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|  | **ECOWAS** | **ECOSTAND 000: 2022** |
|  | **STANDARD** |  |

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|  | | **Textiles – Specification for chemical dyes** | |
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|  |  | | **Reference number**  **ECOSTAND 000: 2022(F)**  **© ECOSTAND 2022** |

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One of the important mandates of ECOWAS is to promote the establishment of a common market, the development and harmonization of standards and conformity assessment procedures and measures in order to reduce technical barriers to trade, encourage intra- and international trade as well as enhance the industrialization of the region.

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The work of preparing this standard was carried out by the ECOWAS Technical Harmonization Committee 3 (THC3) *Chemistry.*

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| **ECOWAS REGIONAL STANDARD DHS ECOSTAND XX: 2022(E)** |

**Textiles – Specification for chemical dyes**

**1. Scope**

This ECOWAS Standard specifies the requirements, sampling and testing methods for the classification of chemical textile dyes.

This Standard defines the classes of chemical dyes and their relationship to textile fibres.

It describes certain procedures for qualitatively identifying the class of the chemical textile dye.

**2. Normative references**

The following referenced documents are essential to the application of this document. For dated references, only the edition referenced applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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**3. Terms and definitions**

For the purposes of this document, the following terms and definitions shall apply.

**3.1**

**Dye**

Dyes are defined as coloured chemical compounds, natural or synthetic, generally organic, which have the property of permanently colouring the substrate to which they are applied under certain conditions.

**3.2**

**Dyeing material**

dye or pigment

**3.3**

**Dye**

molecule, soluble or insoluble in water, which has a dye affinity for the fibre

**3.4**

**Colour Index** (CI)

The Colour Index International is a reference database maintained jointly by the Society of Dyers and Colourists and the American Association of Textile Chemists and Colorists.

**3.5**

**CAS**

(CAS number or CAS registry number): The CAS of a chemical, polymer, biological sequence and alloy is its unique registration number in the database of the Chemical Abstracts Service (CAS), a division of the American Chemical Society (ACS).

**3.6**

**CLP**

The acronym "CLP" stands for Classification, Labelling, Packaging. This European text defines the rules for the classification, labelling and packaging of chemicals

**3.7**

**Carcinogens** (C)

substances and mixtures which, if inhaled, ingested or absorbed through the skin, may cause cancer or increase its incidence.

**3.8**

**Eutrophication**

Eutrophication refers to a process of nutrient accumulation in a given ecosystem (a "eutrophic" environment is literally a "well-fed" environment).

**3.9**

**Under-oxygenation**

When large loads of organic matter are brought to the environment via point source discharges, the natural regulation processes can no longer compensate for the bacterial consumption of oxygen

**3.10**

**Colour, turbidity, odour**

The accumulation of organic matter in watercourses leads to the appearance of bad tastes, bacterial proliferation, pestilential odours and abnormal colourations.

**3.11**

**Persistence**

synthetic organic dyes, especially azo dyes, are very resistant to natural biological degradation

**3.12**

**Bio-accumulation**

If an organism does not have specific mechanisms either to prevent the resorption of a substance such as a dye or to eliminate it once it is absorbed, then that substance accumulates.

**3.13**

**Mutagens (M)**

substances and mixtures which, through inhalation, ingestion or skin penetration, can produce heritable genetic defects or increase their frequency.

**3.14**

**Reproductive toxicants** (R)

substances and mixtures which, through inhalation, ingestion or skin penetration, may produce or increase the incidence of non-heritable adverse effects in the offspring or impair reproductive functions or capacity.

**3.15**

**Chromophores**

groups that confer colour

**4. Essential composition and quality factors**

Mr Mamadou CAMARA will provide the qualiy requirements

**5. Packaging and Labelling**

**5.1 Packaging**

The dye should be packed in clean, corrosion-resistant dry containers with appropriate handles strong enough to withstand normal handling. Containers should be sealed to prevent leakage and contamination of contents during handling, storage and transport.

**5.2 Labelling**

The following information must be legible and indelibly written to the container:

**5.2.1. Technical identification**

- Colour Index (CI) number

- CAS number (CAS registry number)

**5.2.2. Other information**

a) Brand name of the product

b) Name and address of the manufacturer and/or distributor

c) Precise description of the dye:

**- class**

**- nature of the chromophore**

**- nature of the auxochrome**

d) Field of application (textile fibres)

e) Colour (the colour shall be stated as a reference number and/or name).

f) Volume/weight

g) Date of manufacture

h) Manufacturer's instructions for use, mentioning either only "indoor" or "outdoor" use or “for indoor and outdoor use”

i) Country of origin

j) Identification number or barcode

k) Storage conditions

l) use by date

**5.2.3. CLP requirements**

- Hazard pictograms

- Warning statements

- Hazard statements

- Precautionary statements

- Additional information section.

