



**PRODUCT MANUAL FOR
IRON OXIDE PIGMENTS FOR PAINTS
ACCORDING TO IS 44 : 1991**

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 44:1991
	Title	:	IRON OXIDE PIGMENTS FOR PAINTS
	No. of Amendments	:	01
2.	Sampling Guidelines:		
a)	Raw material	:	-
b)	Grouping guidelines	:	Separate samples shall be tested for each grade and type to cover all grades and types in the scope of the licence.
c)	Sample Size	:	2 x 500 gm Iron oxide pigments + 2 x 500 gm Approved Sample
3.	List of Test Equipment	:	Please refer ANNEX – <u>A</u>
4.	Scheme of Inspection and Testing	:	Please refer ANNEX – <u>B</u>
5.	Possible tests in a day :		
	All tests except Sum of water soluble chloride and sulphate expressed as Cl and SO ₄ test (Clause 5.3, Table 1) are possible to be done in a day.		
6.	Scope of the Licence :		
	“Licence is granted to use Standard Mark as per IS 44:1991 with the following scope:		
	Name of the product	IRON OXIDE PIGMENTS FOR PAINTS	
	Type & Grade	Grade 1 Black oxide, Grade 2 Synthetic red oxide, Grade 3 Natural red oxide, Grade 4 Ochre:(Type A — Red, Type B — Yellow) Grade 5 Natural sienna, (Type C — Raw ,Type D — Burnt) Grade 6 Natural umber, (Type C — Raw, Type D — Burnt) Grade 7 Synthetic iron oxide yellow hydrated.	

ANNEX A

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
1.	Form and Condition (Clause 5.2)	Palette knife
2.	Lead Free Material (Clause 5.4)	i) Weighing Balance ii) Hot air Oven iii) Dilute hydrochloric acid iv) Beakers v) Filter Paper vi) Sulphuric acid vii) Tared silica crucible, viii) Muffle furnace ix) Pipette Alternate Method:- i) Electrolysis apparatus. ii) Weighing Balance iii) Hot air Oven iv) Dilute hydrochloric acid v) Beakers vi) Filter Paper vii) Sulphuric acid viii) Nitric acid.
3.	Volatile matter, percent by mass, (Clause 5.3, Table 1)	i) Wide Mouthed Weighing Bottle with ground glass stopper, ii) Oven iii) Balance iv) Desiccator
4.	Residue on sieve, percent by mass, (Clause 5.3, Table 1)	i) Sieves (IS sieves of 45 micron) ii) Brush iii) Sintered Glass Crucible - of porosity Grade P 40. iv) Oven v) Balance – accurate to 1 mg vi) Desiccator vii) Wash Bottle viii) Beaker

		<ul style="list-style-type: none"> ix) Volumetric Flasks x) Suitable dispersing agent xi) Stirrer xii) Distilled Water xiii) Weighingbottle
5.	OIL ABSORPTION (Clause 5.3, Table 1)	<ul style="list-style-type: none"> i) Plate ii) Palette Knife iii) Burette-10 ml iv) Balance v) Refined linseed oil,
6.	Colour (Clause 5.3, Table 1)	<ul style="list-style-type: none"> i) Palette Knife ii) Substrate iii) Burette iv) Automatic muller/Hand muller/Plate, Ground Glass or Marble v) Binder vi) Weighing Balance vii) Colorimeter(Recommendatory)
7.	Matter soluble in water, percent by mass, (Clause 5.3, Table 1)	<ul style="list-style-type: none"> i) Volumetric Flasks ii) Colloid Filter iii) Evaporating Dish –(Glass, platinum, glazed porcelain or silica). iv) Oven v) Balance vi) Desiccator vii) Distilled Water viii) Beaker. ix) Hot plate x) Coagulating agent xi) Water Bath xii) Wetting agent(Ethanol/Ethylene oxide)
8.	Sum of water soluble chloride and sulphate expressed as Cl and SO ₄ , percent by mass,	<p>A. DETERMINATION OF SULPHATE</p> <ul style="list-style-type: none"> i) Balance ii) Beakers iii) Hot plate iv) Volumetric flasks

