

Australian/New Zealand Standard™

Powertrack systems

Part 1: General requirements (IEC 61534-1, Ed. 1 (2003) MOD)



AS/NZS 61534.1:2008

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee EL-004, Electrical Accessories. It was approved on behalf of the Council of Standards Australia on 28 December 2007 and on behalf of the Council of Standards New Zealand on 18 January 2008.
This Standard was published on 12 March 2008.

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This Standard was issued in draft form for comment as DR 07414.

Australian/New Zealand Standard™

Powertrack systems

Part 1: General requirements (IEC 61534-1, Ed. 1 (2003) MOD)

First published as AS/NZS 61534.1:2008.

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Jointly published by Standards Australia, GPO Box 476, Sydney, NSW 2001 and Standards New Zealand, Private Bag 2439, Wellington 6020

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-004, Electrical Accessories.

The objective of this Standard is to provide designers, manufacturers, importers, test laboratories and users with requirements for powertrack systems.

This Standard is an adoption with national modifications and has been reproduced from IEC 61534-1, Ed.1 (2003), *Powertrack systems – Part 1: General requirements*, and has been varied as indicated to take account of Australian/New Zealand conditions.

Variations to IEC 61534-1, Ed.1 (2003) are indicated at the appropriate places throughout this Standard. Strikethrough (~~example~~) identifies IEC text, tables and figures which, for the purposes of this Australian/New Zealand Standard, are deleted. Where text, tables or figures are added, each is set in its proper place and identified by shading (example). Added figures are not themselves shaded, but are identified by a shaded border.

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INTRODUCTION

Particular requirements for specific types of powertrack systems will be specified in the relevant Parts 2 of IEC 61534, which are still under consideration.

For a specific type of powertrack system, Part 1 is to be considered, together with the appropriate particular requirements, which will supplement or modify some of the corresponding clauses in Part 1 to provide the complete requirements for each type of system. Where no such Part 2 exists, then Part 1 applies.

NOTES

STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard

Powertrack systems
Part 1: General requirements
(IEC 61534-1, Ed. 1 (2003) MOD)

Any table, figure or text of the international standard that is struck through is not part of this standard. Any Australian/New Zealand table, figure or text that is added is part of this standard and is identified by shading.

1 Scope

1.1 This part of IEC 61534 specifies general requirements and tests for powertrack (PT) systems with a rated voltage not exceeding 277 V a.c. single phase, or 480 V a.c. two or three phase 50 Hz/60 Hz, with a rated current not exceeding 63 A. These systems are used for distributing electricity in household, commercial and industrial premises.

NOTE The extension of the scope to cover d.c. and communication systems is under consideration.

1.2 Powertrack systems, according to this standard, are intended for use under the following conditions:

- an ambient temperature in the range -5°C to $+40^{\circ}\text{C}$, the average value over a 24 h period not exceeding 35°C ;
- a situation not subject to a source of heat likely to raise temperatures above the limits specified above;
- an altitude not exceeding 2 000 m above sea level;
- an atmosphere not subject to excessive pollution by smoke, chemical fumes, prolonged periods of high humidity or other abnormal conditions.

In locations where special conditions prevail, as in ships, vehicles and the like and in hazardous locations, for instance, where explosions are liable to occur, special constructions may be necessary.

This standard does not apply to:

- cable trunking systems and cable ducting systems covered by IEC 61084 [8] ¹⁾
- busbar trunking systems covered by IEC 60439-2 [5]
- electrical supply track systems for luminaires covered by IEC 60570 [6]

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

¹⁾ Figures in square brackets refer to the bibliography.

