

Australian/New Zealand Standard™

Conduits and fittings for electrical installations

Part 1: General requirements



s t a n d a r d s Australia



AS/NZS 2053.1:2001

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STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

RECONFIRMATION

OF

AS/NZS 2053.1:2001

**Conduits and fittings for electrical installations
Part 1: General requirements**

RECONFIRMATION NOTICE

Technical Committee EL-004 has reviewed the content of this publication and in accordance with Standards Australia procedures for reconfirmation, it has been determined that the publication is still valid and does not require change.

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NOTES

Australian/New Zealand Standard™

Conduits and fittings for electrical installations

Part 1: General requirements

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-004, Electrical Accessories to supersede AS/NZS 2053.1:1995, *Conduits and fittings for electrical installations Part 1: General requirements*, upon publication.

The objective of this Standard is to provide manufacturers, regulators, test laboratories and users with general requirements for conduits and fittings.

This Standard is Part 1 of the following series:

AS/NZS

2053	Conduits and fittings for electrical installations
2053.1	Part 1: General requirements (this Standard)
2053.2	Part 2: Rigid plain conduits and fittings of insulating material
2053.3	Part 3: Rigid plain conduits and fittings of fibre-reinforced concrete material
2053.4	Part 4: Flexible plain conduits and fittings of insulating material
2053.5	Part 5: Corrugated conduits and fittings of insulating material
2053.6	Part 6: Profile-wall, smooth-bore conduits and fittings of insulating material
2053.7	Part 7: Rigid metal conduits and fittings
2053.8	Part 8: Flexible conduits and fittings of metal or composite material

This Standard was revised to introduce the following changes:

- (a) Revision of the requirements for the protection of conduits and fittings.
- (b) Clarification of dimensional requirements.
- (c) Electromagnetic compatibility.
- (d) Revision of the test of resistance to impact.
- (e) Revision of the test of ignitability and flame propagation.
- (f) Revision of the test of level of protection of steel conduits and fittings against corrosive or polluting substances.
- (g) Miscellaneous editorial changes.

Appendices designated as normative are essential to the understanding or implementation of this Standard.

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STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard
Conduits and fittings for electrical installations**Part 1: General requirements****1 SCOPE AND REFERENCED DOCUMENTS****1.1 Scope**

This Standard specifies general requirements for both metallic and non-metallic conduits and fittings used to protect cables in electrical installations. Mechanical properties, electrical characteristics and material requirements are covered.

1.2 Referenced documents

The following documents are referred to in this Standard:

AS

1660 Test methods for electrical cables, cords and conductors

1660.5.3 Part 5.3: Determination of the amount of halogen acid gas evolved during the combustion of polymeric materials taken from cables

1939 Degrees of protection provided by enclosures for electrical equipment (IP Code)

AS/NZS

4695 Fire hazard testing of electrotechnical products

4695.2.41 Part 2.41: Test methods—1 kW nominal premixed test flame and guidance

2 DEFINITIONS

For the purpose of this Standard, the following definitions apply.

2.1 Composite conduits and fittings

Conduits and fittings which consist of both conductive and insulating materials.

2.2 Conduit fittings

Devices designed to join or terminate one or more lengths of conduit. Conduit fittings include couplers, elbows, bends, junction boxes and tees.

2.3 Conduits

Parts of a closed wiring system enclosing cables in an electrical installation, which allow the cables to be drawn in or replaced. Conduits may have a circular or non-circular cross-section.

2.4 Corrugated conduits

Conduits having profiles which are corrugated in the longitudinal section, either on their outer surfaces or their inner surfaces, or both.

2.5 External influences

The presence of water, oil, building materials, mechanical stress, low or high temperatures, corrosive or polluting substances, or solar radiation.

2.6 Flexible conduits

Pliable conduits which are suitable for continuous flexing throughout their lives.

2.7 Halogen-free conduits and fittings

Conduits and fittings which, on combustion, produce low levels of hydrogenhalide-acid gas emission.

NOTE: Halogen-free should not be taken to mean harmless or pollution-free as there may be other fire effluents.

2.8 Inspection fittings

Conduit fittings provided with a removable cover, or the like, designed to provide access to and withdrawal of electric cables.

2.9 Insulating conduits and fittings

Conduits and fittings that consist of insulating material only and which have no conductive components whatever, either in the form of an internal lining or in the form of an external braid or coating.