	(Clause 5.3, Table 1)	<ul style="list-style-type: none"> v) Filter paper vi) Hydrochloric Acid vii) Barium chloride viii) Tared sintered crucible(P 10 or P 16) ix) Desiccator x) Muffle furnace <p>B. DETERMINATION OF CHLORIDE</p> <ul style="list-style-type: none"> i) Silver Nitrate Solution ii) Potassium Chromate Solution iii) Beakers iv) Burette with stand v) Pipette vi) Potentiometric titrator(Alternatively)
9.	<p>Acidity (as H₂SO₄) or alkalinity (as NaOH), percent by mass,</p> <p>(Clause 5.3, Table 1)</p>	<ul style="list-style-type: none"> i) Burette with Stand ii) pH Measuring Device iii) Hydrochloric Acid iv) Sodium or Potassium Hydroxide v) Methyl Red Indicator(Preferably) vi) Beakers vii) Balance viii) Volumetric Flask ix) Potentiometric titrator (Alternate method)
10.	<p>pH of aqueous extract</p> <p>(Clause 5.3, Table 1)</p>	<ul style="list-style-type: none"> i) Glass Container with stopper ii) pH Measuring Device iii) Balance iv) Distilled water v) Thermometer vi) Suitable wetting agent
11.	<p>Total iron (as Fe₂O₃), percent by mass,</p> <p>(Clause 5.3, Table 1)</p>	<p>A. EXTERNAL INDICATOR METHOD</p> <ul style="list-style-type: none"> i) Hydrochloric Acid ii) Standard Potassium Dichromate Solution iii) Stannous Chloride iv) Concentrated hydrochloric acid v) Balance vi) Volumetric flasks vii) Beakers viii) Granulated tin ix) Amber-coloured bottle

		<ul style="list-style-type: none"> x) Mercuric Chloride Solution xi) Potassium Ferricyanide Indicator xii) Conical Flask xiii) Water bath xiv) Hot plate xv) Long necked flask xvi) Watch-glass xvii) Potassium permanganate xviii) Burette with stand xix) Pipette <p>B. INTERNAL INDICATOR METHOD</p> <ul style="list-style-type: none"> i) Standard Potassium Dichromate ii) Stannous Chloride Solution iii) Mercuric Chloride Solution iv) Sulphuric Acid – Phosphoric Acid Mixture v) Volumetric Flasks vi) Sodium Diphenylamine Sulphonate Indicator Solution vii) Amber-coloured bottle viii) Weighing balance ix) Conical Flask x) Water bath xi) Hot plate xii) Long necked flask xiii) Watch-glass xiv) Potassium permanganate xv) Beakers xvi) Burette with stand xvii) Pipette
12.	Ferrous iron (as FeO), percent by mass (Clause 5.3, Table 1)	<ul style="list-style-type: none"> i) Hydrochloric Acid ii) Standard Potassium Dichromate Solution iii) Potassium Ferricyanide Indicator iv) Balance v) Conical Flask vi) Burette with stand vii) Pipette.
13.	Carbonates (as CO ₂), percent by mass, (Clause 5.3, Table 1)	<ul style="list-style-type: none"> i) Hydrochloric Acid ii) Sulphuric Acid iii) Ascarite or Soda Asbestos iv) Magnesium Perchlorate v) Pumice vi) Casserole

