AS 2374.3.1—1992
IEC 76-3-1:1987

Australian Standard®

Power transformers

Part 3.1: Insulation levels and dielectric test—External clearances in air

This Australian Standard was prepared by Committee EL/8, Power Transformers. It was approved on behalf of the Council of Standards Australia on 3 June 1992 and published on 14 September 1992.

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Australian Electrical and Electronic Manufacturers Association
Confederation of Australian Industry
Electrical testing laboratories
Electricity Supply Association of Australia
Electricity Supply Engineers Association of New South Wales
Institute of Technology, S.A.
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PREFACE

This Standard was prepared by the Standards Australia Committee on Power Transformers. It is identical with and has been reproduced from IEC 76-3-1: 1987, *Power transformers*, Part 3.1, *Insulation levels and dielectric tests, External clearances in air*. Variations to the IEC publication required to suit Australian conditions are indicated by marginal bars and detailed in Australian Appendix A.

This Standard is the second part of AS 2374.3.0, *Power transformers*, Part 3.0: *Insulation levels and dielectric tests* which together form part of AS 2374 series of Standards on power transformers.

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In Clause 3.3.2 and Note to Clause 3.3.3 of this Standard, references to Clause 14 of IEC 76-3:1982 should be replaced by references to Clause 15 of AS 2374.3.0—1982.

For the purposes of this Australian Standard, the IEC text should be modified as follows:

(i) *Clauses, Tables and Figure* In accordance with Australian Appendix A.

(ii) *References* Replace references to other International Standards by reference to Australian Standards as follows:

Reference to International Standard		*Australian Standard*	
IEC		AS	
60	High-voltage test techniques	1931	High voltage testing techniques
60-2	Part 2: Test procedures	1931.1	Part 1: General definitions, test requirements, test procedures and measuring devices
71	Insulation co-ordination	1824	Insulation coordination (phase-to-earth and phase-to-phase, above 1 kV)
71-1	Part 1: Terms, definitions, principles and rules	1824.1	Part 1: Basic principles, standard insulation levels and test procedures
71-3	Part 3: Phase-to-phase insulation co-ordination. Principles, rules and application guide	1824.2	Part 2: Application guide
76	Power transformers	2374	Power transformers
76-3	Part 3: Insulation levels and dielectric tests	2374.3.0	Part 3.0: Insulation levels and dielectric tests
137	Bushings for alternating voltages above 1000 V	1265	Bushings for alternating voltages above 1000 V

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1. Introduction

This standard specifies clearances in air between live parts of bushings on oil-immersed power transformers and to objects at earth potential.

Clearances in air are understood to mean, in this standard, distances where the electrostatic field is free from disturbance by insulator bodies. The standard does not deal with the requirements of effective flashover distance or creepage distance along the bushing insulators nor does it consider the risk from intrusion of birds or animals.

The insulation levels and dielectric tests which are specified in IEC Publication 76-3: Power Transformers, Part 3: Insulation Levels and Dielectric Tests, apply, for oil-immersed transformers, to the internal insulation only (see beginning of Clause 2 of that publication).

It is reasonable that the rated withstand voltage values which are specified for the internal insulation of the transformer should also be taken as a reference for its external insulation. This may, however, not be true in all cases. A failure of the non-self-restoring internal insulation is catastrophic and normally leads to the transformer being out of service for a long period, while an external flashover may involve only a short interruption of service without causing lasting damage. Therefore it may be that, for increased safety, higher test voltages are specified by the user for the internal insulation of the transformer than for the external insulation of other components in the system. If such a distinction is made, the external clearances on the transformer should be referred instead to those specified for external insulation withstand voltages.

When establishing the requirements of the present standard in the higher voltage ranges, it has been recognized that the bushing ends normally have a rounded electrode shape. The clearance requirements are valid between such rounded electrodes. It is assumed that conductor clamps with their associated shield electrodes are suitably shaped so that they do not reduce the flashover voltage. It is also assumed that the arrangement of incoming conductors does not reduce the effective clearances provided by the transformer itself.

Note.— If the user intends to make his connection in a particular way which is likely to reduce the effective clearances, this should be mentioned in the enquiry.

In general, the provision of adequate clearances in air becomes technically difficult mainly at high system voltages, particularly for relatively small units, or when the installation space is restricted. The principle followed in the recommendations of this standard is to provide ample, non-critical clearances which are satisfactory without further discussion or proof under various system conditions and in different climates. Where extensive previous experience has indicated that smaller clearances are adequate, there is obviously no need to change.