2.10 May

Indicates the existence of an option.

2.11 Metal conduits and fittings

Conduits and fittings which consist of metal only.

2.12 Non-flame propagating conduits and fittings

Conduits and fittings which may or may not ignite as a result of an applied flame and which do not propagate the flame.

2.13 Non-threadable conduits and fittings

Conduits and fittings suitable for connection by means other than screw threads.

2.14 Plain conduits

Conduits having profiles which are even in the longitudinal section.

2.15 Pliable conduits

Conduits which can be bent by hand using a reasonable force but without other assistance.

2.16 Profile-wall, smooth-bore conduits

Conduits which have a smooth bore and a profile wall (which may be hollow) and which are not normally bent.

2.17 Rigid conduit

Conduits which are normally bent with the help of a mechanical aid and with or without special treatment.

2.18 Self-recovering conduits

Pliable conduits which deform when transverse forces are applied for a short time and which, after removal of the force, return to their original shape after a further short time.

2.19 Shall

Indicates that a statement is mandatory.

2.20 Should

Indicates a recommendation.

2.21 Test pieces

Conduits or fittings, or both, of the length and form required for a particular test.

2.22 Threadable conduits and fittings

Plain conduits and fittings having screw threads or which may have screw threads manually cut.

3 GENERAL REQUIREMENTS

Conduits and fittings shall be designed and constructed to provide reliable mechanical protection of the cables which they enclose.

If applicable, conduits and fittings shall provide adequate electrical protection.

Conduits and fittings shall withstand the stresses likely to occur as a result of both recommended installation practices and normal use.

Compliance shall be checked by carrying out all the relevant tests.

4 GENERAL NOTES ON TESTS

WARNING: SOME OF THE TESTS PRESCRIBED BY THIS STANDARD MAY LEAD TO THE EMISSION OF TOXIC OR HAZARDOUS SUBSTANCES. PRECAUTIONS SHALL BE TAKEN TO PROTECT PERSONNEL PERFORMING THE TESTS.

4.1 Type of tests

Tests in accordance with this Standard shall be type tests. Tests on insulating conduits and fittings shall not be commenced sooner than 10 days after manufacture.

4.2 Ambient temperature

The tests shall be carried out at an ambient temperature of $20^{\circ}\pm 5^{\circ}\text{C}$, unless otherwise specified in a particular test.

4.3 Number of test pieces

Each test shall be carried out on three test pieces that have not been previously tested or installed, unless otherwise specified in a particular test.

4.4 Length of conduit test pieces

The total length of conduit and the length of each test piece shall be as specified in the relevant part of this Standard.

4.5 As delivered

Unless otherwise specified in a particular test—

- (a) conduit test pieces shall be taken from conduits as delivered; and
- (b) fittings for testing shall be as delivered.

4.6 Compliance

Unless otherwise specified in a particular test, conduits and fittings shall be deemed not to comply with this Standard if there are more failures than that of one test piece in any one of the tests.

If one test piece fails in a test, that test and those preceding it which may influence the result of the test, shall be repeated on another set of test pieces as specified in Clause 4.3. All of the second set of test pieces shall pass the repeated tests.

NOTE: The applicant, when submitting the first set of test pieces, may also submit an additional set of test pieces or lengths of conduit, which may be needed should one test piece fail. The testing station may then, without further request, test the additional set of test pieces and will reject the conduit or fitting only if a further failure occurs.

If additional lengths of conduit or additional fittings are not submitted, a failure of one test piece will result in rejection of the conduit or fitting.

5 CLASSIFICATION

All conduits and fittings shall be classified in accordance with Clauses 5.1 to 5.7 and 5.8.5. Additional classifications may be required for a particular type of conduit or fitting. Classifications 5.8.1 to 5.8.4 and 5.8.6 may be provided.

5.1 According to material—

- (a) metal;
- (b) insulating;
- (c) composite; or
- (d) fibre-reinforced concrete.

5.2 According to method of connection, either—

- (a) threadable; or
- (b) non-threadable.

5.3 According to mechanical properties, suitable for—

- (a) very light mechanical stresses;
- (b) light mechanical stresses;
- (c) medium mechanical stresses;
- (d) heavy mechanical stresses; or
- (e) very heavy mechanical stresses.

