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PAINTS AND VARNISHES

**EMULSION PAINTS FOR INTERIOR AND EXTERIOR USE –
Specification**

ZAMBIA BUREAU OF STANDARDS

AMENDMENTS ISSUED SINCE PUBLICATIONS

Amdt No.	Date	Text affected
1	24/03/2026	viscosity equal to or above 90 Krebbs Units at $24 \pm 1^{\circ}\text{C}$.

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ZAMBIA BUREAU OF STANDARDS

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FOREWORD

This National Standard has been prepared by the Paints, Adhesives and Varnishes Technical Committee (TC 4/6) in accordance with the procedures of ZABS. All users should ensure that they have the latest edition of this publication as standards are revised from time to time.

No liability shall attach to ZABS or its Director, employees, servants or agents including individual experts and members of its Technical Committees for any personal injury, property damage or other damages of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon this ZABS publication or any other ZABS publication.

Emulsion paints are widely used in the protection and decoration on masonry, plaster, brickwork, concrete, wood, etc. They are usually a flat or egg-shell finish paint with low sheen and, in dwelling buildings are used for painting less frequented rooms and less touched walls and surfaces like lounge rooms, bedrooms and ceilings owing to the difficulty in removal of dirt once it has been deposited on the paint film.

These paints are water-based and consist basically water, emulsion binder, pigments and extenders. It should be noted that discolouration of these paints may occur if the substrates are not moisture free as the presence of moisture may affect certain pigments to cause this undesirable effect. For that reason it is recommended that all surfaces to be painted should be free from moisture before application of the paints.

The preparation of this Standard has been undertaken by the Paints, Adhesives and Varnishes Technical Committee (TC 4/6). The developments in the construction sector in Zambia necessitated the formulation of this standard. In its preparation assistance was derived from:-

MS 3 1979 Emulsion paints for Interior and Exterior use published by Mauritius Standards Bureau.

SAZS 357:1993 Emulsion paints for Exterior use, published by Standards Association Zimbabwe.

ACKNOWLEDGEMENT

The Zambia Bureau of Standards would like to acknowledge the invaluable support of all the institutions and stakeholders that contributed in the promulgation of this standard.

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ZAMBIA BUREAU OF STANDARDS

Zambian Standard

EMULSION PAINTS FOR INTERIOR AND EXTERIOR USE – Specification

1 SCOPE

This Zambian Standard specifies requirements for emulsion paints, based on polymers, intended for brushing, spraying and roller applications for exterior and interior use on new or previously painted surfaces painted with compatible emulsion paint.

NOTE: This applies in the case of the premium product

2 NORMATIVE REFERENCES

The following Publications contain provisions which, through reference in this text, constitute provisions of this standard. All publications are subject to revision and, since any reference to a publication is deemed to be a reference to the latest edition of that publication, parties to agreements based on this Standard are encouraged to take steps to ensure the use of the most recent editions of the standards indicated below

ZS 284 Part 1	Paints and varnishes-Methods of test Part 1 - Determination of volatile and non-volatile matter
ZS 284 Part 2	Paints and varnishes-Methods of test Part 2 - Determination of coarse and foreign matter
ZS 284 Part 3	Paints and varnishes-Methods of test Part 3 - Determination of viscosity
ZS 284 Part 4	Paints and varnishes-Methods of test Part 4 - Determination consistency of paints by means of Krebs-Stormer viscometer
ZS 284 Part 5	Paints and varnishes-Methods of test Part 5 - Determination of application properties
ZS 284 Part 6	Paints and varnishes-Methods of test Part 6 - Determination of drying properties - Surface drying test
ZS 284 Part 7	Paints and varnishes-Methods of test Part 7 - Determination of specular gloss of paints film at 85°
ZS 284 Part 9	Part 8 - Visual comparison of the colour of paints Part 9 - Determination of reflectance of white paints
ZS 284 Part 10	Paints and varnishes-Methods of test Part 10 - Comparison of contrast ratio (hiding power) of paints of the same colour
ZS 284 Part 11	Paints and varnishes-Methods of test Part 11 - Determination of resistance to wet abrasion
ZS 284 Part 12	Paints and varnishes-Methods of test Part 12 - Determination of light fastness of paints for exterior use exposed to natural light source
ZS 284 Part 13	Paints and varnishes-Methods of test Part 13 - Grey scale for assessing change in colour
ZS 284 Part 14	Paints and varnishes-Methods of test Part 14 - Determination of resistance to staining
ZS 284 Part 15	Paints and varnishes-Methods of test Part 15 - Determination of resistance to fungal growth
ZS 284 Part 16	Paints and varnishes-Methods of test Part 16 - Determination of resistance to alkali
ZS 284 Part 17	Paints and varnishes-Methods of test Part 17 - Determination of specific gravity (weight/litre)

