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DRAFT EAST AFRICAN STANDARD

Copper/chromium/arsenic composition for the preservation of timber — Specification

EAST AFRICAN COMMUNITY

Second Edition 2023

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Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in the East African Community. It is envisaged that through harmonized standardization, trade barriers that are encountered when goods and services are exchanged within the Community will be removed.

The Community has established an East African Standards Committee (EASC) mandated to develop and issue East African Standards (EAS). The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the public and private sector organizations in the community.

East African Standards are developed through Technical Committees that are representative of key stakeholders including government, academia, consumer groups, private sector and other interested parties. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the Principles and procedures for development of East African Standards.

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

The committee responsible for this document is Technical Committee EASC/TC 022, *Wood, timber and their products*.

Attention is drawn to the possibility that some of the elements of this document may be subject of patent rights. EAC shall not be held responsible for identifying any or all such patent rights.

This second edition cancels and replaces the first edition (EAS 326:2002), which has been technically revised.

Introduction

Copper, chromium and arsenic composition is a water borne oxide liquor timber preservative for application to timber by vacuum and pressure impregnation.

The preservative is a finely dispersed oxide liquor of viscosity and solubility intended to facilitate easy and rapid preparation of aqueous treating solutions for preservation of timber against insect attack, termites and fungal decay.

Copper/Chromium/Arsenic (CCA) is hazardous chemical therefore precautions should be taken through use of proper equipment and only by trained personnel. Proper handling and disposal of CCA containers is mandatory. This draft East African Standard does not purport to address all of the safety problems associated with its use. It is the responsibility of each partner state to establish appropriate safety and health practices and determine the applicability of suitable regulatory limitations prior to utilization."

Copper/chromium/arsenic composition for the preservation of timber — Specification

1 Scope

This East African Standard specifies requirements for two types of water-borne preservatives containing mixtures of compounds of copper (II), chromium (VI) and arsenic (V).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EAS 123, *Water — Distilled quality — Specification*
EAS 124, *Rounding off numerical values*

EAS 325, *Wood preservatives and treated timber — Guide to sampling and preparation of wood preservative and treated timber for analysis*

TZS 660, *Wood preservatives and treated timber — Quantitative analysis for copper/chromium/arsenic formulations*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
timber

3.2
liquid junction
any junction between two electrolyte solutions of different composition

3.3
sintered glass filter
filter produced from porous materials formed by the thermal bonding of particles

3.4
pore size index
characteristic of a filter related to pore diameter

3.5
permeability
characteristic of a filter related to the rate of flow through it under specified conditions

3.6
test solution
solution of which the pH value is required

3.7
pH meter
high impedance instrument by means of which either the pH of a solution or the potential difference between a pair of electrodes immersed in a solution is indicated

3.8
electrode
external system that incorporates a fitting solution and a means, such as a ceramic plug or forming the liquid junction

4 Composition

4.1 Raw materials

4.1.1 The preservative shall consist essentially of a mixture of compounds of copper (II), chromium (VI) and arsenic (V).

4.1.2 The mixture of compounds shall be selected to be consistent with this Clause.

4.1.3 The preferred mixtures of compounds are either:

a) hydrated copper (II) sulphate, hydrated sodium or potassium dichromate and hydrated diarsenic pentoxide; or

b) copper (II) oxide, chromium (VI) oxide and diarsenic pentoxide.

NOTE 1 Attention is specially drawn to the toxic nature of the formulations and their solutions that may be injurious to health if adequate precautions are not taken. Therefore, particular care and the use of appropriate protective clothing is necessary.

NOTE 2 Currently Type 2 CCA (Oxide Composition) is used in the region. Also special precautions are required for disposal of these solutions.

4.2 Formulation

4.2.1 The nominal composition of the two types of preservatives (designated Type 1 and Type 2) together with minimum concentration of each component shall be as given in Table 1. The sum of the concentrations of the individual components shall be not less than 95 % m/m.

