UL 1332

STANDARD FOR SAFETY

Organic Coatings for Steel Enclosures for Outdoor Use Electrical Equipment

UL Standard for Safety for Organic Coatings for Steel Enclosures for Outdoor Use Electrical Equipment, UL 1332

Fifth Edition, Dated February 12, 2016

Summary of Topics

This reaffirmation of ANSI/UL 1332 dated November 8, 2024 is being issued to update the title page to reflect the most recent designation as a Reaffirmed American National Standard (ANS). No technical changes have been made.

Text that has been changed in any manner or impacted by ULSE's electronic publishing system is marked with a vertical line in the margin.

The requirements are substantially in accordance with Proposal(s) on this subject dated September 20, 2024.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form by any means, electronic, mechanical photocopying, recording, or otherwise without prior permission of ULSE Inc. (ULSE).

ULSE provides this Standard "as is" without warranty of any kind, either expressed or implied, including but not limited to, the implied warranties of merchantability or fitness for any purpose.

In no event will ULSE be liable for any special, incidental, consequential, indirect or similar damages, including loss of profits, lost savings, loss of data, or any other damages arising out of the use of or the inability to use this Standard, even if ULSE or an authorized ULSE representative has been advised of the possibility of such damage. In no event shall ULSE's liability for any damage ever exceed the price paid for this Standard, regardless of the form of the claim.

Users of the electronic versions of UL's Standards for Safety agree to defend, indemnify, and hold ULSE harmless from and against any loss, expense, liability, damage, claim, or judgment (including reasonable attorney's fees) resulting from any error or deviation introduced while purchaser is storing an electronic Standard on the purchaser's computer system.

ULNORM.COM : Click to view the full PDF of UL 1332 2024

No Text on This Page

FEBRUARY 12, 2016
(Title Page Reprinted: November 8, 2024)

ANSI/UL 1332-2020 (R2024)

UL 1332

Standard for Organic Coatings for Steel Enclosures for Outdoor Use

Electrical Equipment

First Edition – March, 1986
Second Edition – June, 1990
Third Edition – February, 1995
Fourth Edition – February, 2005

Fifth Edition

February 12, 2016

This ANSI/UL Standard for Safety consists of the Fifth Edition including revisions through November 8, 2024.

The most recent designation of ANSI/UL 1332 as a Reaffirmed American National Standard (ANS) occurred on November 8, 2024. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page.

Comments or proposals for revisions on any part of the Standard may be submitted to ULSE at any time. Proposals should be submitted via a Proposal Request in the Collaborative Standards Development System (CSDS) at https://csds.ul.com.

No Text on This Page

CONTENTS

INTRODUCTION

PERFORMANCE

MARKING

APPENDIX A – ORGANIC COATING IDENTIFICATION

No Text on This Page

INTRODUCTION

1 Scope

1.1 These requirements cover tests of opaque and clear organic coatings intended for application to exterior and interior surfaces of steel enclosures of outdoor-use electrical equipment for protection of the metal against atmospheric corrosion.

1.2 These requirements cover organic coatings consisting of one or more coats and their system of application to steel or zinc-coated steel with specified pretreatment, application, bake or cure schedule, and minimum dry-film thickness.

1.3 The final acceptance of a coating is dependent upon its use in a complete product that complies with the requirements in the standard applicable to such a product.

1.4 The requirements may be applied to other organic or nonmetallic coatings if found to be appropriate.

1.5 The flammability or toxicity risks associated with the coating materials in any form, or the acceptability of the materials for uses other than indicated, are not within the scope of these requirements.

2 Glossary

2.1 For the purpose of this standard, the following definitions apply.

2.2 APPLICATION METHOD – The procedure and equipment employed in applying the coating, which may also include parameters of equipment operation.

2.3 BAKE OR CURE SCHEDULE – The time-temperature conditions used following the application of an organic coating.

2.4 ORGANIC COATING – A coating containing drying oils, resins, and setting or hardening agents such as reacting chemicals and catalysts or resins.

2.5 PRETREATMENT – The cleaning or chemical process, such as iron or zinc phosphating, used on the metal surface prior to application of the organic coating.

2.6 RESIN – The polymeric portion of an organic coating system.

2.7 SUBSTRATE – The specific metal surface to which the organic coating is to be applied.

2.8 WEEPING – Corrosion discoloration (e.g. yellow, brown, or orange) condensation droplets of moisture on the coating surface.

3 Units of Measurement

3.1 If a value for measurement is followed by a value in other units in parentheses, the second value may be only approximate. The first stated value is the requirement.

