PRODUCT MANUAL FOR SOLAR FLAT PLATE COLLECTOR- PART 1- REQUIREMENTS ACCORDING to IS 12933(PART 1):2003

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.	**Product**	:	IS 12933(PART 1):2025
	Title	:	Solar Flat Plate Collector- Part 1- Requirements
	No. of Amendments	:	Nil
2.	**Sampling Guidelines:**		
a)	**Raw material**		Components - Clause 4 of IS 12933 (Part 1)
b)	**Grouping guidelines**	:	Please refer ANNEX – A
c)	**Sample Size**	:	One fully assembled unit of Solar Flat Plate Collector along with components as given in Clause 7 of IS 12933(Part 1)
3.	**List of Test Equipment**	:	Please refer ANNEX – B
4.	**Scheme of Inspection and Testing**	:	Please refer ANNEX – C
5.	**Requirements which can be tested in a day :**		
	a) Shapes & Dimensions (Cl. 5) b) Assembly and Workmanship (Cl. 6) c) Static pressure leakage test (Cl. 7.1.1) d) Transmittance test for cover plate, if applicable		
6.	**Scope of the Licence :**		
	Licence is granted to use Standard Mark as per IS 12933 (Part 1) : 2003 with the following scope:		
	Name of the product	Solar Flat Plate Collector	
	Variety	i) Material of following components: • Absorber • Collector Box • Gaskets and Grommets ii) Type of Coating on absorber- Selective/Non-selective iii) Maximum Working Pressure, iv) Size(s) and Shape	
7.	**Any other product specific guidelines**	Please refer Annex D	

Annex-A

Grouping Guidelines

1. The Guidelines as given below shall be followed for GoL/CSoL of Solar Flat Plate Collector as per IS 12399(Part 1):

   i. One fully assembled unit of solar flat plate collector (of highest size) along with the components as given in clause 7 of IS 12933 (Part 1) shall be tested to cover the entire range of sizes.

   ii. Declaration regarding maximum working pressure; collector characteristics- F_R (α_t) and F_RU_L; Material of absorber, Collector box and gaskets and grommets; Surface coating on absorber (selective/ non-selective), Weight of empty collector along with drawings for all the sizes intended to be covered in the licence shall be submitted by manufacturer.

   iii. Typical shape and dimensions of the flat plate collector (sizes a, b and c) are given in Fig. l of IS 12933 (Part 1). Any other size and shape not mentioned in Fig. 1 may also be used provided other components are made in consonance. In case the shape and dimensions differ from that given in Fig.1 of IS 12933 (Part 1), the drawings indicating dimensions shall be furnished to BIS for approval. The tests mentioned in clause 7.2 of IS 12933(Part1) shall also be carried out from independent laboratory before such designs/changes are approved by BIS as Change in Scope of licence (inclusion).

   iv. If any changes in design, material, maximum working pressure, collector characteristics or weight of empty collector are introduced in the approved design, tests mentioned in clause 7.2 of IS 12933(Part1) shall be carried out from independent laboratory before such designs/ changes are approved by BIS as Change in Scope of licence (inclusion).

2. The Firm shall declare the varieties of solar flat plate collector intended to be covered in the Licence. The Scope of Licence may be restricted based on the Manufacturing and testing capabilities of the Manufacturer.

3. 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 Equipments

Major test equipment required to test as per the Indian Standard

Sl No.	Tests used in with Clause Reference	Test Equipment
1	Transmittance Test as per Clause 5.1 of IS 12933 (Part 2)	a) Test frame for mounting the cover plate b) Pyranometer/Solarimeter c) Stop watch d) Protractor
2	Dimensions as per Clause 5 of IS 12933 (Part 1) and IS 12933 (Part 2)	(a) Micrometer (b) Scale (c) Vernier calipers (d) Measuring tape
3	Coating Thickness as per Clause 7.2 of IS 12933 (Part 2)	(a) Coating thickness meter/ Elcometer
4	Resistance to Abrasion Test as per Clause 7.3 of IS 12933 (Part 2)	(a) Apparatus for Resistance to Abrasion Test
5	Temperature Test as per Clause 9.1.4 of IS 12933 (Part 2) and Thermal Shock Test as per Clause 12.1.1 of IS 12933 (Part 2)	(a) Oven (b) Stop watch
6	Outdoor No-Flow exposure Test as per Clause 5.2 of IS 12933 (Part 5)	(a) Test frame for mounting the cover plate (b) Pyranometer/Solarimeter (c) Stop watch
7	Static Pressure Test as per Clause 5.3 of IS 12933 (Part 5)	(a) Hydraulic Pressure Pump (b) Pressure Gauge (c) Stop watch
8	External Thermal Shock Test as per Clause 5.4 of IS 12933 (Part 5)	(a) Oven (b) Stop watch (c) Thermometer (d) Pyranometer/Solarimeter
9	Internal Thermal Shock Test as per Clause 5.5 of IS 12933 (Part 5)	
10	Rain Penetration Test as per Clause 5.6 of IS 12933 (Part 5)	a) Test frame for mounting the cover plate b) Stop watch c) Water spraying arrangement

