



Product Range

ERW Pipes

In grades IS 3589 Fe 330, Fe 410, Fe 450, IS 4270 and ASTM A53 Gr. A & B

Diameter (inch)	Thickness (mm)								
	4.8	5.2	5.6	6.0	6.4	7.1	7.9	9.5	10
8 5/8	4.8	5.2	5.6	6.0	6.4	7.1	7.9	9.5	10
10 3/4	4.8	5.2	5.6	6.0	6.4	7.1	7.9	9.5	10
12 3/4	5.0	5.2	5.6	6.0	6.4	7.1	7.9	9.5	10
14	5.0	5.2	5.6	6.0	6.4	7.1	7.9	9.5	10
16		5.2	5.6	6.0	6.4	7.1	7.9	9.5	10
18		5.2	5.6	6.0	6.4	7.1	7.9	9.5	10

Pipes can be supplied with rust preventive coatings like varnish, red oxide, enamel, liquid epoxy coating, 3LPE coating, etc.

SW Pipes

In grades IS 3589 Fe 330, Fe 410, Fe 450 and IS 5504

Outer Diameter	
OD in Inch	OD in mm
20	508
24	609.6
28	711.2
32	812.8
36	914.4
40	1016
44	1117.6
48	1219.2
52	1320.8
56	1422.4
60	1524.0
64	1625.6

Pipes can be supplied with rust preventive coatings like varnish, red oxide, enamel, liquid epoxy coating, 3LPE coating, etc.

Notes

- ERW pipes in API specifications can be supplied with wall thickness upto 10 mm, if mutually agreed upon.
- Other thickness within the range can be produced for both ERW & SW Pipes
- For SW Pipes thickness above 10.3 mm up to 12.7 mm can be produced as per mutual agreement

* The standard outer diameter of SW pipes are 20", 22", 24", 28", 30", 32", 34", 36", 38", 40", 42", 44", 46", 48", 52", 56", 60" and 64". Pipes in other diameters can be supplied as per mutual agreement.

Length

ERW Pipe : In random lengths of 6.2 to 12.4 metres, usually supplied with plain bevelled edges, bevelled angle being $30^0 (+5^0, - 0^0)$ with a root face of 1.6 ± 0.8 mm. Pipes with closer length tolerance can also be supplied as per mutual agreement.

SW Pipe : In random lengths of 7.5 to 13 metres, usually supplied with plain bevelled edges, bevelled angle being $30^0 (+5^0, - 0^0)$ with a root face of 1.6 ± 0.8 mm

IS: 3589 ERW and SW Pipes for Water and Sewerage (Salient Points)

This specification derives assistance from ISO 559/1977 (International Standards Organisation), BS: 534/1981 (British Standard), BS 3601/1974 (British Standard), API 5L (American Petroleum Institute)

Grade	Chemical Composition					Mechanical Properties		
	C % max	Mn % max	P % max	S % max	CE max	YS MPa min	UTS MPa min	Elongation % min
Fe 330	0.16	1.20	0.040	0.040	—	195	330	20
Fe 410	0.20	1.30	0.040	0.040	0.45	235	410	18
Fe 450	0.25	1.20	0.040	0.040	0.45	275	450	12

Tolerances

- A) Outer Diameter – $\pm 0.75\%$
- B) Wall Thickness – ERW $\pm 10\%$
SWPP $+ 20\%, - 12.5\%$
- C) Straightness - Deviation from straightness not to exceed 0.2% of the total length of each pipe.

Notes

Unless otherwise agreed, end shall be bevelled to an angle of $30^\circ (+5^\circ, - 0^\circ)$ measured from a line drawn perpendicular to the axis of the pipe.

Hydraulic Pressure Test

Each pipe shall be hydraulically tested at the manufacturers' works. The maximum test pressure will be 60% of the specified min YS as per

$$P = 2ST/D, \text{ where}$$

P = Hydraulic test pressure in MPa

S = Min YS 60% of SMYS

T = Specific thickness in mm

D = Specific outside diameter in mm

- (i) Pipes can also be supplied in IS 4270 (ERW), IS 5504 (SW), ASTM A53 (ERW) Grades.
(ii) Maximum test pressure to be limited to 5 MPa (51 kg/cm^2) where applicable.

