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Foreword

Rwanda Standardsarepreparedby Technical Committees and approved by Rwanda Standards Board (RSB) Board of Directors in accordance with the procedures of RSB, in compliance with Annex 3 of the WTO/TBT agreement on the preparation, adoption and application of standards.

The main task of technical committees is to prepare national standards. Final Draft Rwanda Standards adopted by Technical committees are ratified by members of RSB Board of Directors for publication and gazettment as Rwanda Standards.

DRS 301 was prepared by Technical Committee RSB/TC 024, Chemicals and consumer products.

In the preparation of this standard, reference was made to the following standards:

1) IS 15489: 2004, Paint, plastic emulsion - Specification

2) IS 1303: 2001, Glossary of terms relating to paints

The assistance derived from the above source is hereby acknowledged with thanks.

Committee membership

The following organizations were represented on the Technical Committee on Chemicals and consumer products (RSB/TC 024) in the preparation of this standard.

Amaco Paints Company Ltd

AMEKI COLORS Ltd

Crown Paints Rwanda Ltd

Institute of Agriculture, Technology and Education of Kibungo (INATEK)

Integrated Polytechnic Regional Center — Kicukiro Campus (IPRC — Kicukiro Campus)

Ministry of Health (MINISANTE)

National Industrial Research and Development Agency (NIRDA)

Rwanda Environment Management Authority (REMA)

Rwanda Plastic Industries (RPI)

Shalom Paints Ltd

SIGMA PAINTS

The City of Kigali

CORVERNMENTS CONNERNIS

Plastic emulsion paints — Specification

1 Scope

This Rwanda Standard prescribes the requirements and methods of sampling and test for plastic emulsion paint used for interior and exterior protection and decoration of building surfaces after surface preparation and priming.

2 Normative references

The following referenced documents are indispensable for the application 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.

ISO 20340: 2009 Paints and varnishes — Performance requirements for protective paint systems for offshore and related structures

ISO 29601: 2011 Paints and varnishes — Corrosion protection by protective paint systems — Assessment of porosity in a dry film

RS ISO 15184: 2012 Paints and varnishes — Determination of film hardness by pencil test

3 Terms and definitions

For the purposes of this standard, the following terms and definitions apply

3.1

Volatile Organic Compounds (VOC)

volatile matter content minus water content in plastic emulsion paint

3.2

Matt finish

having gloss values from 0 to 10, when viewed at 60°

3.3

egg shell/satin finish

having gloss values from 11 to 25, when viewed at 60°

3.4

semi-glossy finish

having gloss values from 26 to 70, when viewed at 60°

3.5

glossy finish

having gloss values 71 and above, when viewed at 60°

3.6

paint

pigmented material, which when applied in a liquid form to a surface, forms after a time a dry adherent film. The following main types are recognized:

- a) oil paint paint that contains drying oil or oil varnish as the basic vehicle ingredient;
- b) water paint (emulsion paint) A paint that contains a water emulsion or dispersion as the vehicle; and
- c) paste paint A paint in which the pigment is sufficiently concentrated to permit a substantial reduction with vehicle before use.

3.7

emulsion paint

generally, a paint in which the medium is an 'emulsion' or an emulsion-like dispersion of an organic binder in water. Industrially, the name is mainly restricted to those paints in which the medium is an 'emulsion' of a synthetic resin. The medium may also be tailed a latex by analogy with a natural rubber latex; polyvinyl acetate emulsion paint is a typical example

3.8

ambient temperature

temperature between 21°C and 38 °C

3.9 colour

aspect of the appearance of objects which depends up-on the spectral composition of light reaching the retina of the eye and upon its temporal and spatial distribution

NEN

3.10

ageing

change, if any, occurring in a coating on standing under defined conditions at or near ambient temperature

3.11

rust

coating of red or yellow oxides of iron produced when iron and steel is exposed to a humid atmosphere. Not to be confused with 'White Rust' which is a term loosely used to describe corrosion products of certain non-ferrous metals

MCOM

3.12

latex paint

paint based on pigment emulsion of synthetic resin

3.13

anti-condensation paint

paint designed to minimize the effects of condensation of moisture under intermittently dry and humid conditions. Such a material normally has a matt textured finish and frequently contains cork or some other heat insulating materials as a filler

3.14

anti corrosive

general term used to describe material used for preventing corrosion

3.15

coat

paint, varnish or lacquer applied to a surface in a single application to form a properly distributed film when dry. A paint system usually consists of a number of coats separately applied in a predetermined order at suitable intervals to allow for drying. It is possible with certain types of material, to build-up paint systems ofadequate thickness and opacity by a more or less continuous process of application, namely wet on wet spraying. In this case no part of the system can be defined as a separate coat in the above sense. The following types are recognized:

