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BUREAU OF INDIAN STANDARDS

Draft Indian Standard

ULTRAMARINE BLUE FOR PLASTICS — SPECIFICATION

(ICS No. 83.080, 83.140.01)

Plastics Sectional Committee, PCD 12	Last date for receipt of comment is **24 March 2024**

FOREWORD

(*Formal clause to be added later*)

Plastic is a widespread medium for various applications, from children's toys to kitchen tools. Colouring plastics can take on many different forms, and it's vital to meet industry standards for safety and performance. A separate Indian standard has been formulated IS 9833:2018 which lists colorants which can be safely used in contact with food stuffs and pharmaceuticals. Plastic master batch segment holds the largest share of the Indian Ultramarine blue market. Master batches made out of Ultramarine Blue are used in food packaging, like, water bottle, Food crates, Bottle caps, etc. and plastic materials that come in contact with food that we eat is not harmful to the humans.

This standard is intended to be used in the series of Indian standards on paints, textiles, plastics for food contact applications. It is emphasized that these standards are used in combination to provide a system of control to the manufacturers of plastics. There is a need to ensure that Lead and Sulphur content in Ultramarine Blue is within the permissible limits that could reach the final product of mass consumption of Food contact plastics and Toys. Existence of Lead beyond the permissible limits will lead to a high toxicity risk.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2: 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1 SCOPE

The standard specifies the requirements and methods of sampling and test for Ultramarine blue for use in plastics that may be regarded as safe for use in contact with foodstuff and pharmaceuticals.

2 REFERENCES

The following standards contain provisions, which through reference in this text constitute the provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject

to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most editions of the standards indicate below:

Standards	*Title*
IS 33 : 2019	Inorganic pigments and extenders for paints – Methods of sampling and test (*third revision*)
IS 75 : 2020	Specification for linseed oil, raw and refined (*second revision*)
IS 79 : 2021	Specification for linseed stand oil for paints (Second Revision)
IS 101 (Part 10 / Sec 1) : 2022 / ISO 13320 : 2020	Methods of sampling and test for paints varnishes and related products Part 10 Instrumental analysis Section 1 Particle size analysis — Laser diffraction methods (*first revision*)
IS 323 : 2019	Rectified spirit for industrial use - Specification (*second revision*)
IS 460 (Part 2) : 2020	Test Sieves — Specification Part 2 Perforated plate test sieves (*fourth revision*)
IS 1997 : 2008 / ISO 385	Laboratory glassware - Burettes (*third revision*)
IS 2316 : 2022	Methods of preparation of standard solutions for colorimetric and volumetric analysis (*second revision*)
IS 5296 : 2018	Chloroform, pure and technical - Specification (*second revision*)
IS 9788 : 2019	Specification for titanium dioxide, rutile for paints
IS 9845 : 2020	Determination of overall migration of constituents of plastics materials and articles intended to come in contract with food stuffs- Method of analysis (*second version)*
IS 12305 : 2022 / ISO 4793 : 1980	Laboratory sintered (fritted) filters, Porosity grading, classification and designation (*first revision*)

3 TERMINOLOGY

For the purpose of this standard the definitions in IS 2828 and below shall apply.

3.1 Colorants — The generic term for all colouring substances.

NOTES:

1. Colorants comprise pigments (*see* 3.3) which are insoluble in the medium as well as dyestuffs (*see* 3.2) which are soluble in the medium.
2. A pigment may contain in the pure chemical substance and/or a surface treatment and/or additives.
3. A colorant may also contain traces of impurities, which may originate from raw materials and/or the production processes.
4. In order to improve application properties, a colorant may contain additives.

3.2 Dyestuff — Colorants (*see* 3.1) soluble in the application medium.

3.3 Pigment — Colorants (*see* 3.1) consisting of particles, insoluble in the application medium (for example coating material or plastic).

3.4 Colorants product — It refers to commercially available colorants available in market. These commercially available products contain the component responsible for colour as well as quantities of other substances (generally referred to as additives) designed to improve the application properties of product, such as the dispensability, colouristic, flow and flocculation resistance of pigments. Dyestuffs often contains significant amount of diluents.

4 REQUIREMENTS

4.1 Material shall be manufactured in compliance with good manufacturing practice so that under normal or foreseeable condition of use they do not transfer their constituents to food stuff or pharmaceutical in quantities which could endanger human health; bring about an unacceptable change in the composition of the food stuff or pharmaceutical or bring about a deterioration in the organoleptic characteristics thereof.

