



COLD ROLLED
PRODUCTS

Cold Rolled Coils and Sheets



Bokaro Steel Plant : Rationalised sizes of CR Coils

Thickness (mm)	Width (mm)
0.27, 0.30, 0.35	900, 905, 910, 914, 920
0.40, 0.45	900, 905, 910, 914, 920, 1000, 1005, 1010, 1020
0.5	900, 905, 910, 914, 920, 1000, 1005, 1010, 1020, 1105, 1120
0.55, 0.58	900, 905, 910, 914, 920, 1000, 1005, 1010, 1020, 1105
0.60	900, 905, 910, 914, 920, 1000, 1005, 1010, 1020, 1100, 1105, 1120, 1250, 1270
0.63	900, 905, 910, 914, 920, 1000, 1005, 1010, 1020, 1100, 1105, 1120, 1219, 1250, 1270
0.70	900, 905, 910, 914, 920, 1000, 1005, 1010, 1020, 1105, 1219, 1250, 1270
0.8, 0.9	900, 914, 920, 1000, 1020, 1120, 1219, 1250, 1270, 1420
0.95	900, 914, 920, 1000, 1020, 1120, 1219, 1250, 1270
1.00	900, 914, 920, 1000, 1020, 1120, 1219, 1250, 1270, 1320, 1420, 1520, 1580
1.25, 1.40	900, 914, 920, 1000, 1020, 1120, 1219, 1250, 1270, 1320, 1420, 1520, 1580, 1620
1.5, 1.6, 1.85	900, 914, 920, 1000, 1020, 1120, 1219, 1250, 1270, 1320, 1420, 1520, 1580, 1620
1.90, 2.00	900, 914, 920, 1020, 1120, 1219, 1250, 1270, 1320, 1420, 1520, 1580, 1620

In respect of 0.20/0.22/0.25 mm thick CR Coils, 900 & 920 mm shall be considered as rationalized widths for Full Hard/TS513 CR OH quality only.

Bitumen Barrel Size

0.63	876, 896, 1120
(Barrel Size) :	
0.9	914, 920, 1225, 1320
1, 1.2, 1.25	914, 920, 1225, 1320, 1580

Coil Dimension : Outer diameter : 2200 mm, maximum. Internal diameter : 510 mm (thickness 0.63 mm and below and width up to 1020 mm) and 600 mm (for other sizes) and Coil weight: 6-23 tonnes (as per size)

Tolerance as per IS /ISO – 16162/2005

Common Grades : IS 513 (Part-1):2016 (CR1, CR2, CR3, CR4), IRSM 41, SAILCOR, Copper Bearing, HSCR - 26/35.

Bokaro Steel Plant also produces cold rolled coils and sheets to the following foreign specifications : **ASTM A 568/366**, **BS-1449-Pt-1**, **JIS G 3141 SPCC/CD**, **DIN-1623 St 12.3** or equivalent, if sufficient orders are available.

Rourkela Steel Plant : Rationalised sizes of CR Coils

Thickness (mm)	Width (mm)
0.35, 0.4	900
0.5, 0.63	900/1000
0.8, 1.0, 1.25	900/1000/1250
1.85, 2.0	1250

Coil weight : 3 to 15 tonnes for width above 1100 mm and 3 to 10 tonnes up to 1100 mm width.

Coil Internal Diameter : 610 mm (CR-1 route) and 510 mm (Tandem Mill route).

Common Grades : IS 513/2008 Grade

Note : Some quantity may be available in mixed thicknesses of 0.3 - 0.5 mm and mixed widths of 750-1000 mm

Bokaro Steel Plant : Rationalised sizes of Cold Rolled Sheets

Thickness (mm)	Width (mm)	Length (mm)
0.60, 0.63, 0.70	900, 1000, 1100, 1250	2000, 2500, 3000, 3600
0.80, 0.90	900, 1000, 1100, 1250, 1400	2000, 2500, 3000, 3600
1.00, 1.25, 1.50, 1.60, 1.85, 2.00	900, 1000, 1100, 1250, 1400, 1500	2000, 2500, 3000, 3600
Barrel Size		
1.0/1.25	915, 920	1815
1.0/1.25	1315, 1320	1970, 2000

Common grades : IS 513/2008 (O, D, DDK, EDB), IRSM 41, SAILCOR, Copper Bearing

CR coils/sheets are supplied in oiled/uncoiled condition as per customers' requirements.

