



**PRODUCT MANUAL FOR  
HOT PRESS MOULDED THERMOSETTING GLASS  
FIBRE REINFORCED POLYESTER RESIN (GRP)  
SECTIONAL WATER STORAGE TANKS  
ACCORDING TO IS 14399 (Parts 1 and 2): 1996**

*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.	<b>Product</b>	:	IS 14399 (Part 1 and 2): 1996
	<b>Title</b>	:	Hot Press Moulded Thermosetting Glass Fibre Reinforced Polyester Resin (GRP) Sectional Water Storage Tanks
	<b>No. of Amendments</b>	:	Part 1 - 1 Part 2 - Nil
2.	<b>Sampling Guidelines:</b>		
a)	<b>Raw material</b>	:	As per Clause 4 of the respective Part of IS 14399 (Part 1 and 2)
b)	<b>Grouping guidelines</b>	:	Please refer ANNEX – A
c)	<b>Sample Size</b>	:	Panels – 20 Nos Tank – 1 No
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>	:	Please refer ANNEX – D
6.	<b>Scope of the Licence</b>	:	Please refer ANNEX – E

**ANNEX A**

**Grouping Guidelines**

1. IS 14399 (Part 1): 1996 lays down the requirements for the panels of glass fibre reinforced polyester resin (GRP) sectional water storage tanks and IS 14399 (Part 2): 1996 lays down the requirements for assembly, installation and testing of GRP resin sectional water storage tanks. As per the existing practice, combined licence is granted for both parts.

2. Panels covered in Part 1 are categorized as given below:

Type of Panel	A	B	C
Minimum Thickness (mm)	3	4	5

(Half and quarter panel of above type shall have corresponding minimum thickness)

3. Water Storage Tanks covered in Part 2 are categorized as given below:

- a) Length and breadth – In multiples of 0.5 m or 1 m
- b) Depth – In multiples of 0.5 m subject to maximum 3 m
- c) General details for assembly of water tanks is as given below:

Depth of water tank (m)	Description of panel with regard to location	Type of panel
1	Top, bottom and sides	A
2	Bottom and lower tier of sides	B
	Top and top tier of sides	A
3	Bottom and lowest tier of sides	C
	Middle tier of sides	B
	Top and top tier of sides	A

4. Considering the above, following grouping guidelines is developed for GoL/CSoL:

- a) One sample of panel of maximum specified thickness shall be tested for all requirements to cover panels with specified thickness upto and including the thickness tested. i.e if Type C panel is tested Type B and Type A may also be covered in the scope and if Type B is tested then Type A may also be covered in the licence.
- b) One tank of maximum depth from each depth range i.e. upto and including 1 m, from 1 m upto and including 2 m and above 2 m upto and including 3 m shall be tested for all requirement to cover all water tanks of depth upto and including the depth tested in that depth range.

5. The Firm shall declare the varieties they intend to cover in the Licence. The Scope of Licence may be restricted based on the Manufacturing and Testing capabilities of the Manufacturer.