11	Impact Resistance Test as per Clause 5.7 of IS 12933 (Part 5)	(a) Steel Ball (b) Impact Test mounting Stand
12	Thermal Performance Test as per Clause 6 of IS 12933 (Part 5)	a) Test frame for mounting the cover plate b) Pyranometer/Solarimeter c) Stop watch d) Protractor e) Other testing arrangements as per Fig 5 and Fig 6 of IS 12933 (Part 5)

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

ANNEX - C

Scheme of Inspection and Testing

1. QUALITY ASSURANCE PLAN

1.1 It is expected that during operation of BIS licence, manufacturers will implement a Quality Assurance Plan (QAP) i.e. a plan of regular testing and in-process controls, designed to ensure that the product bearing theStandard Mark conforms to all requirements of the Indian Standard.

1.2 The manufacturers shall define a Quality Assurance Plan (QAP) defining the control unit (i.e. lot/batch etc.), the levels of control (i.e. the frequency and number of samples for conducting the differenttests as per the Indian Standard) and declare the arrangement for testing i.e. whether in-house or subcontracting/sharing for each applicable test and submit the same to BIS Branch Office for information. The manufacturer shall comply with the QAP and maintain test records in accordance with para 2.1.

1.3 **RECOMMENDED LEVELS OF CONTROL/CONTROL UNIT**:

1.3.1 For the guidance of manufacturers, the recommended definition of Control Unit is the quantity of "Solar Flat Plate Collectors" of same variety produced in a day.

1.3.2 For the guidance of manufacturers in preparing the Quality Assurance Plan, recommended levels of control are given in **Table 1**. Manufacturer has the discretion of declaring their own levels of control or accept the levels of control given in this document.

1.3.3 The manufacturer shall ensure inspection and testing as per the Quality Assurance Plan submitted by them on the whole production of the factory which is covered by this plan.

2. ENSURING COMPLIANCE THROUGH TESTING- Manufacturers shall ensure compliance of their products to all the requirementsof the Indian Standard for which they may have in-house test facilities. However, there is no obligation to maintain in-house laboratory. Licensee may use alternative arrangements for tests of the production as per the declared QAP. Various alternatives are available for operation of BIS certification as given below and the relevant guidelines for availing such relaxations by the manufacturers, as amended from time to time, are to be referred:

i) Shared testing resources like common facility,

ii) Cluster based testing facility,

iii) Sub-contracting to outside laboratories which may either be:

a) BIS recognised/empanelled laboratories, or

b) Any accredited laboratory as per ISO/IEC 17025

2.1 **TEST RECORDS**- The manufacturers shall maintain test records for the tests carried out (either in-house or at a sub-contracted or at shared test facility) to establish conformity of the product to the Standard for operation of licence. For the tests being subcontracted or conducted at a shared test

facility, test results issued by the laboratories or test facilities, shall be made available for inspection by BIS.

3. LABELLING AND MARKING - Labelling and Marking shall be done as per IS 12933 (Part 1): 2025. The Standard Mark as given in the Schedule of the licence shall be incorporated legibly and indelibly on each Solar Flat plate collector, provided always that the material so marked conforms to each requirement of the specification.

3.1 **Additional Marking requirements**: Additionally, the following shall also be marked on product or package :

a) "For BIS certification details please visit www.bis.gov.in"

4. REJECTION - The production which conforms to the Indian Standard and covered under the scope of this licence shall be marked with the Standard Mark. 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 (Recommended levels of control- For guidance only)

(1)				(2)		
Test Details				**Levels of Control**		
Cl	**Requirement**	**Test Methods**		**No. of Sample**	**Frequency**	**Remarks**
		Cl	**Reference**			
4	Components	4	IS 12933 (Part 1)	No further testing is required, if accompanied with the Test Certificate or ISI Marked. ***Also See Annex-E of this manual***		
5	Shapes and Dimensions	5, Fig 1	IS 12933 (Part 1)	Manufacturer shall exercise adequate levels of control to ensure that entire production should conform to the Standard. Appropriate records of testing indicating conformity shall be maintained		
6	Assembly and Workmanship	6	IS 12933 (Part 1)			
7	***TESTS***					
7.1.1	Static Pressure Leakage Test	5.3	IS 12933 (Part 5)	One	Each control unit	In case of leakage, collector shall be repaired and rechecked for leakage. If the leakage persists even after repair, the collector shall be rejected.
7.2.1	Outdoor No Flow Exposure Test	5.2	IS 12933 (Part 5)	One	Once in a year	The test shall also be carried out to cover each variety produced in the year
7.2.2	External Thermal Shock Test	5.4	IS 12933 (Part 5)			
7.2.3	Internal Thermal Shock Test	5.5	IS 12933 (Part 5)			
7.2.4	Rain Penetration Test	5.6	IS 12933 (Part 5)			
7.2.5	Impact Resistance Test	5.7	IS 12933 (Part 5)			
7.2.6	Thermal Efficiency Test	6.4	IS 12933 (Part 5)			