Tolerance as per IS - 513/IS/ISO/16162 (2005)

Rourkela Steel Plant : Rationalised sizes of Cold Rolled Sheets

Thickness (mm)	Width (mm)	Length (mm)
1.0, 1.25, 1.6	1250	2500

Common grades : IS 513/2008 Grade

Tolerances as per IS 513/IS/ISO 16162 (2005)

Packaging : CR Coils

Coils are first packed with paper and high-density polythene and then secured with steel strapping. A coil is strapped with three eye and two circumferential straps. For identification, one sticker and one metallic tag with a sticker are provided. These are then loaded into wagons with the eye of the coil in horizontal position. Coils are then unitised by strapping.

Packaging : CR Sheets

These are packed in packets of 3 - 10 tonnes each and covered with high density polythene and paper. Thereafter, these are bound with steel straps. They also have stickers inside the packets and metal tags attached to the strips.

Table 1 : Normal thickness tolerances for coils and sheets

Dimensions and tolerances in millimetres

Specified width	Thickness tolerances ^{a, b} for specified thicknesses ^c									
	≤ 0.4	>0.4 ≤0.6	>0.6 ≤0.8	>0.8 ≤1.0	>1.0 ≤1.2	>1.2 ≤1.6	>1.6 ≤2.0	>2.0 ≤2.5	>2.5 ≤3.0	>3.0 ≤4.0
600 ≤ 1200	±0.04	±0.05	±0.07	±0.08	±0.09	±0.11	±0.13	±0.15	±0.18	±0.20
> 1200 ≤1500	±0.50	±0.06	±0.08	±0.09	±0.10	±0.12	±0.14	±0.16	±0.19	±0.21
≥1500 ≤1800	–	±0.08	±0.09	±0.10	±0.12	±0.14	±0.16	±0.18	±0.21	±0.23

Thickness is measured at any point on the sheet not less than 25 mm from a side edge.

Table 2 : Width tolerances for coils and sheets

Dimensions and tolerances in millimetres

Specified width	Tolerance
≤1200	+3 0
> 1200 ≤1500	+5 0
> 1500	+5 0

Table 3 : Length tolerances for sheets

Dimensions and tolerances in millimetres

Specified width	Tolerance
≤2000	+10 0
> 2000 ≤8000	+0.5% X length 0
> 8000	+40 0

Note: For resquared material, more restrictive tolerances are subject to negotiation.

Chemical Composition : IS 513 : 2016

Designation (Quality)	Grade	Carbon	Manganese	Sulphur	Phosphorus
	% Max	% Max	% Max	% Max	% Max
Cold Rolled (Full Hard)	CRO	0.35	4.00	0.035	0.050
General Purpose	CR1	0.15	1.00	0.035	0.080
	CR2	0.12	0.50	0.035	0.040
	CR3	0.10	0.45	0.030	0.025
	CR4	0.08	0.45	0.030	0.020
	CR5	0.06	0.25	0.020	0.020
Drawing Quality	ISC270C	0.12	0.50	0.035	0.040
	ISC270D	0.10	0.45	0.030	0.025
	ISC270E	0.08	0.40	0.030	0.020
	ISC270F	0.06	0.25	0.020	0.020
C, Mn Steel	ISC340W	0.12	0.90	0.030	0.050
	ISC370W	0.15	1.30	0.030	0.050
	ISC390W	0.20	1.50	0.030	0.050
	ISC440W	0.20	1.70	0.030	0.050

NOTES :

1. Restricted chemistry can be mutually agreed to between the purchaser and the manufacturer.
2. When the steel is aluminium-killed, the total aluminium content shall not be less than 0.02 percent. When the steel is silicon-killed, the silicon content shall not be less than 0.10 percent. When the steel is aluminium silicon killed, the silicon content shall not be less than 0.03 percent and total aluminium content shall not be less than 0.01 percent. If mutually agreed to between the purchaser and the manufacturer, for aluminium-killed steel, aluminium content can be less than 0.02 percent.
3. For grades where non-ageing characteristics are defined, Nitrogen content shall be 0.007 percent maximum. For grades where non-ageing characteristics are not defined, Nitrogen content shall be 0.012 percent maximum. This shall be ensured by the manufacturer by occasional check analysis.
4. The steel can be made with microalloying elements like Chromium, Nickel, Niobium, Vanadium, Titanium, molybdenum, Boron, Calcium and others, either added individually or in combination. However, in case of Boron, the limit shall be 0.005 percent maximum.
5. Phosphorus limit of 0.12 percent maximum can be added and in such cases, carbon content shall be limited to 0.15 percent maximum.