ZS 284 Part 18	Paints and varnishes-Methods of test Part 18 - Determination of fineness of grind
ZS ISO 4618	Paints and Varnishes - Terms and Definitions
ZS ISO 1514	Paints and Varnishes - Standard Panels for Testing
ZS ASTM D4214:	Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films

3 DEFINITIONS

For the purpose of this standard, definitions given in ZS ISO 4618 and the following shall apply

3.1 Batch

A final mix or blend of paint in one large vessel from which smaller containers are filled for distribution and marketing.

3.2 Standard test conditions

A temperature of $24 \pm 1^\circ\text{C}$ and a relative humidity of $60 \pm 5\%$. All tests shall be carried out at standard test conditions unless otherwise stated.

4 TYPES

The paint shall be one or both of the following types:-

Type 1 - suitable for exterior use

Type 2 - suitable for interior use

In case the paint which is meant for both interior and exterior use, it shall meet the requirements specified for both Type 1 and Type 2 paints.

5 REQUIREMENTS

5.1 Composition

The material shall consist of pigments and suitable extenders in suitable proportions, in a medium consisting of a stable synthetic polymer dispersion in water with suitable ingredients as may be necessary to produce a material so as to satisfy the requirements of the standard.

5.2 Condition of the container

The paint on receipt in an unopened full container, which should be suitable to contain the paint within the recommended shelf-life by the manufacturer, shall not have irritating or offensive odour and, if any separation of the liquid has taken place, the depth of the upper layer shall not exceed 5% of the total depth of the contents of the container. The paint shall be free from lumps and skins, shall not exhibit excessive settling, caking, granulation, leveraging, or colour separation, and shall be easily dispersed with a paddle to a smooth, homogeneous state. Tests shall be done in accordance with Annex A.

5.3 Volatile Content

The volatile matter content of the paint, determined in accordance with ZS 284 Part 1, shall not be more than 50% (m/m).

5.4 Coarse Particles and Foreign Matter

When tested in accordance with ZS 284 Part 2, the paint shall not leave a residue of more than 1% (m/m) on a sieve of nominal aperture size 75 μm .

5.5 Viscosity

When tested in accordance with ZS 284 Part 3, the paint as supplied shall have a viscosity equal to or above 90 Krebs Units at $24 \pm 1^\circ\text{C}$.

5.6 Fineness of grind

When tested in accordance with ZS 284 Part 18, the fineness of grind reading of the unthinned paint shall not exceed 20 μm .

5.7 Dilution Stability

When suitably thinned with clean water in accordance with the manufacturer's instructions, for roller, brush or spray application, the material shall mix readily with a minimum amount of foaming to a smooth and homogeneous state. The foaming, if any, shall dissipate rapidly. After the well-mixed and reduced paint has been stored for 72 hours at $25 \pm 5^\circ\text{C}$, it shall show no signs of instability of the emulsion. The paint shall readily re-mix to a smooth, uniform state suitable for roller, brush or spray application.