API-5L Specifications for Line Pipe (Salient Points)

Grade & Class	C % max	Mn% max	Si% max	P% max	S% max	Other
PSL-1 Welded						
A	0.22	0.90		0.030	0.030	
B	0.26	0.20		0.030	0.030	c, d
X 42	0.26	1.30		0.030	0.030	d
X46, X52, X56	0.26	1.40		0.030	0.030	d
X60	0.26 ^e	1.40 ^e		0.030	0.030	f
X65	0.26 ^e	1.45 ^e		0.030	0.030	f
X70	0.26 ^e	1.65 ^e		0.030	0.030	f

Notes for PSL 1 Pipe

- a. $Cu \leq 0.50\%$; $Ni \leq 0.50\%$, $Cr \leq 0.50\%$ and $Mo \leq 0.25\%$
- b. For each reduction of 0.01% below the specified maximum concentration for carbon, an increase of 0.05% above the specified maximum concentration for Mn is permissible, up to a maximum of 1.65% for grades $\geq L245$ or B, but $\leq L360$ or X52; up to a maximum of 1.75% for grades $> L360$ or X52, but $< L485$ or X70; and up to a maximum of 2.00% for grade L485 or X70.
- c. Unless otherwise agreed, $Nb + V \leq 0.06\%$.
- d. $Nb + V + Ti \leq 0.15\%$.
- e. Unless otherwise agreed.
- f. Unless otherwise, $Nb + V + Ti < 0.15\%$.

Pipe grade	Yield strength ^a		Tensile strength ^a		Ration ^{3,c}	Elongation (on 50 mm or 2 in) %
	MPa (psi)		MPa (psi)			
	minimum	maximum	minimum	maximum		
B	245	450 ^e	415	655	0.93	T
X42	290	495	415	655	0.93	T
X46	320	525	435	655	0.93	T
X52	360	530	460	760	0.93	T
X56	390	545	490	760	0.93	T
X60	415	565	520	760	0.93	T
X65	450	600	535	760	0.93	T
X70	485	635	570	760	0.93	T

1. For intermediate grades, the difference between the specified maximum yield strength and the specified minimum yield strength shall be as given in the table for the next higher grade and the difference between the specified minimum tensile strength and the specified minimum yield strength shall be as given in the table for the next higher grade. For intermediate grades up to X46, the tensile strength shall be ≤ 655 MPa. For intermediate grades greater than X46 and lower than X70, the tensile strength shall be ≤ 760 MPa. The calculated value shall be rounded to the nearest 5 MPa.
2. This limit applies for pipe with $D > 323.9$ mm
3. For pipe requiring minimum elongation, xxx shall be as determined using the following equation:
where

C is 1.940 for calculations

As is the applicable tensile test piece cross-sectional area, expressed in square millimetres as follows:

for circular cross-section test pieces, 130 mm^2 for 12.7 mm and 8.9 mm diameter test pieces; and 65 mm^2 for 6.4 mm diameter test pieces;

for full-section test pieces, the lesser of (a) 485 mm^2 and (b) the cross-sectional area of the test piece, derived using the specified outside diameter and the specified wall thickness of the pipe, rounded to the nearest 10 mm^2 ;

for strip test pieces, the lesser of (a) 485 mm^2 and (b) the cross-sectional area of the test piece, derived using the specified width of the test piece and the specified wall thickness of the pipe, rounded to the nearest 10 mm^2 ;

U is the specified minimum tensile strength, expressed in megapascals

Tolerances

(A) For diameter of welded, non-expanded pipes

Size (Outer Diameter)	Tolerance
Pipe Body	
2 3/8 " to <20"	± 0.75%
20" - 36"	+ 0.75%, - 0.25%
Above 36"	+ 6.35 mm, - 3.20 mm
Pipe Ends	
≤ 10 3/4"	- 0.4 mm, + 1.59 mm
> 10 3/4"	- 0.79 mm, + 2.38 mm

(B) For wall thickness

	Grade B or lower	Grade X42 and higher
< 20"	+ 15%, -12.5%	+ 15%, - 12.5%
≥ 20"	+ 17.5 %, -12.5%	+ 19.5%, - 8 %

Notes

1. Chemical composition over and above specified API composition to be as per mutual agreement.
2. Supplementary requirements of API 5L as per mutual agreement.
3. Rust preventive varnish coating and end protectors on pipe ends can be provided as per mutual agreement.
4. Pipes in PSL-2 can be supplied only as per mutual agreement.