Mechanical Properties : IS 513 : 2016

Grade	Yield Point or Proof Stress Mpa, Max	Tensile Strength Mpa, Max	Minimum Elongation		Mean Plastic Strain Ration r-Bar	Tensile Strain Hardening Component n-Value	Test Direction
			Gauge Length 80 mm	Gauge Length 80 mm			
CR1	280	410	27	28	-	-	T
CR2	240	370	30	31	-	-	T
CR3	220	350	34	35	1.3 min	0.16 min	T
CR4	210	350	36	37	1.4 min	0.19 min	T
CR5	190	350	38	40	1.7 min	0.22 min	T

Mechanical Properties

Grade	Minimum Tensile Strength Mpa	Yield Point or Proof Stress Mpa				Elongation, percent Gauge Length 50 mm												Amount of Bake Hardening BH Mpa	Test Piece Direction	Mean Plastic Strain Ratio r-Bar	Strain Hardening Component n-Value
		Thickness, t, mm				Thickness, t, mm															
		t< 0.40	0.40≤ t <0.80	0.80≤ t <1.00	t ≥1.00	t< 0.40	0.40≤ t <0.60	0.60≤ t <0.80	0.80≤ t <1.00	1.00≤ t <1.20	1.20≤ t <1.60	1.60≤ t <2.00	2.00≤ t <2.50	t≤ 2.50							
ISC270C	270	155-275	145-265	135-255	125-245	37-46	37-46	38-47	39-48	40-49	41-50	42-53	43-55	44-57	L	-	-				
ISC270D	270	-	135-225	125-215	115-205	40-49	40-49	41-50	42-51	43-52	44-53	45-55	46-57	47-59	L	≥1.2	≥0.15				
ISC270E	270	-	130-205	120-195	110-185	42-50	42-50	43-51	44-52	45-53	46-54	47-56	48-58	49-60	L	≤1.4	≥0.18				
ISC270F	270	-	120-185	110-175	100-165	44-52	44-52	45-53	46-54	47-55	48-56	49-58	50-60	-	L	≥1.6	≥0.20				
ISC340W	340	-	185-285	175-275	165-265	-	33-43	34-44	35-45	36-46	37-47		≥38		T	-	-				
ISC370W	370	-	205-305	195-295	185-285	-	30-40	31-41	32-42	33-43	34-44		≥35		T	-	-				
ISC390W	390	-	245-355	235-345	225-335	-	29-40	30-41	31-42	32-43	33-44		≥34		T	-	-				
ISC440W	440	-	285-390	275-380	265-370	-	26-38	27-39	28-40	29-41	30-42		≥31		T	-	-				

Specification	Grade	C max	Min max	S max	P max	Al min	Si max	MAE max
IS 15391:2003	SAIL RIM	0.11	0.07 - 0.45	0.35 -	0.04	0.04		0.06
Semi Processed Electrical Steel		0.05 max	0.25 - 0.50	0.02	0.025 max	0.08 - 0.12	0.5 - 0.7	
IRSM-41	SAILCOR	0.1 max	0.25 - 0.45	0.03	0.075 - 0.140	0.08 max	0.28 - 0.72	Ni : 0.2 - 0.47 Cu : 0.3 - 0.6 Cr : 0.35 - 0.6

Specification	Grade	YS, MPa	UTS, MPa	% El min 80 mm GL	n bar	r bar
IRSM-41	SAILCOR	300	440 min	26		

Output from the new CRM mill at Bokaro

Thickness	-	0.25 – 2.0 mm	Coil OD	-	1000 – 2000 max
Width	-	800 – 1560 mm	Coil weight	-	31 tonnes max
Coil ID	-	500 mm	Specific Coil weight	-	20 kg / mm (max)

Applications

Specification	Size	Application
Full Hard IS 513 O un-annealed	0.27 to 0.60 mm thickness	Coated Sheets
SAILNOX - IS: 513 O (Sk)/D (K)	Bitumen and Barrel sizes	Packaging
SAIL PRESS - IS: 513 D/DD/EDD	All sizes	Household applications Automobile
IS: 513 O (Sk)/D (K)	0.8 to 2 mm thickness	Precision tubes
SAILCOR (IRSM41)	1.25 to 2 mm thickness	Railway Coaches/Wagons
IS: 513 O/D with Cu	0.63 to 2 mm thickness	Corrosion resistance applications
SAILRIM, SAILHUB SAILMUDGUARD	0.56 to 0.9 mm thickness	Cycle manufacturing
SEMI PROCESSED ELECTRICAL STEEL, SAIL LEC	0.5 to 0.63	Fractional Horse Power Motors & Electrical Applications
ISC 340/370/390/440W	0.8 to 2.0	Load bearing components for automobiles, Roll formed sections, Industrial storage systems, Drums, Barrels etc.