450 E	0.22 max	1.80 max	0.45 max	0.045 max	0.045 max	-	-	0.25 max	0.48 max	Killed
IS 5986 Fe 410	0.20 max	1.20 max	- max	0.040 max	0.040 max	-	-	-	0.42 max	Killed
IS 10748 Gr 1	0.10 max	0.50 max	- max	0.040 max	0.040 max	-	-	-	-	Killed

CARBON STEEL : MECHANICAL PROPERTIES OF STANDARD GRADES

Grades	YS N/mm ²	UTS N/mm ²	% El (Min) GL= 5.65√So	Bend Test (t)	Hard R _B	Charpy V-Notch Impact Energy (min)
IS 1079 Gr O	-	-	-	2 t	-	-
IS 1079 Gr D	-	240 - 400	25	1 t	-	-
IS 1079 Gr DD	-	260 - 390	28	Close	-	-
IS 1079 Gr EDD	-	260 - 380	32	Close	-	-
IS 2062 E250 A	250 min	410 min	23	3 t	-	-
IS 2062 E250 B	250 min	410 min	23	2 t	-	27 J at Room temp See Note
IS 2062 E250 C	250 min	410 min	23	2 t	-	27 J at Roomtemp See Note
IS 2062E250Cu C	250 min	410 min	23	2 t	-	27 J at Roomtemp See Note
IS 2062 E410	410 min	540 min	23	2 t	-	50 J at Roomtemp See Note
IS 2062 E450 D	450 min	570 min	20	2 t	-	45 J at Room temp See Note.
IS 2062 E450 E	450 min	590 min	20	2 t	-	45 J at Room temp See Note
IS 5986 Fe410	255 min	410-520	24 for t>3/0 mm*	2 t	-	

't' = Nominal thickness of test piece , * : Elongation 15 min N in 80mm GL for t ≤ 3.0 mm

Note : For grade IS 2062 E250B, E250C, E410, E450E Impact Test shall be certified for product thickness of 12mm or more. The testing temperature will be room temperature unless otherwise specified in the order.

* Although every care has been taken during the production of this brochure, we regret that we cannot accept any liability in respect of any incorrect information it may contain or any damages which may arise through the misinterpretation of its contents

ALLOY STEEL PLATES

ASTM A387 PRESSURE VESSEL PLATES, ALLOY STEEL, CHROMIUM - MOLYBDENUM												
CHEMICAL COMPOSITION									MECHANICAL PROPERTIES			
Specification	C% max	Si%	Mn%	P% max	S% max	Cr%	Mo%	V%	Tensile Strength Ksi (MPa)	Yield Strength (0.2% offset) Ksi (MPa) min	Elongation % min	
											GL = 8 in *2 or 200 mm	GL = 2 in. or 50 m
Grade 5 Class-2	0.15	0.50 max	0.30~0.60	0.035	0.030	4.00~6.00	0.45~0.65		75-100 (515-690)	45 (310)	-	18
Grade 9 Class-2	0.15	1.00 max	0.30~0.60	0.030	0.030	8.00~10.00	0.90~1.10	0.04 max	75-100 (515-690)	45 (310)	-	18
Grade 11 Class-2	0.05-0.17	0.50~0.80	0.40~0.65	0.035	0.035	1.00~1.50	0.45~0.65		75-100 (515-690)	43 (310)	18	22
Grade 12 Class-2	0.05-0.17	0.15~0.40	0.40~0.65	0.035	0.035	0.80~1.15	0.45~0.60		65-85 (450-585)	40 (275)	19	22
Grade 22 Class-2	0.05-0.15	0.50 max	0.30~0.60	0.035	0.035	2.00~2.50	0.90~1.10		75-100 (515-690)	45 (310)	-	18
Grade 91* Class-2	0.08-0.12	0.20-0.50	0.30-0.60	0.020	0.010	8.00-9.50	0.85-1.05	0.18-0.25	85-110 (585-760)	60 415	-	18

* Additional Properties for Grade 91) Ni - 0.40max, Cb-0.06-0.10, N - 0.030-0.070, Al - 0.02, Ti & Z : 0.01 max

ASTM A 283 LOW AND INTERMEDIATE TENSILE STRENGTH CARBON STEEL PLATES

Designation	Chemical Composition				Mechanical Properties			
	C% max	Mn% max	P% max	S% max	Tensile Strength (Mpa)	Yield Strength (MPa)	Elongation %min	
							GL=8 in	GL=2 in
Grade A	0.14	0.90	0.035	0.040	310-415	165	27	30
Grade B	0.17	0.90	0.035	0.040	345-450	185	25	28
Grade C	0.24	0.90	0.035	0.040	380-515	205	22	25
Grade D	0.27	0.90	0.035	0.040	415-550	230	20	23

Note : 1) For Silicon: Thickness 40mm and under 0.40max & for Thickness over 40mm 0.15-0.40
2) Min% when copper is specified 0.20

ASTM A 285 PRESSURE VESSEL PLATES, CARBON STEEL LOW AND INTERMEDIATE TENSILE STRENGTH

Designation	Chemical Composition				Mechanical Properties			
	C% max	Mn% max	P% max	S% max	Tensile Strength (Mpa)	Yield Strength (MPa)	Elongation %min	
							GL=8 in	GL=2 in
Grade A	0.17	0.90	0.035	0.035	310-415	165	27	30
Grade B	0.22	0.90	0.035	0.040	345-485	185	25	28
Grade C	0.28	0.90	0.035	0.040	380-515	205	22	23