4 References

4.1 Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

PERFORMANCE

5 Specimens for Test

5.1 Specimens representative of the coating system are to be employed in these tests. The sheet steel used in the preparation of specimens of the coating is to be representative of the steel for which the coating is intended, with respect to composition and surface conditions. The specimens are to be prepared by the same procedures of surface cleaning, pretreatment, application of the coating system, drying or curing, and minimum dry-film thickness that will be used in the end-use product.

5.2 If a coating system is intended to be used in a range of colors, specimens representing the range are to be tested. Specimens with the highest resin to non-resin (excluding solvent) content ratio, lowest resin to non-resin content ratio are to be tested. If specific color pigments, textures and/or non-resin solids are known to have unusual or critical performance properties, they are also to be tested.

5.3 Test specimens are to be 4 inches (102 mm) wide and 12 inches (305 mm) long, with the thickness of the base metal being representative of that in the end-use application.

6 Specimen Preparation

6.1 The edges or bare surfaces of all specimens are to be covered with moisture-resistant tape or compound. Two of the specimens are to be scribed in accordance with the Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments, ASTM D1654. A single 8 inch (203.2 mm) diagonal V-cut scribe running lengthwise across the specimen is to be used. The scribe is to be free of burrs and is not to contact the edges. The scribing tool used is to be either:

a) A carbide tipped tool [Style E, with 1/64-inch (0.4-mm) nose radius], or

b) A carbide tipped tool ground to a single point having an included angle of 60 ±15 degrees.

7 Salt-Spray (Fog) Test

7.1 Two scribed and two unscribed specimens shall be exposed for 600 hours to salt spray in accordance with 7.3. Following exposure, specimens shall:

a) Not show more than light corrosion beneath the coating with no visual pitting of substrate and only incipient buildup or weeping of corrosion, not including the scribe,

b) Comply with Table 7.1, and

c) Not exhibit an average creepage distance from the scribe greater than Rating No. 5 [1/8 to 3/16 inch (3.2 – 4.7 mm)] as designated in the Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments, ASTM D1654, Procedure A; with maximum isolated spot not exceeding 3/8 inch (9.5 mm).

Table 7.1
Blister size and frequency

Maximum size[a]	Maximum frequency
2 or 4	Few
6 or 8	Medium
Note – Compliance is to be determined in accordance with the Standard Test Method for Evaluating Degree of Blistering of Paints, ASTM D714.	
[a] The largest blister size is Number 2 and the smallest blister size is Number 8.	

7.2 Removal of the coating along the scribe shall be conducted by scraping the specimen vigorously with a rigid spatula, knife or similar instrument with no sharp edges or corners.

7.3 The specimens are to be exposed to salt spray in accordance with the Standard Practice for Operating Salt-Spray (Fog) Apparatus, ANSI/ASTM B117.

8 Moist Carbon Dioxide-Sulfur Dioxide-Air Test

8.1 Two scribed and two unscribed specimens shall be exposed for 1200 hours to a mixture of moist carbon dioxide and sulfur dioxide and air as described in 8.2 – 8.5. Following exposure, specimens shall:

a) Except for the scribe, not show more than light corrosion beneath the coating with no visual pitting of substrate and only incipient buildup or weeping of corrosion products,

b) Comply with Table 8.1, and

c) Not exhibit an average creepage distance from the scribe greater than Rating No. 6 [1/16 to 1/8 inch (1.6 – 3.2 mm)] as designated in the Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments, ASTM D1654, Procedure A; with maximum isolated spot not exceeding 3/8 inch (9.5 mm).

Table 8.1
Blister size and frequency

Maximum size[a]	Maximum frequency
2	None
4 or 6	Medium
8	Medium dense

Note – Compliance is to be determined in accordance with the Standard Test Method for Evaluating Degree of Blistering of Paints, ASTM D714.

[a] The largest blister size is Number 2 and the smallest blister size is Number 8.

8.2 Removal of the coating along the scribe shall be conducted by scraping the specimen vigorously with a rigid spatula, knife or similar instrument with no sharp edges or corners.

8.3 The apparatus used for the moist carbon dioxide-sulfur dioxide-air exposure is to consist of a chamber having a volume of at least 3 cubic feet (0.08 m^3) with a water jacket and thermostatically controlled heater to maintain a temperature of 95 plus 2 or minus 3°F (35 plus 1.1 or minus 1.7°C).

