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भारतीय मानक मसौदा
अभेद्य कॉटन डक गलैंड पैकिंग की विशिष्टि
(आई एस 4688 का पहला पुनरीक्षण)

Draft Indian Standard

**SPECIFICATION FOR
PROOFED COTTON DUCK GLAND PACKING**

(First Revision of IS 4688)

ICS 21.140

**Gaskets and Packing Sectional Committee,
MED 30**

**Last date for receipt of comments
is 27 December 2021**

FOREWORD

(Formal clauses would be added later on)

This standard was first published in 1968. This revision of the standard has been brought out to bring it in line with the latest practices being followed in the country in the manufacturing of cotton duck gland packing.

The major change in this revision is that requirements for the lubrication of gland packings have been modified.

Gland packings are used to contain fluids, gases, and slurries under extreme pressure and temperatures, abrasives, and other difficult conditions. This standard relates to proofed cotton duck gland packing. The requirements of other types of packing, that is, asbestos gland packing, jute, and hemp or flax packing, are covered in separate standards.

The composition of the committee responsible for the formulation of this standard is given in Annex C. (to be added later)

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, 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.

1 SCOPE

This standard deals with the requirements and methods of tests for proofed cotton duck gland packing used for hydraulic services.

2 MATERIAL

The packing shall consist of layers of friction cotton fabric with top and bottom cover of rubber. Natural rubber, synthetic rubber, or a mixture of the two may be used.

3 DIMENSIONS

3.1 The preferred thickness of the packing are 2, 3, 4, 5, 6, 7, 8, 10, 12, 14, 15, 16, 18, 20, 22, 25, 30, 32, 35, 38, 40, 42, 45, 48 and 50 mm.

3.2 The maximum permissible variations in dimensions shall be ± 0.5 mm for sizes up to and including 10 mm and ± 1 mm for sizes above 10 mm.

4 CONSTRUCTION

4.1 Slab stock shall be built of layers of fractioned cotton fabric laid on a bias at 45° and in alternate directions, each ply overlapping the butted joint of the adjacent ply. There shall be at least one layer of fractioned fabric for each 2 mm thickness. The top and bottom layers shall be of natural rubber, synthetic rubber, or a mixture of the two.

4.2 The surface of the packing shall be smooth and it shall not have torn-out threads.

4.3 The packing shall be coiled into spirals with the edges of the laminations forming the inside and outside surfaces and vulcanized. The inside coil diameter shall not be less than four times nor more than six times the thickness of the finished packing, the packing shall have a square cross-section.

4.4 Lubrication

The packing shall be lubricated by mineral oil and graphite/ mica.

4.4.1 The lubricant shall be either petroleum jelly, a mixture of petroleum oil or petroleum jelly or lime base grease and shall be suitable for use up to 65°C . Mineral filler or any bulky material shall not be added with it. The lubricant content determined as per Annex A shall be between 40 to 50 percent by mass.

4.4.2 Graphite or Mica

Graphite shall be of more than 90 percent carbon contents and not coarser than $75\ \mu$. Mica shall not be coarser than $150\ \mu$. The graphite or mica content when determined as per Annex B shall be between 5 to 15 percent by mass.

5 SAMPLING

5.1 Lot

The number of coils of packing of the same size and of one definite quality, delivered to one buyer against one dispatch note shall constitute a lot.

5.2 The conformity of a lot to the requirements of this standard shall be determined on the basis of the tests carried out on the samples selected from the lot.

5.3 Unless otherwise specified, the number of coils to be selected at random from a lot and shall be in accordance with Table 1.

5.4 The coils selected according to **5.3** shall be inspected for construction, workmanship, and dimensions. If the number of coils found not in conformity with the specified requirements, is less than or equal to the corresponding number given in Table 1, the lot shall be declared conforming to the requirements of visual and dimensional characteristics.

5.5 In case of those lots which have been found satisfactory according to **5.4**, a number of coils equal to the sample size given in Table 1 shall be selected from those coils tested according to **5.4**. The specimens cut from these coils shall be subjected to tests given in **6.2**, **6.3**, and **6.4**. The lot shall be declared conforming to the requirements of this specification if all the coils satisfy the relevant requirements.