NOTE Variation in composition from the nominal composition may arise because of variations in the purity of the ingredients and the lack of homogeneity of the mixture.

4.2.2 The preservatives shall be supplied as mixtures.

NOTE The usual forms are dry ingredients, paste or concentrated solutions.

4.2.3 Containers shall carry information on the mass of preservatives equivalent to unit mass of nominal composition.

4.2.4 Preservatives as supplied may differ in composition from the nominal composition as a result of removal or addition of water. In such cases the ratio of the active ingredients shall be in the same proportions by mass as are the nominal compositions given in Table 1.

Table 1 — Nominal and minimum proportions of components in formulations based on metal oxides (Oxide Type C composition)

Elemental Composition

	%(w/w)		
	Min	**Nominal**	**Max**
Cu	8.05	9.00	9.95
Cr	13.70	14.63	15.55
As	11.60	13.13	14.65
Total	33	37	40

Oxide Composition

	%(w/w)		
	Min	**Nominal**	**Max**
CuO	10.08	11.27	12.46
CrO_3	26.35	28.13	29.90
As_2O_5	17.79	20.13	22.47
Total	54	60	65

5 pH value of solution

When tested in accordance with Annex A, the pH value of a solution equivalent to 20g/L of the nominal preservative composition shall be neither lower than 1.8 nor higher than 2.8.

6 Insoluble matter

When tested in accordance with Annex B the content of insoluble matter shall not be greater than 0.1 % m/m for paste or concentrated solutions, and shall not be greater than 0.25 % m/m for dry powder formulations.

7 Sampling and analysis

7.1 Sampling

The preservative shall be sampled in accordance with EAS 325.

7.2 Analysis

The copper, chromium and arsenic content shall be determined in accordance with TZS 660 on a sample prepared in accordance with EAS 325.

Annex A
(normative)

Determination of pH

A.1 Apparatus

Ordinary laboratory apparatus, together with the following:

A.1.1 sintered glass filter, suitable for laboratory uses with reasonable pore size index and permeability;

A.1.2 pH meter, capable of making a measurement with tolerance + 0.2 in a limiting accuracy class and fitted with suitable electrodes; and

A.1.3 one-mark volumetric flask, 500 mL capacity suitable for laboratory use.

A.2 Reagent

Water, complying with EAS 123.

A.3 Preparation of test solution

Take a mass of the preservative sample equivalent to 10 g + 1.1 g of the nominal composition and weigh it to the nearest 0.001g. Transfer this test portion to a beaker and dissolve it in 250 mL of hot water around 40 ^{O}C, stirring continuously. Cool the solution to room temperature and filter it through the pre-weighed sintered glass filter into the one mark volumetric flask. Wash the beaker and the residue on the filter five times with 10 mL portions of hot water at approximately 40 ^{O}C, collecting the washings in the flask. Dilute to the mark with water. Reserve the filter and residue for the determination of insoluble matter if required (see Annex B).

A.4 Determination

Determine the pH of the test solution prepared in accordance with (A.3) at 27 ^{O}C + 2 ^{O}C using the pH meter which is intended for determining a pH value within a broad range.

Annex B
(normative)

Determination of insoluble matter

B.1 Apparatus

B.1.1 Sintered glass filter, suitable for laboratory uses with reasonable pore size index and permeability.

B.1.2 Laboratory drying oven, capable of being adjusted to 105 ^{O}C + 5 ^{O}C.

B.2 Preparation of test portion

Weigh a mass of the preservative sample equivalent to 10 g + 0.1 g of the nominal composition to the nearest 0.001 g and dissolve it in water, filter and wash as described in (A.3) or, if the pH has already been determined, use the residue on the filter.

B.3 Determination

Transfer the sintered filter containing the residue from (B.2) to the drying oven (B.1.2) previously adjusted to 105 ^{O}C + 5 ^{O}C. Dry initially for a period of 1h, cool in a desiccator to room temperature and re-weigh. Repeat the drying, cooling and re-weighing operations at suitable intervals until the difference between two successive weighings is not greater than 0.5 mg.

