

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	Unit	Symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	Unit	Symbol
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	Unit	Symbol	Definition
Force	newton	N	1 N = 1 kg.m/s ²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²

INDIAN STANDARDS INSTITUTION

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002

Telephones: 26 60 21, 27 01 31

Telegrams: Manaksanstha

Regional Offices:

Telephone

Western : Novelty Chambers, Grant Road	BOMBAY 400307	89 65 28
Eastern : S Chowringhee Approach	CALCUTTA 700072	27 50 90
Southern : C. I. T. Campus	MADRAS 600113	41 24 42
Northern : B69, Phase VII	S.A.S. NAGAR (MOHALI) 160051	8 78 26

Branch Offices:

'Pushpak' Nurmohamed Shaikh Marg, Kharapur	AHMADABAD 380001	2 03 91
'F' Block, Unity Bldg, Narasimharaja Square	BANGALORE 560002	2 48 05
Gangotri Complex, Bhadrabada Road, T.T. Nagar	BHOPAL 462003	6 27 16
22B Kalpana Area	BHUBANESHWAR 751014	5 36 27
5-8-56C L.N. Gupta Marg	HYDERABAD 500001	22 10 83
R 14 Yudhister Marg, C Scheme	JAIPUR 302005	6 98 32
117/418 B Sarvodaya Nagar	KANPUR 208005	4 72 92
Patliputra Industrial Estate	PATNA 800013	6 28 08
Hastex Bldg (2nd Floor), Rly Station Road	TRIVANDRUM 695001	32 27

Printed at Seema Offset Press, Delhi, India

IS : 1239 (Part I) - 1979

Indian Standard

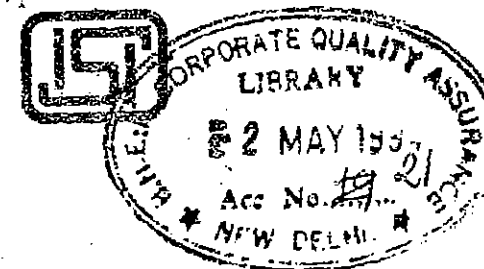
SPECIFICATION FOR MILD STEEL TUBES, TUBULARS AND OTHER WROUGHT STEEL FITTINGS

PART I MILD STEEL TUBES

(Fourth Revision)

Second Reprint OCTOBER 1983

UDC 621.643.2 : [669.141.24]



© Copyright 1979

INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

*Indian Standard*SPECIFICATION FOR
MILD STEEL TUBES, TUBULARS AND OTHER
WROUGHT STEEL FITTINGS

PART I MILD STEEL TUBES

*(Fourth Revision)*Acc. No.
NEW DELHI. ★

Steel Tubes, Pipes and Fittings Sectional Committee, SMDC 22

Chairman

SHRI J. G. KESWANI

Representing

The Indian Seamless Metal Tubes Ltd, Bombay

Members

SHRI M. M. AERON

Steel Authority of India Ltd, Rourkela Steel
Plant, RourkelaSHRI R. N. TANDON (*Alternate*)

SHRI K. K. AHUJA

Indian Oil Corporation Ltd, Bombay

SHRI P. C. JOHARI (*Alternate*)

SHRI S. C. ANAND

Bharat Steel Tubes Ltd, New Delhi

SHRI M. P. MITTAL (*Alternate*)

ASSISTANT DIRECTOR STANDARDS

Ministry of Railways

(LOCO), LUCKNOW

SHRI S. N. BASU

Directorate General of Supplies & Disposals
(Inspection Wing), New DelhiSHRI T. N. UBOVEJA (*Alternate*)

SHRI D. P. BHATTACHARJEE

Export Inspection Council of India, Calcutta

SHRI S. C. ARORA (*Alternate*)

SHRI B. C. CHAKRABORTY

Oil & Natural Gas Commission, Dehra Dun

SHRI V. K. CHATURVEDI (*Alternate*)

SHRI B. B. CHAKRAVERTI

Superintendence Co of India (P) Ltd, Calcutta

SHRI A. K. SHOME (*Alternate*)

SHRI L. M. CHAUDHRI

Public Works Department (Public Health Branch),
Government of Haryana, ChandigarhSHRI K. K. GANDHI (*Alternate*)

SHRI JACOB JOHN

Kalinga Tubes Ltd, Calcutta

SHRI A. K. MITRA (*Alternate*)

(Continued on page 2)

© Copyright 1979

INDIAN STANDARDS INSTITUTION

This publication is protected under the *Indian Copyright Act* (XIV of 1957) and reproduction in whole or in part by any means except with written permission of the publisher shall be deemed to be an infringement of copyright under the said Act.