BRASS

SUMMARY OF SPECIFICATIONS FOR BRASS BARS, RODS AND SECTIONS

SPECIFICATION			COMPOSITION					PROPERTIES				
Material Designation	Original	Near equivalent	Cu %	Zn	Pb.	Sn.	Fe.	Min.	Al	Other elements	U. TS. Min Kgs/mm	Elongation Min %
1. Free Cutting Brass	BS 2874 C2.124	—	60 to 63	Remainder	2.5 to 3.7	—	—	—	—	—	28	12
2. Free Cutting Brass	BS 2874 CZ121	IS.319	55 to 60	Remainder	2.0 to 3.5	—	—	—	—	—	39	15
3. Leaded Brass	Din 1756 MS 58	—	56.5-59.5	Remainder	1.0 to 3	—	—	—	—	—	39.50	9.15
4. Forging Brass	IS 3488.66	BS218/63	56.5-60	Remainder	1.0 to 2.5	—	—	—	—	—	35	25
5. Lead Free Brass	BS 2874 CZ 109	BS 1949	59 to 60	Remainder	—	—	—	—	—	—	34	26
6. High Tensile Brass Rods	BS 2874 CZ 114	BS 250	56 to 60	Remainder	—	.2-1	.25-1.2	3.2	1.5 min	—	47	18
7. High Tensile Brass Rods	BS 2874 CZ 115	BS 1001	56 to 60	Remainder	.5 to 1.5	.6-1.1	.25-1.2	3.2	2 min	—	55	12
8. High Tensile Brass Rods	IS 320/1962		56 to 59	Remainder	.5	.25-1.75	—	2.20	.2 min	.5 min	53	15
	Alloy I		56 to 59	Remainder	.5	0.5 min	—	0.5-1.2	.2-1.2	.25 min	47	20
	Alloy II		57 to 61	Remainder	.75 to 1	1.0 min	—	0.1-0.2	.5-2	.5 min	53	15
9. Naval Brass	IS 291/1961 Grade I	BS 2872 CZ 112 BS 251/63	61 to 64	Remainder	—	1 to 1.5	—	—	—	—	35	18
10. Naval Brass	IS 291/1961 Grade II	BS 2874 CZ 113 BS 252/1963	59 to 62	Remainder	.5 to 1	.5 to	—	—	—	—	35	16
11. Aluminium Bronze	BS 2874 CA 103	BS 2032	Remainder	—	—	—	—	—	8.8 -10	Iron + 4% max Nickel	53	34
12. Aluminium Bronze	BS 2874 CA 104	BS 2033	Remainder	—	—	—	4.6%	0.5	8.5-11%	Nickel 4-6%	71 min	12 min
13. Aluminium Silicon Bronze	ASTM B 283/56	—	89%	—	—	—	—	—	6.5 to .8	Sill 1.5-3%	67 min	25 min
14. Manganese Bronze	ASTM B-138/58 Alloy A Alloy B		57.60 63.68	Remainder Remainder	— —	0.5.1.5 0.5 max	8.2 2.4	05.5 2.5.5	0.25 max 3.6		53 80	25 10
15. Copper Nickel Alloy	ASTM B-411 64	—	Remainder	0.5% max	1% max		0.1%	—	—	Ni 1.6-2.2 Sil 0.4-08	63	8
16. Nickel Silver Alloy	BS 2874 NS 101	—	44.47	Remainder	1.2.5	—	0.40% max	0.20.50	—	Ni.9.0-11.0	47	8 min
17. Electrolytic Tough Pitch	BS 2874 C101	—	99.9% min	—	0.005%	—	—	—	—	Impurities 0.03%	23-35	5.5-6%

TOLERANCES ON MEAN OUTSIDE DIAMETER

Outside Specified	Tolerance	
	Normal	Reduced
mm	mm	mm
	±	±
Up to 10	0.08	0.045
Over 10 to 18	0.10	0.045
Over -18 to 32	0.12	0.055
Over -32 to 50	0.15	0.070

SHIP BUILDING MAKING MATERIAL GRADE

Classification Society Standards (for mild steel)