4.2 When tested in accordance with IS 9845, colorants used shall not show visible bleeding or migration from the finished product and shall show no signs of instability or degradation during process. Colorants shall be sufficiently integrated within plastic material so as to preclude any visible migration in to foodstuff or pharmaceutical under normal condition of use.

4.3 Colorants used shall have a degree of purity. It shall also conform with the requirements given in Table 1 when tested in accordance with the methods given in col 4 and col 5.

4.4 Carbon black, if used, shall not be more than 2.5 percent (*m/m*). The UV absorbance of cyclohexane extract at 386 nm shall be less than 0.02 AU for 1 cm cell, or 0.01 AU for 5 cm cell.

5 MARKING AND PACKING

5.1 Packing — The material shall he suitably packed as agree to between the purchaser and supplier.

5.2 Marking

5.2.1 The containers shall be marked with:

a) Name of the material;
b) Manufacturer’s name or trade mark, if any;
c) Weight of the material;
d) The lot and batch number: and
e) Any other statutory requirements.

5.2.2 *BIS Certification Marking*

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the Bureau of Indian Standards Act, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

Table 1
(*Clause* 4.3)
Requirements of Ultramarine Blue

Sl No.	Characteristics	Requirements	Method of Test
(1)	(2)	(3)	(4)
i	Colour	Shall closely match to that of the standard	11 of IS 33
ii	Bulk density, g/cc	0.4 – 0.6	17 of IS 33
iii	Volatile matter, percent by weight, *Max*	1.0	8 of IS 33
iv	Residue on sieve, percent by weight, *Max*	0.1	9 of IS 33
v	Matter soluble in water, percent by wt., *Max*	1.0	19 of IS 33
vi	Oil absorption, percent by wt.,	30 – 40	10 of IS 33
vii	Relative tinting strength, percentage	100 ± 5	13 of IS 33
viii	Median particle diameter, D(0,5), µm, *Max*	4.0	ISO 13320
ix	Soluble organic colouring matter	To pass the test	Annex A
x	Alkalinity (as Na2CO3), percent by wt., *Max*	0.1	20 of IS 33
xi	Free Sulphur, percent by wt., *Max*	0.02	Annex B
xii	Lead as Pb, percent by wt., *Max*	0.002	15.1 of IS 1699
xiii	Chlorides as NaCl, percent by wt., *Max*	0.4	22.4 of IS 33
xiv	Sulphates as Na2SO4, percent by wt., *Max*	0.6	22.3 of IS 33

6 SAMPLING

Representative sample of the material shall be drawn as prescribed under:

6.1 General

In drawing samples, the following precautions and directions shall be observed:

a) Sample shall not be taken in an exposed place;

b) The sampling apparatus shall be clean and dry;

c) Sample, the material being sampled, the sampling apparatus and container sample shall be protected from adventitious contamination;

d) A representative sample shall be drawn after the contents of each container selected for sampling are mixed thoroughly;

e) The sample shall be placed in clean, dry and air- tight metal or opaque glass container on which the material has no action;

f) The sample containers shall be of such a size that they are almost completely filled by the sample;

g) The sample containers shall be sealed air- tight after filling and marked with full details of sampling, the date of sampling and the month and year of manufacture of the material; and

h) Sample shall be stored in such a manner that the temperature of material does not vary unduly from the normal temperature.

6.2 Sampling apparatus

Sampling shall be carried out by means of a suitable sampling scoop of the type shown in Fig.!. The scoop shall be made of metal and shall have a semi-circular (or C-shaped, if found suitable) cross-section.

6.3 Scale of Sampling

6.3.1. Lot

In any consignment of one type of pigment or extender, all the packages of the same size and drawn from a single batch of manufacture shall constitute a lot. If a consignment of one type of pigment or extender is known to consist of different batches of manufacture or of different size of packages, then the packages of the same size and belonging to the same batch shall be grouped together and each such group shall constitute a separate lot.

6.3.2 For ascertaining the conformity of the lot to the requirement of any specification, tests shall be carried out for each lot separately. The number of packages to be selected at random from various sizes of lots shall be in accordance with Table 2.

6.3.3 The packages shall be selected at random and to ensure randomness of selection, the following procedure is recommended for use:

'Starting from any package in the lot, count them in any suitable order as 1,2, 3 ... ... up to r and so on, where r is the integral part of N/n (N being the lot size, and n the corresponding sample size given in Table 1). Every rth package thus counted shall be withdrawn to give sample for tests'.

