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उत्पाद मैनुअल
थर्मल इंसुलेशन के लिए अनबॉन्ड रॉक और स्लैग वूल की विशिष्टता
IS 3677 : 1985 के अनुसार

PRODUCT MANUAL FOR SPECIFICTION FOR UNBONDED ROCK AND SLAG WOOL FOR THERMAL INSULATION
According to IS 3677 : 1985

भारतीय मानक ब्यूरो (अनुरूपता मूल्यांकन) विनियम 2018 की स्कीम-I के तहत यह उत्पाद मैनुअल प्रमाणीकरण की संचालन रीति में सुसंगता और पारदर्शिता सुनिश्चित करने के लिए सभी क्षेत्रीय/शाखा कार्यालयों एवं लाइसेन्स धारियों द्वारा संदर्भ सामग्री के रूप मे उपयोग किया जाएगा। बीआईएस लाइसेन्स/प्रमाण पत्र प्राप्त करने के इच्छुक भावी आवेदकों द्वारा भी इस दस्तावेज़ का उपयोग किया जा सकता है।

This Product Manual shall be used as reference material by all Regional/Branch Offices & licensees to ensure coherence of practice and transparency in operation of certification under Scheme-I of Bureau of Indian Standards (Conformity Assessment) Regulations, 2018 for various products. The document may also be used by prospective applicants desirous of obtaining BIS certification licence/certificate.

1.	**उत्पाद** **Product**	:	IS 3677 : 1985
	शीर्षक **Title**	:	Specification for unbonded rock and slag wool for thermal insulation
	संशोधनों की संख्या **No. of amendments**	:	1
2.	**नमूना दिशा निर्देश** **Sampling Guidelines**		
a)	**कच्चा माल** **Raw material**	:	No specific raw material requirement
b)	**समूहीकरण दिशानिर्देश** **Grouping Guidelines**	:	Please refer **Annex-A**

c)	**नमूने का आकार** **Sample Size**	:	15 kg
d)	**निगरानी के लिए नमूना दिशानिर्देश** **Sampling guidelines for surveillance**		One factory sample and only one Market sample shall be tested in an operative year for all requirements of the specification.
3.	**परीक्षण उपकरणों की सूची** **List of Test Equipment**	:	Please refer **Annex–B**
4.	**निरीक्षण और परीक्षण की स्कीम** **Scheme of Inspection and Testing**	:	Please refer **Annex–C**
5.	**एक दिन में संभावित परीक्षण** **Possible tests in a day**	:	• Description • Apparent Density Under Specified load • Apparent Density • Shot Content • Moisture Content • Incombustibility • Dimensions • Sulphur Content • Fibre Diameter • Alkalinity • Determination of Carbon • Determination of Oil
6.	**लाइसेंस का दायरा /Scope of the Licence:** License is granted to use Standard Mark as per IS 3677 : 1985 with the following scope		
	Name of the product:		Unbonded rock and slag wool for thermal insulation
	Type(s):		1/2
	Mean Temperature(s) for Thermal Conductivity (at Specified Apparent Density):		**50°C (200 kg/m³, 150 kg/m³…..)** **100 °C (150 kg/m³, 120 kg/m³ …..)** **…….**
	Optional Requirements		With/without Moisture Content With/without Resistance to Micro-Organisms With/without Odour Emission Test With/without oil content With/without carbon content With/without Resistance to Vibration With/without Resistance to Jolting

		With/without Heat Resistance at _____ ℃ as maximum temperature of use With/without Fibre diameter With/without Alkalinity With/without Corrosive Attack

ANNEX-A

GROUPING GUIDELINES

1) IS 3677:1985 classifies Unbonded rock and slag wool for thermal insulation according to:

i) Types 1 & 2
ii) Mean Temperature(s) for Thermal Conductivity: 50/100/150/200/250 ºC
iii) Sizes/Dimensions(for Type 2 only): Width and Thickness
iv) Confining Medium(for Type 2 only): Metallic Cage, Hessian Cloth etc.

2) For the purpose of grant of licence, and change in scope of licence, the following grouping guidelines shall apply:

a) Sample(s) of **each type (1/2)** of unbounded rock and slag wool at **each Mean Temperature(s) for Thermal Conductivity (50/100/150/200/250 ºC)** shall be drawn.

b) Manufacturer shall declare the apparent density(ies) at which the Thermal Conductivity measurement is to be carried out, for each mean temperature.

c) In case optional requirements (cl.4.11.1 to c.4.11.11) are required to be covered, then the manufacturer shall declare the intended optional requirements intended to be covered in the licence and accordingly, the above samples shall also be tested for the applicable optional requirements. If found conforming, such optional requirements shall be suitably indicated in the scope of the licence.

3) However, scope of licence shall be restricted according to the manufacturing and testing facilities available.

4) During operation of licence, samples of all varieties covered in the scope of licence, shall be drawn in rotation, to the extent possible.

