



## उत्पाद मैनुअल

भा. मा. 16544: 2016 के अनुसार

समस्त ग्लास एवैक्युईतिद नलिका सौर जल तापन प्रणाली के लिए  
दस्तावेज़ संख्या-पी एम/आई एस 16544/1/दिसंबर 2022

भारतीय मानक ब्यूरो की स्कीम-1 (अनुरूपता मूल्यांकन) विनियम, 2018 के तहत यह उत्पाद मैनुअल प्रमाणीकरण के प्रचालन में रीति औरपारिशिक्ता की सुसंगतता सुनिश्चित करनेके लिए सभी क्षेत्रीय/शाखा कार्यालयों और लाइसेंसी द्वारा संदर्भ सामग्री के रूप में उपयोग किया जाएगा। बीआईएस प्रमाणीकरण लाइसेंस/प्रमाणपत्र प्राप्त करने के इच्छुक भावी आवेदकों द्वारा भी इस दस्तावेज़ का उपयोग किया जा सकता है।

## PRODUCT MANUAL FOR ALL GLASS EVACUATED TUBES SOLAR WATER HEATING SYSTEM ACCORDING to IS 16544:2016

Document No.-PM/IS 16544/1/ December 2022

*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.*

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## PRODUCT MANUAL FOR ALL GLASS EVACUATED TUBES SOLAR WATER HEATING SYSTEM ACCORDING TO IS 16544: 2022

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1.	<b>Product</b>	:	IS 16544: 2016
	<b>Title</b>	:	All Glass Evacuated Tubes Solar Water Heating System
	<b>No. of Amendments</b>	:	One
2.	<b>Sampling Guidelines:</b>		
a)	<b>Raw material</b>	:	<ul style="list-style-type: none"> <li>➤ All Glass Evacuated Tubes as per IS 16543</li> <li>➤ Direct insertion Storage Water Tank for all glass evacuated tubes solar collector as per IS 16542</li> <li>➤ Supporting frame/Stand- <ul style="list-style-type: none"> <li>• Mild Steel as per IS 2062 with hot dip galvanized or powder coated</li> <li>• Galvanized sheet as per IS 277 with powder coating</li> </ul> </li> </ul> <p><i>(Materials as per IS 2062 and IS 277 are under mandatory BIS Certification and manufacturer shall ensure that materials used in manufacturing frame/stand shall be only ISI Marked material and received with test certificate.)</i></p>
b)	<b>Grouping guidelines</b>	:	Please refer ANNEX –A
c)	<b>Sample Size</b>	:	1 No. (Also refer to Cl. 2.2 of IS 16368 for specific requirement of Tank)
d)	<b>Sampling during operation of licence</b>	:	Only One FS shall be drawn during operation of licence. No MS shall be drawn.
3.	<b>List of Test Equipment</b>	:	Please refer ANNEX –B
4.	<b>Scheme of Inspection and Testing</b>	:	Please refer ANNEX –C
5.	<b>Possible tests in a day</b>	:	External thermal shock test (cl. 6.2.4), Internal thermal shock test (Cl. 6.2.5), resistance to impact test (Cl. 6.2.7)
6.	<b>Scope of the Licence:</b>	:	Licence is granted to use Standard Mark as per IS 16544:2016 with the following scope:
	Name of product	:	All Glass Evacuated Tubes Solar Water Heating System
	Model No.	:	

	System capacity, lpd	:	
	Collector area, in m <sup>2</sup>	:	
	No. of evacuated tubes	:	
	Outer diameter and length of evacuated tubes	:	
	Material of Tank	:	
	Material of Tubes	:	

**ANNEX A**

**Grouping Guidelines**

1. Different types of “All Glass evacuated Tubes Solar Water Heating system” as per IS 16544:2016 vary in terms of system capacity (litres per day), Collector area, No. of Tubes, Outer diameter and length of tubes used, Material of Tank and Tubes.
2. The Firm shall declare all the models of “All Glass evacuated Tubes Solar Water Heating system” intended to be covered in the Licence along with their system capacity (litres per day), Collector area, No. of Tubes, Outer diameter and length of tubes used, Material of Tank and Tubes.
3. Each model shall be tested for considering GoL/CSoL.
4. During the operation of the Licence, BO shall ensure that all the varieties covered in the Licence are tested in rotation, to the extent possible.