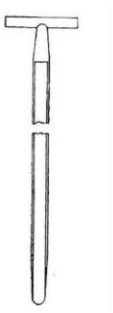

Fig 1: Sampling scoop

Table 2
(*Clause* 6.3.2)

Scale of Sampling

Sl No.	Lot Size	Sample Size
(1)	(2)	(3)
i.	Up to 50	2
ii.	51 to 100	3
iii.	101 to 300	4
iv.	301 to 500	5
v.	501 to 1 000	7
vi.	1 001 to 3 000	10
vii.	3 001 and above	15

6.4 Preparation of test samples

6.4.1 From each of the packages selected according to 6.3.3, a small representative portion of the material shall be drawn with the help of the Sample scoop by inserting it into the material at different depths. (The approximate quantity of material to be drawn from a package shall be not less than 500 g).

6.4.2 Out of these portion a small but equal quantity of material shall, be taken and thoroughly mixed to form a composite sample, sufficient for carrying out triplicate determination for all the characteristics, specified under 5.5. If the quantities of material mixed from different portions is much larger, the process of coning and quartering may be adopted to obtain the requisite quantity (see Note). The composite sample shall be divided into three parts. one for the purchaser, another for the supplier and the third to be used a s a referee sample.

NOTE — On a clean impervious surface, heap the sample into a cone by depositing separate small quantities, one on top of the other, ensuring that the apex always remains in the same vertical line. Break down the cone, mix and reform the cone twice in the same manner. Flatten the third cone by pressing with a metal or glass sheet so that the mass of uniform thickness and diameter is obtained and quarter along the two diameters. Discard the diagonally opposite quarters and heap remaining two quarters into a cone. Repeat this process until a sufficient quantity is left to provide sample of not less than 500g.

6.4.3 The three parts of the composite sample shall be transferred to separate containers. These containers shall be sealed airtight and labelled with full identification particulars given in 6.1(g).

6.4.4 The reference test sample shall bear the seal of both the purchaser and the supplier. It shall be kept at a place agreed to between the purchaser and the supplier, and should be used in case of any dispute between the two.

6.5 Number of Tests

Test for determination of all the characteristics specified in the relevant material specification shall be conducted on the composite sample

6.6. Criteria of Conformity

A lot shall be declared as conforming to the requirements of the specification if the characteristics tested on the composite sample satisfy the requirements given in the material specification.

ANNEX A
(Table 1, Sl No. ix)

SOLUBLE ORGANIC COLOURING MATTER

A-1 GENERAL

A-1.1 Outline of Method — To a boiling solution of the material in ethanol, sodium hydroxide solution and acetic acid are added separately and examined for any development of colour.

A-2 REAGENT

A-2.1 Ethyl Alcohol – 95 percent (*v/v*), conforming to IS 323

A-2.2 Acidic Acid – 10 percent (*v/v*).

A-2.3 Sodium Hydroxide Solution — approximately 4N.

A-3 PROCEDURE

A-3.1 Add to ethyl alcohol in a beaker, a small quantity of the material and bring to boiling. Divide the boiling solution into parts and take in two test tube. To the test tubes, add a few ml of acetic acid and sodium hydroxide respectively. Observe the colour of the liquid in the test tube.

A-4 RESULT

A-4.1 The material shall be deemed to have passed this test if the liquids remain colourless.

ANNEX B
(Table 1, Sl No. xi)

DETERMINATION OF FREE SULPHATE

B-1 GENERAL

B-1.1 Outline of Method — The material is extracted with chloroform, as solvent in soxhlet apparatus, and the solvent evaporated from the extracted material. The amount of free sulphur is calculated from the residue left after evaporation.

B-2 APPARATUS

B-2.1 Soxhlet Apparatus

B-3 REAGENT

B-3.1 *Chloroform* – neutral and pure (*see* IS 5296)

B-4 PROCEDURE

B-4.1 Weight accurately about 60 g of the material and extract with sufficient quantity of chloroform in a Soxhlet apparatus for about 60 hours. Distil off the contents and evaporated the residue to dryness at 60° C weight the residue obtained**.**

B-5 CALCULATION

Free sulphur, percent by weight = $\frac{W1}{W2}$X100

Where,
W_1 = Weight in g of residue, and
W_2 = Weight in g of the material taken.