**6. Sampling and analytical methods**

The sampling and analytical methods are those specified in the standards in Chapter 2 of this document.

**ANNEX 1(informative)**

**List of 26 aromatic amines quantified by the laboratory in textiles:**

* 2-Methyl-5-Nitroaniline (CAS : 99-55-8)
* 2-Naphthylamine (CAS : 91-59-8)
* 2,4-Diaminoanisol (CAS : 615-05-04)
* 2,4-Diaminotoluene (CAS : 95-80-7)
* 2,4-Dimethylaniline (CAS : 95-68-1)
* 2,4,5-Trimethylaniline (CAS : 137-17-7)
* 2,6-Dimethylaniline (CAS : 87-62-7)
* 3,3′-Dichlorbenzidine (CAS : 91-94-1)
* 3,3′-Dimethoxybenzidine (CAS : 119-90-4)
* 3,3′-Dimethylbenzidine (CAS : 119-93-7)
* 4-Aminoazobenzene (CAS : 60-09-6)
* 4-Aminobiphenyl (CAS : 92-67-1)
* 4-Chloro-o-Toluidine (CAS : 95-69-2)
* 4-Chloraniline (CAS : 106-47-8)
* 4,4′-Diamino-3,3′-dimethyldiphenylmethane (CAS : 838-88-0)
* 4,4′-Diamino-3,3′-dichlordiphenylmethane (CAS : 101-14-4)
* 4,4′-Diaminodiphenylmethane (CAS : 101-77-9)
* 4,4′-Oxydianiline (CAS : 101-80-4)
* 4,4′-Thiodianiline (CAS : 139-65-1)
* Aniline (CAS : 62-53-3)
* Benzidine (CAS : 92-87-5)
* o-Aminoazotoluene (CAS : 97-56-3)
* o-Anisidine (CAS : 90-04-0)
* o-Toluidine (CAS : 95-53-4)
* p-Cresidine (CAS : 120-71-8)
* p-Toluidine (CAS : 106-49-0)

**ANNEX 2 (informative):** **Fixation rate on textile fibre for the different dye classes of azo dyes**

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| **Dye class** | **Dyed fibres** | **Fixation %** | **Rejection %** |
| Acid | Wool, Nylon | 80 - 93 | 7 - 20 |
| Cationic | Acrylic | 97 - 98 | 2 - 3 |
| Vat | Cellulose | 80 - 95 | 5 - 20 |
| Direct | Cellulose | 70 - 95 | 5 - 30 |
| Disperse | Synthetic | 80 - 92 | 8 - 20 |
| Reactive | Cellulose | 50 - 80 | 20- 50 |
| Disperse | Cellulose | 60 - 70 | 30 - 40 |

**ANNEX 3 (informative):** Main textile fibres and main types of dyes according to their use for different materials.

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| **Textile**  **fibres**    **Dyes** | | **Animal** | **Vegetal** | **Artificial** | | | **Synthetic** | | | |
| Wool | Cotton | Viscose | Acetate | Tri acetate | Nylon | Polyester | Polyacry-  lic crylor | Polyvi  nylic rhovyl |
| Solubles | Acid | x |  |  |  |  | x |  |  |  |
| Cationic | x |  |  |  |  | x |  | x |  |
| Chrome or mordant | x |  |  |  |  | x |  |  |  |
| Direct |  | x | x |  |  | x |  |  |  |
| Metallic 1/1 1/2 | x |  |  |  |  | x |  |  |  |
| Reactive | x | x | x |  |  | x |  |  |  |
| Insolubles | Vat |  | x | x | x | X |  |  |  |  |
| Sulphides |  | x |  |  |  |  |  |  |  |
| Naphtols |  | x | x | x | X | X | x |  | X |
| Disperse (plastosoluble) |  |  |  | x | x | x | x | x | x |

**Annex 4 (informative):** Classification of dyes

There are no hard and fast rules for classification in the field of dyes. There are two types of classification:

- According to the diversity of application technologies: anionic dyes (acid, acid-biting, direct, reactive, vat, sulphur dyes) or cationic (basic)

- According to their chemical constitution: azo, anthraquinone, triarylmethane and phthalocyanine

The trade names refer to the shades, their main use or the name of their inventor.

**A - CLASSIFICATION OF DYES BASED ON THE METHOD OF APPLICATION OF THE DYE**

**4.1 Acid dyes**

Acid dyes are mainly used for light-colour dyeing of wool, silk and polyamide.