**Annex B**  
**List of Test Equipment**

*Major test equipment required to test as per the Indian Standard*

<b>Sl. No.</b>	<b>Tests used in with Clause Reference</b>	<b>Test Equipment</b>
1	Pre-conditioning Test, Cl. 6.1	Stop Watch, Pyranometer
2	Exterior Test, Cl. 6.2.1	Thermometer
3	Leakage Test, Cl. 6.2.2	Thermometer, Pressure Gauge, Stop Watch
4	Stagnation Test, Cl. 6.2.3	Pyranometer, Thermometer, Stop Watch, Anemometer(Device for measuring wind speed)
5	External Thermal Shock Test, Cl. 6.2.4	Pyranometer, Stop Watch, Protractor, Thermometer, Flowmeter.
6	Internal Thermal Shock Test, Cl. 6.2.5	Pyranometer, Stop Watch
7	Thermal Performance Test, Cl. 6.2.6	Setup as per fig 1 of IS 16368.
8	Resistance to Impact Test, Cl. 6.2.7	V-shaped groove, 5 mm thick polyurethane liner, steel ball with a mass of $120 \pm 10$ g

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

**ANNEX C**

**Scheme of Inspection and Testing**

**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 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** – As per the requirements of IS 16544: 2022.

**4. CONTROL UNIT**- Quantity of “All glass evacuated Solar water heating system” of same capacity (litres per day), manufactured under similar conditions from same consignment of raw material in a fortnight, 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 Table 1, 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.

**5.1** All the production which conforms to the Indian Standards and covered by the licence should be marked with Standard Mark.

**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**

(1)				(2)	(3)		
Test Details				Test equipment requirement R: required (or) S: Sub-contracting permitted	Levels of Control		
Cl.	Requirement	Test Method			No. of Sample	Frequency	Remarks
		Clause	Reference				
<b>Raw Materials</b>							
4.1(a)	All glass evacuated tubes	IS 16543		S	One	Each consignment	No further testing is required, if accompanied with the Test Certificate or ISI Marked.
4.1(b)	Storage water tank	IS 16542		S	One	Each consignment	No further testing is required, if accompanied with the Test Certificate or ISI Marked.
4.1(c)	Diffuse flat plate reflector	4.4	IS 16544	S	One	Each consignment	-----
4.1(d)	Tube resting caps	4.5	IS 16544	S	One	Each consignment	-----
4.1(f)	Supporting frame/stand	4.6	IS 16544	S	One	Each consignment	No further testing is required, if accompanied with the Test Certificate or ISI Marked.

							<i>Materials as per IS 2062 and IS 277 are under mandatory BIS Certification and manufacturer shall ensure that materials used in manufacturing frame/stand shall be only ISI Marked material and received with test certificate</i>
5.1	General Requirements	<b>5.1.1, 5.1.2, 5.1.3</b>	<b>IS 16544</b>	<b>R</b>	One	Each Control Unit	--
5.2	Over Temperature Protection for system	<b>5.2</b>	<b>IS 16544</b>	<b>R</b>	One	Each Control Unit	--
6.1	Pre-conditioning Test	<b>6.1.1&amp;6.1.2</b>	<b>IS 16544</b>	<b>R</b>	One	Once in a year	The test shall also be carried out, whenever there is any change in design/material.
6.2.1	Exterior Test	<b>Annex B</b>	<b>IS 16544</b>	<b>R</b>	One	Once in a year	First Exterior check before starting other tests shall be done on Each Solar Water Heating System
6.2.2	Leakage Test	<b>Annex C</b>	<b>IS 16544</b>	<b>R</b>	One	Once in a year	First Leakage test after first exterior leak check tests shall be done on Each Solar Water Heating System
6.2.3	Stagnation Test	<b>Annex D</b>	<b>IS 16544</b>	<b>S</b>	One	Once in a year	The test shall also be carried out, whenever there is any change in design/material.
6.2.4	External Thermal Shock Test	<b>Annex E</b>	<b>IS 16544</b>	<b>S</b>	One	Once in a year	The test shall also be carried out, whenever there is any change in design/material.

6.2.5	Internal Thermal Shock Test	<b>Annex F</b>	<b>IS 16544</b>	<b>S</b>	One	Once in a year	The test shall also be carried out, whenever there is any change in design/material.
6.2.6	Thermal Performance Test	<b>6.2.6</b> <b>7</b>	<b>IS 16544</b> <b>IS 16368</b>	<b>S</b>	One	Once in a year	The test shall also be carried out, whenever there is any change in design/material.
6.2.7	Resistance to Impact Test	<b>Annex F</b>	<b>IS 16543</b>	<b>S</b>	One	Once in a year	The test shall also be carried out, whenever there is any change in design/material/source of tubes.

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

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