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 60038:1983, IEC standard voltages~~ ²⁾

AS 60038, Standard voltages

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

AS 1931.1, High-voltage test techniques, Part 1: General definitions and test requirements

~~IEC 60068-2-75, Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests~~

AS 60068.2.75, Environmental testing, Part 2.75: Tests—Test Eh: Hammer tests

~~IEC 60112:2003, Method for the determination of the proof and the comparative tracking indices of solid insulating materials~~

AS/NZS 60112, Method for the determination of the proof and the comparative tracking indices of solid insulating materials

IEC 60127-1:1998, Miniature fuses – Part 1: Definitions for miniature fuses and general requirements for miniature fuse-links ³⁾

~~IEC 60269-1:1998, Low-voltage fuses – Part 1: General requirements~~

AS 60269.1, Low-voltage fuses, Part 1: General requirements

IEC 60417-DB:2002 ⁴⁾, Graphical symbols for use on equipment – Part 1: Overview and application

~~IEC 60529:1989, Degrees of protection provided by enclosures (IP code)~~ ⁵⁾

AS 60529, Degrees of protection provided by enclosures (IP Code)

~~IEC 60695-2-11:2000, Fire hazard testing – Part 2-11: Glowing/hot wire based test methods—Glow-wire flammability test methods for end-products~~

AS/NZS 60695.2.11, Fire hazard testing, Part 2.11: Glowing/hot wire based test methods—Glow-wire flammability test method for end-products

IEC 60695-2-4/1:1991, Fire hazard testing – Part 2: Test methods – Section 4/Sheet 1: 1 kW nominal pre-mixed test flame and guidance
Amendment 1 (1994)

~~IEC 60695-10-2:1995, Fire hazard testing – Part 10-2: Guidance and test methods for the minimization of the effects of abnormal heat on electrotechnical products involved in fires.~~

2) There exists a consolidated edition (6.2), including IEC 60038(1983) and its Amendments 1 (1994) and 2 (1997).

3) There exists a consolidated edition (1.1) including IEC 60127-1 (1988) and its Amendment 1 (1999).

4) DB refers to the on-line IEC database.

5) There exists a consolidated edition (2.1) including IEC 60529 (1989) and its Amendment 1 (1999).

~~Method for testing products made from non-metallic materials for resistance to heat using the ball pressure test⁶⁾~~

AS/NZS 60695.10.2, *Fire hazard testing, Part 10.2: Abnormal heat—Ball pressure test*

IEC 60760:1989, *Flat, quick-connect terminations*
Amendment 1 (1993)

~~IEC 60884-1:2002, *Plugs and socket-outlets for household and similar purposes—Part 1: General requirements*~~

AS/NZS 3112, *Approval and test specification—Plugs and socket-outlets*

IEC 60998-1:2002, *Connecting devices for low voltage circuits for household and similar purposes – Part 1: General requirements*

IEC 60998-2-3:2002, *Connecting devices for low voltage circuits for household and similar purposes – Part 2-3: Particular requirements for connecting devices as separate entities with insulation-piercing clamping units*

IEC 60999-1:1999, *Connecting devices – Electrical copper conductors – Safety requirements for screw-type and screwless-type clamping units – Part 1: General requirements and particular requirements for clamping units for conductors from 0,2 mm² up to 35 mm² (included)*

IEC 60999-2:1995, *Connecting devices - Safety requirements for screw-type and screwless-type clamping units for electrical copper conductors – Part 2: Particular requirements for conductors from 35 mm² up to 300 mm²*

IEC 61032:1997, *Protection of persons and equipment by enclosures – Probes for verification*

~~IEC 61210:1993, *Connecting devices – Flat quick-connect terminations for electrical copper conductors – Safety requirements*~~

AS/NZS 61210, *Connecting devices—Flat quick-connect terminations for electrical copper conductors—Safety requirements (IEC 61210:1993, MOD)*

ISO 1456:2003, *Metallic coatings – Electrodeposited coatings of nickel plus chromium and of copper plus nickel plus chromium*

ISO 2081:1986, *Metallic coatings – Electroplated coatings of zinc on iron or steel*

ISO 2093:1986, *Electroplated coatings of tin – Specification and test methods*

AS/NZS 2053.1, *Conduits and fittings for electrical installations, Part 1: General requirements*

AS/NZS 3000, *Electrical installations (known as the Australian/New Zealand Wiring Rules)*

AS/NZS 60335.1, *Household and similar electrical appliances—Safety, Part 1: General requirements (IEC 60335-1 Ed 4.2, MOD)*

6) There exists a consolidated edition (1.1) including IEC 60695-2-10 (1995) and its Amendment 1 (2001).