8.4 Sulfur dioxide and carbon dioxide are to be supplied to the test chamber from commercial cylinders containing the gases under pressure. An amount of sulfur dioxide equivalent to 1 percent of volume of the test chamber, and an equal volume of carbon dioxide are to be introduced into the chamber each working day. Prior to introducing the new charge of gas each day, the remaining gas-air mixture from the previous day is to be purged from the chamber. A small amount of water (approximately 10 ml/0.0003 m^3 of chamber volume) is to be maintained at the bottom of the chamber for humidity. This water is not to be changed during the exposure.

8.5 The specimens are to be supported in plastic racks at an angle of 15 to 30 degrees from the vertical.

9 Light and Water Test for Clear Coatings

9.1 Two scribed and two unscribed specimens shall be exposed for 500 hours to light and water in accordance with 9.3. Following exposure, specimens shall:

a) Except for the scribe, show no base metal corrosion,

b) Show no blisters,

c) Not exhibit an average creepage distance from the scribe greater than rating No. 6 [1/16 to 1/8 inch (1.6 – 3.2 mm)] as designated in the Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments, ASTM D1654, Procedure A; with maximum isolated spot not exceeding 3/8 inch (9.5 mm), and

d) Not show more than light corrosion of the base metal beneath coating uplifted from the scribe with no visual pitting of substrate and only incipient buildup of corrosion products.

9.2 Removal of the coating along the scribe shall be conducted after exposure by scraping the specimen vigorously with a rigid spatula, knife or similar instrument with no sharp edges or corners.

9.3 The specimens are to be exposed to light and water in accordance with the Standard Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that Use Laboratory Light Sources, ASTM G151, and the Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials, ASTM G155. The spectral power distribution of the xenon lamp shall conform to the requirement in Table 1 in ASTM G155 for a xenon lamp with daylight filters. The apparatus shall operate with a spectral irradiance of 0.35 W/m^2 nm at 340 nm and a black-panel temperature of 63 ±3°C (145.4 ±5.4°F). During each operating cycle of 120 minutes, each specimen is to be exposed to:

a) Light for 102 minutes, and

b) Water spray with light for 18 minutes.

MARKING

10 General

10.1 A product container shall be marked with the manufacturer's name, trade name, code designation, or other marking that serves to identify the product.

10.2 If a manufacturer produces a coating material at more than one factory, the product container shall have a distinctive marking by which it may be identified as the product of a particular factory.

APPENDIX A – ORGANIC COATING IDENTIFICATION

A1 Scope

A1.1 Analytical tests may be performed to determine the general composition of a coating material. Sections A3 – A7 contain some common methods for these analytical tests. Other methods may be employed if deemed necessary.

A1.2 This Appendix is not part of the requirements for organic coatings for steel enclosures for outdoor-use electrical equipment, UL 1332, but is included for information purposes only.

A2 General

A2.1 A 0.25 liter liquid or 250 g solid sample of each coating is to be provided for the identification tests.

A2.2 All materials are to be well mixed so that representative samples are used. When a mechanical mixer or shaker is used, the sample is to be examined to determine that mixing is complete and that no solids remain on the bottom of the container.

A3 Test for Weight Per Gallon of Liquid Coating

A3.1 General

A3.1.1 To determine the weight per gallon of a liquid coating, a Baltimore cup is to be carefully filled in accordance with A3.2.1 and A3.2.2. The weight of the content of the Baltimore cup in grams is equal to the weight per gallon in pounds.

A3.1.2 The following materials and equipment are to be used in the test:

a) An analytical balance capable of weighing to 0.01 gram, and

b) A Baltimore weight per gallon cup.

A3.2 Test procedure

A3.2.1 If air bubbles become entrapped in the material during mixing (see A2.2), the sample is to be allowed to stand until the bubbles escape, and is then to be stirred gently by hand with a paint paddle before filling the Baltimore cup.

A3.2.2 The weight per gallon is to be determined with the sample at room temperature, approximately 25°C. The tared Baltimore cup is to be carefully filled to avoid entrapment of air. After filling, the cap is to be carefully placed on the cup and gradually pushed into place, allowing the excess material to escape through the hole in the cap. The overflow is to be wiped from the cup and the contents are to be weighed using the tare to compensate for the weight of the cup.

A4 Test for Percent Non-Volatile Content

A4.1 General

A4.1.1 The percent non-volatile content of an organic coating system is to be determined in accordance with A4.2.1 and A4.2.2. The non-volatile content is to be calculated from the weight of the original sample tested and the weight of the residue remaining after heating.

A4.1.2 This test is typically performed for liquid from specimens and is applicable to coating materials containing volatile ingredients.