Specification category	Grade	Chemical composition (%)						C+Mn/6	Al	S	Mn	Mn	Type of deoxidation	Thickness (mm)	Heat treatment	Yield point or proof stress (N/mm ²)	Tensile strength (N/mm ²)	Elongation (L=200)		Charpy impact test	
		C	Si	Mn	Mn	Si	Thickness (mm)											Elongation (%)	Testing temperature (°C)	Minimum mean absorbed energy (J)	
NK	KA	0.23 max.	0.50 max.	0.035 max.	0.035 max.	0.40 max.			0.035 max.	0.035 max.	2.5 X C min.	S.K.	t ≤ 50	AR.N.CR.TMCP	235 min	400 - 520	5 < t ≤ 10 16 min	0	L	T	
	KB	0.21 max.	0.35 max.				0.015 min.				0.80 min (0.60 min.)	K	t ≤ 25				10 < t ≤ 15 17 min	0	-	-	
	KD		0.60 min								0.60 min	Ks	t ≤ 50	N.TMCP			15 < t ≤ 20 18 min	-20	27	20	
	KE	0.18 max.	0.70 min.								0.70 min.	Ks	t ≤ 50				20 < t ≤ 25 19 min	-40	-	-	
ABS	AA	0.23 max.	0.50 max.	0.035 max.	0.035 max.	0.40 max.			0.035 max.	0.035 max.	2.5 X C min	S.K	t ≤ 50	AR.N.CR.TMCP	235 min.	400 - 550	5 < t ≤ 10 16 min	0	-	-	
	AB	0.21 max.	0.35 max.								0.80 min. (0.60 min.)	K	t ≤ 25				10 < t ≤ 15 17 min	0	27	20	
	AD		0.10 - 0.35								0.60 min.	K	t ≤ 25				15 < t ≤ 20 18 min	-20	-	-	
	AE	0.18 max.	0.70 min.								0.70 min.	Ks	t ≤ 50	N.TMCP			20 < t ≤ 25 19 min	-40	-	-	
LR	LA	0.23 max.	0.50 max.	0.035 max.	0.035 max.	0.40 max.			0.035 max.	0.035 max.	2.5 X C min.	S.K	t ≤ 50	AR.N.CR.TMCP	235 min	400 - 520	5 < t ≤ 10 16 min	0	27	20	
	LB	0.21 max.	0.35 max.								0.80 min. (0.60 min.)	K	t ≤ 25				10 < t ≤ 15 17 min	0	-	-	
	LD	0.18 max.	0.10 - 0.35								0.60 min.	K	t ≤ 25				15 < t ≤ 20 18 min	-20	-	-	
	LE	0.18 max.	0.70 min.								0.70 min.	Ks	t ≤ 50	N.TMCP			20 < t ≤ 25 19 min	-40	-	-	
DNV	NVA	0.23 max.	0.50 max.	0.035 max.	0.035 max.	0.40 max.			0.035 max.	0.035 max.	2.5 X C min.	S.K	t ≤ 50	AR.N.CR.TMCP	235 min	400 - 520	5 < t ≤ 10 16 min	0	27	20	
	NVB	0.21 max.	0.35 max.								0.80 min. (0.60 min.)	K	t ≤ 25				10 < t ≤ 15 17 min	0	-	-	
	NVD		0.10 - 0.35								0.60 min.	K	t ≤ 25				15 < t ≤ 20 18 min	-20	-	-	
	NVE	0.18 max.	0.70 min.								0.70 min.	Ks	t ≤ 50	N.TMCP			20 < t ≤ 25 19 min	-40	-	-	
BV	BA	0.23 max.	0.50 max.	0.035 max.	0.035 max.	0.40 max.			0.035 max.	0.035 max.	2.5 X C min.	S.K	t ≤ 50	AR.N.CR.TMCP	235 min	400 - 550	5 < t ≤ 10 16 min	0	27	20	
	BB	0.21 max.	0.35 max.								0.80 min. (0.60 min.)	K	t ≤ 25				10 < t ≤ 15 17 min	0	-	-	
	BD		0.60 min.								0.60 min.	K	t ≤ 25				15 < t ≤ 20 18 min	-20	-	-	
	BE	0.18 max.	0.70 min.								0.70 min.	Ks	t ≤ 50	N.TMCP/CR			20 < t ≤ 25 19 min	-40	-	-	
GL	GL-A	0.23 max.	0.50 max.	0.035 max.	0.035 max.	0.40 max.			0.035 max.	0.035 max.	2.5 X C min.	S.K	t ≤ 50	AR.N.CR.TMCP	235 min	400 - 520	5 < t ≤ 10 16 min	0	27	20	
	GL-B	0.21 max.	0.35 max.								0.80 min. (0.60 min.)	K	t ≤ 25				10 < t ≤ 15 17 min	0	-	-	
	GL-D		0.60 min.								0.60 min.	K	t ≤ 25				15 < t ≤ 20 18 min	-20	-	-	
	GL-E	0.18 max.	0.25 max.								0.70 min.	Ks	t ≤ 50	N.TMCP			20 < t ≤ 25 19 min	-40	-	-	
KR	RA	0.23 max.	0.50 max.	0.035 max.	0.035 max.	0.40 max.			0.035 max.	0.035 max.	2.5 X C min.	S.K	t ≤ 50	AR.N.CR.TMCP	235 min	400 - 520	5 < t ≤ 10 16 min	0	27	20	
	RB	0.21 max.	0.35 max.								0.80 min. (0.60 min.)	K	t ≤ 25				10 < t ≤ 15 17 min	0	-	-	
	RD		0.60 min.								0.60 min.	K	t ≤ 25				15 < t ≤ 20 18 min	-20	-	-	
	RE	0.18 max.	0.70 min.								0.70 min.	Ks	t ≤ 50	N.TMCP/CR			20 < t ≤ 25 19 min	-40	-	-	
CR	CA	0.23 max.	0.50 max.	0.035 max.	0.035 max.	0.40 max.			0.035 max.	0.035 max.	2.5 X C min.	S.K	t ≤ 50	AR.N.CR.TMCP	235 min	400 - 550	5 < t ≤ 10 16 min	0	27	20	
	CB	0.21 max.	0.35 max.								0.80 min. (0.60 min.)	K	t ≤ 25				10 < t ≤ 15 17 min	0	-	-	
	CD		0.60 min.								0.60 min.	K	t ≤ 25				15 < t ≤ 20 18 min	-20	-	-	
	CE	0.18 max.	0.70 min.								0.70 min.	Ks	t ≤ 50	N.TMCP/CR			20 < t ≤ 25 19 min	-40	-	-	
CCS	CSA	0.23 max.	0.50 max.	0.035 max.	0.035 max.	0.40 max.			0.035 max.	0.035 max.	2.5 X C min.	S.K	t ≤ 50	AR.N.CR.TMCP	235 min	400 - 520	5 < t ≤ 10 16 min	0	27	20	
	CSB	0.21 max.	0.35 max.								0.80 min. (0.60 min.)	K	t ≤ 25				10 < t ≤ 15 17 min	0	-	-	
	CSD		0.60 min.								0.60 min.	K	t ≤ 25				15 < t ≤ 20 18 min	-20	-	-	
	CSE	0.18 max.	0.70 min.								0.70 min.	Ks	t ≤ 50	N.TMCP			20 < t ≤ 25 19 min	-40	-	-	