5.8 pH value

The pH value of the material when determined by a suitable glass electrode system shall be between 8.0 and 10.0.

5.9 Shelf-life

The paint, when stored at a temperature between 20°C and 30°C in shade and in fully unopened containers as delivered by the manufacturer, shall meet all the requirements of this standard up to at least 9 months from the indicated date of manufacture.

5.10 Temperature stability

The paint when put into a 400 ml glass jar with ground-in cover, to about three quarter full, and kept fully closed in a suitable oven at a temperature of $40 \pm 2^\circ\text{C}$ for one month or $60 \pm 2^\circ\text{C}$ for 48 hours shall not develop an offensive odour and shall still comply with the requirements of 5.7, 5.13 and 5.14.

5.11 Mass in Kgs/litre

The mass in kgs/litre of the material when tested in accordance with ZS 284 Part 17 shall not differ by more than $\pm 5\%$ from that of the approved sample (formulation).

5.12 Resistance to alkali

When tested in accordance with ZS 284 Part 5, the difference between the opened and the unopened material shall not be appreciable when examined visually.

5.13 Application properties

When tested in accordance with ZS 284 Part 5, the material shall, after recommended thinning, be suitable for application by brush, spray or roller. The first coat shall brush, or work satisfactorily and during the application of the second coat the paint shall brush, airless or work easily, flow, spread and join well. It shall show no floating, film coarseness or any other undesirable film characteristic in the wet or dry film.

5.14 Recoating properties

When three successive coats of paint, after suitable thinning with water, are applied under normal conditions (refer to 3.2) on Use “Dry Primed Rhino board paper coated on both sides” (8.2.1) at an interval of two hours between coats by brushing, roller-coating, or spraying at a spreading rate of approximately 12 square metres per litre, there shall be no lifting of the under-lying coats. The paint system shall not exhibit colour separation, sagging, pitting, flaking or cracking. No difficulty shall be experienced with the application of the successive coats by brushing, spraying or with the roller. The brush marks produced during brush application shall not be more pronounced than those on the first coat.

NOTE: the rhino board paper should be primed with premium universal undercoat 16 hours prior to use

5.15 Drying properties

Apply a coat of paint on a glass panel (8.2.2) giving a wet film thickness of approximately 75 μm . When tested in accordance with ZS 284 Part 6 at standard test conditions, the paint shall be surface dry at the end of 20 minutes and shall dry to a suitable condition for recoating within 4 hours.

5.16 Specular gloss at 85° (sheen)

Apply a coat of paint by means of a spreading device (e.g. doctor's blade) on a glass panel (8.2.2) giving a wet film thickness of approximately 75 μm .

When tested in accordance with ZS 284 Part 7, the dry paint shall have the 85° specular gloss given below relevant to the type of finish specified by the manufacturer:-

Flat finishes	15° max
Egg-shell finishes	16° - 50°

5.17 Colour

Unless otherwise, the colour shall be as agreed between purchaser and manufacturer.

5.18 Reflectance of white paints

White paint shall have a daylight 45°, 0° luminous directional reflectance relative to magnesium oxide of at least 85%, when tested in accordance with ZS 284 Part 9.

5.19 Hiding power

When tested in accordance with ZS 284 Part 10, a paint that has the daylight 45°, 0° luminous directional reflectance value in column 1 of Table 1 shall have the corresponding dry hiding power given in column 2.

Table 1 - Requirements for Hiding Power.

Column 1	Column 2
Reflectance, %	Hiding power, m^2/l
40 and more	10
20 - 39.9	13.3
10 - 19.9	15.4

less than 10	10.0
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5.20 Resistance to wet abrasion

When tested in accordance with ZS 284 Part 11, for 9000 oscillations, the material shall be deemed to have passed the test if it does not show film defects like blistering, exposure of undercoat, finish and colour fading. 9000 oscillations as minimum.