6. 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*

Sl. No.	Tests used in with Clause Reference	Test Equipment
<b>Tests as per IS 14399 (Part 1): 1996</b>		
1	Panel dimension (Clause 6)	<ul style="list-style-type: none"> <li>- Vernier calliper</li> <li>- Micrometer</li> <li>- Steel Scale</li> <li>- Steel tape</li> <li>- Angle protractor</li> </ul>
2	Tensile strength (Clause 8.2)	<ul style="list-style-type: none"> <li>- Epoxide resin</li> <li>- Tensile testing machine</li> <li>- Vernier calliper</li> <li>- Micrometer</li> <li>- Arrangement to maintain temperature of <math>27 \pm 2</math> °C</li> <li>- Stop watch</li> <li>- Abrasive paper</li> <li>- Necessary tools for preparation of sample</li> </ul>
3	Bending strength (Cross breaking) (Clause 8.2)	<ul style="list-style-type: none"> <li>- Bending strength test apparatus as per clause C-1 of IS 14399: 1996</li> <li>- Vernier calliper</li> <li>- V-Shaped supports for supporting sample and loading load on sample</li> </ul>
4	Elastic modulus in bend (Clause 8.2)	<ul style="list-style-type: none"> <li>- Bending strength test apparatus as per clause C-1 of IS 14399 1996</li> <li>- Vernier calliper</li> <li>- V-Shaped supports for supporting sample and loading load on sample</li> <li>- Arrangement to maintain temperature of <math>27 \pm 2</math> °C</li> </ul>
5	Glass content (Clause 8.2)	<ul style="list-style-type: none"> <li>- Physical balance</li> <li>- Muffle furnace</li> <li>- Crucible, Desiccator</li> <li>- Thermometer</li> <li>- Stop watch</li> <li>- Standard sieve of 200 mesh size</li> <li>- Hot air oven</li> </ul>

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6	Barcoal hardness (Clause 8.2)	<ul style="list-style-type: none"> <li>- Barcoal hardness tester as per clause F-1 and Fig 4 of IS 14399: 1996</li> <li>- Arrangement to maintain temperature of <math>27 \pm 2</math> °C and relative humidity <math>65 \pm 5</math> %</li> </ul>
7	Water absorption (Clause 8.2)	<ul style="list-style-type: none"> <li>- Weighing balance</li> <li>- Vernier calliper</li> <li>- Micrometer</li> <li>- Thermostatically maintained water bath (<math>27 \pm 2</math> °C)</li> <li>- Filter paper/clean cloth</li> </ul>
8	Hydrostatic test (Clause 9)	<ul style="list-style-type: none"> <li>- Hydrostatic tester as per clause H-1 and Fig. 5 of IS 14399: 1996</li> <li>- Thermometer</li> </ul>
9	Deflection test (Clause 10)	<ul style="list-style-type: none"> <li>- Hydrostatic tester as per clause H-1 and Fig. 5 of IS 14399: 1996</li> <li>- Thermometer</li> <li>- Dial gauge</li> </ul>
<b>Tests as per IS 14399 (Part 2): 1996</b>		
10	Material and construction (Clause 4) Dimension of tanks (Clause 5)	<ul style="list-style-type: none"> <li>- Vernier calliper</li> <li>- Micrometer</li> <li>- Steel scale/Steel tape</li> </ul>

*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 requirement of IS 14399 (Part 1): 1996.

**4. CONTROL UNIT** –300 water tank panels or part thereof of the same type, manufactured from the same batch of raw material from same machine under similar conditions of manufacturing continuously 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	Level of Control		
Cl.	Requirements	Test Method			No. of samples	Frequency	Remarks
		Clause	Reference				
<b>PART 1 - PANEL</b>							
4.2	<b>Polyester Resin</b>						
	Unsaturated resin	4.2.1	IS 14399 (Part 1) IS 6746	S	One	Each batch received	Further testing is not required if material received with test certificate or ISI marked.
	Cured resin	4.2.2	IS 14399 (Part 1) IS 6746	S	One	Each batch received	
	Cured resin (Hydrolysis test)	4.2.2.1	IS 14399 (Part 1)	S	One	Once in three months for each supplier	Additional sample shall be tested whenever grade of material supplied change.
4.3	Glass fibre reinforcement	4.3	IS 14399 (Part 1) IS 11273 IS 11320 IS 11551	S	One	Each batch received	Further testing is not required if material received with test certificate or ISI marked.
4.4	Fillers	4.4	IS 14399 (Part 1)	S	One	Each batch received	
5	Colour	5	IS 14399 (Part 1)	R	Five	Each control unit	-
6	Panel dimensions	6.1 to 6.4	IS 14399 (Part 1)	R	Five	Each control unit	-
7	Visual inspection of panel	7	IS 14399 (Part 1)	-	Each panel		-

