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मानक

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IS 4214 (1997): Brush, boiler tube (without shank) [CHD 24: Brushware]



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“Knowledge is such a treasure which cannot be stolen”

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भारतीय मानक
ब्रुश, बॉयलर नलिका (शैंक रहित) — विशिष्टि
(पहला पुनरीक्षण)

Indian Standard
BRUSHES, BOILER TUBE (WITHOUT SHANK) —
SPECIFICATION
(*First Revision*)

ICS 27.060.30 : 25.220.10

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

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Brushware Sectional Committee had been approved by the Chemical Division Council.

This standard was first published in 1967 based on IND/GS/1244, Brush, boiler 1½" and 2½", issued by the Ministry of Defence, Govt of India. Boiler tube brushes are generally used to remove carbon and soot deposits from boiler tubes. These brushes are required by industries using boilers. Since their fabrication is a precision work, they are manufactured after taking account of the nature of the problem and various factors on which it depends. Such brushes are generally used after being attached to long or short shanks to which they are fixed with screw threads.

The size of the boiler tube brush is determined by the actual size of the boiler tube and any special requirements of the user. However, with a view to secure efficient service, the usual practice is to manufacture these brushes with a slightly larger diameter than the nominal diameter of the boiler tubes to be cleared (*see* 5.1 and 6.1). Moreover, brushes with different kinds of filling material are used for cleaning of tubes of different metals to avoid any damage to the tubes while cleaning. As these brushes rotate fast after entering into the boiler tubes, the larger diameter does not cause any obstruction, but once inserted complete cleaning and removal of foreign matter is ensured. These brushes are also used for cleaning of heat exchangers, evaporators and other tubular heating devices.

Specific sizes of boiler tube brush having filling of steel wire, brass, phosphor bronze, nickel, silver, nylon and hog bristles are in use. After due consideration it was felt that for general purposes, boiler tube brushes with steel wire may be recommended (*see* 6.2.1 and 6.2.1.1). It may also be noted that stainless steel wires are used in bulk quantity for the purpose in the non-magnetic appliances.

In this revision, nylon monofilaments and bristles have been introduced as filling material as an optional requirement if agreed to between the purchaser and the supplier.

The composition of the committee responsible for formulation of this standard is given in Annex B.

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
BRUSHES, BOILER TUBE (WITHOUT SHANK) —
SPECIFICATION
(First Revision)

1 SCOPE

This standard prescribes requirements and methods of sampling and test for brushes, boiler tube (without shank).

2 REFERENCES

The following Indian Standards are necessary adjuncts to this standard:

<i>IS No.</i>	<i>Title</i>
3451 (Part 2) : 1975	Code of practice for care and maintenance of brushes: Part 2 Brushes other than pan set brushes
5060 : 1969	Glossary of terms used in brushware industry

3 TERMINOLOGY

For the purpose of this standard, definitions of terms given in IS 5060 and the following shall apply.

3.1 Approved Tender Sample

The sample accepted by the indentor or inspection authority as basis for supply. When a sample is tested and approved by the purchaser or an inspection authority, the results of such tests as will permit the supplier to meet the limits imposed by the specifications for deliveries, shall be made available to the supplier.

4 TYPES

There shall be two types of boiler tube brushes (without shank), namely: Type 1 Single spiral, and Type 2 Double spiral.

5 SIZES

5.1 Depending on the size of the boiler tube to be cleaned (6 mm to 150 mm diameter), these brushes shall be manufactured in size suitable for such boiler tubes. The size of brush is determined by the diameter of the brush formed by the filling materials.

5.1.1 With a view to secure efficient cleaning, it is recommended that these brushes are manufactured slightly larger in diameter than the nominal diameter of the boiler tubes to be cleaned and as agreed to between the supplier and the purchaser.

6 REQUIREMENTS**6.1 Description**

As the use of boiler tube brushes is confined to boiler tubes, the type and size of brush shall be mutually agreed to between the purchaser and the supplier.

6.2 Material

Boiler tube brushes shall be manufactured from the following materials.

6.2.1 Filling Materials

Straight steel wire of 0.3 mm to 0.33 mm diameter, free from rust and any other foreign matters, shall be used. There shall be 125 to 150 wires per bunch.

6.2.1.1 For special purposes flat steel wire [1.626 mm (16 SWG) × 0.511 mm (24 SWG) to 2.946 mm (11 SWG) × 1.016 mm (19 SWG)] stainless steel, brass, phosphor bronze, nickel silver, mexican fibres, nylon and bristles may also be used as filling materials if agreed upon between the purchaser and the supplier.

6.2.2 Holding Wire

Galvanized wire 5.385 mm (5 SWG) to 4.064 mm (8 SWG) thick for general purposes and 3.251 mm (10 SWG) to 2.032 mm (14 SWG) thick required for special purposes.