5.21 Resistance to exterior exposure

This test shall apply to Type 1 paints. When tested in exposure stations approved by the Zambia Bureau of Standards (as prescribed in Annex B), the paint shall not chalk more than the equivalent ZS ASTM D4214 Rating No. 8 after 6 months and Rating No. 6 after 12 months and coloured paints shall not exhibit more than a very slight change of colour. The paint shall not show more than a slight degree of dirt retention and shall show no sign of film breakdown, such as cracking, flaking, blistering after 12 months exposure.

5.22 Light fastness

This test shall apply only to type 1 paints. When tested in accordance with ZS 284 Part 12, using a single carbon arc apparatus and glass panels (see 8.2.2 and 8.2.3) the paint after 168 hours of exposure, shall not exhibit more than a slight change of colour corresponding to rating 4 as specified in ZS 284 Part 13, grey scale.

5.23 Resistance to staining

This test shall apply to both type 1 and type 2 paints. When tested in accordance with ZS 284 Part 14, the paint film shall show no sign of staining¹.

Note 1: This does not apply to matt finish.

5.24 Resistance to development of gloss

This test shall apply only to Type 2 paints. Panels are prepared and aged as prescribed in **Annex B**. In the case of an egg-shell finish, the 85° specular gloss is measured. The test carried out as in ZS 284 Part 11, but only 375 oscillations of the brush are used. The paint film is then washed with water, the panel is allowed to dry and the 85° specular gloss then measured.

When the paint is tested as above, the 85° specular gloss (sheen) of flat finishes shall not increase by more than 50% over the original value

5.25 Resistance to fungal growth

When a paint is specified as providing a fungus-resistant finish the dry paint film both after 48 hours ageing and after 6 months ageing in standard air-drying conditions shall pass the test described in ZS 284 Part 15. This test applies to both Type 1 and Type 2 paints except that, for Type 1 paints and for paints meant for both interior and exterior use, the test shall be carried out after 6 months' exterior exposure instead of ageing for 6 months in standard air-drying conditions.

5.26 Water drop test

When an undiluted paint is applied to a glass panel to give a wet film thickness of about 120 µm and allowed to air-dry for 24 hours, no blistering, wrinkling, swelling or cracking of the paint film shall occur within a period of 30 minutes after 4 ml of distilled water in the form of circular drop is placed on the film.

6 PACKAGING AND MARKING

6.1 Packing (container)

The paint shall be packed in clean and dry containers. The containers shall be strong enough to withstand normal usage and shall be adequately sealed to prevent leakage and contamination of the contents during normal transportation and storage.

6.2 Marking

The following information shall be clearly and indelibly marked on each container or on a label securely fixed to it:-

- a) manufacturers name, address and trade mark, if any;
- b) volume of the material or net mass in the container;
- c) the use of the product;
 - in case of Type 1 paints, 'for exterior use';
 - in case of Type 2 paints, 'for interior use';
 - in case of paints meeting the requirements specified for both Type 1 and Type 2 paints, 'for exterior and interior use'; and when applicable, the words "Fungus-resistant";
- d) the colour;
- e) the batch identification date of manufacture and expiry;
- f) the application and usage instructions including safety information;
- g) the storage precautions;
- h) the finish (whether flat or egg-shell).

6.2.1 The containers may also be marked with the ZABS Certification Mark.



7 SAMPLING

The following sampling procedure shall be applied in determining whether a lot complies with the relevant

requirements of the standard. The samples so drawn shall be deemed to represent the lot.

- a) From the lot draw at random two containers each of capacity at litre, for the storage stability test.
- b) From the lot draw at random one container for all the remaining tests.

8 TEST SAMPLE AND TEST PANELS

8.1 Test Samples

First assess the condition in the container in accordance with Annex A. Then thoroughly stir or mix the contents of the container until a homogeneous product is obtained and take from the container a test sample of volume 1 litre. Use this sample for the remainder of the tests. In case of the samples for the storage stability test, these shall not be stirred.

