AS 3894.1:2026

Australian STANDARD®

STANDARDS Australia

Site testing of protective coatings

Method 1: Non-conductive coatings — Continuity testing — High voltage (brush) method



AS 3894.1:2026

This Australian Standard® was prepared by CH-003, Paints And Related Materials. It was approved on behalf of Standards Australia's Standards Development and Accreditation Committee on 05 May 2026.

This Standard was published on 19 June 2026.

The following are represented on Committee CH-003:

- Australian Industry Group
- Australian Institute of Building
- Australian Paint Manufacturers Federation
- CSIRO
- Engineers Australia
- Master Painters Australia
- National Association of Testing Authorities Australia
- National Painting and Decorating Institute
- Road Marking Industry Association of Australia
- Surface Coatings Association Australia
- The Association of Wall & Ceiling Industries of NSW
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This Standard was issued for comment as DR AS 3894.1:2026

Status of this document

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ISBN: 978 1 76175 754 9

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Method 1: Non-conductive coatings — Continuity testing — High voltage (brush) method

Originated as AS 3894.1-1991.
Second edition AS 3894.1-2002.
This document AS 3894.1:2026.

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How to read this Standard

This page explains the meaning of the language and structure of this Standard.

Refer to Standards Australia's Standardisation Guide 006 for more details about drafting rules.

Australian and Australian/New Zealand Standards are voluntary unless they are referenced in legislation or called up in contracts.

Requirements

To conform to a Standard, all requirements in the Standard need to be met.

A requirement is any statement in the Standard which uses the word "shall".

Recommendations, permissions and possibilities

The following words are commonly used in Standards, but statements using them do not have to be followed to conform to the Standard:

(a) "should" means that something is recommended.

(b) "may" means that something is permitted.

(c) "can" means that something is possible.

Structure of Standards

A Standard always has the following parts:

(i) The Preface states who developed the Standard, what the Standard is aiming to do, and how it relates to other documents.

(ii) The Scope states what the Standard is about, what it covers and what it does not cover.

(iii) The Normative references clause lists other documents that are referenced in the Standard as part of requirements.

(iv) The Terms and definitions clause defines important terms to help with understanding the Standard.

A Standard may also include other parts, such as the following:

(1) A normative appendix sets additional requirements that need to be conformed to.

(2) An informative appendix provides additional information or guidance. They usually do not contain requirements. If an informative appendix does contain requirements, the Standard will explain when those requirements apply.

(3) A Bibliography lists documents referenced in the Standard but not as part of requirements.

Many Standards include notes. Notes provide recommendations and/or guidance only. They never contain requirements.

Preface

This Standard was prepared by the Australian members of the Joint Standards Australia/Standards New Zealand Committee CH-003, Paints and Related Materials, to supersede AS 3894.1:2002.

The objective of this document is to set out the high voltage or "brush" method for determining the presence of defects in an electrically non-conductive, protective coating of at least 150 μm thickness on an electrically conductive substrate. This test method is intended to accurately locate defects, which can subsequently be repaired by appropriate procedures, prior to the item being placed into service.

This document is part of a series of Standards that provides test methods for inspectors and technical staff involved in the conduct of continuity testing and the assessment of results. As products tested are generally expected to exhibit long life prior to first major maintenance, and are often difficult or costly to assess once installed, it is essential that sound inspection methods are used and accurate test results are obtained before product is placed into service.

The major change in this edition is the removal of the coating film factor "F" from the voltage calculation formula.

The terms "normative" and "informative" are used in Standards to define the application of the appendices to which they apply. A "normative" appendix is an integral part of a Standard, whereas an "informative" appendix is only for information and guidance.

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Introduction

Testing of the electrical properties of a continuous protective coating on metal can be carried out by various procedures, which yield differing results not related to the durability of the coating. Measurement of current flowing under the stress of high voltages provides a measure of the ohmic or volume resistivity. Application of alternating voltage produces a current related to the dielectric constant of the coating material. Measurement of current flow when the film is wet with conducting salts will provide a value for another characteristic.

The purpose of the method specified in this document is to produce electrical breakdown in a discontinuity, which exists between the substrate and the exploring electrode, wherever the electrode passes over a “holiday”, i.e. a pinhole or defect in the coating.

Although the coatings being considered here are applied to the metal substrate in liquid form, they might not necessarily be homogeneous or isotropic in nature, which can impose limitations on the suitability of certain types of instrument for this test method. In addition, a specified delay could be needed between the application of the coating and performance of the test to ensure all solvent has been released and the coating is sufficiently cured. The geometry of the fabricated object may render this test unsuitable if the exploring electrode cannot conform to all of the surface.

The rectification of discontinuities found by the use of this method should prolong the life of a coating.

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Site testing of protective coatings

Method 1: Non-conductive coatings — Continuity testing — High voltage (brush) method

1 Scope

This document provides a practical test method for the on-site determination of the presence of voids, pinholes, holidays, cracks and other discontinuities that penetrate to the substrate, in a non-conductive, protective coating of at least 150 µm thickness (see Note) on a conductive substrate, using the high voltage or "brush" method.

NOTE Where coatings are less than 150 µm thick, an alternative method such as the low voltage wet sponge method (refer to AS 3894.2) should be used.

This document is applicable to site testing of coated metal items of equipment or structures which may be subjected to long-term burial or immersion, such as structural steel, pipelines, storage vessels, bridges and mobile/transportable containers. The method is confined to testing instruments that can provide a minimum voltage of 500 V. This document is not intended to apply to coating types incorporating pigments that conduct an electric current, such as zinc dust and aluminium flakes.

The voltages recommended in this document are intended to be applied to a dry surface under conditions of normal atmospheric pressure and temperature.

2 Application

This document is intended for use in the field (see Section 8). It may also be used in the laboratory for inspecting panels and relatively small test items.

While this document is mainly intended for use on new coatings, it can also be used to test coatings that have been in service for some time. In the latter case, it is important to bear in mind that the coating might have been penetrated by substances in contact with the coating during service which could increase its conductivity.

WARNING OWING TO THE POSSIBILITY OF THE TEST INSTRUMENTS INTERFERING WITH ELECTRICAL DEVICES SENSITIVE TO MAGNETIC AND ELECTRIC FIELDS, IT SHOULD BE ENSURED THAT OPERATORS HAVING PACEMAKERS OR OTHER BIO-ELECTRICAL DEVICES DO NOT USE THIS METHOD. REFER TO APPENDIX A FOR SAFE PRACTICES WHEN CONDUCTING HIGH VOLTAGE TESTING.

3 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.

NOTE Documents referenced for informative purposes are listed in the Bibliography.

AS 2886, *Voltage measurement — Sphere-gap method (one sphere earthed)*

AS 3894.3, *Site testing of protective coatings, Method 3: Determination of dry film thickness*

AS/NZS 1580.101.5, *Paints and related materials — Methods of test, Method 101.5: Conditions of test — temperature and humidity control*

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