- a) full coat, as thick a coat of paint, varnish or lacquer as can be applied in one operation (brush or spray) consistent with the production of a film of uniform appearance, satisfactory hardness, etc, when dry;
- b) glaze coal a translucent or semi-transparent coating, sometimes coloured. It may be either an intermediate or the final coat of a paint system. It is frequently applied thinly with the object to modify but not obscure the ground colour;

- c) ground coat a coat of paint having good opacity which is applied before a glaze coat or stumble. The final colour effect when glazed is dependent on the mutual influence of the ground coat and the glaze coat;
- d) guide coat a very thin coat of loosely bound paint applied over a continuous coating of surface or filler, prior to rubbing down. It is completely removed during the rubbing operations but, as it first disappears from the higher spots and ridges, it serves as a guide to the -operator in producing a smooth surface; and
- e) mist coat it can be of two types:
 - i) i) a very thin coat applied by spraying, more particularly in connection with cellulose lacquers. In some cases it may form a 'fogged' coat or non-continuous film;
 - ii) ii) a thin coat of volatile thinners, with or without a small amount of lacquer, which is sometimes sprayed over a dry lacquer film to improve the smoothness and lustre;

iii) round coat - A full coat of a heavy bodied paint or varnish; and

iv)sharp coat -- A coat of white lead in oil thinned liberally with turpentine or white spirit. A sharp coat used for treating new plaster following the trowel is frequently referred to as 'sharp colour'.

3.16

coating

liquid, liquefiable for mastic composition, that is converted to a solid protective, decorative or functional adherent film after application as a thin layer

4 Types

Plastic emulsion paint shall be of two types:

- a) type 1: for interior use, and
- b) type 2: for exterior use.

4.1 Class

There shall be the following four classes of products:

- a) matt finish,
- b) egg shell/satin finish,
- c) semi-glossy finish, and

d) glossy finish.

5 Requirements

5.1 General requirements

5.1.1 Composition

The material shall consists of pigments and if required suitable extenders in appropriate proportion in a medium consisting of any stable synthetic polymer emulsion in water with other suitable ingredients as may be necessary to produce a material so as to satisfy the requirements of this standard.

5.1.2 Conditions in the container

The material shall be free from odour of putrefaction. It shall be free from lumps, skins and the conditions of the material shall be such that settling, if any, maybe easily incorporated on stirring.

5.1.3 Thinning

When suitably thinned with water, the material shall mix readily with minimum amount of foaming to asmooth and homogeneous state. The foaming, if any, shall dissipate rapidly.

5.1.4 Application properties

The material after recommended thinning shall be suitable for application by brush, spray or roller. The resulting film shall not show pigment flocculation, coarseness or other undesirable characteristics.

5.1.5 Recoating properties

When three successive coats of the material, after suitable thinning with water, are applied on a dry asbestos cement sheet at an interval of 4 h for classes A and B material and 8 h for classes C and D material between coats, there shall be no lifting of the underlying coats. The paint shall not exhibit colour separation, sagging, pitting, flaking or cracking.

5.1.6 Consistency

Insert a clean metal rod or palette knife into the original container and examine the nature of settling. The material shall not cake hard inside the container and shall be in such a condition that stirring easily produces a smooth uniform paint suitable for application by appropriate method after recommended thinning.

5.1.7 Mass in kg

The mass in kg of the material, shall not differ by more than ± 3 sample percent from that of the approved sample.

5.1.8 Opacity

The material, when tested as detailed in Annex B shall pass the test.

5.1.9 Keeping properties

5.1.9.1 The material shall conform to all the requirements as mentioned in 5.2 to 5.9 and 5.11 (including requirements given in Table 1), when tested after one year from the date of manufacturing. The material shall be stored in original sealed container under normal atmospheric condition.

5.1.9.2 The material shall also comply with the requirements given in Table 1.

5.1.9.1 The product shall conform to the requirements for quality and performance prescribed under 5.1.1 to 5.1.10.

5.2 Specific requirements

S/No	Characteristic	Requirement	Test method
1	Drying time, Max		A D 1.1 and 1.2
	Surface dry		
	Class A and B	45 min	
	Class C and D	90 min	
	Hard dry	5.3.1	
	Class A and B	4h	
	Class C and D	8h	
2	Finish	Smooth and uniform	D 1.3
3	Gloss at 60°		
	Class A	0-10	
	Class B	11-25	
	Class C	26-70	
	Class D	71 and above	
4	Colour	Close match to	Е
		colour specified	
		by the purchaser	
5	Fastness to light	To pass the test	
		undlazed art	
		paper)	
6	Resistance to alkali	To pass the test	F
7	Washabiity and cleanability	To pass the test	G

Table 1 — Requirement for plastic emulsion paint

8	Temperature stability	To pass the test	Н
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5.2.1 The product shall contain not more than 5 %, by mass of volatile organic compounds(VOC).