Annex –B

List of Test Equipment

Major test equipment required to test as per the Indian Standard

Sr. No.	Tests used in with Clause Reference	Test Equipment/Chemicals/Glassware
1	**Apparent Density Under Specified Load for Loose materials(IS 3144 Cl.10)**	• Metallic cylindrical vessel • Metallic Plunger with lifting device • Metre scale • Weights • Balance
2	**Apparent Density Under Specified Load for Felted materials(IS 3144 Cl.10)**	• Steel rule of LC 1mm • Flat Horizontal surface • Platen • Weights • Compression testing machine • Balance • Vernier calliper
3	**Apparent Density(IS 3144 Cl.9)**	• Balance • Steel rule of LC 1mm • Thickness measuring instrument (cl.7.1.1 of IS 3144) • Glass sheet/Mild Steel sheet • T-Square • Steel Scale
4	**Thermal Conductivity (IS 3346)**	• Low-temperature metal-surface guarded hot plate apparatus • High-temperature guarded hot plate apparatus
5	**Shot Content (IS 3144 Cl.13)**	• Glass Elutriator • Analytical Balance of 0.1 mg LC • Knife • Furnace • Beaker • Distilled water • Wetting agent • Glass stirring rod • IS sieves (250 and 500 micron) • Spatula • Oven • Desiccator • Rubber stopper • Bristles brush

6	**Moisture Absorption (IS 3144 Cl.15)**	• Thermostat fitted Drying Oven with vent • Chicken gauze • Analytical Balance • Thermostatically controlled Humidity Chamber
7	**Incombustibility (IS 3144 Cl.16)**	• Incombustibility test apparatus • Thermocouple • Temp. Indicator • Timer • Oven • Analytical Balance
8	**Sulphur Content(IS 3144 Cl.19)**	• Gas Absorption flasks • Flask fitted with dropping funnel • Sulphuric Acid • Cadmium Acetate • Hydrochloric acid • Iodine • Sodium thiosulphate • Starch • Mercuric Iodide • Distilled water • Analytical balance • Sulphur Determination Apparatus • Apparatus for Titration
9	**Dimensions(IS 3144 Cl.6,7)**	• Steel rule of LC 1mm • Thickness measuring instrument • Glass sheet/Mild Steel sheet • Flat Surface • T-Square • Steel Scale
10	**Description**	• Steel rule/ Vernier Calliper • Micrometer • Steel Scale

OPTIONAL REQUIRMENTS

11	**Resistance to Micro-organisms (IS 3144 Cl. 17)**	• Incubator • Hot-air oven • Autoclave • Analytical Balance (0.1 mgLC) • Stereoscopic Microscope • Petri Dish • Test organisms – *Aspergillus Nigerand Bacillus Substilis* • Volumetric Flask • Pipettes • Test tube • Erlenmeyer flasks • Microbial solutions • Ethanol-water mixture • O-phenyl phenol • Ethanol • Lactic Acid • Soyabean Casein Digest Agar(SCDA) • Potato Dextrose Agar(PDA) • Sodium Chloride • Distilled water
12	**Odour Emission Test (IS 3144 Cl. 18)**	• Refrigerator • Enamelled Refrigerator Pans • Glass Squares • Butter
13	**Moisture Content (IS 3144 Cl.14)**	• Thermostat fitted Drying Oven with vent • Chicken gauze • Analytical Balance
14	**Alkalinity(IS 3144 Cl.25)**	• pH meter • Analytical Balance • Distilled Water
15	**Corrosive Attack**	• Std. Silver Nitrate Solution • Potassiumchromate • Steam Bath • Whatman no. 42 filterpaper • Sulphuric Acid solution • Sodium Hydroxide Solution • Anayltical Balance
16	**Oil Content (IS 3144 Cl.20)**	• Soxhlet Extraction Apparatus • Carbon Tetra Chloride • Dessicator • Drying Oven • Anayltical Balance • Hot Plate • Sand Bath

17	**Carbon Content (IS 3144 Cl.21)**	• Porcelain or Silica Boat • Combustion Tube • Electric Furnace • Absorption Assembly • Potassium Bichromate • Copper Oxide • Lead Chromate • Oxygen Gas • Standard Barium Hydroxide • Standard Hydrochloric Acid • Phenolphthalein Indicator • Analytical Balance • Stopper carrying a thermocouple • Potassium hydroxide • Condenser • Burette (directly calibrated in terms of C percentage)
18	**Fibre Diameter(IS 3144 Cl. 24)**	• Projection Microscope • Microscope slides • Mounting Medium (Glycerine+distilled water)
19	**Heat Resistance (IS 3144 Cl.12)**	• Dessicator/ ventilated oven • Hot plate/ pipe mandrel quipped for internal heating • Thermocouple • Steel plate
20	**Resistance to Vibration (IS 3144 cl.22.)**	• Wooden Box with removable lid • Steel framework fixed to a steel base plate rigidly mounted on unsprung wheels • Vibration Tester • Transparent Plastic Strip
21	**Resistance to Jolting (IS 3144 cl.22.)**	• Wooden Box with removable lid • Steel framework fixed to a steel base plate rigidly mounted on unsprung wheels • Guide Pins

The above list is indicative only and may not be treated as exhaustive.