(Continued from page 1)

Members	Representing
SHRI B. KUMAR	Stewarts & Lloyds of India Ltd, Calcutta
SHRI T. K. BASU (Alternate)	The Fertilizer Corporation of India Ltd, Sindri
SHRI K. MUKHERJEE	Central Boilers Board, New Delhi
SHRI R. K. SINHA (Alternate)	Zenith Steel Pipes and Industries Ltd, Khopoli
SHRI P. T. SHANKARAN NAYAR	Indian Register of Shipping, Bombay
SHRI G. S. GOSAL (Alternate)	Indian Tube Co Ltd, Jamshedpur
SHRI S. NEELAKANTAN	Hindustan Shipyard Ltd, Vishakhapatnam
DR. A. R. KESKAR (Alternate)	Tube Products of India, Madras
SHRI V. N. PANDEY	Bharat Heavy Electricals Ltd, Tiruchchirappalli
SHRI S. CHANDRA (Alternate)	Gujarat Steel Tubes Ltd, Ahmadabad
SHRI N. V. RAGHAVAN	Director General, ISI (Ex-officio Member)
SHRI D. DUTTA (Alternate)	
SHRI M. C. KESAVA RAO	
SHRI M. VEERABABU (Alternate)	
SHRI S. RANGANATHAN	
SHRI T. SIVASHANKAR (Alternate)	
SHRI A. SRINIVASULU	
SHRI H. J. THAKAR	
SHRI C. R. RAMA RAO,	
Director (Struc & Met)	
(Secretary)	

Panel for Consideration of Comments on IS : 1239 and IS : 1161,
SMDC 22 : P15

Convener	
SHRI D. DUTTA	Indian Tube Co Ltd, Jamshedpur
Members	
ASSISTANT DIRECTOR STANDARDS (LOCO), LUCKNOW	Ministry of Railways
SHRI G. CHATTERJEE	Indian Tube Co Ltd, Jamshedpur
SHRI M. N. JANI	Bharat Forge & Press Industries (P) Ltd, Vadodara
SHRI M. L. SHARMA (Alternate)	Directorate General of Supplies & Disposals (Inspection Wing), New Delhi
SHRI M. T. KANSE	
SHRI S. C. KAPUR (Alternate)	Zenith Steel Pipes and Industries Ltd, Khopoli
SHRI S. NEELAKANTAN	The Fertilizer Corporation of India Ltd, Sindri
SHRI R. K. SINHA	Bharat Heavy Electricals Ltd, Tiruchchirappalli
SHRI A. SRINIVASULU	Gujarat Steel Tubes Ltd, Ahmadabad
SHRI H. J. THAKAR	

Indian Standard

SPECIFICATION FOR MILD STEEL TUBES, TUBULARS AND OTHER WROUGHT STEEL FITTINGS

PART I MILD STEEL TUBES

(Fourth Revision)

0. FOREWORD

0.1 This Indian Standard (Fourth Revision) was adopted by the Indian Standards Institution on 1 May 1979, after the draft finalized by the Steel Tubes, Pipes and Fittings Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 This standard was first published in 1958 and subsequently revised in 1964, 1968 and 1973 respectively.

Based on the experience gained in the use of this standard, it has been decided to further revise this standard incorporating Amendments No. 1 to 5. Taking note of the possible adverse effect of the internal weld-fin in the case of certain applications, a provision has been made for limiting the fin height for such applications, as an optional requirement, when required by the purchaser. Investigations, however, are afoot to determine the various aspects of the deleterious effects of the fin and the notch and it is hoped that in due course it will be possible to specify the maximum permissible fin height and notch dimensions for general purpose tubes also.

0.2.1 Where the use of tubes is not controlled by byelaws or regulations, a reference should be made to the code of practice relating to the particular application.

0.2.2 In this country, the regulations governing the use of tubes for conveying steam are laid down in the Indian Boiler Regulations published by the Central Boilers Board.

0.2.3 Originally, a uniform value of 20 percent minimum for elongation had been specified for tubes irrespective of their services. While reviewing

this standard the Committee felt it expedient to temporarily revise the value to 12 percent minimum mainly for services other than steam and gas applications for nominal bores upto and including 25 mm. This was due to the greater extent of cold working operations adopted for these sizes under the present manufacturing practices followed in the country. However, there shall be further investigation to review the value of 12 percent minimum at an early date.

0.3 While formulating this standard, due consideration has been given to the trade practices followed in the country in this field. Due consideration has also been given to international co-ordination among the standards prevailing in different countries. Assistance has been derived from the following publications:

ISO 65-1973 Steel tubes suitable for screwing in accordance with ISO Recommendation R 7. International Organization for Standardization.

BS 1387: 1967 Steel tubes and tubulars suitable for screwing to BS 21 pipe threads. British Standards Institution.