Table 1 Sample Size and Criteria for Conformity

(Clause 5.3, 5.4, 5.5 and 6.1)

Sl. No.	No. of Coils in the Lot	For Visual and Dimensional Characteristics		Sample Size for Other Characteristics
		Sample Size	Permissible No. of Defectives	
(1)	(2)	(3)	(4)	(5)
i)	Up to 100	8	0	3
ii)	101 to 300	13	1	4
iii)	301 to 500	20	1	5
iv)	501 to 1000	32	2	6
v)	1001 to above	50	3	7

6 TESTS

6.1 Visual and Dimensional Inspection

Each coil selected in accordance with Table 1 shall be inspected for the construction, workmanship, and dimensions. The dimensions shall be measured to an accuracy of 0.1 mm with

a slide-gauge at three different places in two perpendicular directions. The mean of the six measurements thus made shall be within the variation specified at **3.2**.

6.2 Flexibility

A suitable length of packing with the cover stock against a rod of diameter four times the thickness and bent through 180° shall not crack or separate into layers.

6.3 Cotton Fabric

The fabric used for the packing shall weigh not less than 918 g/m².

6.4 Friction Compound

There shall be neither ply separation nor material hardening of the compound when a piece of finished packing is exposed to saturated steam at a pressure of 25 kgf/cm² for four hours.

7 MARKING

7.1 Identification Marking

Each coil of packing shall be marked with the manufacturer's name or trade-mark and the dimensions of the packing.

7.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standard* Act, 2016 and the Rules and Regulations framed there under, and the product(s) may be marked with the Standard Mark.

ANNEX A

(Clause 4.4.1)

DETERMINATION TESTS FOR LUBRICATED COTTON GLAND PACKINGS

A-1 PROCEDURE

A-1.1 Take a Soxhlet thimble and a Whitman's filter paper of 10 cm diameter, previously extracted with carbon tetrachloride, and place them in a weighing bottle.

A-1.2 Place the weighing bottle (with the thimble and filter paper) with the lid offset, in an oven maintained between 105 °C and 110 °C for one hour. Replace the lid and cool in a desiccator to room temperature and weigh.

A-1.3 Unplait a representative section of the packing not less than 5 gm in mass, over the open filter paper so that all materials which are dislodged fall on the filter paper.

A-1.4 Wrap the sample in the filter paper and insert into the thimble. The thimble with the filter paper and sample should be replaced in the weighing bottle which should once again be dried in the oven for one hour as before and cooled in a desiccator to room temperature and weighed.

A-1.5 Place thimble with the sample wrapped in the filter paper in a Soxhlet extraction apparatus fitted with water cooled Liebig condenser.

A-1.6 Extract for one hour (or more till the extraction is colorless) with carbon tetrachloride. The volume of the solvent to be used should be at least three times the capacity of the Soxhlet extractor.

A-1.7 Dry an evaporating basin in an oven at 105 °C for one hour, cool to room temperature in a desiccator and weigh.

A-1.8 Transfer the solution from the extraction flask to the basin. Rinse the flask with a small quantity of fresh carbon tetrachloride and transfer to the basin.

A-1.9 Place the basin and its contents in an oven for half an hour at 105 °C, cool in a desiccator to room temperature and weigh.

A-2 CALCULATIONS

Lubricant (Grease or Petroleum oil) content, percent = $\frac{W_4 - W_3}{W_2 - W_1} \times 100$

where

W_1 = mass of weighing bottle, thimble and filter paper (*see A-1.2*);

W_2 = mass of weighing bottle, thimble and filter paper with sample (*see A-1.4*);

W_3 = mass of the dry evaporating basin; and

W_4 = mass of evaporating basin with extract.

ANNEX B

(Clause 4.4.2)

DETERMINATION OF GRAPHITE OR MICA CONTENT

B-1 PROCEDURE

B-1.1 Dry the Soxhlet thimble and its contents after the extraction is carried out as given under **A-1.6**, in an oven maintained between 105 °C to 110 °C for one hour and cool in a desiccator to room temperature.

B-1.2 Take filter paper and contents, open the filter paper and carefully dislodge the graphite or mica, on to the filter paper by gently untwisting the yarn.

B-1.3 Discard the yarn.

B-1.4 Weigh the weighing bottle with filter paper and graphite or mica.

B-2 CALCULATIONS

Graphite or mica content, percent = $\frac{W_5 - W_1}{W_2 - W_1} \times 100$

where

W_1 = mass of weighing bottle, thimble and filter paper (*see A-1.2*);

W_2 = mass of weighing bottle, thimble and filter paper with sample (*see A-1.4*); and

W_5 = mass of weighing bottle, thimble and filter paper with graphite/ mica.