IS 4711 (2008): Methods for sampling of steel pipes, tubes and fittings [MTD 13: Ores and Raw Materials]

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भारतीय मानक

इस्पात की पाइपों, ट्यूबों और फिटिंग्स के नमूने लेने की पद्धतियाँ

(दूसरा पुनरीक्षण)

Indian Standard

METHODS FOR SAMPLING OF STEEL PIPES, TUBES AND FITTINGS

(Second Revision)

ICS 77.140.75

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

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Price Group 2

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Steel Tubes, Pipes and Fittings Sectional Committee had been approved by the Metallurgical Engineering Division Council.

This standard was first published in 1968 and revised in 1974 with a view to providing an objective and rational sampling procedure for steel pipes, tubes and fittings. In view of the experience gained during the period, the Committee decided to take up the revision of the standard. However, as a result of the implementation of the standard more emphasis has now been laid in the revised version on process control and thereby slightly reduce the number of destructive tests so as to make the testing more economical.

Steel pipes and tubes have been found to be highly versatile and are used in a variety of ways, for example, in water and gas mains, tubular poles, paper and textile mill rolls, oil well drill pipes and water well casings, conveyor rolls and transformer cooling tubes. In the context of increasing production and transaction of steel pipes, tubes and fittings, it is imperative that due consideration is given to the sampling procedures which will help in the proper and objective evaluation of the visual, dimensional and physical properties of these products.

Proper quality control during the process of manufacture would substantially reduce the quality fluctuations of the ultimate products. For effective process control, the use of stastical quality control techniques is imperative for which helpful guidance may be obtained from IS 397 (Part 1) : 2003 'Method of statistical quality control during production: Part 1 Control charts by variables (*second revision*)'. A recommended frequency of testing and inspection is, however, given in Annex A to serve as a guide to the manufacturers.

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 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

METHODS FOR SAMPLING OF STEEL PIPES, TUBES AND FITTINGS

(Second Revision)

1 SCOPE

1.1 This standard prescribes the methods of sampling and the criteria for conformity for steel pipes, tubes and fittings.

1.2 It does not cover the sampling requirements of pressure and other special pipes, such as boiler tubes, superheater tubes and petroleum pipes.

2 REFERENCE

The standard listed below contains provision, which through reference in this text constitutes provision of this standard. At the time of publication, the edition indicated was valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below:

IS No.	*Title*
4905 : 1968	Methods for random sampling

3 TERMINOLOGY

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

3.1 Acceptance Number (*a*) — The maximum permissible number of defectives in the sample(s) for acceptance of the lot.

3.2 Defect — Failure to meet the requirement imposed on an item with respect to a single characteristic.

3.3 Defective — An item having one or more defects.

3.4 Item — A unit such as tube, pipe or fitting meant for inspection or testing.

3.5 Lot — A collection of items of one type manufactured by the same process under similar conditions of production.

3.6 Lot Size — Number of items in a lot.

3.7 Rejection Number (*r*) — The minimum number of defectives in the sample(s) for rejection of the lot.

3.8 Sample — Collection of items selected for inspection or testing from a lot.

3.9 Sample Size — Number of items in a sample.

3.10 Tube (Pipe) — A long, hollow, open-ended steel product of circular or the cross-section. The terms tubes and pipes are often used synonymously..

4 PROCESS INSPECTION

The object of inspecting and testing steel pipes, tubes and fittings by the purchaser is to ensure their conformity to the specification requirements, whereas inspection done by the manufacturer during production is to ensure conformity to relevant specifications as also to maintain better control over the process. The manufacturer may take representative samples of the items at regular intervals to control the quality fluctuations. The inspection levels given in Annex A may serve as a guide for routine control over the manufacturing process.

5 LOT INSPECTION

5.1 In case adequate and satisfactory system of quality control has been maintained, the resulting data and information may be made available to the purchaser along with the items supplied to enable him to judge the acceptability of the lot. When it is not possible to make such information available to the purchaser or when the purchaser so desires, the procedure laid down in the following clauses shall be followed for determining the conformity of the lot of steel pipes, tubes and fittings to the requirements of the relevant specifications.

5.2 The samples shall be selected and examined for each lot separately for ascertaining their conformity to the requirements of the relevant specification.

5.2.1 Unless otherwise agreed to between the supplier and the purchaser, each and every item shall be inspected/tested for surface defects and the defective ones removed. If agreed to between the parties concerned, the hydraulic test may also be conducted on each and every tube preferably before finishing.

5.3 The lot which has been found satisfactory in respect of visual characteristics shall be tested for weight and dimensional characteristics like length, thickness and diameter. The number of items to be selected from a lot for the checking of dimensional characteristics depends on the size of the lot and shall be taken in accordance with relevant columns of Table 1. In the case of circular pipes and tubes with outside diameter more than 200 mm as also pipes and tubes of non-circular cross-sections, the scale of sampling would be in accordance with col 3 and col 5 of Table 1. All these items shall be taken at random from the lot by using suitable random number tables as given in IS 4905 or by using any other procedure which ensures randomness.

