

**TOLERANCES****IS : 3589 - 1981**

Outside Diameter

Pipe Body - The tolerance on the pipe body shall be as shown below:

Nominal Size	Tolerance
Up to 500 mm	± 0.75 percent
Over 500 mm	± 1.00 percent

Note : Measurements may be made by any suitable instrument, such as outside calipers, diameter tapes, micrometers, etc.

**Thickness** - The tolerance on specified wall thickness shall be as follows :

ERW Pipe	± 10 percent
EFW Pipe	+ 15 percent
	- 10 percent

**HYDRO TEST PRESSURE : 5 MPA****CHEMICAL COMPOSITION**

Ladle Analysis - the steel shall show on ladle analysis the composition given in Table 1 appropriate to the steel grade specified

**TABLE 1 : CHEMICAL COMPOSITION**

Steel Grade	Chemical Composition (Ladle Analysis)		
	C	P	S
	Max	Max	Max
320	0.17	0.06	0.06
410	0.25	0.06	0.06

In the case of non-availability of ladle analysis, the finished product may also be checked to verify the chemical composition, it so agreed to by the producer

For tubes fitted with appropriate flanges or suitably butt welded together, the **maximum** permissible **pressure** shall be **21.00 kg/cm<sup>2</sup>** and the **maximum** permissible **temperature 260° C**.**BEND TEST AND FLATTENING TEST****Bend Test on Tubes up to and including 50 mm Nominal Bore** - When tested in accordance with IS:2329-1963, the finished tubes shall be capable of withstanding the bend test without showing any signs of fracture or failure. Welded tubes shall be bent with the weld at 90° to the plane of bending. The tubes shall not be filled for this test.

Ungalvanized tubes shall be capable of being bent cold, without cracking, through 180° round a former having a radius at the bottom of groove, in the plane of bending, equal to six times the outside diameter of the tube.

Galvanized tubes shall be capable of being bent cold, without cracking the steel, through 90° round a former having a radius at the bottom of the groove equal to eight times the outside diameter of the tube.

**Flattening Test on Tubes above 50 mm Nominal Bore** - Rings, not less than 40 mm in length, cut from the ends of selected tubes, shall be flattened between parallel plates with the weld if any at 90° (point of maximum bending) in accordance with IS : 2328 - 1963 No Opening shall occur by fracture in the weld until the distance between the plates is less than 75 percent of the original outside diameter of the pipe and no cracks or breaks in the metal elsewhere than in the weld shall occur until the distance between the plates is less than 60 percent of the original outside diameter.**SPECIAL FORMULA****1. Weight of Pipe**

$$\text{kg/ft.} = 0.0075 \times (\text{OD} - \text{Wall Thickness}) \times \text{Wall Thickness}$$

(mm) (mm)

**2. Weight of Circle in Kg.**

$$= \frac{\text{OD (Inch)} \times \text{OD (Inch)} \times \text{thickness (mm)}}{250}$$

**3. Weight of Plate in Kg.**

$$= \frac{W \text{ (mm)}}{1000} \times \frac{L \text{ (mm)}}{1000} \times \text{thickness (mm)} \times 7.9$$

**4. Weight of Rod kg./ft = OD (mm) x OD (mm) x 0.0019****5. Formula for making Tubes from Sheet**

$$\{\text{OD (mm)} - \text{Wall Thickness (mm)}\} \times 3.14 = \text{width of Sheet}$$

**6. Weight of S.S. Material ÷ 3 = Aluminium Material Weight****7. Weight of S.S. Material x 9% = Brass Material Weight****8. Weight of S.S. Material x 12% = Copper Material Weight****CONVERSION**

1kg/cm<sup>2</sup> = 10,000 MMWC

= 1000 M BAR

= 10 MWC

40" WC = 1000 MMWC

1 atn = 14.70 lbs/in<sup>2</sup>

1bar = 14.50 lbs/in<sup>2</sup>

1 kg/cm<sup>2</sup> = 14.22 lbs/in<sup>2</sup>

1 Mtr = 3.281 ft.