Remarks: Type of deoxidation S: Semi-killed steel
K: Killed steel
AR: As-rolled
CR: Rolling under temperature control
N: Normalizing
TMCP: Controlling method of thermal processing
QT: Quenching and tempering
Charpy impact test: L: Rolling direction
T: Perpendicular to rolling direction

A131 GR A, B, D & E

(With IACS Class Approvals) Lloyds, ABS, DNVGL, DBV, IRS, RINA, TUV, BV

General Product Description

ASTM A131 Grades A, B, D, and E are ordinary-strength structural steels with a minimum specified yield strength of 34 ksi and specified minimum Charpy V-notch impact toughness properties.

Applications

Typical applications include shipbuilding and mobile offshore drilling units and structures.

Dimensions

Grade	Product Type	Thickness (Inches)	Width ¹⁾ (Inches)	Length ²⁾ (Inches)
Grade A	Plate	0.1875-3.00	72-129.9	240-1020
Grade B	Plate	0.1875-2.00	72-129.9	240-1020
Grade D	Plate	0.1875-3.94	72-129.9	240-1020
Grade E	Plate	0.197-3.94	75-129.9	240-590

¹⁾ Please inquire for available plate widths for thicknesses less than 0.250 in. For plate thicknesses of 0.250 in. or greater inquire for widths less than 72 in. or over 120 in.

²⁾ Please inquire for plate lengths < 240 in. and greater than the listed maxima

Mechanical Properties

Tensile testing is performed in the transverse direction.

Grade	Product Type	Thickness (Inches)	Yield Strength (min ksi)	Tensile Strength (ksi)	Elongation in 2" ²⁾ (min %)	Elongation in 8" ¹⁾ (min %)
Grade A	Plate	0.1875-3.00	34	58-75	24	21
Grade B	Plate	0.1875-2.00	34	58-75	24	21
Grade D	Plate	0.1875-3.94	34	58-75	24	21
Grade E	Plate	0.197-3.94	34	58-75	24	21

¹⁾ For plates less than 5/16 in. thickness, a deduction from the specified 8" elongation percentage shall be made in accordance with ASTM A6 Elongation Requirement Adjustments.

²⁾ For plates over 3.5 in. in thickness, a deduction from the specified percentage elongation in 2 in, shall be made in accordance with ASTM A6 Elongation Requirement Adjustments.

Impact Properties

Grade	Thickness	Test Temp	longitudinal Min average energy ^{1) 2) 3) 4)}	Transverse Min average energy ^{1) 2) 3) 4)}
Grade A	2.001-2.800 Inches	68 °F	25 ft-lbs	17 ft-lbs
Grade A	2.801-3.00 Inches	68 °F	30 ft-lbs	20 ft-lbs
Grade B	1.001-2.000 Inches	32 °F	20 ft-lbs	14 ft-lbs
Grade D	0.251-2.000 Inches	-4 °F	20 ft-lbs	14 ft-lbs
Grade D	2.001-2.800 Inches	-4 °F	25 ft-lbs	17 ft-lbs
Grade D	2.801-3.940 Inches	-4 °F	30 ft-lbs	20 ft-lbs
Grade E	0.251-2.000 Inches	-40 °F	20 ft-lbs	14 ft-lbs
Grade E	2.001-2.800 Inches	-40 °F	25 ft-lbs	17 ft-lbs
Grade E	2.801-3.940 Inches	-40 °F	30 ft-lbs	20 ft-lbs

¹⁾ Specimen orientation at the option of the manufacturer unless otherwise specified in the order.

²⁾ No more than one value below the specified minimum average energy but no less than 70% of the specified minimum average energy value.

³⁾ Impact tests not required for Grade A if produced using fine grain practice and normalized.

⁴⁾ Minimum average energy for full-size specimens. Refer to ASTM A131 for sub-size specimen energy requirements.

A131 GR AH/DH/EH 36

(With IACS Class Approvals) Lloyds, ABS, DNVGL, DBV, IRS, RINA, TUV, BV

General Product Description

ASTM A131 Grades AH36, DH36, and EH36 are higher-strength structural steels with a minimum specified yield strength of 51 ksi and specified minimum Charpy V-notch impact toughness properties.

Applications

Typical applications include shipbuilding and mobile offshore drilling units and structures

Dimensions

Grade	Product Type	Thickness (Inches)	Width ²⁾ (Inches)	Length ³⁾ (Inches)
Grade AH36	Plate	0.251-2.00 ¹⁾	72-129.9	240- 1020
Grade DH36	Plate	0.251-2.00 ¹⁾	72-129.9	240-1020
Grade EH36	Plate	0.251-3.94 ¹⁾	75-129.9	240-590

¹⁾ Please inquire for AH36 and DH36 greater than 2.00 in. thick.

²⁾ Please inquire for available plate widths for thickness less than 0.250 in. For plate thickness of 0.250 in. or greater inquire for widths less than 72 in. or over 120 in.

³⁾ Please inquire for plate lengths <240 in. and greater than the listed maximum.

Mechanical Properties

Tensile testing is performed in the transverse direction.

