
**Specification for Disperse Yellow 3
for Textile Industry**

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Foreword

This Ethiopian Standard has been prepared under the direction of Technical Committee for Sizing & Finishing material, Dye stuff & Pigments (TC 71) and published by the Ethiopian Standards Agency (ESA). This Ethiopian Standard cancels and replaces ES 3341:2007 (Reaffirmed 2018) Specification for Disperse Yellow 3 for Textile Industry .

In preparing this Ethiopian Standard reference has been made to the following:

IS 12386:1988 "Specification for *Disperse Yellow 3 for Textile Industry* ", published by Indian Standard Institution.

Acknowledgment is made for the use of information from the above publication.

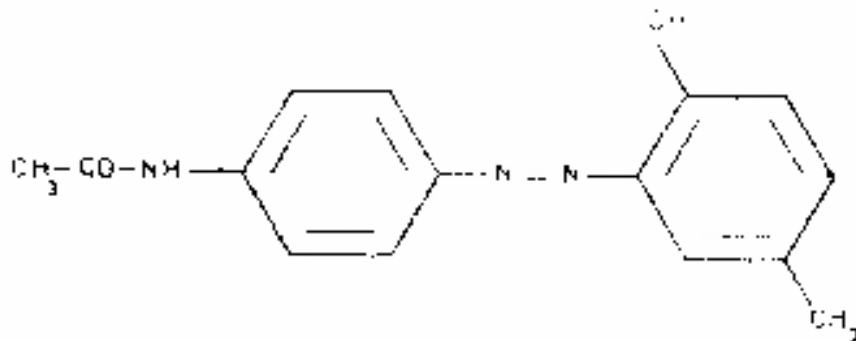
Specification for Disperse Yellow 3 for Textile Industry

1. SCOPE

This Ethiopian Standard species the requirements for disperse yellow 3 used in textile industry.

2: CHEMICAL COMPOSITION

2.1 Disperse, yellow 3 shall have the following chemical structure with empirical formula $C_{15}H_{15}O_2N_3$ and the molecular weight of the dye shall be 269.303:



Disperse Yellow 3

2.1.1 It shall be manufactured by diazotization of p-amino-acetanilide and coupling *with* p-cresol.

3. PHYSICAL STATE

3.1 The dye shall be supplied in the form of a powder mixture containing auxiliary substances with value of the dye content as agreed to between the buyer and the seller when tested by the method prescribed in A-I. The tolerance on the agreed value of dye content shall be ± 2 percent.

4. IDENTIFICATION

4.1 Solubility - The dye shall be soluble in ethanol, acetone and benzene

4.2 Action of Sulphuric Acid - On adding concentrated sulphuric acid, the dye shall give orange colour which, on further dilution with distilled water, will convert into golden yellow to yellowish brown colour.

4.3 Action of Sodium Hydroxide - On addition of concentrated sodium hydroxide solution (18 percent *m/m*), the dye shall give orange colour.

5. STANDARD DYESTUFF

5.1 In order to compare the strength and tint of the dyestuff, a standard sample of the dyestuff shall be sealed according to the agreement between the buyer and the seller. The standard sample shall be kept in hermetically closed glass vessel in a dry and dark place. The standard sample shall be replaced by fresh one once in every five years.

5.1.1 The strength of the standard sample of the dyestuff shall be assumed to be 100 percent.

6. REQUIREMENTS

6.1 Filtering Capacity Limit of Water Suspension The filtering capacity limit of a water suspension of the dye shall be 0.6 g/100ml minimum when measured by the method prescribed in A-2.

6.2 Chromatography Test - The height of the water suspension shall be at least 55 mm when measured by the method prescribed in A-3. However, in the phase boundary line, an insignificant zone (strip) is allowed.

6.3 Wettability in Water - The dye shall wet rapidly and spread uniformly in water at room temperature forming an intensely coloured suspension with very little turbidity. At 70°C, the suspension shall be intensely coloured without any turbidity.

6.3.1 The wettability of dye shall be tested by the method prescribed in A-4.

6.4 Time of Half-Dyeing - The time of half dyeing of the dye on acetate and polyester fibres, when measured by the method prescribed in A-5, shall correspond to that of the standard sample of dye.