CRNO Coils & Sheets

To meet the demands of the electrical industry, Rourkela Steel Plant offers Cold Rolled Non Oriented (CRNO) fully processed steel used in the manufacture of magnetic cores and components.

Grades and Specifications

CRNO steels from RSP are graded on the basis of Epstein Core Loss Testing at an induction of 1.5 Tesla. The maximum core loss limits are based upon the general test procedures established by the Bureau of Indian Standard (IS:649). For this purpose RSP has a fully equipped and modern testing laboratory consisting of among other equipments, a sophisticated Digital Core Loss Testing Unit. Other test instruments include Franklin Surface Insulation Resistance Tester, Fishers' coating thickness machine, hardness tester, etc.

Magnetic and Mechanical Properties

Grades As per BIS	Thickness (mm)	Assumed Density (kg/dm)	Maximum Core Loss at 50 Hz and 1.5T (W/kg)	a.c Magnetization (50 Hz) Minimum Values of B Max (Tesla) 5000 A/m	Minimum Stacking
50C 330	0.50	7.65	3.30	1.60	96.0
50C 350		7.65	3.50	1.60	
50C 400		7.70	4.0	1.63	
50C 470		7.70	4.7	1.64	
50C 530		7.70	5.3	1.65	
50C 600		7.75	6.0	1.66	
50C 630		7.75	6.3	1.68	
50C 700		7.80	7.0	1.69	
50C 800		7.80	8.0	1.70	
50C 900		7.80	9.0	1.70	
50C 1000	7.85	10.0	1.72		

Note : The present production is in 0.50 mm thickness. Production can be undertaken in 0.35 mm and 0.65mm thickness conforming to BIS Specification IS:648/2006 with mutual consent.

The values are measured in accordance with IS:649 with ASTM A34 methods using fully processed consisting of half of the strip parallel and half sheared transverse to the rolling directions.

Magnetic Ageing : The Non-Oriented steels will have less than 5% increase in core loss upon a standard ageing treatment (of as sheared specimens) at 225°C for 24 hours Grading is done based on watt loss value obtained after ageing.

Packing : Coils are packed in Eye - Horizontal condition. The material is first wrapped with stretch film/VCI (Colatile corrosion inhibitor) film over Air bubble sheet/HDPE paper. Metallic edge protectors are provided in the eye & OD edges. It is then packed in galvanized sheet metal envelopes strapped with 4 eyes & 3 to 4 circumferential straps of special steel. Additional support is provided when warranted. No metallic packing is given on slit coil.

Insulation and Applications

Insulation Designation	Type of Coating	Coating Thickness (Microns)	Applications
C-0	Natural	Nil	Fractional horsepower motors and relays, small communication power transformers and reactors.
C-3	Organic	2-3	Air/Oil cooled medium sized power and distribution transformers, medium sized continuous duty, rotating electrical machinery.
C-3	Organic	3-6	Medium sized continuous duty high efficiency rotating electrical machinery.
C-6	Semi-organic	0.8-1.5	Applications requiring stress-relief anneal and burn-off treatment. Extremely useful for stamped laminations of hermetically sealed compressors used in refrigeration system

Standard Width : The standard width of CRNO coils or sheets are 900, 950 and 1000 mm. Other sizes are negotiable.

Standard Length : The standard length of CRNO sheets are 2000 and 2500 mm.

Coil Weight : upto 6 tonnes.

Tolerances in dimensions and shape

Width	Normal Thickness	Thickness Tolerance	Thickness Deviation in Transverse Direction	Width Tolerance	Camber per 2 m of length	Flatness (% max)*
mm	mm	%	mm	mm	mm	mm
≥ 300 to 600	0.50	±8	0.02 or less	+0.5-0	2	2
≥600 to 1000	0.50	±8	0.02 or less	+1.0-0	2	2
≥1000 to 1250	0.50	±8	0.02 or less	+1.5-0	2	2

* Flatness %: (Wave height/Wave length) x 100

Burr height : Maximum 50 micron