Grade	Product Type	Thickness (Inches)	Yield Strength (min ksi)	Tensile Strength (ksi)	Elongation in 2" ²⁾ (min%)	Elongation in 8" ²⁾ (min%)
Grade AH36	Plate	0.251-2.00	51	71-90	22	19
Grade DH36	Plate	0.251-2.00	51	71-90	22	19
Grade EH36	Plate	0.251-3.94	51	71-90	22	19

¹⁾ For plates less than 5/16 in., a deduction from the specified 8" elongation percentage shall be made in accordance with ASTM A6 Elongation Requirement Adjustments.

²⁾ For plates over 3.5 in. in thickness, a deduction from the specified percentage elongation in 2 in. shall be made in accordance with ASTM A6 Elongation Requirement Adjustments

Impact Properties

Grade	Thickness	Test Temp	Longitudinal Min average energy ^{1) 2) 3)}	Transverse Min average energy ^{1) 2) 3)}
AH36	0.251-2.000 Inches	32 °F	25 ft-lbs	17 ft-lbs
DH36	0.251-2.000 Inches	-4 °F	25 ft-lbs	17 ft-lbs
EH36	0.251-2.000 Inches	-40 °F	25 ft-lbs	17 ft-lbs
EH36	2.011-2.800 Inches	-40 °F	30 ft-lbs	20 ft-lbs
EH36	2.801-3.94 Inches	-40 °F	37 ft-lbs	25 ft-lbs

¹⁾ Specimen orientation at the option of the manufacturer unless otherwise specified in the order.

²⁾ No more than one value below the specified minimum average energy but no less than 70% of the specified minimum average energy value.

³⁾ Minimum average energy for full-size specimens. Refer to ASTM A131 for sub-size specimen energy requirements

Chemical Composition

Carbon Equivalent Values

Thickness (Inches)	AH36	DH36	EH36	EH36
	0.1875-2.000	0.1875-2.000	0.1875-2.000	2.001-3.94
CEV ¹⁾ (max wt %)	0.38	0.38	0.38	0.40

¹⁾ Carbon equivalent requirements for TMCP condition of supply only

ROUND BARS

STAINLESS STEEL BRIGHT BARS (PEELED/TURNED)

We, within a short span has become a major source for Stainless Steel Rolled / Forged / Peeled Rounds, Rcs, Blooms & Billets. We have huge stocks for our quality products which are supplied on time at lowest possible rates meeting most of our customer's requirement.

Product Range

Condition	Peeled, Centreless & Polished	Peeled & Polished	Peeled (Rough Turned)	Forged, Rough Turned
	301, 303, 304, 304L, 310, 316, 316L, 321, 410, 416, 420, 430, 431, 430F & others		304, 304L, 316L, 410, 416, 420, 430	303, 304, 304L, 316, 316L, 410, 416, 420, 431
Diameter (Size)	20mm to 85mm (3/4" to 3-1/4")	85mm to 140mm (3-1/4" to 5 - 1/2")	25mm to 140mm (1" to 5-1/2")	150mm to 400mm (6" to 16")
Diameter Tolerance	h9 (Din 671) (ASTM A484)	h 11	K 12/K 13 (Din 1013)	-0mm to +3mm (-0"/+0.12")
Length	3/4/5, 6/6 meter (12/14ft/20 feet)	3/4/5, 6/6 meter (12/14ft/20 feet)	3/4/5,6/6 meter 10 feet, 16 feet	3 meter - 5 meter
Length Tolerance	-0/+200mm of + 100mm to + 50mm (-0"/1 feet or +4" or 2")	-0/+ 200mm or +100mm or +50mm (-0"/+1 feet or +4" or 2")	-0/+ 100mm or 500mm (-0"/+3 feet or+2 feet)	-0/+2 meter - (-0/+6 feet)

Stainless Steel Wires

Diameter (Size)	Thick/Medium Wire - 1mm to 8mm (0.039" to 0.314")	
Grade	204Cu, 302, 302HQ, 303, 304, 304L, 304HC, 310, 316, 316L, 321, 304LER, 308LER, 316LER, 420, 430L	
Surface Finish	Matt, Bright Drawn, Bright Shiny, EPQ, Coated, De-coated	
Diameter Tolerance	Diameter 0.80 mm (0.0314") to < 1.50 mm (0.0590") 1.50 mm (0.0590") to < 2.00 mm (0.0787") 2.00 mm (0.0787") to < 4.00 mm (0.1574") 4.00 mm (0.1574") to < 6.00 mm (0.236")	Tolerance +/-0.013 mm (0.0005") +/-0.013 mm (0.0006") +/-0.025 mm (0.0009") +/-0.030 mm (0.0011")
Tensile Strength	Type Soft 1/4 Hard 1/2 Hard Full Hard	Tensile In Kg/mm ² 60-75 75-90 90-140 140-200 or ASTM A313 / DIN 17224
Packing	<ul style="list-style-type: none"> - HDPE wrapped coils of 20 kg. to 250 kg. - Pattern laid coils on MS Carriers / spiders (200 Kg. to 1000 kg.) - Coils on wooden pallets (100 kg to 800 kg) - Cheese coils (500 kg -1000 kg) - Drum Packing - Fine wire in Spools from Din 80 to Din 250 	

Stainless Steel Bright Bars (Cold Drawn)