6.3 Dimensions and Tolerances

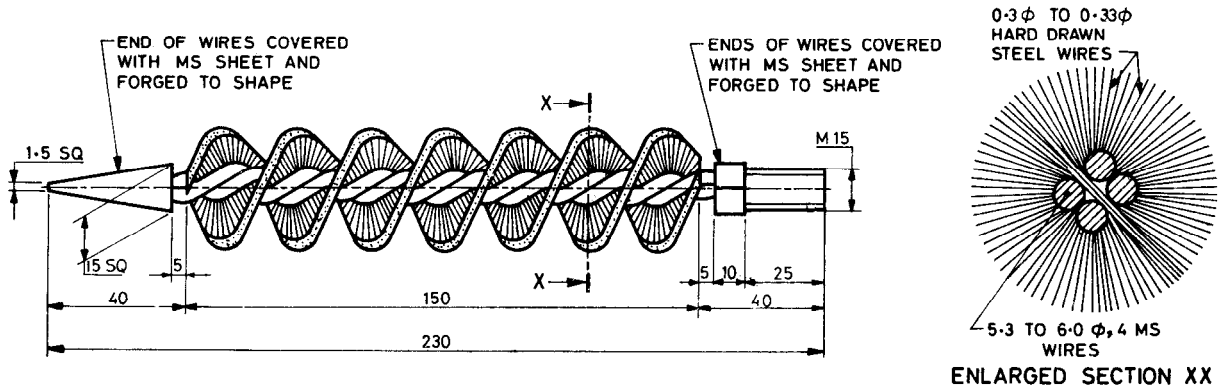
6.3.1 The brushes shall conform to the dimensions as given in Fig. 1 to 4. Number of pitches per brush shall be 13 to 14.

6.3.2 The tolerance on the linear dimensions shall be as given in Table 1.

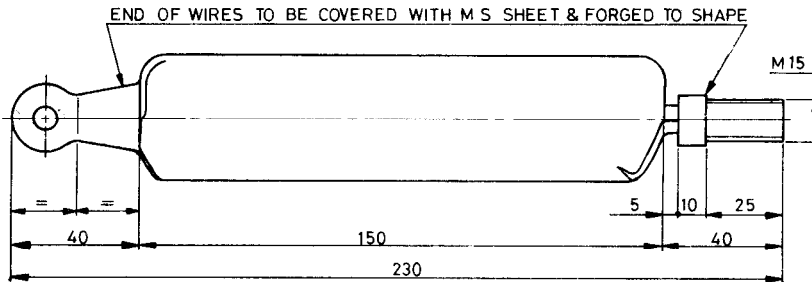
6.4 Manufacture

6.4.1 The brushes shall conform to the shape and design as shown in Fig. 1 to 4, unless otherwise agreed to between the manufacturer/supplier and the purchaser.

6.4.1.1 The filling wire cut to the requisite size shall be held between the holding wire. The holding wire shall be twisted, care being taken neither to overtwist not to undertwist. Overtwisting weakens



All dimensions in millimetres.
 FIG. 1 BRUSH BOILER TUBE (SINGLE SPIRAL) SINGLE ACTION



All dimensions in millimetres.
 FIG. 2 BRUSH BOILER TUBE (SINGLE SPIRAL) DOUBLE ACTION

Table 1 Dimensional Tolerance for Brush, Boiler Tube (Without Shank)
 (Clause 6.3.2)

Sl No.	Dimension	Tolerance, mm
(1)	(2)	(3)
i)	Size or diameter of brush	±1.0
ii)	Overall length	±3.0
iii)	Length of brush covered by filling material	±3.0
iv)	Other dimensions	±0.5

the wire and results in breaking of the filling wire, while undertwisting leaves the filling wire loose.

6.4.2 After twisting, the filling wire shall be cut to the shape and size as required.

6.4.3 The two ends of the holding wires shall be cut and covered with mild steel sheet and forged to the shape as shown in Fig. 2 and Fig. 4. Alternately, both the ends of the holding wires may be welded with the threaded metal socket for connecting device.

6.4.4 The posterior end of the boiler tube brush shall be provided with screw threads for attachment of shank of adequate length as may be necessary.

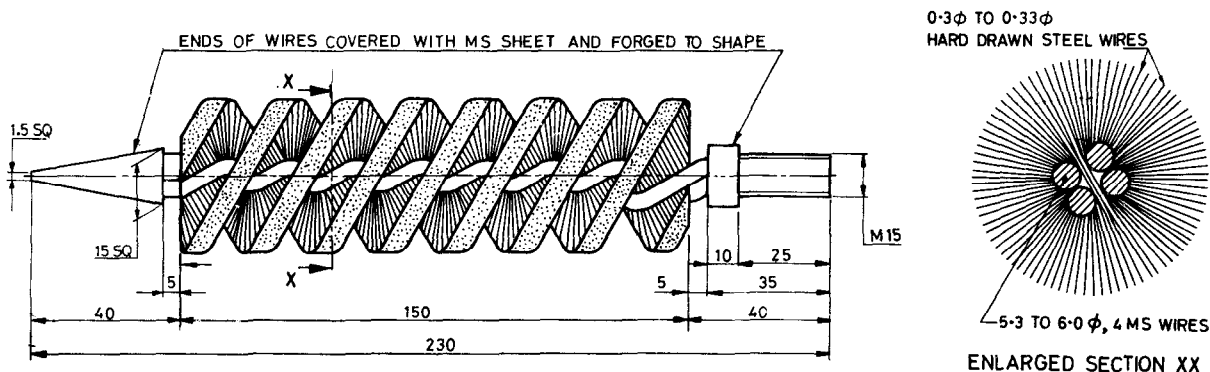
6.5 Workmanship and Finish

In general workmanship and finish, the brushes shall match the approved sample.