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

powertrack system (PT system)

assembly of system components including a powertrack by which accessories may be connected to an electrical supply at one or more points (pre-determined or otherwise) along the powertrack

3.2

system component

part specifically designed for the PT system which may or may not incorporate an accessory

3.3

powertrack

system component which is a generally linear assembly of spaced and supported busbars providing electrical connection of accessories

NOTE A powertrack may also provide mechanical support for accessories.

3.4

busbar

main current-carrying conductor(s) to which, for example, one or more tap-off units, accessories or electrical system components may be connected

3.5

accessory

electrical device complying with its own standard and associated with or incorporated in the PT system

3.6

rewireable accessory

accessory so constructed that a cable can be fitted or replaced using a tool

3.7

non-rewirable system component

system component so constructed that it forms a complete unit with the cable after connection and assembly by the manufacturer of the system component

3.8

connector

device which provides the electrical connection and possibly the mechanical connection of powertracks

3.9

supply connector

device enabling the supply wiring to be connected to the powertrack

3.10

live parts

conductor or conductive part intended to be energized in normal operation, including a neutral conductor, but by convention not a PEN conductor

[IEV 195-02-19, modified] [2]

3.11**rated voltage, rated current**

value assigned to a PT system by the manufacturer and to which operation and performance characteristics are referred

3.12**clamping unit**

part(s) of a terminal necessary for the mechanical clamping and the electrical connection of the conductor(s) including the parts which are necessary to ensure the correct contact pressure

3.13**termination**

part of a PT system to which a conductor(s) is attached providing a non-reusable connection

3.14**terminal**

part of the PT system composed of one or more clamping unit(s) to which a conductor(s) is attached providing a reusable connection

3.15**insulation piercing connecting device (IPCD)**

connecting device for the connection and possible disconnection of one conductor or the interconnection of two or more conductors, the connection being made by piercing, boring through, cutting through, removing, displacing or making ineffective in some other manner the insulation of the conductor(s) without previous stripping

NOTE The removal of the sheath of the cable, if necessary, is not considered as a previous stripping.

3.16**flat quick-connect termination**

electrical connection consisting of a male tab and a female connector which can be inserted and withdrawn with or without the use of a tool

3.17**plug**

accessory intended for connection to a flexible cable intended for frequent manual engagement with a socket outlet

3.18**socket-outlet**

accessory having a set of contacts designed to engage with the pins of a corresponding plug and which may have terminals or terminations for the connection of conductors

NOTE: AS/NZS 3000 contains requirements for switching devices to be used in Australian and New Zealand electrical installations.

3.19**fuse-link**

part of the fuse including the fuse-element(s) and intended to be replaced after the fuse has operated

3.20**type test**

test of one or more PT systems made to a certain design to show that the design meets certain specifications

[IEV 151-16-16, modified] [1]

3.21**routine test**

test to which each PT system is subjected during or after manufacture to ascertain whether it complies with the relevant requirements of this standard

[IEV 151-16-17, modified]

NOTE Routine tests are specified in Annex G.

3.22**dummy track**

device for maintaining visual appearance and mechanical integrity which may be with or without current-carrying parts

3.23**tap-off unit**

system component intended for infrequent manual engagement with the busbars directly or indirectly via a tap-off outlet

3.24**tap-off outlet**

aperture into which the tap-off unit engages

3.25**clearance**

shortest distance in air between two conductive parts

3.26**creepage distance**

shortest distance along the surface of the insulating material between two conductive parts

[IEV 151-15-50]

3.27**overvoltage**

voltage having a peak value exceeding the corresponding peak value of maximum steady-state voltage at normal operating conditions

3.28**transient overvoltage**

short duration overvoltage of a few milliseconds or less, oscillatory or non-oscillatory, usually highly damped

[IEV 604-03-13]

3.29**overvoltage category**

numeral defining a transient overvoltage condition

3.30**rated impulse withstand voltage**

highest peak value of impulse voltage of prescribed form and polarity assigned by the manufacturer and which does not cause breakdown of insulation under specified conditions

3.31**rated insulation voltage**

r.m.s. withstand voltage value assigned by the manufacturer to the PT system or to a part of it, characterising the specified (long term) withstand capability of its insulation

NOTE The rated insulation voltage is not necessarily equal to the rated voltage of the PT system which is primarily related to functional performance.

