AS 4435.4—2005
IEC 61952, Ed.1.0 (2002)

AS 4435.4—2005

Australian Standard™

Insulators—Composite for overhead power lines—
Voltages greater than 1000 V a.c.

Part 4: Definitions, test methods, acceptance criteria for post insulator units

STANDARDS AUSTRALIA

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Australasian Railway Association
Australian Chamber of Commerce and Industry
Australian Electrical and Electronic Manufacturers Association
Australian Porcelain Insulators Association
Electricity Engineers Association (New Zealand)
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PREFACE

This Standard was prepared by the Australian members of the Joint Standards Australia/ Standards New Zealand Committee EL-010, Overhead Lines, to supersede AS 4435.4—1997. After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian, rather than Australian/New Zealand Standard.

The objective of this Standard is to provide users and manufacturers of composite line post insulators with definitions and terms, test methods and acceptance criteria to facilitate their specification.

This Standard is one of a five-part series to cover composite insulators for overhead lines, which when complete will comprise the following:

(a) AS 4435.1, Insulators—Composite for overhead powerlines—Voltages greater than 1000 V a.c.—Definitions, test methods and acceptance criteria for string insulator units

(b) AS 4435.2, Insulators—Composite for overhead powerlines—Voltages greater than 1000 V a.c.—Standard strength classes and end fittings for string insulator units

(c) AS 4435.3, A proposed Part 3 to cover dimensional and electrical characteristics of composite insulators for overhead power lines.

(d) AS 4435.4, Insulators—Composite for overhead powerlines—Voltages greater than 1000 V a.c.—Definitions, test methods and acceptance criteria for post insulator units (this Standard)

(e) A proposed Part 5 to cover standard strength classes and end fittings for post insulator units

This Standard is identical with, and has been reproduced from IEC 61952, Ed. 1.0 (2002), *Insulators for overhead lines – Composite line post insulators for a.c. with a nominal voltage greater than1000 V*.

As this Standard is reproduced from an International Standard, the following applies:

(a) Its number does not appear on each page of text and its identity is shown only on the cover and title page.

(b) In the source text 'this international standard' should read 'this Australian Standard'.

(c) A full point should be substituted for a comma when referring to a decimal marker.

(d) Any French text or figures should be ignored.

The term 'informative' is used to define the application of the annex to which it applies. An informative annex is only for information and guidance.

CONTENTS

INTRODUCTION

Composite line post insulators consist of a cylindrical solid insulating core, bearing the mechanical load, protected by an elastomer housing, the loads being transmitted to the core by metal fittings. Despite these common features, the materials used and the construction details employed by different manufacturers may be different.

Some tests have been grouped together as "design tests" to be performed only once for insulators of the same design. Design tests are performed in order to eliminate designs and materials not suitable for high-voltage applications. The influence of time on the electrical and mechanical properties of the complete composite line post insulator and its components (core material, housing material, interfaces, etc.) has been considered in specifying the design tests in order to ensure a satisfactory lifetime under normal service conditions.

The approach for mechanical testing under bending loads used in this standard is based on the work of CIGRE. This approach uses the concept of a damage limit which is the maximum stress which can be developed in the insulator before damage begins to occur. Annex A gives some notes on the mechanical loads and tests used in this standard.

Line post insulators are often used in braced structures whose geometry varies from line to line. A combined loading test to reproduce the complex loading cases in such structures is outside the scope of this standard and it would be very difficult to specify a general test which covers the majority of geometry and loading cases. In order to give some guidance, annex B explains how to calculate the moment in the insulators resulting from combined loads. This moment can then be equated to an equivalent bending load or stress for design purposes.

Compression load tests are not specified in this standard. The mechanical loads expected from service stress acting on line post insulators are mostly combined loads, These loads will cause some deflection on the insulator. Compression loads applied on pre-deflected insulators will lead to results largely dependent on the pre-deflection. Therefore a pure compression test has little meaning since the deflection prior to the cantilever load test cannot be specified.

Pollution tests, as specified in IEC 60507, are not included in this standard, their applicability to composite line post insulators not having been proven. Such pollution tests performed on insulators made of non-ceramic materials do not correlate with experience obtained from service. Specific pollution tests for non-ceramic insulators are under consideration.

The tracking and erosion test given in this standard is based on the test specified in IEC 61109. However, when this standard was drafted, it had been decided to study the possibility of preparing a general standard on tracking, erosion and ageing tests for all types of composite insulators. The prescriptions concerning the 1 000 h and alternative tests for severe environmental conditions are therefore given as a temporary measure until such time as the general standard is issued by the IEC.

For insulators intended for use in severe environmental conditions, a supplementary multi-stress ageing test may be considered (such as the 5 000 h ageing test in annex C of IEC 61109). However CIGRE and IEC are currently studying the representativity, repeatability and reproducibility of ageing tests and will issue guidance in the future. In the meantime, it is recommended that particular care be taken when specifying the type and parameters of such tests.

It has not been considered useful to specify a power arc test as a mandatory test. The test parameters are manifold and can have very different values depending on the configurations of the network and the supports and on the design of arc-protection devices. The heating effect of power arcs should be considered in the design of metal fittings. Critical damage to the metal fittings, resulting from the magnitude and duration of the short-circuit current can be avoided by properly designed arc-protection devices. This standard, however, does not

exclude the possibility of a power arc test if agreed between the user and manufacturer. IEC 61467 gives details of a.c. power arc testing of insulator sets.

Radio interference and corona tests are not specified in this standard since the RIV and corona performance are not characteristics of the insulator alone.

Composite, hollow core, line post insulators are currently not dealt with in this standard. IEC 61462 gives details of tests on hollow core, composite insulators, many of which can be applied to such line post insulators.

Torsion loads are not dealt with in this standard since they are usually negligible in the configuration in which line post insulators are generally used. Specific applications where high torsion loads can occur are outside the scope of this standard.

NOTES

STANDARDS AUSTRALIA

Australian Standard

Insulators—Composite for overhead power lines—Voltages greater than 1000 V a.c. Part 4: Definitions, test methods, acceptance criteria for post insulator units

1 Scope and object

This International Standard applies to composite line post insulators consisting of a load-bearing, cylindrical, insulating solid core made up of fibres – usually glass – in a resin-based matrix, a housing (outside the insulating core) made of elastomer material (e.g. silicone or ethylene-propylene) and end fittings permanently attached to the insulating core.

Composite line post insulators covered by this standard are subjected to cantilever, tensile and compressive loads, when supporting the line conductors.

They are intended for use on a.c. overhead lines with a rated voltage greater than 1 000 V and a frequency not greater than 100 Hz.

The object of this standard is to

– define the terms used,

– prescribe test methods,

– prescribe acceptance or failure criteria.

This standard does not include requirements dealing with the choice of insulators for specific operating conditions.

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.

References to international standards that are struck through in this clause are replaced by references to Australian or Australian/New Zealand Standards that are listed immediately thereafter and identified by shading. Any Australian or Australian/New Zealand Standard that is identical to the International Standard it replaces is identified as such.

~~IEC 60060-1:1989, *High-voltage test techniques – Part 1: General definitions and test requirements*~~

AS 1931.1, *High-voltage test techniques—General definitions and test requirements*

~~IEC 60383-1:1993, *Insulators for overhead lines with a nominal voltage above 1 000 V – Part 1: Ceramic or glass insulator units for a.c. systems – Definitions, test methods and acceptance criteria*~~

AS/NZS 2947.1, *Insulators—Porcelain and glass for overhead power lines—Voltages greater than 1000 V a.c.—Test methods—Insulator units*