



## PRODUCT MANUAL FOR CERAMIC UNGLAZED VITREOUS ACID RESISTING TILES ACCORDING TO IS 4457 : 2007

*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 4457 : 2007
	<b>Title</b>	:	CERAMIC UNGLAZED VITREOUS ACID RESISTING TILES
	<b>No. of Amendments</b>	:	NIL
2.	<b>Sampling Guidelines:</b>		
a)	<b>Raw material</b>	:	-
b)	<b>Grouping guidelines</b>	:	Please refer <a href="#">ANNEX – A</a>
c)	<b>Sample Size</b>	:	50 tiles for all tests
3.	<b>List of Test Equipment</b>	:	Please refer <a href="#">ANNEX – B</a>
4.	<b>Scheme of Inspection and Testing</b>	:	Please refer <a href="#">ANNEX – C</a>
5.	<b>Possible tests in a day :</b>		
	(i) Dimension and surface quality [Clause 5, Table 1(i)]		
	(ii) Surface quality [Clause 5, Table 1(ii)]		
	(iii) Abrasion resistance { Clause 5, Table 1[iii(d)]}		
6.	<b>Scope of the Licence :</b>		
	“Licence is granted to use Standard Mark as per IS 4457 : 2007 with the following scope:		
	Name of the product	CERAMIC UNGLAZED VITREOUS ACID RESISTING TILES	
	Type	Modular / non modular	
	Surface area and size of tile		
	Thickness of tiles	--- mm	

**ANNEX A****Grouping Guidelines**

1. Ceramic unglazed vitreous acid resisting tiles as per IS 4457 : 2007 are classified as below:
  - a) Sizes – Modular and Non modular
  - b) Dimensions – As per the clause 4.1 of IS 4457 : 2007 and other sizes as agreed between manufacturer and purchaser provided it is less than 375 mm x 375 mm.
  - c) Thickness – 8 mm, 10 mm, 12 mm, 15 mm and 20 mm and any other thickness as reported by the manufacturer, provided it is less than 20 mm.
  - d) Surface area (S) of the product (cm<sup>2</sup>) –

	Group I	Group II	Group III	Group IV
Surface area(S)	$S \leq 90$	$90 < S \leq 190$	$190 < S \leq 410$	$S > 410$

2. Further, the specified requirement for Breaking strength of tiles with thickness  $\geq 7.5$  mm and tiles with thickness  $< 7.5$  mm are not the same.
3. Considering the above, guidelines given below shall be followed for GoL/CSoL:
  - a) One sample of modular and non-modular size tiles from each surface area (S) group shall be tested to cover all tiles of that size (modular / non-modular) for the particular surface area (S) group tested.
  - b) If tiles of thickness less than 7.5 mm is tested then thickness shall be restricted to less than 7.5 mm. If tiles of thickness 7.5 mm or above is tested, thickness covered under the scope of licence shall be from 7.5 mm to 20 mm.
4. The Firm shall declare the varieties of tiles they intend to cover in the Licence. The Scope of Licence may be restricted based on the Manufacturing and Testing capabilities of the Manufacturer.
5. 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*

S. No.	Tests used in with Clause Reference	Test Equipment
1	<b>Dimensions and surface quality (Clause 5, Table 1)</b>	<ul style="list-style-type: none"> <li>- Vernier caliper or other suitable equipment</li> <li>- Micrometre</li> <li>- Arrangement for measuring straightness and rectangularity as per fig 2 or dial gauge and steel square</li> <li>- Calibrating metal plate</li> <li>- Test apparatus as per clause B-6.2 for measurement of surface flatness</li> <li>- Straight edge</li> <li>- Filler gauge</li> <li>- Fluorescent lighting</li> <li>- Steel scale</li> <li>- Light meter</li> </ul>
2	<b>Physical properties (Clause 5, Table 1)</b>	
A	Water Absorption by weight	<ul style="list-style-type: none"> <li>- Drying oven</li> <li>- Heating apparatus</li> <li>- Weighing balance</li> <li>- De-iodinized or distilled water</li> <li>- Desiccator with silica gel</li> <li>- Chamois leather</li> <li>- Wire loop</li> <li>- Heater/ Hot plate</li> <li>- Basket</li> </ul>
B	Breaking Strength & Modulus of Rupture	<ul style="list-style-type: none"> <li>- Drying oven</li> <li>- An apparatus as per D-3 and Fig. 8 of IS 4457</li> </ul>
C	Abrasion Resistance	<ul style="list-style-type: none"> <li>- Abrasive material as per E-3 of IS 4457</li> <li>- Abrasion testing apparatus as per E-4 of IS 4457</li> </ul>