5.4 Each of the items selected according to 5.3 shall be inspected for dimensional characteristics and weight requirements. Any items failing to meet one or more dimensional requirements or individual tolerances for weight shall be considered as defective. If the number of defectives found in the sample checked for dimensional characteristics is less than or equal to the corresponding acceptance number, the lot shall be deemed as having met the dimensional requirements of the relevant specification, otherwise not. The lot shall be deemed as having met the mass requirements of the relevant specification, if the number of defectives found in the sample is less than or equal to the corresponding acceptance number and the total mass of the lot is within the tolerance wherever applicable.

5.4.1 In the case of those lots which have been found unsatisfactory, all the items in the lot may be inspected for dimensional characteristics and weight requirements and the defectives be removed, if agreed to between the purchaser and the supplier.

5.5 The lot shall also be tested for appropriate physical characteristics like tensile strength, bend, flattening and drift tests. The number of items to be drawn in accordance with Table 2 may be taken at random from that already drawn for dimensional inspection.

5.5.1 From each of the item so chosen, the required number of the specimens shall be prepared for conducting the physical tests specification in the manner of preparation of test specimens as well as their dimensions shall be in accordance with the relevant specifications. Any items failing to meet the requirements of a physical test shall be considered as defective.

5.5.2 For any of the physical tests, if in the first sample the number of defective items is less than or equal to the corresponding acceptance number (a) the lot shall be declared as conforming to the requirement of that test. If the number of defectives is greater than or equal to the corresponding rejection number (r), the lot shall be deemed as not meeting the requirement of that particular physical test. If the number of defectives is greater than the acceptance number but less than the rejection number, a second sample of the same size as the first shall be taken to determine the conformity or otherwise of the lot. The number of defectives found in the first and second samples shall be combined and if the combined number of defectives is less than or equal to the corresponding acceptance number of the second sample, the lot shall be declared as conforming to the requirements of the particular physical test, otherwise not.

Table 1 Scale of Sampling and Permissible Number of Defectives for Mass and Dimensional Characteristics

(*Clause* 5.3)

Sl No.	Lot	Pipes or Tubes (Outside Dia ≤ 200 mm)		Others	
		Sample	Acceptance	Sample	Acceptance
(1)	(2)	(3)	(4)	(5)	(6)
i)	Up to 100	3	0	2	0
ii)	101-150	5	0	3	0
iii)	151-300	8	0	5	0
iv)	301-500	13	0	8	0
v)	501-1 000	20	1	13	0
vi)	1 001-3 000	32	2	20	1
vii)	3 001-10 000	50	3	32	2
viii)	10 001and above	80	5	50	3

Table 2 Scale of Sampling and Permissible Number of Defectives for Physical Tests (Tensile, Bend, Flattening and Drift)

(*Clause* 5.5)

Sl No.	Lot Size	Stage of the Sample	Sample Size for Each Physical Test	Acceptance Number	Rejection Number
(1)	(2)	(3)	(4)	(5)	(6)
i)	Up to 100	First	1	0	*See* Note 1
ii)	101-150	First	2	0	*See* Note 1
iii)	151-300	First	3	0	2
		Second	3	0	1
iv)	301-800	First	5	0	2
		Second	5	1	2
v)	801-3000	First	8	0	2
		Second	8	2	3
vi)	3001and above	First	13	1	3
		Second	13	3	4

NOTES

1 If one sample fails to meet the requirement, the purchaser may select 2 samples randomly from the same lot and both the samples should comply with the requirements except the original failed length.

2 The test pieces for physical tests may be cut from the same item wherever possible.

ANNEX A

(*Foreword*, and *Clause* 4)

RECOMMENDED LEVELS OF INSPECTION/TESTING

Sl No.	*Characteristics for Inspection/Testing*	*Frequencies of Inspection/Testing Pipes and Tubes Manufactured*	
		Seamless Process	Other Process Like Fretz-Moon and ERW
i)	Chemical composition	A ladle analysis from every cast	A ladle analysis from every cast
ii)	Visual inspection for surface defects and steel defects	Each pipe and tube	Each pipe and tube
iii)	Outside diameter	All pipes and tubes	1/h
iv)	Thickness	All pipes and tubes	1/h
v)	Length	All pipes and tubes	1/h
vi)	Tensile test	One coil from each cast	One coil from each cast
vii)	Bend test	One for every 100 cast or part thereof	One test every hour
viii)	Flattening test	One for every 20 cast or part thereof	One test every half hour
ix)	Drift test	One for every 20 cast or part thereof	One test every half hour
x)	Hydraulic test	Each pipe and tube	Each pipe and tube

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Amendments Issued Since Publication

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