Annex - C

SCHEME OF INSPECTION AND TESTING FOR UNBONDED ROCK AND SLAG WOOL FOR THERMAL INSULATION- SPECIFICATION According to IS 3677:1985

1. LABORATORY- A laboratory shall be maintained which shall be suitably equipped (as per the requirement given in column 2 of Table 1) and staffed, where different tests given in the specification shall be carried out in accordance with the methods given in the specification.

1.1 The manufacturer shall prepare and implement a calibration plan for the test equipments.

2. TEST RECORDS – The manufacturer shall maintain test records for the tests carried out to establish conformity.

3. LABELLING AND MARKING–

The Standard Mark as given in the Schedule of the licence shall be labeled on each package of unbonded rock and slag wool for thermal insulation or printed on the label applied to the package as the case may be, provided always that the material in each package to which this mark is applied conforms to every requirement of the specification.

3.1 Marking shall be in accordance with **Cl. 5** of IS 3677 : 1985. In addition, the following details shall be marked on the package of unbonded rock and slag wool for thermal insulation:

i) Licence No.(CM/L.....)
ii) The phrase 'Please see www.bis.gov.in for BIS certification details'.

4. CONTROL UNIT – For the purpose of this Scheme, all unbonded rock and slag wool for thermal insulation of the same type produced under essentially the same conditions of manufacture in a day shall constitute a control unit.

5. LEVELS OF CONTROL - The tests as indicated in column 1 of Table 1 and the levels of control in column 3 of Table1, shall be carried out on the whole production of the factory which is covered by this plan and appropriate records maintained in accordance with paragraph 2 above.

6. REJECTIONS – Disposal of non-conforming product shall be done in such a way so as to ensure that there is no violation of provisions of BIS Act, 2016.

TABLE 1
Levels of Control
(para 5 of Scheme of Inspection and Testing)

(1)				(2)	(3)		
Test Details				Test equipment requirement R: required (or) S: Sub- contracting permitted	Levels of Control		
Clause	Requirement	Test Methods Clause Reference			No. of Sample	Frequency	Remarks
		Clause	Reference				
4	Description	4.1, 4.1.1, 4.1.2, 4.1.2.1, 4.1.2.2	IS 3677	R	Five	Each control unit	----
4.2	Apparent Density	9	IS 3144	R	Five	Each control unit	----
4.3	Apparent Density under specified load	10	IS 3144	R	Five	Each control unit	----
4.4	Shot Content	13	IS 3144	R	One	Each control unit	-----
4.5	Moisture Absorption	15	IS 3144	R	One	Every seventh control unit	-----
4.6	Incombustibility	16	IS 3144	R	One	Each control unit	-----
4.7	Thermal Conductivity	-	IS 3346	S	One for each density	Every year	----
4.8	Sulphur Content	19	IS 3144	R	One	Each control unit	----
4.9	Width and length	6	IS 3144	R	Five	Each control unit	----
4.10	Thickness	7	IS 3144	R	Five	Each control unit	----

4.11	**OPTIONAL REQUIREMENTS**						
4.11.2	**Resistance to Micro-organisms**	**17**	**IS 3144**	**S**	**---**	**----**	**If required by Purchaser See Note 3**
4.11.3	**Odour Emission Test**	**18**	**IS 3144**	**S**	**----**	**----**	**-do-**
4.11.1	**Moisture Content**	**14**	**IS 3144**	**S**	**----**	**----**	**-do-**
4.11.6	**Resistance to Vibration**	**22.2**	**IS 3144**	**S**	**----**	**----**	**-do-**
4.11.7	**Resistance to jolting**	**22.3**	**IS 3144**	**S**	**---**	**----**	**-do-**
4.11.8	**Heat Resistance**	**12**	**IS 3144**	**S**	**-----**	**-----**	**-do-**
4.11.10	**Alkalinity**	**25**	**IS 3144**	**S**	**----**	**----**	**-do-**
4.11.11	**Corrosive Attack**	**26**	**IS 3144**	**S**	**----**	**----**	**-do-**
4.11.9	**Fibre Diameter**	**24**	**IS 3144**	**S**	**----**	**----**	**-do-**
4.11.4	**Oil Content**	**20**	**IS 3144**	**S**	**----**	**----**	**-do-**
4.11.5	**Carbon Content**	**21**	**IS 3144**	**S**	**----**	**----**	**-do-**

Note-1: Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empaneled by the Bureau.

Note-2: Levels of control given in column 3 are only recommendatory in nature. The manufacturer may define the control and submit his own levels of control in column 3 with proper justification for approval by BO Head**.**

Note 3 : Levels of control are as agreed to between the manufacturer and purchaser