0.4 This standard contains clauses 5.2.1 and 5.3 which call for an agreement of the purchaser.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard covers the requirements for butt welded and seamless screwed and socketed and plain end mild steel tubes intended for ordinary uses in steam, water, gas and air lines. Only 'medium' and 'heavy' tubes are recommended for carrying steam. The maximum permissible pressures and temperatures for different sizes of tubes for conveying steam are given in Appendix A.

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Black Tube — Tube as manufactured, but without any subsequent surface treatment.

*Rules for rounding off numerical values (revised).

2.2 Exact Length of Screwed and Socketed Tube — The length of the tube exclusive of the socket.

2.3 Length of Screwed and Socketed Tube — The length of the tube inclusive of the socket.

NOTE 1 — While 2.2 applies to exact lengths, 2.3 applies to random lengths only.

NOTE 2 — The length of the tube inclusive of the socket means the tube length measured with socket fitted at one end to handling-tight.

NOTE 3 — Handling-tight means that the socket is so tight fitted that it should not fall down during handling or transit.

2.4 Nominal Bore — A size reference denoting the approximate bore of the tube. For each size of tube, the outside diameter is fixed by the corresponding screw thread dimensions of IS : 554-1975*, and therefore, the actual bore of each size of tube will vary according to the thickness.

2.5 Random Length — Normal manufacturing lengths which may vary over a range of several metres. Alternatively, a length range agreed to between the purchaser and the manufacturer.

2.6 Socket — The screwed coupling utilized in jointing the tubes together.

NOTE — The term 'socket' is synonymous with the term 'coupler'.

2.7 Tube (Pipe) — A long, hollow, open-ended object of circular or other cross-section. The term 'tube' is synonymous with the term 'pipe'.

3. DESIGNATION

3.1 Mild steel tubes covered by this standard shall be designated by their nominal bore, and shall be further classified as 'light', 'medium' and 'heavy' depending on the wall thickness.

3.2 Mild steel socket shall be designated by the respective nominal bore of the tube for which it is intended.

4. SUPPLY OF MATERIAL

4.1 General requirements relating to the supply of mild steel tubes and sockets shall conform to IS : 1387-1967†.

5. MANUFACTURE

5.1 Tubes shall be made from tested quality steel manufactured by any approved process (see also 5.2).

*Dimensions for pipe threads where pressure-tight joints are required on the threads (second revision).

†General requirements for the supply of metallurgical materials (first revision).

5.2 'Medium' and 'heavy' tubes for use in steam services shall be manufactured from mild steel made by the open-hearth, electric, or any of the oxygen process.

5.2.1 If any other process is employed in the manufacture, prior approval of the purchaser shall be obtained.

5.2.2 Steel tubes and sockets shall be manufactured by one of the following processes:

- Hot-finished seamless (HFS),
- Electric resistance welded (ERW),
- High frequency induction welded (HFIW), and
- Hot-finished welded (HFW).

NOTE 1 — Tubes made by manual welding are not covered by this specification.

NOTE 2 — Hand welding of sockets may be permitted provided the test requirements for the sockets covered by this standard are complied with.

5.2.3 'Light', 'medium' and 'heavy' tubes and all sockets shall be either welded or seamless as agreed to between the purchaser and the manufacturer.

5.2.4 All electric welded tubes and sockets (medium and heavy class) used for steam services shall be normalized.

5.3 If so specified by the purchaser, the height of the internal weld fin shall not be greater than 60 percent of the specified thickness.

6. CHEMICAL COMPOSITION

6.1 The ladle analysis of the steel for tubes and sockets used for water and gas purposes, when made in accordance with IS : 228 (Part III)-1972* and IS : 228 (Part IX)-1975†, shall not show sulphur and phosphorus in amounts exceeding 0.060 percent each.

6.1.1 The ladle analysis of the steel for tubes and sockets used for steam services, when carried out in accordance with the methods specified in IS : 228 (Part III)-1972* and IS : 228 (Part IX)-1975†, shall not show sulphur and phosphorus in amounts exceeding 0.050 percent each.

6.2 Product Analysis — The maximum permissible variation of sulphur and phosphorus in the case of product analysis from the limits stated in 6.1 and 6.1.1 shall be 0.005 percent each.

NOTE — The product analysis is not applicable to rimming quality steel.

*Methods for chemical analysis of steels: Part III Determination of phosphorus by alkalimetric method (second revision).

†Methods for chemical analysis of steels: Part IX Determination of sulphur in plain carbon steels by evolution method (second revision).

7. DIMENSIONS

7.1 The dimensions of tubes shall be in accordance with Tables 1, 2 and 3, subject to the tolerances permitted in 9. Dimensions of sockets shall be in accordance with Table 4.

8. WEIGHT

8.1 Nominal weights of 'light', 'medium' and 'heavy' black tubes shall be as specified in Tables 1, 2 and 3 respectively.