6.5 Hue of the Dye Powder - When examined, the dye shall appear a uniform of dark yellow to brown colour.

6.6 Strength and Tint of Dye - The strength of dye shall correspond to that of standard sample that is, 100 ± 1 percent when tested by the method prescribed in IS: 12149-1987* and IS: 12150-1987+. The tint of the dye, when examined visually on dyed yam specimens, shall correspond to that of the standard sample of dye.

NOTE - The assessment of tint may also be done instrumentally, if facilities are available.

6.7 Colour Fastness Ratings - The colour fastness ratings of the dye on acetate and polyester fibres towards various agencies shall be as given in Tables 1 and 2. The fastness of dyed fabrics made of polyester and acetate fibres to the various agencies shall be determined periodically for each lot.

7. PACKING

7.1 For smaller packing, the dyestuff in powder form shall be packed in polyethylene bags which shall be sealed and put in rustproof mild steel containers of 0.5 or 1.0 kg capacity and having an opening of 7.5 or 13.0 cm (circumference). Each container shall be made leakageproof by proper sealing of the end of corner. Each container shall be provided with a temperproof, spill proof and pilferproof sealing so as to avoid adulteration at intermediate stages. Such sealing device may consist of a mild steel ring and a plastic seal to be fitted around the neck of the container after seaming the capseal. The seal may also bear the monogram, the serial number and different columns at intervals making the replacement not very easy. A suitable number of such containers shall then be packed in wooden cases or HDPE containers lined with cushioning of corrugated paper board/synthetic cushion materials so as to mitigate shock and/or to protect surfaces from abrasion and/or to position an article in a receptacle.

7.2 The dyestuff in emulsion or paste form shall be packed in 5.0 or 10.0 kg capacity container/ drum made of HDPE or polypropylene or corrugated fibre board lined with polyethylene or polyester film resins or with kraft paper combined with thermoplastic adhesives. The containers shall have an opening of 18.0 cm or 28.0 cm (circumference) for convenient scooping out of the dyestuff at the time of use. Each container shall have a temperproof, spill proof and pilfer proof sealing as described for small containers.

7.3 For medium packing of dyestuff in the range visually of 25 to 200 kg, drums or containers as described powder for dyestuff in emulsion or paste form shall be used.

7.4 For bulk packing of dry 'flowable' powder of dyestuff to contain up to 2000 kg of dyestuff, bulk bags made of HDPE or bulk boxes made from triple wall or two or more thicknesses of double wall corrugated fibre board laminated in the side walls by polyethylene or polyester film resin shall be used.

7.5 In cases of packing of dyestuff for export, in addition to the above, the packing shall be such that it meets the requirements laid in the contract

TABLE 1 COLOUR FASTNESS REQUIREMENTS OF DISPERSE YELLOW 3 ON ACETATE RAYON

(Clause 6.7)

PERCENT DEPTH OF SHADE	MINIMUM COLOUR FASTNESS RATINGS OF DYE ON ACETATE RAYON WITH RESPECT TO										
	ARTIFICIAL LIGHT	WEATHER- ING BY XENON ARC LAMP	WATER	SEA WATER	WASHING TEST 3	PERSPIRA- TION ACIDIC AND ALKALINE	DRY CLEANING	HOT PRESSING	RUBBING		STEAMING
									Dry	Wet	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
0.25	5-6	4-5	4 (4)	4 (4)	4 (3-4)	5 (3)	4	5 (4)	5	4-5	5 (4)
1.5	6	5	4 (3)	4 (3)	4 (3)	5 (3)	4	5 (4)	5	4-5	5 (4)
3.0	6-7	4-6	4 (3)	4 (3)	4 (3)	5 (3)	4	5 (4)	4-5	4	5 (4)
Method of Test	IS : 2454- 1985 ¹	IS : 6152- 1985 ²	IS : 767- 1988 ³	IS : 690- 1988 ⁴	IS : 764- 1979 ⁵	IS : 971- 1983 ⁶	IS : 4802- 1988 ⁷	IS : 689- 1988 ⁸	IS : 766- 1988 ⁹		IS : 974- 1984 ¹⁰

NOTE — The figures without bracket give the colour fastness ratings for change in colour while those within brackets give colour fastness ratings for staining of adjacent fabrics.

