



**PRODUCT MANUAL  
FOR TITANIUM DIOXIDE, ANATASE, FOR PAINTS  
ACCORDING TO IS 411:2020**

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 411:2020
	<b>Title</b>	:	TITANIUM DIOXIDE, ANATASE, FOR PAINTS
	<b>No. of Amendments</b>	:	NIL
2.	<b>Sampling Guidelines:</b>		
a)	Raw material	:	No specific requirement
b)	Grouping guidelines	:	Not applicable - there are no varieties in the standard
c)	Sample Size	:	500 g
3.	<b>List of Test Equipment</b>	:	Please refer Annex –A
4.	<b>Scheme of Inspection and Testing</b>	:	Please refer Annex - B
5.	<b>Possible tests in a day :</b>	:	Titanium Dioxide Content, Volatile matter at 105 ± 2°C, Residue on 45 micron IS Sieve, Oil absorption, Colour, Reducing Power, Relative density at 27°C, Matter Soluble in water, pH of pigment slurry (without filtering)
6.	<b>Scope of the Licence :</b>		
	Licence is granted to use Standard Mark as per IS 411:2020 with the following scope:		
	Name of the product	TITANIUM DIOXIDE, ANATASE, FOR PAINTS	

ANNEX-A

LIST OF TEST EQUIPMENTS

Major test equipment required to test as per the Indian Standard

S. No.	Tests used in with Clause Reference	Test Equipment / Chemicals / Glassware
	Description Clause 4.1	<u>X-Ray Diffraction Method</u> X-Ray Diffractometer with operating conditions as specified in A-2 of Annex A, IS 411:2020 Untreated Rutile (100%) and Anatase(100%) grades of TiO <sub>2</sub> as synthetic standards for calibration.
1.	<u>Composition,</u> Clause 4.3 and <u>Titanium dioxide</u> <u>content</u> Clause 4.3	<u>Zinc Reduction Method</u> Nakazono Reductor with 3 stopclocks ( as per Annex B of IS 411:2020) 50 ml pipette Gooch Crucible with no asbestos pad Porcelain dish Hot water bath Calibrated Weighing balance Calibrated burettes Conc. H <sub>2</sub> SO <sub>4</sub> Ammonium Sulphate Zinc Amalgam <u>(B)Aluminium Reduction Method</u> Delivery Tube (as per Annex B of IS 411:2020) Long Necked flask- 500ml capacity Hot Plate Calibrated balance L.C. 0.001g Measuring jars- 100ml, 1L Glass Rod Calibrated Burette Reagents as per Annex B of IS 411;1991 <u>(C)Gravimetric Method</u> Glass Beakers, 500ml and 1L Watch glass Silica Crucible, 50 ml Desiccator Electronic Balance, L.C. 0.001g Hot plate Muffle furnace Whatman No. 40, No. 41 filter papers Dropper Reagents as per Annex B of IS 411:2020
2.	<u>Volatile Matter</u> Clause 4.3	Weighing bottle as per Cl. 8.1.1, IS 33:1992 Oven capable of being maintained at 105±2°C Calibrated Balance, L.C. 0.001g Desiccator

3.	<u>Residue on 45 micron sieve</u> Clause 4.3	IS sieve of 45 microns, conforming to IS 460(Part 2):1985 Brush-hog bristle, approximate dimensions 5mm thick, 20mm wide, 35mm long Sintered Glass crucible- porosity grade P40 Oven capable of being maintained at 105±2°C Calibrated balance, L.C. 0.001g Desiccator Wash Bottle
4.	<u>Oil Absorption</u> Clause 4.3	Plate, Ground glass or marble, at least 300mm×400mm Palette knife as per Cl.10.1.2, IS 33:1992 Burette Calibrated balance
5.	<u>Colour</u> Clause 4.3	Palette knife as per 11.1.1, IS 33:1992 Substrate of minimum area 150mm×50mm Burette (1 ml of the binder contains about 35 drops) Muller as per Cl. 11.1.4, IS 33;1992 Plate, ground glass or marble
6.	<u>Reducing Power</u> Clause 4.3	Pyknometer- Type 5, of capacity 25ml or 50 ml, preferably with a loose fitting cap Vacuum Desiccator, as per Cl. 16.1.2, IS 33:1992 Vacuum Pump, capable of reducing the pressure, to not greater than 2kPa Thermostatically Controlled water bath Balance, L.C. 0.001g
7.	<u>Matter Soluble in water</u> Clause 4.3	One mark volumetric flask- 250ml Colloid Filter Evaporating Dish- Flat bottomed, of glass, platinum, glazed porcelain or silica Oven, capable of being maintained at 150±2°C Balance Desiccator Double Distilled water
8.	<u>pH of Pigment Slurry</u> Clause 4.3	Glass container, 50 ml, made of chemically resistant glass, fitted with a ground glass or rubber stopper. pH meter, D.L. 0.1 unit, calibrated with standard buffer solutions.
9.	<u>volatile matter at 105°C after 24 h preconditioning at (23 ± 2)°C and (50 ± 5) percent relative humidity</u> Clause 4.3	Weighing bottle as per Cl. 8.1.1, IS 33:1992 Oven capable of being maintained at 105±2°C Calibrated Balance, L.C. 0.001g Desiccator Thermometer and Relative Humidity meter
10.	<u>Resistivity of aqueous extract</u> Clause 4.3	<b>Apparatus</b> <ul style="list-style-type: none"> <li>• <b>Centrifuge</b>, or ultra-centrifuge, if necessary.</li> <li>• <b>Filter Paper</b>, finely textured.</li> <li>• <b>Cylinder</b>, approximately 35 mm wide by 125 mm high, or other container suitable for use with the conductivity cell.</li> <li>• <b>Conductivity Meter</b>, with temperature measurement and its compensation</li> </ul>