3.32**basic protection**

protection against electric shock under fault-free conditions

[IEV 195-06-01]

3.33**fault protection**

protection against electric shock under single fault conditions (for example, failure of basic insulation)

[IEV 195-06-02, modified]

3.34**functional insulation**

insulation between live parts which is necessary only for the proper functioning of the PT system

[IEV 195-02-41, modified]

3.35**basic insulation**

insulation of live parts which provides basic protection against electric shock

[IEV 195-06-06, modified]

3.36**supplementary insulation**

independent insulation applied as fault protection in addition to basic insulation in order to provide protection against electric shock in the event of a failure of basic insulation (fault protection)

[IEV 195-06-07, modified]

3.37**double insulation**

insulation comprising both basic insulation and supplementary insulation

[IEV 195-06-08, modified]

3.38**reinforced insulation**

insulation of live parts which provides a degree of protection against electric shock equivalent to double insulation

[IEV 195-06-09, modified]

3.39**solid insulation**

insulation material interposed between two conductive parts

3.40**pollution**

addition of foreign matter, solid, liquid, or gaseous, that can result in a reduction of electric surface resistivity

3.41**pollution degree**

numeral characterising the expected pollution of the micro-environment

3.42**micro-environment**

immediate environment of the insulation which particularly influences the dimensioning of creepage distances

3.43**macro-environment**

environment of the room or other location in which the equipment is installed or used

3.44**ordinary person**

person who is neither a skilled person nor an instructed person

[IEV 195-04-03]

3.45**(electrically) skilled person**

person with relevant education and experience to enable him or her to avoid dangers and to prevent risks which electricity may create

[IEV 195-04-01, modified]

3.46**(electrically) instructed person**

person adequately advised or supervised by skilled persons to enable him or her to avoid dangers and to prevent risks which electricity may create

[IEV 195-04-02, modified]

3.47**entry membrane**

component or an integral part of a PT system used to protect the cable and which may be used to support the cable, conduit or ducting or trunking at the point of entry

NOTE It may also provide ingress protection.

3.48**special purpose tool**

tool which is unlikely to be readily available in a normal household, for example, a key for a three-angle headed screw

3.49**stress corrosion cracking**

spontaneous failure of metals by cracking under the combined action of corrosion and residual or applied tensile stress

3.50**residual tensile stress**

tensile stress that remains within a body as a result of plastic deformation

3.51**applied tensile stress**

tensile stress that is set up and exists in a body during application of an external load

3.52**exposed-conductive-parts**

conductive part of equipment which can be touched and which is not normally live, but which can become live when basic insulation fails

[IEV 195-06-10]

NOTE A conductive part of electrical equipment which can only become live through contact with an exposed-conductive-part which has become live is not considered to be an exposed-conductive-part itself.

3.53 hazardous-live-part

live part which, under certain conditions, can give a harmful electric shock

[IEV 195-06-05]

4 General requirements

4.1 PT systems shall be so designed and constructed that in normal use their performance is reliable and without unreasonable hazard to the user or the surroundings when installed in accordance with manufacturer's instructions.

4.2 Compliance is checked by all relevant tests according to this standard and the appropriate part 2.

4.3 Accessories associated with or incorporated in a system component shall and need only comply with the relevant standard for that accessory if any.

5 General notes on tests

5.1 Tests according to this standard are type tests.

5.2 Unless otherwise specified in this standard, the samples shall be tested as delivered under normal or simulated conditions of use, at an ambient temperature of $(20 \pm 5) ^\circ\text{C}$. The samples used for the tests shall be representative of normal production in respect of all details which may affect the test results. Unless otherwise specified, samples shall be assembled and mounted in accordance with the manufacturers instructions. Samples of non-rewireable system components shall be supplied with an appropriate flexible cable which shall be at least 1 m long.

5.3 Generally, a total of 10 samples of any one type shall be subjected to inspection and tests in the following order of clauses:

- 3 samples: Clauses 6 to 13
- 3 samples: Clauses 9, 11 to 17 and 20
- 3 samples: Clauses 18
- 1 sample: Clause 19

Unless otherwise specified, a sample means an individual component, a powertrack not less than 1 m in length, or a combination typifying the system as a whole.