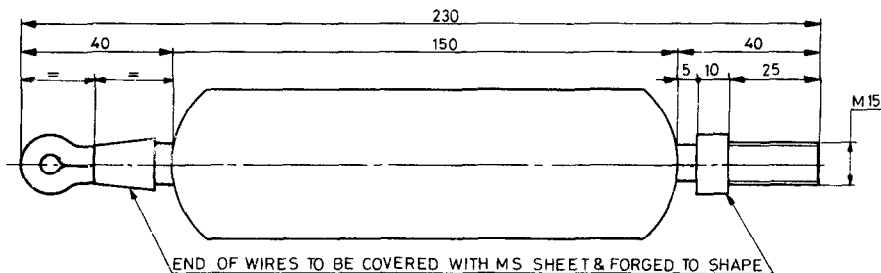
6.6 Test

6.6.1 Bend Test for Filling Wire

The steel filling wire shall be capable for being bent to an angle of 180° and when straightened, it shall do so without fracture. When doubled over a



All dimensions in millimetres.
FIG. 3 BRUSH BOILER TUBE (DOUBLE SPIRAL) SINGLE ACTION



All dimensions in millimetres.
FIG. 4 BRUSH BOILER TUBE (DOUBLE SPIRAL) DOUBLE ACTION

mandrel having a diameter of 6 mm, it shall, on release, return to an angle of 45°.

7 PACKING AND MARKING

7.1 Packing

The brushes shall be packed in packages as mutually agreed to between the indenter or inspection authority and the supplier.

7.2 Marking

Unless otherwise agreed to between the indenter or inspection authority and the supplier, each brush shall be legibly and indelibly marked with the following information:

- a) Indication of source of manufacture, and
- b) Year of manufacture.

7.2.1 The product may also be marked with the Standard Mark.

7.2.1.1 The use of the Standard Mark is governed by the provisions of *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

8 PRESERVATION

Boiler tube brushes made of steel shall be chemically treated to render them rust-proof.

9 SHELF LIFE

The brushes shall have a shelf life of one year from the date of manufacture. [Proper storage conditions are used and adequate precautions are taken for preserving them as given under 4 of IS 3451 (Part 2)].

10 SAMPLING

Representative samples for test shall be drawn as prescribed in Annex A.

ANNEX A
(Clause 10)

SAMPLING AND CRITERIA FOR CONFORMITY FOR BRUSHES, BOILER TUBE

A-0 GENERAL

A-0.1 The supplier shall submit three identical brushes for approval.

A-0.2 The indenter or inspection authority shall retain one of the three samples approved against each item till the completion of the order.

A-1 SCALE OF SAMPLING

A-1.1 Lot

In any consignment, all the brushes of the same size and quality shall be divided into groups of 500 brushes or less and each such group shall constitute a lot. Care shall be taken to ensure that brushes included in a lot do not differ in construction, as far as possible.

A-1.1.1 The conformity of the brushes in a lot to the requirements of this specification shall be ascertained for each lot separately. The number of brushes to be selected for this purpose shall be in accordance with col 1 and 2 of Table 2.

A-1.1.2 The brushes shall be selected at random. To ensure randomness of selection one of the following procedures is recommended for use:

- a) If all the brushes in a lot are packed in one box, then starting from any brush, count them in any suitable order as 1, 2, up to r and so on, where r is the integral part of N/n (N and n being the lot size and sample size respectively). Every r th brush thus counted shall be withdrawn to constitute the sample.
- b) If the brushes in a lot are packed in more than

one box; approximately equal number of brushes shall be picked up at random from as many boxes as possible so as to obtain the required number of brushes as specified in Table 2.

A-2 CRITERIA FOR CONFORMITY

For declaring the conformity of the lot to the requirements of this specification, all the brushes selected according to **A-1.1.2** shall satisfy the relevant requirements given in 6.

NOTE — For workmanship and finish (see 6.5) the brushes selected according to **A-1.1.2** shall be matched with the approved sample which shall be suitably stamped and sealed by the indenter or the inspection authority and the supplier and kept at a place agreed to between the two.

Table 2 Scale of Sampling
(Clauses A-1.1.1 and A.1.1.2)

No. of Brushes in the Lot N (1)	No. of Brushes to be Selected n (2)
Up to 10	2
11 to 25	3
26 " 50	4
51 " 100	5
101 " 150	6
151 " 300	7
301 " 500	8

ANNEX B
(*Foreword*)
COMMITTEE COMPOSITION

Brushware Sectional Committee, CHD 024

Chairman

SHRI SUBHASH RANJAN ROY

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Amendments Issued Since Publication

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