TABLE 1 DIMENSIONS AND NOMINAL WEIGHTS OF BLACK STEEL TUBES (LIGHT)

(Clauses 7.1 and 8.1)

NOMINAL BORE	OUTSIDE DIAMETER		THICKNESS	WEIGHT OF BLACK TUBE	
	Maximum	Minimum		Plain End	Screwed and Socketed
(1) mm	(2) mm	(3) mm	(4) mm	(5) kg/m	(6) kg/m
6	10.1	9.7	1.8	0.361	0.364
8	13.6	13.2	1.8	0.517	0.521
10	17.1	16.7	1.8	0.674	0.680
15	21.4	21.0	2.0	0.952	0.961
20	26.9	26.4	2.35	1.41	1.42
25	33.8	33.2	2.65	2.01	2.03
32	42.5	41.9	2.65	2.58	2.61
40	48.4	47.8	2.9	3.25	3.29
50	60.2	59.6	2.9	4.11	4.18
65	76.0	75.2	3.25	5.80	5.92
80	88.7	87.9	3.25	6.81	6.98
100	113.5	113.0	3.65	9.89	10.2

NOTE — Dimensions and weights are in accordance with ISO 65-1973 (light series II).

TABLE 2 DIMENSIONS AND NOMINAL WEIGHTS OF BLACK STEEL TUBES (MEDIUM)

(Clauses 7.1 and 8.1)

NOMINAL BORE	OUTSIDE DIAMETER		THICKNESS	WEIGHT OF BLACK TUBE	
	Maximum	Minimum		Plain End	Screwed and Socketed
(1) mm	(2) mm	(3) mm	(4) mm	(5) kg/m	(6) kg/m
6	10.6	9.8	2.0	0.407	0.410
8	14.0	13.2	2.35	0.650	0.654
10	17.5	16.7	2.35	0.852	0.858
15	21.8	21.0	2.65	1.22	1.23
20	27.3	26.5	2.65	1.58	1.59
25	34.2	33.3	3.25	2.44	2.46
32	42.9	42.0	3.25	3.14	3.17
40	48.8	47.9	3.25	3.61	3.65
50	60.8	59.7	3.65	5.10	5.17
65	76.6	75.3	3.65	6.51	6.63
80	89.5	88.0	4.05	8.47	8.64
100	115.0	113.1	4.5	12.1	12.4
125	140.8	138.5	4.85	16.2	16.7
150	166.5	163.9	4.85	19.2	19.8

NOTE — Dimensions and weights are in accordance with ISO 65-1973.

TABLE 3 DIMENSIONS AND NOMINAL WEIGHTS OF BLACK STEEL TUBES (HEAVY)

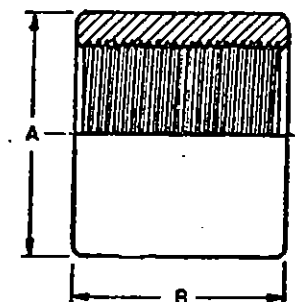
(Clauses 7.1 and 8.1)

NOMINAL BORE	OUTSIDE DIAMETER		THICKNESS	WEIGHT OF BLACK TUBE	
	Maximum	Minimum		Plain End	Screwed and Socketed
(1) mm	(2) mm	(3) mm	(4) mm	(5) kg/m	(6) kg/m
6	10.6	9.8	2.65	0.493	0.496
8	14.0	13.2	2.9	0.769	0.773
10	17.5	16.7	2.9	1.02	1.03
15	21.8	21.0	3.25	1.45	1.46
20	27.3	26.5	3.25	1.90	1.91
25	34.2	33.3	4.05	2.97	2.99
32	42.9	42.0	4.05	3.84	3.87
40	48.8	47.9	4.05	4.43	4.47
50	60.8	59.7	4.5	6.17	6.24
65	76.6	75.3	4.5	7.90	8.02
80	89.5	88.0	4.85	10.1	10.3
100	115.0	113.1	5.4	14.4	14.7
125	140.8	138.5	5.4	17.8	18.3
150	166.5	163.9	5.4	21.2	21.8

NOTE — Dimensions and weights are in accordance with ISO 65-1973.

TABLE 4 DIMENSIONS OF SOCKETS

(Clause 7.1)



NOMINAL BORE	OUTSIDE DIAMETER, A	LENGTH, B
(1)	Min	Min
(2)	(3)	
mm	mm	mm
6	15	19
8	18.5	27
10	22	28
15	27	37
20	32.5	39
25	39.5	46
32	49	51
40	56	51
50	68	60
65	84	69
80	98	75
100	124	87
125	151	96
150	178	96

NOTE — The socket lengths shown in this table meet the requirements of ISO 50-1977, but the minimum length has been increased to allow for the chamfer at the ends of the socket and is based on:

$$B = 2L + 3\frac{1}{2}P$$

where

L = length of useful thread on pipe end (see IS: 554-1975*), and

P = pitch of thread.