Condition	Cold Drawn and Polished	Cold Drawn, Center less Ground & Polished	Cold Drawn, Center less Ground and Polished (Strain Hardened)
Grades	303, 304, 304L, 310, 316, 316L, 321, 410, 420, 416, 430, 431, 430F, & others		304, 304L, 316, 316L
Diameter (Size)	2mm to 5mm (1/8" to 3/16)	6mm to 22mm (1/4" to 7/8")	10mm to 40mm (3/8" to 1-1/2")
Diameter Tolerance	h9 (Din 671), h11 ASTM A 484	h9 (Din 671) ASTM A 484	h9 (Din 671), h11 ASTM A 484
Length	3/4/5, 6/6 meter (12/14ft/20 feet)	3/4/5, 6/6 meter (12/14ft/20 feet)	3/4/5, 6/6 meter (12/14ft/20 feet)
Length Tolerance	-0/+ 200mm of +100mm or+50mm (-0"/+1 feet or+ 4" or 2")	-0/+200mm or +100mm or +50mm (-0"/+1 feet or+4" or 2")	-0/+200mm (-0"/+1 feet)



Stainless Steel Hexagon & Square Bars

Type	Cold Drawn and Polished(Squares)	Cold Drawn and Polished (Hexagons)
Grades	304, 304L, 316, 316L	304, 304L, 316, 316L
Diameter	5mm to 40mm (1/4" to 1-1/2")	10mm to 40mm (3/8" to 1-1/2")
Diameter Tolerance	h 11 (ASTM A 484)	h 11 (ASTM A 484)
Length	3/4/6 meter (12/14ft/20feet)	3/4/6 meter (12/14ft/20 feet)
Length Tolerance	-0/+500mm (-0"/+2 feet)	-0/+500mm or+ 100mm or +50mm (-0"/+2feet)

Stainless Steel Cold Heading Wires

Condition	Cold drawn, Annealed and Pickled
Diameter	1.6 mm to 17 mm (1/16" to 11/16")
Tensile Strength	65kg / mm2 max
Packing	HDPE wrapped coils of 300 kg to 500 kg
Grades	202, 304, 304L, 316, 316L, 304HC, 302HQ

ALUMINIUM

ALUMINIUM ALLOY : ALLOY EQUIVALENT (APPROX.)

INDIA		U.S.A. (A.A.)	Britain (B.S.)	Canada	Germany (DIN)	Russia	I.S.O	French ND
New IS	Old IS							
19501	1E	1350 (E.C)	1E	C 1S	E-A1-99.5	—	—	—
19500	1B	1050	1B	1S	A1-99.5	—	A1-99.5	1050A
19600	—	1060	—	—	—	—	—	—
19700	—	1070	—	—	A1-99.7	—	A1-99.7	—
19800	1A	1080	1A	—	—	—	A1-99.8	—
19000	1C	1100	1C	2S	A1-99.0	AD	A1-99.0	1200
—	—	2011	FC1	28S	A1-Cu-BiPb	—	A1-Cu-6BiPb	2011
24345	H15	2014	H15	B26S	A1-Cu-Si	AK	—	—
24534	H14	2017	H14	17S/16S	—	D1	A1-Cu-4Mg Si	—
—	—	2024	—	24S	A1-Cu Mg.2	—	A1-Cu4Mn1	2024
31000	N3	3003	N3	3S	A1-Mn	A-Mn	A1-Mn1	3003
43000	N21	4043	N21	33S	A1-Si-5	AK	A1-Si5	4043
46000	N2	4047	N2	35S	—	—	—	—
51000A	—	5005	—	B57S	—	—	A1-Mg-1	—
52000	N4	5052	N4	M57S	A1-Mg.2	A-Mg	A1-Mg-2	5051
53000	N5	5086	N5	54S	—	A-Mg-3	A1-Mg-23.5	—
54300	N8	5083	N8	D54S	A1-Mg-4.5Mn	—	A1-Mg-4.5Mn	5083
55000	N6	5056	N6	A56S	A1-Mg-5	—	A1-Mg-5	5356
65032	H20	6061	H20	65S	A1-Mg Si Cu	—	Al-Mg-1Si Cu	—
63400	H9	6063	H9	50S	A1-Mg Si 0.5	—	A1-Mg-Si	—
64430	H30	6351	H30	B51S	A1-Mg Si 1	AV	A1-Si-1Mg	6081
64423	H11	6066	H11	C62S	—	—	—	—
62400	—	6005	—	C51S	—	—	—	—
63401	91E	6101	91E	D50S	E.A.1.Mg Si 0.5	—	—	—
64401	—	6201	—	—	—	—	—	—
74530	—	7039	—	D74S	A1-Zn-Mg.1	—	—	3004
—	—	7075	DTD5124	75S	Al-Zn-Mg Cu 1.5	—	A1-Zn 6 Mg Cu	7075

ALUMINIUM ALLOY : CHEMICAL COMPOSITION STD.