5.4 Unless otherwise specified, three samples are subjected to the tests and the requirements are satisfied if the tests are met. If one of the samples does not satisfy a test due to an assembly or manufacturing fault, that test and any preceding one which may have influenced the results of the test shall be repeated and also the tests which follow shall be made in the required sequence on another full set of samples, all of which shall comply with the requirements.

6 Ratings

6.1 PT systems shall have:

- a) a rated voltage not exceeding 480 V a.c.;
- b) a rated current not exceeding 63 A.

6.2 Compliance is checked in conjunction with 8.2.

7 Classification

PT systems and/or system components shall be classified as follows:

7.1 According to resistance to impact for installation and application with values as listed in AS/NZS 2053.1, Test of Resistance to Impact, except that the very light classification is not permitted.

- PT system for light impact: 1 J;
- PT system for medium impact: 2 J;
- PT system for heavy impact: 5 J;
- PT system for very heavy impact: 20 J.

7.2 According to whether the tap-off units are intended to be connected and disconnected with the system energised and/or their load connected.

7.2.1 Tap-off units not intended to be connected or disconnected when the system is energised.

7.2.2 Tap-off units intended to be connected or disconnected when the system is energised but without a load connected

7.2.2.1 By ordinary person, skilled person or instructed person.

7.2.2.2 By skilled person or instructed person.

7.2.3 Tap-off units intended to be connected or disconnected when the system is energised and with a load connected.

7.3 According to degrees of protection provided by enclosures according to IEC 60529.

7.3.1 According to protection against ingress of solid foreign objects.

7.3.2 According to protection against ingress of water.

7.4 According to degree of pollution:

- pollution degree 1;
- pollution degree 2;
- pollution degree 3.

NOTE 1 Details for the pollution degrees are given in Annex D.

NOTE 2 A PT system suitable for use in a particular situation may be used in a less polluted situation.

NOTE 3 A PT system designed with creepage and clearance distances for a particular pollution degree may be used in a higher pollution degree environment providing additional enclosures or seals are used.

7.5 According to the rated impulse withstand voltage:

- 330 V;
- 500 V;
- 800 V;
- 1 500 V;

- 2 500 V;
- 4 000 V.

NOTE The relationship between rated impulse withstand voltage, rated voltage and overvoltage category is given in Annex C.

8 Marking and documentation

8.1 Each system component shall be marked with:

- a) the name or trademark of the manufacturer or responsible vendor;
- b) product identification which may comprise, for example, a colour, a catalogue number, a symbol.

In the case where the PT system is supplied as an assembly then only the assembly need be marked, and this shall not be on easily removable parts.

Where it is not possible to mark a component due to its size then it will be sufficient to mark the smallest package unit according to 8.1.

8.2 In addition to 8.1 the powertrack, tap-off units and supply connectors shall be marked with:

- a) rated voltage in volt
- b) rated current in ampere
- c) nature of supply.

If symbols are used they shall be in accordance with 8.7.

8.3 Line, neutral and earth terminals for external conductors shall be marked using the symbols in accordance with 8.7. Alternatively these marks can be placed adjacent to the terminal.

8.4 If necessary for correct installation, for example for screwless type or insulation piercing terminals, the following information shall be given by marking adjacent to terminals:

- connection and disconnection procedure;
- cross-sectional areas and types of connectable conductors.

NOTE Type of connectable conductors could include solid, stranded, flexible, copper or aluminium.

Alternatively the information may be given on the smallest package unit or in the manufacturer's installation instructions.

In addition, the location of protective devices such as ~~fuses~~, circuit breakers and residual current devices which are not visible after installation shall be marked in their vicinity with the appropriate symbol or text, which shall be visible after installation. ~~In the case of fuses or other protective devices which can be replaced without the use of a tool, the appropriate current shall also be marked and, if necessary, the appropriate voltage.~~

Compliance is checked by inspection.