*Dimensions for pipe threads where pressure tight joints are required on the threads (second revision).

9. TOLERANCES ON THICKNESS AND WEIGHT

9.1 The following manufacturing tolerances shall be permitted on the tubes and sockets:

a) *Thickness:*

1) Butt welded

Light tubes: + Not limited
- 8 percent

Medium and heavy tubes: + Not limited
- 10 percent

2) Seamless tubes + Not limited
- 12.5 percent

b) *Weight:*

1) Single tube (irrespective of the quantity) + 10 percent
- 8 percent

2) For quantities of less than 150 m of one size + 10 percent
- 8 percent

3) For quantities of 150 m and over of one size \pm 4 percent

10. JOINTS

10.1 All screwed tubes and sockets shall be supplied with pipe threads conforming to IS: 554-1975*.

10.1.1 Unless specified otherwise, tubes shall be supplied screwed with taper threads and sockets with parallel threads.

10.1.1.1 However, in the case of 'light' tubes, the application of taper pipe threads may be modified by permitting the outside diameter of the tubes to be within the limits shown in column 2 and 3 of Table 1. Where the tube approaches the lower limit of outside diameter, some incomplete threads (perfect at root and imperfect at the crest) may be expected from and beyond the gauge plane. Such incomplete threads shall not be regarded as justification for rejection of the tubes. Also the minimum length of threads in 'light' tubes shall be 80 percent of that specified in IS: 554-1975*.

10.2 Each tube shall be supplied with one socket. The ends of sockets shall be chamfered internally to prevent damage to the leading thread. Tapping of sockets shall be done from one end only.

*Dimensions for pipe threads where pressure tight joints are required on the threads (second revision).

TO

IS:1239(Part I)-1979 SPECIFICATION FOR MILD STEEL TUBES, TUBULARS AND OTHER WROUGHT STEEL FITTINGS

PART I MILD STEEL TUBES

(Fourth Revision)

[The requirements for tolerance and weight have been modified to bring them in line with ISO/R 65 in principle.]

Alteration

(Page 10, clause 9.1) - Substitute the following for the existing clause:

'9.1 The following manufacturing tolerances shall be permitted on the tubes and sockets:

a) *Thickness:*

1) Butt welded

Light tubes + Not limited
- 8 percent

Medium and heavy tubes + Not limited
- 10 percent

2) Seamless tubes + Not limited
- 12.5 percent

b) *Weight:*

1) Single tube (light series) + 10 percent
- 8 percent

2) Single tube (medium and heavy series) \pm 10 percent

3) For quantities per load ± 5 percent
of 10 tonnes, *Min*
(light series)

4) For quantities per load ± 7.5 percent
of 10 tonnes, *Min*
(medium and heavy series)

NOTE - For the purpose of a minimum weighment
of 10 tonnes lot, the weighment may be done in
convenient lots at the option of the manufacturer.'

(SMDC 22)



AMENDMENT NO. 3 JULY 1983

TO

IS:1239(Part I)-1979 SPECIFICATION FOR MILD STEEL
TUBES, TUBULARS AND OTHER WROUGHT STEEL FITTINGS

PART I MILD STEEL TUBES

(Fourth Revision)

Alterations

(Page 6, clauses 6.1 and 6.1.1) - Substitute
the following for the existing clauses:

'6.1 The ladle analysis of the steel for tubes and
sockets used for water and gas purposes shall not
show sulphur and phosphorus in amounts exceeding
0.060 percent each.

6.1.1 The ladle analysis of the steel for tubes and
sockets used for steam services shall not show sulphur
and phosphorus in amounts exceeding 0.050 percent
each.

6.1.2 The analysis of steel shall be carried out
either by the method specified in IS:228* and its
relevant parts or any other established instrumental/
chemical method. In case of dispute the procedure
given in IS:228* and its relevant parts shall be
referee method. However, where the method is not
given in IS:228* and its relevant parts, the referee
method shall be agreed to between the purchaser and
the manufacturer.'

(Page 6, foot-notes with '*' and '+' marks) -
Substitute the following for the existing foot-notes:

'Methods for chemical analysis of steels.'

(SMDC 22)



AMENDMENT NO. 2 DECEMBER 1982

TO

IS:1239(Part I)-1979 SPECIFICATION FOR MILD STEEL
TUBES, TUBULARS AND OTHER WROUGHT STEEL FITTINGS

PART I MILD STEEL TUBES

(Fourth Revision)

Alteration

(Page 11, clause 13.1) - Substitute the following
for the existing clause:

"13.1 Each tube shall be hydraulically tested at the
manufacturer's works or as mutually agreed to between
the manufacturer and the purchaser either before or
after galvanizing."

