



**PRODUCT MANUAL FOR
SOLAR FLAT PLATE COLLECTOR
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):2003
	Title	:	SOLAR FLAT PLATE COLLECTOR
	No. of Amendments	:	2
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 :		
	<ul style="list-style-type: none"> a) Shapes & Dimensions b) Assembly and Workmanship c) Static pressure leakage test d) Transmittance Test for cover plate e) Thickness of collector boxes 		
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	
	Type	Absorber Material, Type of Coating (Selective/Non-selective), Maximum Working Pressure, Size(s) and Shape	

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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 $F_R (\alpha_t)$ and F_{RU_L} , absorber material, surface coating (selective/ non-selective), weight of empty collector etc. along with drawings for all the sizes intended to be covered in the licence shall be obtained.
 - iii. Typical shape and dimensions of the flat plate collector (sizes a, b and c) may be as given in Fig. 1 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. However, if any changes in size, shape, design, material etc. are introduced in the approved design or any new model is introduced, 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.
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 - BList 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
9	Internal Thermal Shock Test as per Clause 5.5 of IS 12933 (Part 5)	(d) Pyranometer/Solarimeter
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. 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 equipment.

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 12933 (Part 1).

4. CONTROL UNIT – All Solar Flat Plate Collectors of same shape and dimensions produced 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 [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 Standard 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 required (or) S: Sub-contracting permitted	Levels of Control		
CI	Requirement	Test Methods			No. of Sample	Frequency	Remarks
		CI	Reference				
4	Components	4	IS 12933 (Part 1)	As per <i>Annex –I</i>		No further testing is required, if accompanied with the Test Certificate or ISI Marked.	
5	Shapes and Dimensions	5, Fig 1	IS 12933 (Part 1)	R	Five	Each control unit	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.
6	Assembly and Workmanship	6	IS 12933 (Part 1)	R	Five	Each control unit	---
7	TESTS						
7.1.1	Static Pressure Leakage Test	5.3	IS 12933 (Part 5)	R	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)	S	One	Once in a year	The test shall also be carried out, whenever there is any change in design/material of any component of collector.
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)				
7.2.8	Incident Angle Modifier Test	6.6	IS 12933 (Part 5)				

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.

Annex-1 to SITTest details for Components

(1)				(2)	(3)		
Test Details				Test equipment requirement required (or) S: Sub contracting permitted	Levels of Control		
Clause	Requirement	Test Methods			No. of Sample	Frequency	Remarks
		Clause	Reference				
COVER PLATE							
4	Material		IS 12933 (Part 2)	S	One	Each Consignment	No further testing is required, if accompanied with the Test Certificate or ISI Marked.
	Freedom from defects	4		R	Each piece	---	---
5.1	Transmittance test	5.1		R	Two	Each Consignment	---
COLLECTOR BOX							
6.1	Material	6.1	IS 12933 (Part 2)	S	One	Each Consignment	No further testing is required, if accompanied with the Test Certificate or ISI Marked.
6.2	Thickness	6.2	IS 12933 (Part 2)	R	5	Each Consignment	---
7	Workmanship and Finish						
	Workmanship	7.1	IS 12933 (Part 2)	R	Each collector box		---
	Resistance to Abrasion (for painted and powder coated)	7.2, 7.3	IS 12933 (Part 2)	R	One	Each Consignment	No further testing is required, if accompanied with the Test Certificate or ISI Marked.

	Thickness and Abrasion test (for Electroplated zinc coating)	7.2, 7.3	IS 12933 (Part 2)	R	Two	Each Consignment	No further testing is required, if accompanied with the Test Certificate or ISI Marked.
8	Fabrication	8	IS 12933 (Part 2)	R	Each collector box	---	No further testing is required w.r.t material, if accompanied with the Test Certificate or ISI Marked.
ABSORBER (including RISERS, HEADERS, SHEET FOR ABSORBER)							
9.1.1	Material	9.1.1	IS 12933 (Part 2)	S	Two	Each Consignment	No further testing is required, if accompanied with the Test Certificate or ISI Marked.
9.1.4	Temperature Test	9.1.4	IS 12933 (Part 2)	R	Two (for each type of coating)	Each Consignment	
9.2.1	Static Pressure Leakage Test	9.2.1	IS 12933 (Part 2)	R	Each Assembly	---	This requirement shall be checked during manufacture
9.2.2	Bonding Between Riser and Sheet	9.2.2					
COLLECTOR BOX INSULATION							
10.1	Thermal resistance of insulating material (Back and Side Insulation)	10.1	IS 12933 (Part 2)	S	One	Every seventh Consignment	No further testing is required, if accompanied with the Test Certificate or ISI Marked.
		10.2		R	Each collector box insulation	---	---

GASKETS AND GROMMETS							
11	Material	11	IS 12933 (Part 2)	S	One (for each type of material)	Every seventh Consignment	No further testing is required, if accompanied with the Test Certificate or ISI Marked.
12.1	Thermal shock Test	12.1.1					

Note-1: In case any of the components fail, double the number of samples shall be tested for the requirements where the failure has occurred. In case of any failure in retesting, the components from the consignment shall not be used.

Note -2: Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empanelled by the Bureau.

Note-3: 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.