5.2.2 The product shall not contain more than 0.1 percent by mass (as metal), of any toxic metalssuch as lead, cadmium, chromium (VI) and their compounds when tested by the relevant AtomicAbsorption Spectrophotometric methods.

5.2.3 The product shall not be manufactured from any carcinogenic ingredients.

6 Packaging and marking

6.1 Packaging

The material shall be packaged in sound clean and dry, containers as agreed to between the manufacturer and the purchaser.

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6.2 Marking

The containers shall be marked with the following information:

- a) name and type of the material;
- b) type and grade;
- c) mass of the material;
- d) month and year of manufacture;
- e) production date;
- f) best before use
- g) batch No. or lot No. in code or otherwise; and
- h) name of the manufacture and/or any recognized trade-mark.

Annex A

(Informative)

Method of determination of epoxide equivalent of epoxy compounds

A.1 Principle

A.1.1 Method A

- MS

Epoxide groups react with nascent hydrogen bromide produced by the action of a standard 0.1 mol/1solution of perchioric acid on tetraethyl ammonium bromide. The end-point is determined either by using crystal violet as indicator or, for dark-coloured products, by a potentiometric method. This method is recommended for normal reactive epoxy resin.

A.1.2 Method B

The amino nitrogen of the epoxyamine is titrated with a standard solution of perchloric acid. The value thus obtained is used as a correction in the calculation of the epoxide equivalent as obtained in Method A. This method is recommended for slow reactive epoxy resin.

NOTE — Safety goggles and safety screen may be used while carrying out tests through the above methods.

A.2 Reagents

- A.2.1 Acetic Acid, Glacial
- A.2.2 Acetic Anhydride.

A.2.3 Suitable Solvent for Solution of the sample — for example, chloroform, dibutyl phthalate, chlorobenzene.

- A.2.4 Potassium Hydrogen Phthalate Dry the potassium hydrogen phthalate for 2 h at 120°C before use.
- A.2.5 Crystal Violet, Indicator Solution Dissolve 100 mg of crystal violet in 100 mL of acetic acid.

A.2.6 Perchloric Acid, 0.1 mol/1 Standard Solution — To 8.5 mL ofa 70 percent (m/m) aqueous solution of perchloric acid, add 300 mL of acetic acid followed by 20 mL of acetic anhydride. Dilute to 1 litre with acetic acid and mix thoroughly, standardize this solution by titrating it against 200 mg of potassium hydrogen phthalate dissolved in 50 mL of acetic acid, using the crystal violet indicator solution (see Note 1).Use 4 to 6 drops of the crystal violet indicator solution and continue the titration until a stable green colour is obtained. Note the temperature, t_s, of the solution of perchloric acid at the time of standardization (see Note 2). The concentration, C, in mol/1 of the standard perchloric acid solution, is given by the formula

 $c = \frac{m}{VX0.204\ 22}$

Where,

m = is the mass (in g) of potassium hydrogen phthalate, and

V= is the volume (in ml) of perchloric acid used in the titration.

NOTE 1 — If a potentiometric method is used, it is necessary to standardize the perchloric acid in the same way as used for the test.

NOTE 2 — The use of a correction factor is necessary if the temperature of the perchloric acid at the time of its standardization is different from that at the time of the test. This is because of the significant coefficient of expansion of the standard perchloric acid solution ($1.07 \times 10^{-3} \, {}^{\circ}{\rm C}^{-1}$), which corresponds to a volume variation of 0.1 percent ${}^{\circ}{\rm C}$.

A.2.7 Tetraethylammonium Bromide Reagent Solution – Dissolve 100 g of tetraethylammonium bromide in 400 mL of acetic acid. Add a few drops of the crystal violet indicator solution; if it changes colour, bring it back to the original colour with the perchloric acid standard solution.

NOTE — For some epoxy compounds of low reactivity, the use of tetrabutylammonium iodide is advised, either as the solid or as a 10 % solution in chloroform; in this case, light should be excluded as much as possible. Solutions of tetrabutyl ammonium iodide in chloroform are unstable and should be freshly prepared for each titration.

A.3 Apparatus

- A.3.1 Balance Accurate to within 0.1 mg.
- A.3.2 Conical Flask 100 mL or 200 mL, with ground glass neck and ground glass stopper.
- A.3.3 Micro-burette of capacity 10 mL
- A.3.4 Magnetic Stirrer With polytetrafluorethylene coated bar.
- A.3.5 Thermometer—Calibrated to permit temperature measurements to within± 0.1 °C.