7.2.7	Determination of Time Constant	6.5	IS 12933 (Part 5)	One	Once in a year	The test shall also be carried out to cover each variety produced in the year
7.2.8	Incident Angle Modifier Test	6.6	IS 12933 (Part 5)			

ANNEX-D

Requirement of BIS Certification for "Components of Solar Flat Plate Collector" as per IS 12933 (Part 2): 2003 for Manufacturers making and supplying Complete System i.e. " Solar Flat Plate Collector " as per IS 12933 (Part 1): 2025

A. **Introduction**:

1. Both "Solar Flat Plate Collector" as per IS 12933 (Part 1): 2025 and "Components of Solar Flat Plate Collector" as per IS 12933 (Part 2): 2003 have been covered under "the Solar Thermal Systems, Devices and Components (Quality Control) Order, 2024" (QCO) issued by MNRE.

2. As per Cl. 4 of IS 12933 (Part 1): 2025 (Standard for the complete product i.e. "Solar Flat Plate Collector" in this context), "Components of Solar Flat Plate Collector" shall conform to IS 12933 (Part 2). Accordingly, manufacturers applying for grant of BIS Certification for the complete product as per IS 12933 (Part 1): 2025 are required to submit test report of "components" as per IS 12933 (Part 2). Conformity of "Components" as per IS 12933 (Part 2) is to be checked for every such application made for grant of licence on complete product as per IS 12933 (Part 1).

3. Many manufacturers are manufacturing components in-house and are using solely for the captive consumption for the complete product, while it is also possible that some are manufacturing and selling these components to the manufacturers of the complete product also.

B. **REQUIREMENT OF BIS CERTIFICATION**: In view of the above, following guidelines are to be followed for certification:

   1. Manufacturers who are manufacturing components in-house and are using solely for the captive consumption, are **not** required to obtain a separate BIS licence for these components as per IS 12933 (Part 1)**, provided** they have valid BIS licence for the of the complete product i.e "Solar Flat Plate Collector" as per IS 12933 (Part 1) using same material of component. However, all manufacturers shall ensure that the components manufactured and used by them conform to IS 12933 (Part 2), and records of production and testing shall be maintained as per the levels of control specified in Annex- C of this manual (Whether as per levels of control specified by BIS or as per manufacturer's own designed levels of control).

   2. However, any licensee manufacturer holding BIS licence for complete product, intends to sell the components as per IS 12933 (Part 2) also, then (s)he shall be required to obtain **separate** BIS Certification for those components **also** as per IS 12933 (Part 2), as per the requirement of the QCO. **However, separate sample of components as per IS 12933 (Part 2) need not be drawn or separate test report of components as per IS 12933 (Part 2) need not be submitted, provided that they have valid BIS licence for the the complete product manufactured using same material of the components.**

   3. Any manufacturer who is manufacturing complete product, but procuring the components from outside, shall buy only ISI Marked components as per IS 12933 (Part 2), the as per the provisions of the QCO. Records of all such procurement indicating traceability of purchase of ISI Marked material shall be maintained.

C. **OPERATION OF BIS LICENCE**:

1. Records of Production and Dispatch shall be maintained by all manufacturers and manufacturers shall be responsible to establish the consumption of the components (whether used in-house for captive consumption OR sold outside).

2. All manufacturers (***whether holding a separate licence for*** **IS 12933 (Part 2)** ***or not***) shall ensure that the components manufactured and used by them conform to IS **12933 (Part 2)**, and records of production and testing shall be maintained as per the levels of control specified in Annex- C of this manual (Whether as per levels of control specified by BIS or as per manufacturer's own designed levels of control).

3. For manufacturers who have licences for both complete product i.e. "Solar Flat Plate Collector" as per IS 12933 (Part 1), as well as for "Components" as per IS **12933 (Part 2)**, separate sample of components as per IS 12933 (Part 2) need not be drawn if sample of complete product i..e. "Solar Flat Plate Collector" is already drawn during the visit during Surveillance inspections,