3	Chemical properties (Clause 5, Table 1)	
A	Resistance to low concentration of acids and alkalies	<ul style="list-style-type: none"> <li>- Ammonium chloride</li> <li>- Anhydrous sodium carbonate</li> <li>- Sodium perborate</li> <li>- Sodium silicate</li> <li>- Sodium hydroxide</li> <li>- Oleic acid</li> <li>- Distilled/de-ionized water</li> <li>- Sodium hypochlorite (Technical Grade)</li> <li>- Active chlorine</li> <li>- Copper sulphate</li> <li>- Sulphuric acid</li> <li>- Lactic acid</li> <li>- Potassium hydroxide</li> <li>- Vessel as per F-4.1 of IS 4457</li> <li>- Drying oven</li> <li>- Chamois leather</li> <li>- Weighing balance</li> <li>- Means of cutting tiles</li> <li>- Methanol</li> </ul>
B	Resistance to high concentration of acids and alkalies	
C	Resistance to household chemicals and swimming pool salts	
D	Resistance to concentrated HNO <sub>3</sub> and H <sub>2</sub> SO <sub>4</sub>	<ul style="list-style-type: none"> <li>- Oven</li> <li>- Weighing balance</li> <li>- Stoneware mortar</li> <li>- IS sieve 850 μm &amp; 600 μm</li> <li>- Distilled water</li> <li>- Porcelain basin</li> <li>- Sand bath</li> <li>- Heater/hot plate</li> <li>- HNO<sub>3</sub></li> <li>- H<sub>2</sub>SO<sub>4</sub></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 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 4457 : 2007. Each box/package of tiles shall also be marked with size and thickness of tiles.

**4. CONTROL UNIT** – All tiles of same shape, size and thickness manufactured continuously from same batch of raw material under similar condition in a week 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 requirement R: required (or) S: Sub-contracting permitted	Levels of Control		
Cl.	Requirement	Test Methods		No. of Sample	Frequency	Remarks
		Clause	Reference			
Clause 5 Table 1	<b>DIMENSIONS AND SURFACE QUALITY</b>					
	a) Length and Width  (i) Deviation in percent of the average size for each tile from the work size  (ii) Deviation in percent of the average size for each tile from the average size of the 10 test specimens	4.1 5 Annex -B	IS 4457	R	10	Daily for each size and shape and thickness
	b) Thickness	4.2 5 Annex-B	IS 4457	R	10	Daily for each size and shape and thickness
	c) Straightness of Sides (facial sides)	5 Annex-B	IS 4457	R	10	Daily for each size and shape and thickness
	d) Rectangularity	5 Annex-B	IS 4457	R	10	Daily for each size and shape and thickness
	e) Surface Flatness  (i) Centre curvature (ii) Edge curvature (iii) Warpage	5 Annex-B	IS 4457	R	10	Daily for each size and shape and thickness
Clause 5 Table 1	Surface Quality	5 Annex-B	IS 4457	R	At least 1 sqm with minimum 30 tiles	Daily for each size and shape and thickness

Clause 5 Table 1	<b>PHYSICAL PROPERTIES</b>						
	a) Water Absorption by weight	5 Annex-C	IS 4457	R	10	Each control unit	
	b) Breaking Strength	5 Annex-D	IS 4457	R	10	Each control unit	
	c) Modulus of Rupture	5 Annex-D	IS 4457	R	10	Each control unit	
	d) Abrasion Resistance	5 Annex-E	IS 4457	R	10	Each control unit	
Clause 5 Table 1	<b>CHEMICAL PROPERTIES</b>						
	a) Resistance to chemicals:	5 Annex- F	IS 4457				The level of resistance (Class) shall be as agreed to between the manufacturer and the purchaser of the product
	(i) Resistance to low concentrations of acids and alkalies			R	5 for each test solution	Once in three month	
	(ii) Resistance to high concentrations of acids and alkalies			R	5 for each test solution	Once in three month	
(iii) Resistance to household chemicals and swimming pool salts	R	5 for each test solution	Once in three month				
	b) Resistance to concentrated HNO <sub>3</sub> and H <sub>2</sub> SO <sub>4</sub>	5 Annex-G	IS 4457	R	1	Each Control Unit	

Note -1 : If any of the sample fails in any of the requirements, twice the number of sample shall be tested for that requirement from the same batch/control unit and product shall be marked only if retested samples pass.

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.