		<p><b>Reagents</b></p> <ul style="list-style-type: none"> <li>• Water, specific resistivity not less than 2 500 <math>\Omega \cdot m</math> or specific conductivity below 4 <math>\mu S/cm</math>, respectively.</li> <li>• Ethanol, specific resistivity preferable not less than 2 500 <math>\Omega \cdot m</math> or specific conductivity below 4 <math>\mu S/cm</math>, respectively.</li> <li>• Conductivity calibration solution ( for example, potassium chloride).</li> </ul>
11.	<p><u>Scattering power of titanium dioxide</u> <i>Clause 4.3</i></p>	<p>Spectrophotometer/ tristimulus colorimeter using a Y-filter Analytical balance reference pigment black pigment paste spatula.</p>

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

## ANNEX – B

### 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. **PACKING AND MARKING** — The Standard Mark, as given in the Schedule of the licence, shall be marked on the package provided always that material so marked conform to requirements of the specification.

3.1 Packing and Marking shall be done as per the provisions of the Indian Standard. In addition, the following shall be incorporated on each container:

i) BIS Licence Number CM/L and

ii) BIS website details i.e. “For details of BIS certification please visit [www.bis.gov.in](http://www.bis.gov.in)”.

4. **CONTROL UNIT** – For the purpose of this scheme, the entire quantity of the material of the produced in one day under similar conditions of manufacture 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.

5.1.1 The samples shall be drawn from the discharge end of the ring- roller mill at the time when the material is being packed in bags. One sample shall be drawn from every 40<sup>th</sup> bag during the course of the production of the day. The first sample shall be from the 20<sup>th</sup> bag, the second from the material packed in 40 bags. Thus the sample from the 20<sup>th</sup> bag shall represent the quality of the material in 1 to 40<sup>th</sup> bag; the sample from the 60<sup>th</sup> bag that of 41<sup>st</sup> to 80<sup>th</sup> bag and so on.

5.1.2 **Colour**: Test for colour (cl. 11 of IS 33:1992) shall be made on each of the samples drawn from the day of production. If any of the sample fails, the material in the corresponding 40 bags shall not be used under the scheme without further processing.

5.1.3 **Reducing Power, Oil Absorption and Residue on Sieve**-Two consecutive samples drawn to represent the production of 80 bags as under 5.1.1 shall be mixed together in equal proportion to form a composite sample and tested for these characteristics. The lot represented by the composite sample shall only be marked if the test results satisfy the requirements for all these characteristics as given in the specification. (See cl. 9.10 &15 of IS 33:1992)

**5.1.3 Description, Titanium Dioxide, matter soluble in water, volatile matter and pH of pigment slurry, resistivity of aqueous extract and scattering power of titanium dioxide-**

A composite sample shall be prepared by mixing equal proportion of material drawn from selected bags of the day's production( see para 5.1.1) and shall be tested for these requirements. If the composite sample satisfies the requirements for the various characteristics as given in the specification, the day's production shall be considered to have satisfied the requirements of the specification and shall be marked under the scheme. If the sample fails in any of these requirements the day's production represented by the sample shall not be marked.

- 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 LEVELS OF CONTROL

(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				
4.1	Description	4.1 & Annex A	IS 411:2020	R	**One Composite Sample	Each control unit	
4.2	Composition	Annex B	-do-	R	** One composite sample	Each control unit	
4.3, Table-1	i) Titanium dioxide content	Annex B	-do-	R	** One composite sample	Each control unit	
	ii) Volatile matter, % by mass	8	IS 33:1990	R	-do-	-do-	
	iii) Residue on 45 micron sieve, % by mass	9	-do-	R	*One Composite sample	80 bags	See para 5.1.2 of the Scheme for sampling details
	iv) Oil absorption	10	-do-	R	-do-	-do-	
	v) Colour	11	-do-	R	One	40 bags	

	vi) Reducing Power	15	-do-	R	*One Composite sample	80 bags	
	vii) Matter soluble in water, % by mass	19	-do-	R	**One Composite sample	Each control unit	
	viii) pH of pigment slurry (without filtering) at 27°C	21	-do-	R	-do-	-do-	
	ix) Volatile Matter At 105°C After 24 h Preconditioning At (23 ± 2)°C And (50 ± 5) Percent Relative Humidity	8	-do-	R	-do-	-do-	
	x) Resistivity of aqueous extract	Annex C	IS 411:2020	R	-do-	-do-	
	xi) Scattering power of titanium dioxide (percent), compared with standard sample	Annex D	-do-	R	-do-	-do-	

\* The composite sample shall be prepared as detailed in para 5.1.3 of the scheme.

\*\* The composite sample shall be prepared as detailed in para 5.1.4 of the scheme.

Note-1: Whether test equipment is required or sub-contracting is permitted in column 2 shall be decided by the Bureau and shall be mandatory. Sub-contracting is permitted to a laboratory recognized by the Bureau or Government laboratories empaneled 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 and submit it for approval to BO Head.