8.5 The manufacturer or responsible vendor shall provide documentation giving the information necessary for the proper and safe installation and use of the PT system for:

- system components of the PT system;
- the purpose of the system components and their assemblies;
- the classification of the PT system according to Clause 7;

- guidance to reach the declared performance;
- guidance regarding periodic inspection and/or maintenance where required;
- static loading characteristics (see 14.2), if any;
- maximum and minimum cross-sectional areas of cables that the supply terminals are able to accommodate.

Compliance is checked by Inspection.

8.6 Information according to 8.1, 8.2, 8.3, 8.4 and 8.5 which is provided with the smallest package unit or in the manufacturer's installation instructions shall be in the form of illustrations and/or in a language which is acceptable to the country in which the PT system is intended to be installed.

Compliance is checked by inspection.

Information and instructions shall be in English.

8.7 Symbols

Ampere	A
Volt	V
Hertz	Hz
Alternating current	~ [IEC 60417-5032 (DB:2002-10)] or a.c.
Line	L, or in the case of more than one L1, L2, L3, etc.
Neutral	N
Protective earth	 [IEC 60417-5019 (DB:2002-10)]
Noiseless (clean) earth	 [IEC 60417-5018 (DB:2002-10)]
Fuse	 [IEC 60417-5016 (DB:2002-10)]
IP code according to IEC 60529	IPXX

NOTE 1 Details of construction of symbols are given in IEC 60417-1.

NOTE 2 Lines formed by the construction of the tool are not considered as part of the marking.

For the marking of rated current and rated voltage figures may be used alone. The figure for the rated current shall be placed before or above that for the rated voltage and separated from the latter by a line. If the symbol for the nature of supply is used, it shall be placed next to the marking for rated current and rated voltage.

For example 10 A 250 V ~ or $\frac{10}{250}$ ~

Compliance is checked by inspection.

8.8 Marking on the product shall be easily legible and durable.

The marking according to 8.2, 8.3 and 8.4 shall not be placed on easily removable parts and screws or washers.

Compliance is checked by inspection, using normal or corrected vision, without additional magnification and by rubbing the marking by hand for 15 s with a piece of cloth soaked with water and again for 15 s with a piece of cloth soaked with petroleum spirit.

After the test the marking shall be legible. Labels shall not be easily removable and shall not have curled.

NOTE 1 Petroleum spirit is defined as the aliphatic solvent hexane with a content of aromatics of maximum 0,1 % volume, a kauri butanol value of 29, initial boiling point 65 °C, a dry point of 69 °C and a density of approximately 0,68 g/cm³.

NOTE 2 Marking on the product may be applied, for example, by moulding, pressing, engraving, printing, adhesive labels or waterslide transfers.

NOTE 3 The durability of marking made by engraving, moulding or pressing is deemed to comply with the requirements without testing.

9 Construction

9.1 For tap-off units classified according to 7.2.1 it shall not be possible to connect or disconnect it without the use of a tool, unless the design of the tap-off unit is such that it is not possible to connect or disconnect it with the PT system energised.

Compliance is checked by inspection and by manual test.

9.2 For tap-off units classified according to 7.2.2.1 it shall not be possible to connect or disconnect it with the tap-off unit under load.

Compliance is checked by inspection and by manual test.

9.3 For tap-off units classified according to 7.2.2.2 the tap-off unit shall be clearly marked to indicate that it shall not be connected or disconnected under load and shall only be accessible by the use of a tool or intended to have restricted access by an ordinary person.

NOTE Examples of tap-off units having restricted access by an ordinary person include:

- a) tap-off units situated under a raised access floor;
- b) tap-off units situated either > 2,5 m above floor level or within a suspended ceiling.

Compliance is checked by inspection and by manual test.

9.4 For non-rewirable system components it shall not be possible to break the terminations and/or replace the cable without making the system component permanently useless.

Compliance is checked by inspection and if necessary by manual test.

~~**9.5** System components with the provision for fuse-links shall be so designed that ordinary persons cannot gain access to live parts when replacing fuse-links.~~

~~Compliance is checked by inspection and test according to 11.1.1.1.~~

9.5 Fuses and fuse-links shall not be used.

9.6 PT systems shall be so designed that they cause no damage to the insulation of conductors or sheath of cables, both during installation and in normal use.

Compliance is checked by inspection.