Australian Standard®

VOLTAGE MEASUREMENT—SPHERE-GAP METHOD (ONE SPHERE EARTHED)

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Australian Electrical and Electronic Manufacturers Association

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PREFACE

This standard was prepared by the Association's Committee on Power Switchgear to supersede AS C329—1961, Method for the Measurement of Voltage with Sphere-gaps (One Sphere Earthed), an endorsement of BS 358:1960.

This standard has been reproduced from IEC 52 (1960) and except for an amended title, a correction to the second equation in Clause 5.3.2 and a correction to the disruptive discharge voltage value in Table I for a 50 cm sphere diameter with 38 cm gap spacing, it is identical with IEC 52 (1960). Thus it has a different format from that of AS C329—1961.

This standard specifies requirements for the sphere-gaps and their use for the measurement of peak alternating voltages, direct voltages, standard lightning impulse voltages and lightning impulse voltages with longer tails.

Sphere-gaps have also been used to measure switching impulse voltages and it is anticipated that, following a study by CIGRE, some amendments will be made to IEC 52 and to this standard to cover the measurement of switching impulse voltages.

IEC 52(1960) was prepared by the International Electrotechnical Commission's Technical Committee IEC TC 42, High-voltage Testing Techniques, has been approved by the majority of National Committees and has achieved worldwide acceptance as a truly international standard for voltage measurement.

For the purpose of this standard, the reference to IEC publications should be replaced by reference to Australian Standards, as follows:

Reference to IEC Publication	*Appropriate Australian Standard*
IEC 60: High voltage test techniques	AS 1931 High Voltage Testing Techniques Part 1— General Definitions, Test Procedures and Measuring Devices

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard for VOLTAGE MEASUREMENT—SPHERE-GAP METHOD (ONE SPHERE EARTHED)

1. SCOPE AND OBJECT

These recommendations concern the construction and use of sphere-gaps for voltage measurement. The rules apply to the measurement of the peak value of:

a) alternating voltages

b) full standard impulses as defined in I.E.C. Publication 60 and impulses with longer tails

c) direct voltages.

The peak values of the disruptive voltages in air for various spacings between the spheres are given in two tables.

Appendix A gives the limits of voltage and frequency over which the tables have been derived from experiments and can be presumed to be accurate within the tolerances specified in Clause 5.2.

Appendix B gives the procedure by which the values in the tables have been derived from previous National Standards and other sources.

2. STANDARD SPHERE-GAP

The standard sphere-gap is a peak voltage measuring device constructed and arranged in accordance with the rules in this document. It consists of two metal spheres of the same diameter (D) with their shanks, operating gear, insulating supports, supporting frame and leads for connection to the point at which the voltage is to be measured. Standard values of D are 2 - 5 - 6.25 - 10 - 12.5 - 15 - 25 - 50 - 75 - 100 - 150 and 200 cm. The spacing between the spheres is designated S.

The points on the two spheres which are closest to each other are called the sparking points. In practice the disruptive discharge may occur between other neighbouring points.

Figures 1 and 2 show two arrangements, one of which is typical of sphere-gaps with a vertical axis and the other of sphere-gaps with a horizontal axis.

2.1 **Requirements for the spheres**

2.1.1 *Tolerances on size and shape*

The spheres shall be carefully made so that their surfaces are smooth and their curvature is as uniform as possible.

The requirements on their shapes are as follows:

General Shape

The diameter of each sphere shall nowhere differ by more than 2 % from the nominal value.