(SMDC 22)

11. LENGTHS

11.1 Random Length — Tubes shall be supplied in random lengths from 4 to 7 m.

11.1.1 For orders of over 150 m of any one size of tube, it shall be permissible to supply short random lengths from 2 to 4 m, provided that the number of such lengths does not exceed 7.5 percent of the total number of lengths for sizes 65 to and including 100 mm nominal bore, and 5 percent for all other sizes. In addition, it shall be permissible for two lengths to be jointed together to make a random length, provided that the number of such jointed lengths does not exceed 7.5 percent of the total number of lengths for sizes 65 to and including 100 mm nominal bore, and 5 percent for all other sizes.

11.2 Exact Lengths — Unless otherwise agreed to between the manufacturer and purchaser, where exact lengths are specified, either for screwed and socketed tubes or for plain end tubes, each tube shall be within ± 8 mm of the specified length.

12. GALVANIZING

12.1 Where tubes are required to be galvanized, the zinc coating on the tubes shall be in accordance with IS : 4736-1968*.

12.1.1 Tubes which are to be screwed shall be galvanized before screwing.

13. HYDRAULIC TEST

13.1 Each tube shall be hydraulically tested at the manufacturer's works either before or after galvanizing.

13.2 Tubes shall withstand a test pressure of 5 MPa† without showing defects of any kind. The pressure shall be applied by approved means and maintained sufficiently long for proof and inspection. The testing apparatus shall be fitted with an accurate pressure indicator, and provision shall be made for its accuracy to be verified by the purchaser, if required.

14. TEST ON FINISHED TUBES AND SOCKETS

14.0 The following tests shall be conducted by the manufacturer on finished tubes and sockets.

14.1 The tensile strength of length, or strip cut from selected tubes, when tested in accordance with IS : 1894-1972‡ shall be at least 320 MPa† (320 N/mm²).

*Specification for hot-dip zinc coatings on steel tubes.

†1 MPa = 1 N/mm² = 0.102 0 kg/mm².

‡Method for tensile testing of steel tube (first revision).

14.1.1 The elongation percentage on a gauge length of $5.65\sqrt{S_0}$ (where S_0 is the original cross-sectional area of the test specimen) shall be as follows:

Nominal Bore	Elongation, Percent Min
a) For steam and gas services for all sizes	20 percent
b) Other services:	
Up to and including 25 mm	12 percent
Over 25 mm up to and including 150 mm	20 percent

14.2 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.

14.2.1 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.

14.2.2 Galvanized tubes shall be capable of being bent cold, without cracking of 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.

14.3 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.

14.3.1 The test rings may have the inner and outer edges rounded.

14.4 Expansion Test on Sockets — At the option of the manufacturer any one of the tests described in 14.4.1 and 14.4.2 shall be carried out.

*Method for bending test on steel tubes.

†Method for flattening test on steel tubes.

14.4.1 Drift Expanding Test — It shall be carried out on sockets, blanks or sockets in accordance with IS : 2335-1963* on a conical mandrel having an included taper on diameter 1 in 16 and the minimum increase in outside diameter after expansion shall be as follows:

Nominal Bore mm	Percentage of Expansion, Min
Up to and including 25	2
32 to 40	1.5
50 „ 80	1
100 „ 150	0.5

14.4.2 Taper Screw Plug Test — Sockets shall be capable of withstanding the expansion test as described below without showing any sign of fracture or failure.

14.4.2.1 The test shall consist of screwing the selected socket on a taper screw plug.

14.4.2.2 The threads of the socket shall be thoroughly clean and free from foreign matter. Should the threads show sign of burr, this shall be removed by means of a pipe thread tap. The threads of the socket and the end of the test plug shall be lubricated with oil, and the socket shall then be screwed on to the test plug to the extent of extreme hand tightness by holding the head of the plug between the jaws of a vice, or other suitable fixtures, and by rotating the socket with both hands. The socket shall then be further rotated five complete turns beyond hand tightness, either by means of a pipe wrench of an adequate length to operate the test with gradual turning or by a power machine giving an appropriate leverage. The wrench shall not be hammered (see Fig. 1).

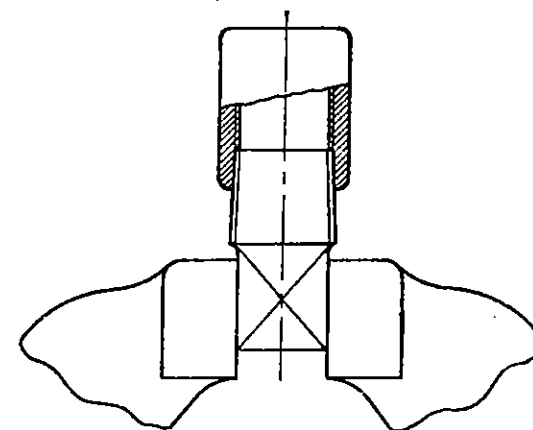


FIG. 1 MECHANICAL EXPANSION TEST ON SOCKETS

*Method for drift expanding test on steel tubes.