¹Methods for determination of colour fastness of textile materials to artificial light (xenon lamp) (*first revision*).

²Methods for determination of colour fastness of textile materials to weathering by xenon arc lamp (*first revision*).

³Method for determination of colour fastness of textile materials to water (*first revision*).

⁴Method for determination of colour fastness of textile materials to sea water (*first revision*).

⁵Method for determination of colour fastness of textile materials to washing : Test 3 (*second revision*).

⁶Method for determination of colour fastness of textile materials to perspiration (*first revision*).

⁷Method for determination of colour fastness of textile materials to dry-cleaning (*first revision*).

⁸Method for determination of colour fastness of textile materials to hot pressing (*first revision*).

⁹Method for determination of colour fastness of textile materials to rubbing (*first revision*).

¹⁰Method for determination of colour fastness of textile materials to steaming under atmospheric pressure (*second revision*).

TABLE 2 COLOUR FASTNESS REQUIREMENTS OF DISPERSE YELLOW 3 ON POLYESTER FIBRE
(Clause 6.7)

PERCENT DEPTH OF SHADE	MINIMUM COLOUR FASTNESS RATINGS OF DYE ON POLYESTER FIBRE WITH RESPECT TO																
	ARTIFI- CIAL LIGHT	WEAT- HERING BY XENON ARC LAMP	WATER	SEA WATER	WASH- ING TEST 3	PERSPI- RATION ACIDIC AND ALKA- LINE	DRY CLEAN- ING	HOT- PRESS- ING	DECATI- ZING MILD AND SEVERE	RUBBING		MILLING		CARBO- NIZING	SUBLIMATION		
										DRY	WET	ACIDIC	ALKA- LINE		At 150°C FOR 30 SECONDS	At 180°C FOR 30 SECONDS	At 210°C FOR 30 SECONDS
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
0.5	5	4-5	5 (5)	5 (5)	5 (5)	5 (4)	4	5 (4)	5	5	5	5 (5)	5 (5)	5	5 (4)	4 (3 - 4)	4 (2 - 3)
1.5	6	5-6	5 (5)	5 (5)	5 (5)	5 (4)	4	5 (4)	5	5	5	5 (5)	5 (5)	5	—	—	—
2.0	6-7	6	5 (5)	5 (5)	5 (5)	5 (4)	4	5 (4)	5	5	5	5 (5)	5 (5)	5	—	—	—
Method of Test	IS : 2454- 1985 ¹	IS : 6152- 1985 ²	IS : 767- 1988 ³	IS : 690 - 1988 ⁴	IS : 764- 1979 ⁵	IS : 971- 1983 ⁶	IS : 4802- 1988 ⁷	IS : 689- 1988 ⁸	IS : 865- 1958 ⁹	IS : 766- 1988 ¹⁰		IS : 981- 1988 ¹¹	IS : 983 - 1980 ¹²	IS : 11220- 1984 ¹³	IS : 975-1988 ¹⁴		

NOTE — The figures without brackets give the colour fastness ratings for change in colour while those within brackets give colour fastness ratings for staining of adjacent fabrics.

¹Methods for determination of colour fastness of textile materials to artificial light (xenon lamp) (*first revision*).

²Methods for determination of colour fastness of textile materials to weathering by xenon arc lamp. (*first revision*).

³Methods for determination of colour fastness of textile materials to water (*first revision*).

⁴Methods for determination of colour fastness of textile materials to sea water (*first revision*).

⁵Methods for determination of colour fastness of textile materials to washing : Test 3 (*second revision*).

⁶Method for determination of colour fastness of textile materials to perspiration (*first revision*).

⁷Method for determination of colour fastness of textile materials to dry-cleaning (*first revision*).

⁸Method for determination of colour fastness of textile materials to hot pressing (*first revision*).

⁹Method for determination of colour fastness of textile materials to decatizing.

¹⁰Method for determination of colour fastness of textile materials to rubbing (*first revision*).

¹¹Method for determination of colour fastness of textile materials to acid milling (*first revision*).

¹²Method for determination of colour fastness of textile materials to alkaline milling (*first revision*).

¹³Method for determination of colour fastness of disperse dyes on polyester cellulosic fabric to carbonization.