8.2 Test panels

- 8.2.1** Use “Rhino board paper coated on both sides” and primed with premium universal undercoat 16 hours prior to use

300 x 300 mm and 300 x 100 mm sizes

- 8.2.2** Polished glass panels

150 x 100 x 4 to 6 mm and 320 x 110 x 6 mm complying with ZS ISO 1514 requirements.

- 8.2.3** Method of film application

Apply the paint according to the following method, unless otherwise specified.

A clean, soft, flat paintbrush, free from loose bristles shall be used. Use only brushes which have been thoroughly broken-in previously. First soak the brush in water for a few minutes and then shake off the excess water.

Apply the well-mixed material to the cleaned panel with the brush and do not pour or spill it on the surface. Work the brush through the film up and then down and across to obtain a uniform thickness of film.

The wet film thickness per coat shall be approximately 75 μm except where a different thickness is specified in the method.

Where two coats are specified, allow an interval of 4 hours to elapse between coats, unless otherwise specified.

- 8.2.4** Air-drying conditions

Immediately after application of film place all panels in a horizontal position for drying except where otherwise specified. Air-dry in a well ventilated room. During drying protect the film from direct sunlight.

- 8.2.5** Ageing

Age all panels for 24 hours after application of the final coat, except where different times for ageing are specified.

ANNEX A

CONDITIONS IN THE CONTAINER

A.1 Apparatus

A.1.1 Spatula

A stiff steel spatula with a square end.

A.2 Procedure

Open the original container as received and examine the contents for skinning, incompatibility, levering or gelling, before shaking or stirring. Remove, by means of a spatula, any continuous skin that may be present. Stir the contents with the spatula and examine for presence of any hard sediment or cake. If hard sediment is present, decant the supernatant paint, stir the residue, and determine whether it can be easily broken up and re- incorporated with the vehicle to form a smooth paint by stirring manually.

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ANNEX B

RESISTANCE TO EXTERIOR EXPOSURE

B.1 Preparation of panel

B.1.1 Panels

Use Dry Primed Rhino board paper coated on both sides of 300 x 100 mm size (see 8.2.1).

B.1.2 Paint application

Apply three coats of paint on the panel by brush, roller or spray application at intervals of 24 hours between each coat. Air dry for seven days at a temperature of $25 \pm 5^{\circ}\text{C}$ and $60 \pm 5\%$ relative humidity in a horizontal position and in the absence of direct sunlight.

B.2 Procedure

B.2.1 Racks

Expose the panels on racks constructed from galvanized steel sheets and sections at appropriate exposure site(s). The test fence runs east and west, and is constructed to hold test panels on racks on both sides so that there are panels facing both north and south. There are three rows of racks one above the other on each side of the fence. A 45° flap is placed along the top of the fence, and projects beyond the racks. At the end of each rack a channel running parallel to the fence is fitted so as to prevent rain water from one panel to fall on the next one below it (the water runs and falls on either side of the fence).

B.2.2 Panel exposure

Fit the Dry Rhino board paper coated on both side with galvanized screws and nuts on the test racks¹. Examine the conditions of the exposed film after six months for chalking and after twelve months for the following properties:-

- | | |
|---------------|-------------------|
| a) Colour | b) Flaking |
| c) Cracking | d) Chalking |
| e) Blistering | f) Dirt retention |

The exposure period shall include the summer months i.e. the month with highest average temperatures. For the above examination, wash the right hand half of the surface of test panels by pouring water and then wiping with soft cloth. Examine the same half of the test panels at each examination; at the end of the stipulated period for exterior exposure test, examine the two halves of the test panels for the above characteristics. The sample shall be considered satisfactory if the condition of the film in both halves, the one washed periodically as well as the one washed only for the final examination meet the requirements of 5.3.7. Stray film failure due to extraneous causes other than climatic shall be ignored.

Note 1: the panel exposure rack can be placed about 3 meters from the ground on a flat holding base free from obstruction such as trees, buildings etc.