5.4 According to suitability for bending—

- (a) rigid conduits;
- (b) pliable conduits;
- (c) self-recovering conduits; or
- (d) flexible conduits.

5.5 According to temperature—

Conduits and fittings may be classified in accordance with the maximum and minimum permanent service temperatures specified by the manufacturer.

5.6 According to resistance to flame propagation, either—

- (a) non-flame propagating; or
- (b) flame propagating.

5.7 According to electrical characteristics—

- (a) with electrical continuity;
- (b) without electrical continuity;
- (c) with electrical insulating characteristics; or
- (d) without electrical insulating characteristics.

5.8 According to protection against external influences

Conduits and fittings may be classified according to their protection against external influences in accordance with Clauses 5.8.1 to 5.8.4 and 5.8.6. Conduits and fittings shall be classified according to protection against moisture according to 5.8.5.

5.8.1 *Protection against the ingress of water*

Conduits and fittings may be classified according to their protection against the ingress of water in accordance with AS 1939.

5.8.2 *Protection against the ingress of foreign objects*

Conduits and fittings may be classified according to their protection against the ingress of foreign objects in accordance with AS 1939.

5.8.3 *Protection against corrosive or polluting substances*

Conduits and fittings may be classified according to their protection against corrosive and polluting substances in accordance with Clauses 5.8.3.1 and 5.8.3.2.

5.8.3.1 *Conduits and fittings with the same protection on the outside and inside*

Conduits and fittings may be classified as having—

- (a) medium protection; or
- (b) high protection.

5.8.3.2 *Conduits and fittings with greater protection on the outside than on the inside*

Conduits and fittings may be classified as having—

- (a) medium protection outside and no protection inside;
- (b) high protection outside and no protection inside; or
- (c) high protection outside and medium protection inside.

5.8.4 *Protection against solar radiation*

Conduits and fittings may be classified as being—

- (a) without protection against solar radiation; or
- (b) with protection against solar radiation.

5.8.5 *Protection against moisture*

Conduits and fittings may be classified according to their protection against moisture as either—

- (a) hygroscopic; or
- (b) non-hygroscopic.

5.8.6 *Acid-gas emission properties*

Conduits and fittings may be classified according to their acid-gas emission properties as either—

- (a) halogen-free; or
- (b) non-halogen-free.

6 MARKING

6.1 Information to be marked on conduits

Conduits shall be marked with—

- (a) the name of the manufacturer or responsible vendor, or a trademark, or other identifying symbol;
- (b) the nominal size;
- (c) the word 'ELECTRICAL';
- (d) one of the following as appropriate—
 - (i) 'VERY LIGHT DUTY' or 'VLD';
 - (ii) 'LIGHT DUTY' or 'LD';
 - (iii) 'MEDIUM DUTY' or 'MD';
 - (iv) 'HEAVY DUTY' or 'HD';
 - (v) 'VERY HEAVY DUTY' or 'VHD'.
- (e) the word 'HALOGEN-FREE' or 'HF', if appropriate;
- (f) the letter 'T', indicating protection against solar radiation, if appropriate; and
- (g) the minimum and maximum service temperatures as specified by the manufacturer, in degrees Celsius, in the form '5/60'.

6.2 Location of conduit marking

Marking of conduits shall be repeated at regular intervals preferably of 1 m but no greater than 3 m.

Rigid conduits shall be marked at least once on each manufacturing length, preferably 50 mm from one end.

6.3 Information to be marked on fittings

Fittings shall be marked with—

- (a) the name of the manufacturer or responsible vendor, or a trademark, or other identifying symbol;
- (b) the size of conduit for which the fitting is intended or, alternatively, a catalogue number providing easy identification of the conduit size; and
- (c) one of the following as appropriate—
 - (i) 'VERY LIGHT DUTY' or 'VLD';
 - (ii) 'LIGHT DUTY' or 'LD';
 - (iii) 'MEDIUM DUTY' or 'MD';
 - (iv) 'HEAVY DUTY' or 'HD';
 - (v) 'VERY HEAVY DUTY' or 'VHD'.

NOTE: Manufacturers making a statement of compliance with this Australian/New Zealand Standard on a product, packaging, or promotional material related to that product are advised to ensure that such compliance is capable of being verified.

6.4 Method of marking

Marking shall be durable and easily legible. Marking shall be checked by inspection and by rubbing the marking by hand.