¹⁴Method for determination of colour fastness of textile materials to sublimation (*first revision*).

and also the requirements of shipping corporations (national and international) and the insurance obligations to safeguard against unfortunate incidents. The packing shall be such that it is not damaged during transshipment, air freight or transport, and during loading and unloading.

8. MARKING

8.1 Each package shall be marked with the following:

- Name and class of the dyestuff according to colour index (3rd edition);
- Dye content in percentage;
- Strength and tint of the dyestuff as compared to the standard dyestuff;
- Nett mass of each package;
- Trade name and/or trade-mark of the manufacturer, if any; and
- Month and year of manufacture and batch number.

8.1.1 Each package may also be marked with the information required by any other law in force, for example, excise regulations.

8.1.2 Each package may also be marked with the Standard Mark.

NOTE — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standards conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

9. SAMPLING AND CRITERIA FOR CONFORMITY

9.1 Lot — All the packages of the same dye having the same dye content delivered to a buyer against one despatch note shall constitute a lot.

9.2 Unless otherwise agreed to between the buyer and the seller, the number of packages to be selected at random from a lot shall be as given in Table 3.

TABLE 3 SAMPLE SIZE AND CRITERIA FOR CONFORMITY

(Clauses 9.2, 9.3, 9.4 and 9.5)

LOT SIZE (PACKAGES)	SAMPLE SIZE (PACKAGES)	PERMISSIBLE NUMBER OF NON- CONFORMING PACKAGES	SUB- SAMPLE SIZE (PACKAGES)
(1)	(2)	(3)	(4)
UP to 100	10	1	5
101 to 300	15	1	6
301 to 500	25	2	7
501 to 800	35	3	8
801 to 1 300	50	4	9
1 301 and above	75	6	10

9.3 For evaluating dye content, strength tint and hue of dye, the packages selected as in col 2 of Table 3 shall constitute the test sample.

9.4 For evaluating filtering capacity limit, chromatographic pattern, wettability in water, diffusion number, time of half dyeing and colour fastness ratings, the packages selected as in col 4 of Table 3 shall constitute the test sample.

9.5 Criteria for Conformity — The lot shall be declared as conforming to the requirements of this standard if the following conditions are satisfied:

- The number of packages found non-conforming with respect to:
 - strength of dye,
 - dye content,
 - filtering capacity limit,
 - chromatographic pattern,
 - diffusion number, and
 - time of half dyeing does not exceed the corresponding number given in col 3 of Table 3.
- The colour fastness ratings on acetate and polyester fibres shall satisfy the requirements given in Tables 1 and 2. In case of failure even in one characteristic, fresh tests will be carried out on double the samples. The results of fresh test shall be final for the entire lot.
- All the test specimens tested for the remaining characteristics, such as wettability in water, tint of dye and hue of dye shall satisfy the corresponding requirements given in this standard.

APPENDIX A

(Clauses 3.1, 6.1, 6.2, 6.3.1 and 6.4)

METHODS OF TEST

A-I. DETERMINATION OF DYE CONTENT

A-1.1 Take a test specimen of the dyestuff of about one gram in a weighing bottle and dry it to constant mass in a drying oven at $105 \pm 3^\circ\text{C}$. Cool the specimen in a desiccator charged with self-indicating silica gel or calcium Chloride and obtain the oven dry mass of the specimen to an accuracy of 0.0002 g with the help of an analytical balance.

A-1.2 Dissolve the specimen in 100 ml of benzene or acetone or ethanol solution with constant stirring and filter the solution on a Buchner funnel through a Whatman filter paper No. 41 under low pressure of 320 mm of mercury. Repeat the procedure for the residue left twice more and collect all the filtered solution.

A-1.3 Evaporate the solvent from the solution obtained in **A-1.2** and dry the residue obtained at $105 \pm 3^\circ\text{C}$ to constant mass. Cool the residue in a desiccator and weigh it.

A-1.4 Calculate the dye content, percent (P), by the formula:

$$P = \frac{m_2}{m_1} \times 100$$

Where

m_1 is the oven-dry mass of the specimen of dye-stuff taken, and

m_2 is the oven-dry mass of the residue obtained.