8	Mechanical and Physical properties of panels	8.1, 8.2, Table 3	IS 14399 (Part 1)	R	As per clause 8	Each control unit	-
	Tensile strength	Annex-B					
	Bending strength (Cross breaking)	Annex-C					
	Elastic modulus in bend	Annex-D					
	Glass content	Annex-E					
	Barcoal hardness	Annex-F					
	Water Absorption	Annex-G					
9	Hydrostatic test	9, Annex- H	IS 14399 (Part 1)	R	One	Each control unit	-
10	Deflection test	10.1	IS 14399 (Part 1)	R	One	Each control unit	-
11	Potability of water (Type test)	11.5 to 11.5, Annex- J	IS 14399 (Part 1)  IS 10500	S	One	Once in three years	<p>1) In case of failure of sample in type test, marking shall be stopped under intimation to BIS. Marking to be resumed satisfactory verification of corrective actions and passing of improved sample.</p> <p>2) This test shall be repeated whenever there is significant change in composition or manufacturing process in order to establish the suitability and performance capacity of the panels.</p> <p>3) Even if no change is made in the composition or process, this test shall be carried out once in three years</p>

<b>PART 2 – WATER TANKS</b>							
4.1	Panels	4.1	IS 14399 (Part 1) IS 14399 (Part 2)	-	-	-	Panel shall meet the requirements of IS 14399 (Part 1): 1996
4.2	Sealants	4.2	IS 14399 (Part 2)	S	One	Each batch received	Further testing is not required if material received with test certificate or ISI marked.
4.3	Bolts and nuts	4.3	IS 14399 (Part 2) IS 1364 (Part 1) IS 1364 (Part 3) IS 1367 (Part 13)	S	One	Each batch received	
4.4	Support system	4.4	IS 14399 (Part 2) IS 6911 IS 1367 (Part 13)	S	One	Each batch received	
4.5	Roof of the tank	4.5	IS 14399 (Part 2)	-	Each tank	-	-
4.6	Connections to tank	4.6	IS 14399 (Part 2)	-	Each tank	-	Positions and size of all connections shall be as per agreement between the manufacturer and the purchaser
4.7	Manhole Hatches	4.7	IS 14399 (Part 2)	-	Each tank	-	-
4.8	Air vents	4.8	IS 14399 (Part 2)	-	Each tank	-	-
4.9	Internal ladder	4.9	IS 14399 (Part 2)	-	Each tank	-	-
5	Dimensions of tank	5.1, 5.2	IS 14399 (Part 2)	R	Each tank	-	-
6	<b>Assembly</b>						=
	General	6.1	IS 14399 (Part 2)	R	Each tank	-	
-	Foundation and support system	6.2	IS 14399 (Part 2)	R	Each tank	Record of each installation shall be maintained.	
7	Leakage test	7.1, 7.2	IS 14399 (Part 2)	R	Each tank	-	-

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 D**

**Possible tests in a day:**

**A: As per IS 14399 (Part 1): 1996**

- i) Colour (Clause 5)
- ii) Panel dimensions (Clause 6)
- iii) Visual inspection of panel (Clause 7)
- iv) Tensile strength [Clause 8.2, Table 3, Sl No (i)]
- v) Bending strength [Clause 8.2, Table 3, Sl No (ii)]
- vi) Elastic modulus in bend [Clause 8.2, Table 3, Sl No (iii)]

**B: As per IS 14399 (Part 2): 1996**

- i) Dimension of tanks (Clause 5)

**ANNEX E**

**Scope of the licence:**

“Licence is granted to use Standard Mark as per IS 14399 (Part 1 and 2): 1996 with the following scope:	
Name of the product	Hot Press Moulded Thermosetting Glass Fibre Reinforced Polyester Resin (GRP) Sectional Water Storage Tanks
Type of Panel	A/B/C
Depth (for Water Tank)	From ---- m upto and including ---- m