14.4.2.3 The plugs shall be manufactured from steel and shall be hardened to give a Vickers hardness between 700 and 800 HV when determined by applying a load of 30 kgf in accordance with IS : 1501-1968*.

14.4.2.4 The plugs shall be in accordance with the dimensions given in Table 5. The thread shall be ground after the plugs are case hardened, and the thread form and angle of taper shall be in accordance with the appropriate dimensions and tolerances specified in IS : 554-1975†.

14.4.2.5 For routine testing, use may be made, if so desired, of unhardened steel plugs in accordance with the dimensions given in Table 5 and having machined threads, the thread form and angle of taper being in accordance with the appropriate dimensions and tolerances specified in IS : 554-1975†.

14.4.2.6 In cases of dispute, however, the test shall be carried out with the hardened plugs specified in 14.4.2.3 and 14.4.2.4.

14.5 Retest — Should any one of the test pieces first selected fail to pass any of the tests specified, two further samples shall be selected for testing in respect of each failure. Should the test pieces from both these additional samples pass, the material shall be deemed to comply with the requirements of that particular test. Should the test pieces from either of these additional samples fail, the material represented by the test samples shall be deemed as not complying with the standard.

15. WORKMANSHIP

15.1 The tubes shall be cleanly finished and reasonably free from scale. They shall be reasonably straight, free from cracks, surface flaws, laminations and other defects. The screw threads of screwed tubes and sockets shall be clean and well cut. The ends shall be cut cleanly and square with the axis of the tube.

16. SAMPLING OF TUBES AND SOCKETS

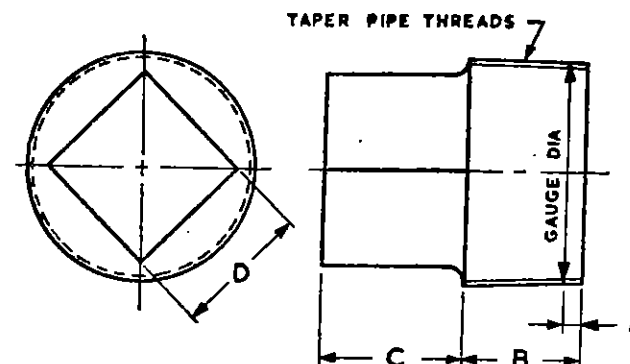
16.1 Lot — For the purpose of drawing samples all mild steel tubes bearing same designation and manufactured under a single process shall be grouped together to constitute a lot. Each lot shall be sampled separately and assessed for conformity to this specification.

*Method for Vickers hardness test for steel (first revision).

†Dimensions for pipe threads where pressure tight joints are required on the threads (second revision).

TABLE 5 DIMENSIONS OF TAPER SCREW PLUGS FOR EXPANSION TEST

(Clauses 14.4.2.4 and 14.4.2.5)



NOMINAL BORE	GAUGE DIAMETER	THREADS PER 25.4 mm	TOLERANCES ON TOTAL NUMBER OF THREADS	A	B	C	D
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
mm	mm			mm	mm	mm	mm
6	9.728	28	2	1.8	13	11	7
8	13.157	19	2	2.8	19	13	10
10	16.662	19	2	2.8	19	16	13
15	20.955	14	2	3.6	25	19	14
20	26.441	14	2	3.6	25	29	17
25	33.249	11	2	4.6	32	29	21
32	41.910	11	2	4.6	32	32	27
40	47.803	11	2	4.6	32	38	32
50	59.614	11	2	4.6	32	38	37
65	75.184	11	2	4.6	32	51	48
80	87.884	11	2	4.6	32	57	54
100	113.030	11	2	4.6	32	64	70
125	138.430	11	2	4.6	32	67	76
150	163.830	11	2	4.6	32	70	89

16.2 Sampling and Criterion for Conformity — Unless otherwise agreed to between the manufacturer and the purchaser the procedure for sampling of tubes for various tests and criteria for conformity shall be as given in IS : 4711-1974*.

*Methods for sampling of steel pipes, tubes and fittings (first revision)

17. MARKING

17.1 Each tube shall carry legibly the manufacturer's name or trade-mark.

17.2 The different classes of tubes shall be distinguished by colour bands which shall be applied as follows before the tubes leave the manufacturer's works:

- 'Light' tubes Yellow*
- 'Medium' tubes Blue
- 'Heavy' tubes Red.

17.2.1 Unless otherwise mutually agreed to between the manufacturer and the purchaser, a white colour band shall be applied at each end of the tubes for steam services.