A-2. DETERMINATION OF FILTERING CAPACITY LIMIT OF WATER SUSPENSION OF THE DYE

A-2.1 Take 0.5 to 1.0 g samples of the dye in steps of 0.1 g and weight them correct to 0.01g. Introduce the samples in beakers of 150 ml capacity containing some distilled water at 70°C and under stirring, add in each beaker distilled water to complete 100 ml. Place the suspension in each beaker and filter on a Buchner funnel through a What man filter paper No. 41 under low pressure of 320 mm of mercury.

A-2.2 Note the mass of that sample of dye for which the filter is uniformly coloured as the filtering capacity limit, however, the residues of dye may be visible in the places over the holes of the funnel when an extremely thin layer of dye may be formed.

A-3. CHROMATOGRAPHIC TEST

A-3.1 In two beakers of 50 mm dia, introduce 10 ml of 1 percent water suspension of the test dye and of the standard sample respectively. In a third beaker, take 10 ml of distilled water

A-3.2 In each beaker, as in A-3.1, after stirring the suspension, insert a cylinder made of 70 x 80 mm rectangular chromatographic paper.

A-3.3 When, in the third beaker, water reaches the top of the paper cylinder, remove the cylinders in the other two beakers and dry them in air.

A-3.4 Compare the chromatographs of the test dye and that of standard sample of dye and record the height of rise of the suspension, intensity of colouring and appearance of strips at the bottom portion of the paper cylinder and at the level of the surface of the liquid

A-4. DETERMINATION OF WETTABILITY IN WATER

A-4.1 Weigh about 0.05 g of test dye and the same quantity of standard sample of dyestuff correct to 0.01 g and add them simultaneously in separate glass cylinders containing 500 ml distilled water at the required temperature or at 25 or 70°C. By comparing with the standard sample of dye, note the solubility of test dye, rate of its spreading in water, intensity of colouration and the turbidity of the suspension.

A-5. DETERMINATION OF TIME OF HALFDYEING

A-5.1 Carry out dyeings of the dye on polyester and acetate fibres as prescribed in IS: 12149:1987* and IS: 12150:1987†.

A-5.2 Carry out dyeings on five samples each of polyester and acetate as in A-5.1 except that the amount of dye taken shall be double to that taken in A-5.1 and times of dyeing for each sample of each fibre shall be 5, 10, 15, 20 and 25 minutes respectively.

A-5.3 Match the samples obtained in A-5.2 with those of A-5.1 separately for each fibre and note the time of dyeing for the sample obtained in A-5.2 separately for each fibre. Record this time as the time of half-dyeing for polyester and acetate separately.

* Method for determination of strength of disperse dyes for polyester by exhaust dyeing.

† Method for determination of strength of disperse acetate dyes by exhaust dyeing

Organization and Objectives

The Ethiopian Standards Agency (ESA) is the national standards body of Ethiopia established in 2010 based on regulation No. 193/2010. ESA is established due to the restructuring of Quality and Standards Authority of Ethiopia (QSAE) which was established in 1998.

ESA's objectives are:-

- ❖ Develop Ethiopian standards and establish a system that enable to check whether goods and services are in compliance with the required standards,
- ❖ Facilitate the country's technology transfer through the use of standards,
- ❖ Develop national standards for local products and services so as to make them competitive in the international market.

Ethiopian Standards

The Ethiopian Standards are developed by national technical committees which are composed of different stakeholders consisting of educational institutions, research institutes, government organizations, certification, inspection, and testing organizations, regulatory bodies, consumer association etc. The requirements and/or recommendations contained in Ethiopian Standards are consensus based that reflects the interest of the TC representatives and also of comments received from the public and other sources. Ethiopian Standards are approved by the National Standardization Council and are kept under continuous review after publication and updated regularly to take account of latest scientific and technological changes. Orders for all Ethiopian Standards, International Standard and ASTM standards, including electronic versions, should be addressed to the Documentation and Publication Team at the Head office and Branch (Liaisons) offices. A catalogue of Ethiopian Standards is also available freely and can be accessed in from our website.

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International Involvement

ESA, representing Ethiopia, is a member of the International Organization for Standardization (ISO), and Codex Alimentarius Commission (CODEX). It also maintains close working relations with the international Electro-technical Commission (IEC) and American Society for Testing and Materials (ASTM). It is a founding member of the African Regional Organization for standardization (ARSO).

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