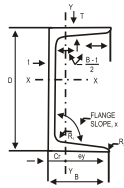
Alloy (ISS) Old	Equivalent alloy (A.A.)		Copper		Magnesium		Silicon		Iron	Manganese		*Other (total)	Remark
	New	U.S.A.	Min.	Max.	Min.	Max.	Min.	Max.					
1B	19500	1050	—	0.05	—	—	—	0.30	0.4	—	0.05	0.1	Aluminium 99.5% Min.
1E	19501	1050(EC)	—	0.04	—	—	—	0.15	0.35	—	—	0.1	Aluminium 99.5% Min.
—	19700	1070	—	0.03	—	—	—	0.20	0.25	—	0.03	0.1	Aluminium 99.7% Min.
1A	19800	1080	—	0.03	—	—	—	0.15	0.15	—	0.03	0.1	Aluminium 99.8% Min.
1C	19900	1100	—	0.1	—	0.2	—	0.50	0.7	—	0.1	0.2	Aluminium 99.0% Min.
—	—	2011	5.0	6.0	—	0.1	—	0.4	0.7	—	0.1	0.4	Also lead & bismuth - 0.2 - 0.6% each
H 15	24345	2014	3.8	5.0	0.2	0.8	0.5	1.2	0.7	0.3	1.2	0.5	—
H 14	24534	2017	3.5	4.7	0.4	1.2	0.2	0.7	0.7	0.4	1.2	0.5	—
N 3	31000	3003	—	0.1	—	0.1	—	0.6	0.7	0.8	1.5	0.4	—
N 21	43000	4043	—	0.1	—	0.2	4.5	6.0	0.6	—	0.5	0.5	—
N 2	46000	4047	—	0.1	—	0.2	10.0	13.0	0.6	—	0.5	0.5	—
N 4	52000	5052	—	0.1	1.7	2.6	—	0.6	0.7	—	0.5	0.4	—
N 5	53000	5086	—	0.1	2.8	4.0	—	0.6	0.7	—	0.5	0.4	—
N 6	55000	5056	—	0.1	4.5	5.0	—	0.6	0.7	—	1.01	0.4	Chromium upto 0.25
N 8	54300	5083	—	0.1	4.0	4.9	—	0.4	0.7	0.5	1.0	0.4	Chromium upto 0.25
H 20	65032	6061	0.15	0.4	0.8	1.2	0.4	0.8	0.7	0.2	0.8	0.4	Chromium (0.15 - 0.35) Either Mn ₂ Cr Shall be present.
H 9	63400	6063	—	0.1	0.4	0.9	0.3	0.7	0.6	—	0.3	0.4	—
—	—	6066	0.7	1.2	0.8	1.4	0.9	1.8	0.7	0.6	1.1	0.4	—
—	64423	—	0.5	1.0	0.5	1.3	0.7	1.3	0.8	1.0	—	—	—
91 E	63401	6101	—	0.1	0.35	0.8	0.3	0.7	0.5	—	0.03	0.1	—
—	64401	6201	—	0.1	0.6	0.9	0.5	0.9	0.5	—	0.03	0.1	—
H 30	64430	6351	—	0.1	0.4	1.2	0.6	1.3	0.6	0.4	1.0	0.4	—
—	74530	7039	—	0.2	1.0	1.5	—	0.4	0.7	0.2	0.7	0.4	Zinc (4 - 5%)
—	—	7075	1.20	2.0	2.1	2.9	—	0.4	0.5	—	0.3	0.5	Zinc (5.1 - 6.4) & Chromium (0.1 - 0.25)

Titanium and/or other grain refining elements
 Either Mn or Cr Shall be present

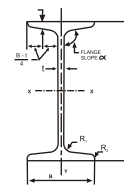
STEEL SECTIONS

DIMENSIONS & WEIGHT FOR STEEL, BEAM, CHANNEL & ANGLE SECTIONS AS PER IS 808:1999

CHANNELS SECTIONS



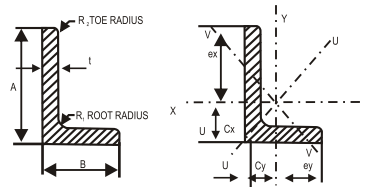
BEAMS SECTIONS



DESIGNATION	SIZE	WEIGHT KG/M
ISMC 75	75 X 40 X 4.8	7.14
ISMC 100	100 X 50 X 5.0	9.56
ISMC 125	125 X 65 X 5.3	13.1
ISMC 150	150 X 75 X 5.7	16.8
ISMC 175	175 X 75 X 6.0	19.6
ISMC 200	200 X 75 X 6.2	22.3
ISMC 225	225 X 80 X 6.5	26.1
ISMC 250	250 X 80 X 7.2	30.6
ISMC 300	300 X 90 X 7.8	36.3
ISMC 350	350 X 100 X 8.3	42.7
ISMC 400	400 X 100 X 8.8	50.1

DESIGNATION	SIZE	WEIGHT KG/M
ISMB 100	100 X 50 X 4.7	8.90
ISMB 125	125 X 70 X 5.0	13.3
ISMB 150	150 X 75 X 5.0	15.0
ISMB 175	175 X 85 X 5.8	19.6
ISMB 200	200 X 100 X 5.7	24.2
ISMB 225	225 X 110 X 6.5	31.1
ISMB 250	250 X 125 X 6.9	37.3
ISMB 300	300 X 140 X 7.7	46.0
ISMB 350	350 X 140 X 8.1	52.4
ISMB 400	400 X 140 X 8.9	61.5
ISMB 450	450 X 150 X 9.4	72.4
ISMB 500	500 X 180 X 10.2	86.9
ISMB 550	550 X 190 X 11.2	104
ISMB 600	600 X 210 X 12.0	123

EQUAL ANGLES



UNEQUAL ANGLES

Size in mm	Weight Kg/M
Angles (equal)	
50 x 50 x 6	4.5
65 X 65 X 6	5.8
65 X 65 X 8	7.7
65 X 65 X 10	9.4
75 X 75 X 6	6.8
75 X 75 X 8	8.9
75 X 75 X 10	11.0
80 X 80 X 6	7.3
80 X 80 X 8	9.6
80 X 80 X 10	11.8
90 X 90 X 6	8.2
90 X 90 X 8	10.8
90 X 90 X 10	13.4
100 X 100 X 8	12.1
100 X 100 X 10	14.9
100 X 100 X 12	17.7
110 X 110 X 10	16.6
110 X 110 X 12	19.7
130 X 130 X 10	19.7
130 X 130 X 12	23.5
150 X 150 X 16	35.8
150 X 150 X 20	44.1
200 X 200 X 16	48.5
200 X 200 X 20	60.0