B.4 Calculation

The percentage by mass of insoluble matter in the preservative m is given by the following equation:

$$m = \frac{m_2 - m_1}{m_3} \times 100\%$$

where

m_1 is the mass in g of the sintered glass filter;

m_2 is the mass in g of the sintered filter and residue after drying;

m_3 is the mass in g of preservative taken for the determination.

Annex C
(normative)

Method for determination of preservative penetration

C.1 Test Specimens

Penetration is best measured on a freshly prepared end grain surface; alternatively the measurements can be taken on increment cores. The end grain surface shall be cut at least 500 mm from the end of the treated timber because penetration along the grain is easy and good penetration is always achieved near the ends of preserved timber.

C.2 Measurement of penetration

C.2.1 Oil Preservatives

The depth of penetration is easily seen on the end grain surface. If the sample has been recently treated, the saw or the core bores may smudge the oil over unpenetrated parts of the timber.

C.2.2 Waterborne Preservatives

Sometimes the depth of penetration is not apparent, in which case it is necessary to treat the surface with a chemical indicator which changes colour in the presence of surface is made smooth by planning or sandpapering and the chemical indicator applied sparingly, ideally by spray but a rag moistened with the chemical indicator is better than wetting the test specimen with indicator.

C.3 Measurement of Penetration

Oil preservatives

The depth of penetration is easily seen on end grain surface. If the sample has been recently treated, the saw or the core bores may smudge the oil over unpenetrated parts of the timber.

Sometimes the depth of penetration is not apparent, in which case it is necessary to treat the surface with a chemical indicator which changes colour in the presence of the preservative. Best results are achieved when the end grain surface is made smooth by planning or sandpapering and the chemical indicator applied sparingly, ideally by spray but a rag moistened with the chemical indicator is better than wetting the test specimen with indicator.

C.4 Copper

C.4.1 Chrome Azurols Test

Reagent:
A solution containing 0.5 per cent chromo azurol S dye and 5 per cent sodium acetate in distilled water.

Application:

Light spray gives a strong royal blue colour in wood with copper, persistent for several weeks. Untreated wood becomes orange coloured

C.4.2 Rubeanic Acid Test

Reagents:

A 5 per cent ammonium solution made by diluting 1 part ammonia (0.880) with 6 parts water by volume – solution A.

A 0.5 per rubeanic acid made by dissolving 0.5 g rubeanic acid (dithio-oxamide) in 100 ml ethanol or methylated spirit – Solution B.

Application:

Spray with solution *A* followed by solution *B* produces a royal blue colour in wood containing arsenic.

C.5 Arsenic

Reagent:

Solution A made by mixing 22 ml concentrated hydrochloric acid and 88ml distilled water than dissolving in this solution 10g sodium molydbate.

Solution B made by dissolving 5 g stannous chloride in the mixture of 22ml concentrated hydrochloric acid and 88ml distilled water. Alternatively, 5 g ascorbic acid is dissolved in 100ml distilled water. The solution does not keep long and that last alternative shall be prepared fresh every day of test.

Application:

Spray with solution A followed after soaking with solution B produces a royal blue colour in wood containing arsenic

C.6 Pentachlorophenol in oil solution

Cuprin Acetate Test

Reagent:

Cupric acetate and 0.5 g wetting agent (such as shell ‘Nonident P40’) in 100 ml water.

Silver nitrate solution made by dissolving 0.4 g silver nitrate in 100 ml water. The solution is light sensitive and shall be stored in dark brown glass bottles.

Application:

A mixture of equal quantities of the two solutions (shelf life about one month) applied to a freshly cut surface produces a deep red-brown colour in wood containing pentachlorophenol (PCP).

Bibliography

EAS 326:2002, *Copper/chromium/arsenic composition for the preservation of timber — Specification*