		<ul style="list-style-type: none"> vii) Copper sulphate viii) Air oven ix) Desiccator x) Glass-stoppered bottle xi) Balance xii) Apparatus as per Clause D-1.1 ,fig 1 xiii) CO2 free air supply system xiv) Heater
14.	<p>Calcium compounds (asCaO), percent by mass, (Clause 5.3, Table 1)</p>	<ul style="list-style-type: none"> i) Dilute Hydrochloric Acid ii) Ammonium Hydroxide iii) Hydrogen Peroxide iv) Ammonium Oxalate Solution v) Dilute Sulphuric Acid vi) Standard Potassium Permanganate Solution vii) Balance viii) Beakers ix) Volumetric flasks x) Pipette xi) Filter paper xii) Hot plate xiii) Burette with stand xiv) Measuring Cylinder
15.	<p>Manganese content (as MnO₂), percent by mass (Clause 5.3, Table 1)</p>	<ul style="list-style-type: none"> i) Nitric Acid ii) Sodium Bismuthate iii) Sulphurous Acid or Sodium Sulphite iv) Standard Ferrous Ammonium Sulphate Solution v) Standard Potassium Permanganate Solution vi) Phosphoric Acid vii) Balance viii) Conical flasks ix) Hot plate x) Sintered glass crucible xi) Pipette xii) Measuring cylinder xiii) Burette with stand
16.	<p>Loss on ignition, percent (Clause 5.3, Table 1)</p>	<ul style="list-style-type: none"> i) Balance ii) Oven iii) Porcelain crucible iv) Muffle furnace

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The above list is indicative only and may not be treated 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 stencilled or printed on each container of iron oxide pigment or on a label applied to the container, provided always that the product thus marked conforms to every requirement of the Indian Standard.

3.1 Packing and Marking shall be done as per the provisions of the Indian Standard. In addition, the following shall be marked on each container of iron oxide pigment or on a label applied to the container:

- i. BIS licence no: CM/L-
- ii. Details of BIS website i.e. “for details of BIS certification please visit www.bis.gov.in”

4. CONTROL UNIT –The total quantity of the material of the same grade and type finally homogenised and blended at a time to match either with the standard sample or a particular colourshade as asked by the customer 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	Levels of Control		
Cl.	Requirement	Test Method			No. of Sample	Frequency	Remarks
		Clause	Reference				
5.1	Composition	5.1.1,5.1.2,5.1.3,5.1.4,5.1.5,5.1.6	IS 44 : 1991	R	One sample	Each control unit	
5.2	Form and Condition	5.2	IS 44 : 1991	R	One	Each control unit	
5.3 & Table 1	Volatile matter	8	IS 33:1992	R	One	Each control unit	
-do-	Residue on sieve	9	IS 33:1992	R	One	Each control unit	
-do-	Oil absorption	10	IS 33:1992	R	One	Each control unit	
-do-	Colour	11	IS 33:1992	R	One	Each control unit	
-do-	Matter soluble in water	19	IS 33:1992	R	One	Each control unit	
-do-	Sum of water soluble chloride and sulphate expressed as Cl and SO ₄	Annex A	IS 44 : 1991	R	One	Each control unit	This test is applicable to Grades 2 & 7.

-do-	Acidity (as H ₂ SO ₄) oralkalinity (as NaOH),	20	IS 33:1992	R	One	Each control unit	
-do-	pH of aqueous extract	21	IS 33:1992	R	One	Each control unit	
-do-	Total iron (as Fe ₂ O ₃),	Annex B	IS 44 : 1991	R	One	Each control unit	This test is applicable to Grades 1, 2, 3, 4 & 7.
-do-	Ferrous iron (as FeO)	Annex C	IS 44 : 1991	R	One	Each control unit	This test is applicable to Grades 1 & 2.
-do-	Carbonates (as CO ₂),	Annex D	IS 44 : 1991	R	One	Each control unit	This test is applicable to Grades 1 & 6.
-do-	Calcium compounds (as CaO),	Annex E	IS 44 : 1991	R	One	Each control unit	This test is applicable to Grades 2, 4, 5 & 6.
-do-	Manganese content (as MnO ₂),	Annex F	IS 44 : 1991	R	One	Each control unit	This test is applicable to Grades 5 & 6 only.
-do-	Loss on ignition	Annex G	IS 44 : 1991	R	One	Each control unit	This test is applicable to Grade 7 only.
5.4	Lead Free Material	25	IS 33:1992	R	One	Each control unit	Test applicable only when Lead Free Iron Oxide is required.

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 for approval to BO head.