Sides in	Thickness					Weight in Kg per meter					
mm	3	4	5	6	8	10	12	15	16	18	20
Equivalent											
20 x 20 mm	0.9	1.1									
25 x 25 mm	1.1	1.4	1.8								
30 x 30 mm	1.4	1.8	2.2								
35 x 35 mm	1.6	2.1	2.6	3.0							
40 x 40 mm	1.8	2.4	3.0	3.5							
45 x 45 mm	2.1	2.7	3.4	4.0							
50 x 50 mm	2.3	3.0	3.8	4.5							
55 x 55 mm		3.3	4.1	4.9	6.4	7.9					
60 x 60 mm		3.70	4.5	5.4	7.0	8.6					
65 x 65 mm		4.0	4.9	5.8	7.7	9.4					
70 x 70 mm			5.3	6.3	8.3	10.2					
75 x 75 mm			5.7	6.8	8.9	11.0					
45 x 30 mm	1.7	2.2	2.8	3.3							
75 x 50 mm			4.7	5.6	7.4	9.0					
90 x 60 mm				6.8	8.9	11.0	13.0				
100 x 75 mm				8.0	10.5	13.0	15.4				
125 x 75 mm				9.2	12.1	14.9					
125 x 95 mm				10.1	13.4	16.5	19.6				
150 x 75 mm					13.7	17.0	20.2				
150 x 115 mm					16.3	20.1	34.0	31.4	31.4		
200 X 100 mm						22.9	27.3		35.8		
200 X 150 mm						26.9	32.1		42.2		52.0

Clientele



Eckhardt Steel & Alloys

ISO 9001:2015, ISO 14001:2015,
ISO 45001:2018 & PED 2014/68/EU
Manufacturing Certified Company

more than 1000 + A Group clients

300+
INTERNATIONAL CLIENTS

700+
HAPPY CLIENTS

50+
INDUSTRY EXPERIENCE

INDIAN CLIENTS



OVERSEAS CLIENT



FORMULAE OF CALCULATING WEIGHT

- WEIGHT OF STAINLESS STEEL / CARBON STEEL PIPES & TUBES
 $OD \text{ (mm)} - W.T. \text{ (mm)} \times W.T. \text{ (mm)} \times 0.02466 = \text{KG/MTR}$
- WEIGHT OF COPPER PIPES & TUBES
 $O.D. \text{ (mm)} - W.T. \text{ (mm)} \times W.T. \text{ (mm)} \times 0.0285 = \text{KG/MTR}$
- WEIGHT OF ALUMINIUM PIPES & TUBES
 $O.D. \text{ (mm)} - W.T. \text{ (mm)} \times W.T. \text{ (mm)} \times 0.0082 = \text{KG/MTR}$
- WEIGHT OF LEAD PIPES & TUBES
 $O.D. \text{ (mm)} - W.T. \text{ (mm)} \times W.T. \text{ (mm)} \times 0.0345 = \text{KG/MTR}$
- SHEET WIDTH REQD FOR ROLLED & WELDED PIPES
 $O.D. \text{ (mm)} - Thk. \text{ (mm)} \times 3.14 = \text{SHEET WIDTH (mm)}$
- WEIGHT FOR SQUARE / RECTANGLE PIPES
 $\text{Length From 4 Angle (OD)} / 3.14 - \text{Thk (mm)} \times \text{Thk. (mm)} \times 0.00756 = \text{KG/PER FEET}$
- WEIGHT OF STAINLESS STEEL CIRCLE & BLANKS
 $O.D. \text{ (mm)} \times O.D. \text{ (mm)} \times \text{Thk (mm)} / 160 / 1000 = \text{KG/PCS.}$
- WEIGHT OF STAINLESS STEEL SHEETS & PLATES
 $\text{Length (mtr)} \times \text{Width (mtr)} \times \text{Thk. (mm)} \times 8 = \text{KG/SHEET}$
- WEIGHT OF CARBON STEEL SHEETS & PLATES
 $\text{Length (mtr)} \times \text{Width (mtr)} \times \text{Thk. (mm)} \times 7.85 = \text{KG/SHEET}$
- WEIGHT OF ALUMINIUM SHEETS & PLATES
 $\text{Length (mtr)} \times \text{Width (mtr)} \times \text{Thk. (mm)} \times 2.66 = \text{KG/SHEET}$
- WEIGHT OF LEAD SHEETS & PLATES
 $\text{Length (mtr)} \times \text{Width (mtr)} \times \text{Thk. (mm)} \times 11.2 = \text{KG/SHEET}$
- WEIGHT OF STAINLESS STEEL ROUNDS / ROUND BAR
 $\text{Dia. (mm)} \times \text{Dia. (mm)} \times 0.00623 = \text{KG/MTR}$
- WEIGHT OF STAINLESS STEEL HEXAGONAL RODS
 $\text{Dia. (mm)} \times \text{Dia. (mm)} \times 0.00679 = \text{KG/MTR}$
- WEIGHT OF STAINLESS STEEL SQUARE RODS
 $\text{Dia. (mm)} \times \text{Dia. (mm)} \times 0.00787 = \text{KG/MTR}$



ISO 9001:2015, ISO 14001:2015, ISO 45001:2018 & PED 2014/68/EU Certified Manufacturing Company

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