A.3.6 Pipette, One-mark 10 mL Capacity. In addition the following apparatus is required if a potentiometric end-point is to be used.

A.3.7 pH-millivoltmeter — Preferably of the compensating type.

A.3.8 Glass and Calomel Reference Electrodes — The electrode system shall have a salt bridge of lithium chloride in glacial acetic acid. If the electrodes are not in constant use, wash the glass electrode with butanone, rinse with water, soak the electrode for at least 10 min in a solution of dilute hydrochloric acid (9 mL of hydrochloric acid made up to 100 mL with water) and rinse again with water and butanone. If the electrodes are in constant use, it is sufficient to soak the electrodes in water between carrying out tests.

A.4 Procedure

A.4.1 Method A

A.4.1.1 Weigh into the flask, to the nearest 0.2 mg, a quantity of samplecontainingfrom0.6 millimolesto 0.9 millimoles of epoxide groups. (This corresponds to a mass of between 0.6 x EE mg and 0.9 x EE mg, where EE is the epoxide equivalent of the epoxide compound.) Add 10 mL of the solvent chosen for solution of the sample; then dissolve the sample by stirring and, if necessary, heat slightly. Cool the solution to room temperature. Add 20 mL of the acetic acid and, with the pipette, 10 mL of the tetraethylammonium bromide reagent. Then add 4 to 6 drops of the crystal violet indicator solution. Titrate with the standard perchloric acid solution immediately, in a closed system while stirring the contents of the flask'by means of the magnetic stirrer. Continue the titration until a stable green colour is obtained.

NOTE — The temperature,t, of the standard perchloric acid solution.

A.4.1.2 At the same time carry out a blank test, omitting the sample. If a potentiometric end point is used, carry out the above procedure using the electrodes and omitting the indicator solution. Take the mid-point of the inflection the titration curve as the end point.

A.4.2 Method B

Follow the procedure for Method A, including the blank test. Also carry out a second test with the sample,but without the addition of the tetraethylammonium bromide reagent.

A.5 Expression of results

A.5.1 Method A

The epoxide equivalent, EE, in grams per mole, is given by the formula:

$$EE = \frac{1000 \, x \, m}{(V_1 - V_0) \left(1 - \frac{t - t_S}{1000}\right) xC}$$

Where,

m = is the mass (in g) of the test sample;

Vo= is the volume (in ml) of the standard perchloric acid solution used in the blank test;

 V_1 = is the volume (in ml) of the standard perchloric acid solution used in the test on the sample;

t = is the temperature (in °C) of the standard perchloric acid solution at the time of tests;

ts = is the temperature (in °C) of the standard perchloric acid solution at the time of standardization; and

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C = is the concentration(in mol/1) of the perchloric acid solution at the time of standardization.

The result is sometimes expressed as epoxide index (in moles of epoxide groups per kg) calculated as follows:

$$Epoxide index = \frac{1000}{EE}$$

A.5.2 Method B

The epoxide equivalent, EE, in grams per mole, is given by the formula:

 $EE = \frac{100 \ x \ m}{(V_1 - V_0) \ (1 - \frac{t - t_s}{1000}) xC} - t_s$

Where,

m = is the mass (in g) of the test sample;

m_i = is the mass (in g) of the test sample used in the second test, that is, without the addition of the tetraethylammonium bromide reagent;

Vo= is the volume (in ml) of the standard perchloric acid solution used in the blank test;

- V₁= is the volume (in ml) of the standard perchloric acid solution used in the first test on the sample;
- V₂= is the volume (in ml) of the standard perchloric acid solution used in the second test on the sample, that is, without the addition of the tetraethylammonium bromide reagent;

t = is the temperature (in °C) of the standard perch loric acid solution at the time of the tesls;

 t_s =is the temperature (in 'C) of the standard perchloric acid solution at the time of standardization; and

C=is tk concentration (in nlol/1) of the perchloric acid solution at the time of standardization.

The result is sometimes expressed as epoxide index, expressed in moles of epoxide groups per kilogram, calculated as follows:

$$Epoxideindex = \frac{1000}{EE}$$

A.6 Test report

The test report shall include the following particulars:

- a) a complete identification of the material tested, including type, source, manufacturer's code numbers etc;
- the epoxide equivalent; b)
- CONTRACT OR PUBLIC REVIEW COMMENTE C) the solvent used for solutioland the reagent used if is not tetraethylammonium bromide;

Bibliography

[1] IS 354: 1987, Methods of sampling and test for resins for paints: Part 4, Special test methods for epoxy

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