17.3 All long random lengths shall each have two 75 mm bands, one near each end; all other lengths shall each have one 75 mm band.

17.3.1 The tubes may also be marked with the ISI Certification Mark.

NOTE— The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

18. PROTECTION AND PACKING

18.1 Tubes not otherwise protected shall be varnished or suitably painted externally throughout the length unless ordered unvarnished or unpainted. Where tubes are bundled for transport, all qualities of tubes shall be packed in accordance with IS : 4740-1968†.

*For export purposes the tubes may be painted yellow or brown.

†Code of practice for packaging of steel tubes.

APPENDIX A

(Clause 1.1)

**MAXIMUM PERMISSIBLE PRESSURE AND TEMPERATURE
FOR TUBES FOR CONVEYING STEAM**

A-1. The maximum permissible pressure and temperature for tubes with screwed and socketed joints shall be as given in Table 6.

**TABLE 6 MAXIMUM PERMISSIBLE PRESSURE AND TEMPERATURE
FOR TUBES WITH STEEL COUPLINGS OR SCREWED AND
SOCKETED JOINTS**

NOMINAL BORE	MAXIMUM PERMISSIBLE PRESSURE	MAXIMUM PERMISSIBLE TEMPERATURE
(1) mm	(2) MPa	(3) °C
Up to and including 25 mm	1.20	260
Over 25 mm up to and including 40 mm	1.03	260
Over 40 mm up to and including 80 mm	0.86	260
Over 80 mm up to and including 100 mm	0.69 0.83	260 177
Over 100 mm up to and including 125 mm	0.69	171
Over 125 mm up to and including 150 mm	0.50	160

$$1 \text{ MPa} = 1 \text{ N/mm}^2 = 0.1020 \text{ kg/mm}^2.$$

A-2. For tubes fitted with appropriate flanges or suitably butt welded together, the maximum permissible pressure shall be 2.06 MPa and the maximum permissible temperature 260°C.

INDIAN STANDARDS

ON

STEEL TUBES, PIPES AND FITTINGS

IS:

- 1161-1979 Steel tubes for structural purposes (*third revision*)
1239 (Part I)-1979 Mild steel tubes, tubulars and other wrought steel fittings: Part I
Mild steel tubes (*fourth revision*)
1239 (Part II)-1969 Mild steel tubes, tubulars and other wrought steel fittings: Part II
Mild steel tubulars and other wrought steel pipe fittings (*second revision*)
1894-1972 Method for tensile testing of steel tubes (*first revision*)
1914 (Parts I to IV)-1977 Carbon steel boiler tubes and superheater tubes
(*first revision*)
1978-1971 Line pipe (*first revision*)
1979-1971 High test line pipe (*first revision*)
2039-1964 Steel tubes for bicycle and allied purposes
2328-1963 Method for flattening test on steel tubes
2329-1963 Method for bend test on steel tubes
2330-1963 Method for flanging test on steel tubes
2335-1963 Method for drift expanding test on steel tubes
2416-1963 Boiler and superheater tubes for marine and naval purposes
2484-1979 Dimensions for steel tubes for bicycle purposes (*first revision*)
3074-1965 Steel tubes for automotive purposes
3589-1966 Electrically welded steel pipes for water, gas and sewage (200 to 2 000 mm
nominal diameter)
3601-1966 Steel tubes for mechanical and general engineering purposes
3609-1966 Chrome molybdenum steel, seamless, boiler and superheater tubes
4270-1967 Steel tubes used for water wells
4310-1967 Weldable steel pipe fittings for marine purposes
4516-1968 Elliptical mild steel tubes
4711-1974 Methods for sampling of steel pipes, tubes and fittings (*first revision*)
4712-1968 Dimensions for forged steel socket-welding fittings
4922-1968 Seamless steel tubes (suitable for welding) for aircraft purposes
4923-1968 Hollow steel sections for structural use
5429-1979 Dimensions for steel tubes for automotive purposes (*first revision*)
5433-1969 Oil well steel casing pipes and couplings
5504-1969 Spiral welded pipes
5929-1970 Inspection and testing procedure for circular steel tubes for aircraft
purposes
6011-1970 Carbon steel tubes for use on board ships for pressure service
6286-1971 Seamless and welded steel pipe for sub-zero temperature service
6392-1971 Steel pipe for hydraulic purposes
6630-1972 Seamless ferritic alloy steel pipes for high temperature service
6631-1972 Steel pipes for hydraulic purposes
6647-1972 Drill pipes for use in oil or natural gas wells
6913-1973 Stainless steel tubes for the food and beverage industry
7138-1973 Steel tubes for furniture purposes
7174-1974 Carbon steel tubes for use on board ships for working pressures 0.7 to 1.7
N/mm²
8036-1976 Mild steel transformer cooling tubes
8119-1976 Copper brazed steel tubing