**4.2 Metal complex acid dye**

Metal complex dyes are used for the dark dyeing of protein fibres and polyamide. They are characterized by better color fastness than acid dyes.

**4.3 Insoluble azo dyes**

Azo dyes are azo compounds in which the azo group (-N=N-) group links two benzene rings.

**4.4 Basic dyes (also called cationic dyes)**

Cationic dyes, formerly called basic dyes, are soluble dyes used in dyeing to dye wool in pastel colours (babies). They are also sometimes used on cotton, as well as on certain types of modified polyamides and polyester.

**4.5 Mordant dyes**

Mordant dyes require the addition of chemicals such as electrolytes to give them an affinity for the material to be dyed. They are applied to cellulose fibres, wool or silk in combination with metallic salts.

**4.6 Direct dyes**

Direct or substantive dyes have a strong affinity for cellulosic fibres.

**4.7 Disperse Dyes**

Disperse dyes are very fine suspensions of water-insoluble organic pigments used to dye synthetic fibres such as polyester and more rarely polyamides.

**4.8 Reactive Dyes**

Reactive dyes are the most widely used dyes for dyeing cellulosic fibres at present and are characterised by a covalent type of attachment to the fibre (covalent chemical reaction between the dye and the reactive hydroxyl groups of the cellulose), which gives them very good resistance to household washing.

**4.9 Sulphur Dyes**

Sulphur dyes are dyes used to dye cellulose fibres fairly economically, mainly in dark shades

**4.10 Vat Dye**

Sulphur dyes, which are insoluble in water and whose chemical formula is not always precisely known, are used to dye cellulose fibres. They are ideal for dull, dark colours. This class of dyes is characterised by low light fastness in the case of light shades. They have the advantage of being very inexpensive compared to other dye classes.

**B- CLASSIFICATION OF DYES ACCORDING TO THEIR CHEMICAL CONSTITUTION**

**4.11 Anthraquinone dyes** are, from a commercial point of view, the most important after azo dyes.

**4.12 Indigo dyes** take their name from the indigo from which they are derived.

**4.13 Xanthene dyes**, of which the best known compound is fluorescein, have intense fluorescence.

**4.14 Phthalocyanines** have a complex structure based on the central copper atom.

**4.15 Nitro and nitrosated dyes** are a very limited and relatively old class of dyes characterised by the presence of a nitro group (-NO2) in the ortho position to an electron-donor group (hydroxyl or amino groups).

**C- COMPLEMENTARY DYE CLASS BASED ON THE CLASSIFICATION OF CHEMISTS: AZO DYE**

**4.16 "Azo dyes"** are compounds characterised by the AZO (-N = N-) functional group linking two identical or non-identical alkyl or aryl groups (symmetrical and unsymmetrical azo). These structures, which are generally based on the azobenzene skeleton, are aromatic or pseudo-aromatic systems linked by an AZO (-N = N-) chromophore group.

They are found in various dye classes:

- Basic dyes

- Acid dyes

- Direct dyes

- Water-soluble reactive dyes

- Disperse and non-ionic mordant azo dyes that are insoluble in water.

**Toxicity of azo dyes**: work carried out on azo dyes has shown that these chemical compounds have carcinogenic effects on humans and animals.

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* **ISO 16373-1: 2015 Textiles** — Dyestuffs — Part 1: General principles of testing coloured textiles for dyestuff identification
* **ISO 16373-2: 2014 Textiles** — Dyestuffs — Part 2: General method for the determination of extractable dyestuffs including allergenic and carcinogenic dyestuffs (method using pyridine-water)
* **ISO 16373-3: 2014** Textiles — Dyestuffs — Part 3: Method for determination of certain carcinogenic dyestuffs (method using trimethylamine/methanol)

## [**ISO 5089**](https://www.iso.org/obp/ui/#iso:std:iso:5089:en)**:** Textiles — Preparation of laboratory test samples and test specimens for chemical testing

* **ISO 18451-1: 2015** Pigments, dyestuffs and extenders — Terminology — Part 1: General terms
* **ISO 18451-2: 2015** Pigments, dyestuffs and extenders — Terminology — Part 2: Classification of colouring materials according to colouristic and chemical aspects
* **EN 14362-1: 2012** Textiles - Methods for determination of certain aromatic amines derived from azo colorants - Part 1: Detection of the use of certain azo colorants accessible with and without extracting the fibres
* **EN 14362-3: 2011** Textiles — Methods for determination of certain aromatic amines derived from azo colorants — Part 3: Detection of the use of certain azo colorants, which may release 4-aminoazobenzene