



Programmable controllers

Part 2: Equipment requirements and tests

STANDARDS
Australia

Currently in preview, click buy full version

This Australian Standard® was prepared by Committee IT-006, Industrial Process Measurement, Control and Automation. It was approved on behalf of the Council of Standards Australia on 14 November 2014.
This Standard was published on 19 December 2014.

The following are represented on Committee IT-006:

- Australian Computer Society
 - Australian Industry Group
 - Australian Petroleum Production and Exploration Association
 - Australian Safety Critical Systems Association
 - Consult Australia
 - Engineers Australia
 - Institute of Chemical Engineers Australia
 - Institute of Instrumentation, Control and Automation Australia
 - ISACA
 - Process Control Society
 - University of Queensland
 - Workplace Health and Safety Queensland
-

This Standard was issued in draft form for comment as DR AS IEC 61131.2:2014.

Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the Committee and through the public comment period.

Keeping Standards up-to-date

Australian Standards® are living documents that reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued.

Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments that may have been published since the Standard was published.

Detailed information about Australian Standards, drafts, amendments and new projects can be found by visiting www.standards.org.au

Standards Australia welcomes suggestions for improvements, and encourages readers to notify us immediately of any apparent inaccuracies or ambiguities. Contact us via email at mail@standards.org.au, or write to Standards Australia, GPO Box 476, Sydney, NSW 2001.

Australian Standard[®]

Programmable controllers

Part 2: Equipment requirements and tests

Original as AS 4168.2—1994.
Previous edition AS IEC 61131.2—2004.
Second edition 2014.

COPYRIGHT

© Standards Australia Limited

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher, unless otherwise permitted under the Copyright Act 1968.

Published by SAI Global Limited under licence from Standards Australia Limited, GPO Box 476, Sydney, NSW 2001, Australia

ISBN 978 1 74342 930 3

PREFACE

This Standard was prepared by the Standards Australia Committee IT-006, Industrial Process Measurement, Control and Automation, to supersede AS IEC 61131.2—2004.

The objective of this Standard is to specify requirements and related tests for programmable controllers (PLCs) and their assorted peripherals [for example, programming and debugging tools (PADTs), human-machine interfaces (HMIs), etc.] which have as their intended use the control and command of machines and industrial processes.

This Standard should be read in conjunction with the other parts of the AS IEC 61131 series.

This Standard is identical with, and has been reproduced from, IEC 61131-2, Ed. 3.0 (2007), *Programmable controllers—Part 2: Equipment requirements and tests*.

The principal differences between this and the previous edition are given in the Foreword.

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

- (a) In the source text ‘this part of IEC 61131’ should read ‘this Australian Standard’.
- (b) A full point substitutes for a comma when referring to a decimal number.

References to International Standards should be replaced by references to Australian or Australian/New Zealand Standards, as follows:

<i>Reference to International Standard</i>		<i>Australian Standard</i>	
IEC		AS	
60060	High-voltage test techniques	1921	High-voltage test techniques
60060-1	Part 1: General definitions and test requirements	1921.1	Part 1: General definitions and test requirements
60068	Environmental testing	60068	Environmental testing
60068-2-2	Part 2-2: Tests—Tests B: Dry heat	60068.2.2	Part 2.2: Tests—Tests B: Dry heat
60068-2-6	Part 2-6: Tests—Test Fc: Vibration (sinusoidal)	60068.2.6	Part 2.6: Tests—Test Fc: Vibration (sinusoidal)
60068-2-14	Part 2-14: Tests—Test N: Change of temperature	60068.2.14	Part 2.14: Tests—Test N: Change of temperature
60068-2-27	Part 2-27: Tests—Test Ea and guidance: Shock	60068.2.27	Part 2.27: Tests—Test Ea and guidance: Shock
60068-2-31	Part 2-31: Tests—Test Ec: Drop and topple, primarily for equipment-type specimens	60068.2.31	Part 2.31: Tests—Test Ec: Drop and topple, primarily for equipment-type specimens
60068-2-32	Part 2-32: Tests—Test Ed: Free fall	60068.2.32	Part 2.32: Tests—Test Ed: Free fall
60417	Graphical symbols for use on equipment (series)	60417	Graphical symbols for use on equipment (series)
60529	Degrees of protection provided by enclosures (IP Code)	60529	Degrees of protection provided by enclosures (IP Code)
60947	Low-voltage switchgear and controlgear	60947	Low-voltage switchgear and controlgear
60947-5-1	Part 5-1: Control circuit devices and switching elements—Electromechanical control circuit devices	60947.5.1	Part 5.1: Control circuit devices and switching elements—Electromechanical control circuit devices

<i>Reference to International Standard</i>		<i>Australian Standard</i>	
IEC		AS	
60947-5-2	Part 5-2: Control circuit devices and switching elements—Proximity switches	60947.5.2	Part 5.2: Control circuit devices and switching elements—Proximity switches
60947-7-1	Part 7-1: Ancillary equipment—Terminal blocks for copper conductors	60947.7.1	Part 7.1: Ancillary equipment—Terminal blocks for copper conductors
60695		AS/NZS	
60695-11-10		60695	
60695-11-10	Part 11-10: Test flames—50 W horizontal and vertical flame test methods	60695.11.10	Part 11.10: Test flames—50 W horizontal and vertical flame test methods
61000	Electromagnetic compatibility (EMC)	61000	Electromagnetic compatibility (EMC)
61000-4-3	Part 4-3: Testing and measurement techniques—Radiated radio-frequency electromagnetic field immunity test	61000.4.3	Part 4.3: Testing and measurement techniques—Radiated radio-frequency electromagnetic field immunity test
61000-4-4	Part 4-4: Testing and measurement techniques—Electrical fast transient/burst immunity test	61000.4.4	Part 4.4: Testing and measurement techniques—Electrical fast transient/burst immunity test
61000-4-5	Part 4-5: Testing and measurement techniques—Surge immunity test	61000.4.5	Part 4.5: Testing and measurement techniques—Surge immunity test
61000-6-1	Part 6-1: Generic standards—Immunity for residential, commercial and light-industrial environments	61000.6.1	Part 6.1: Generic standards—Immunity for residential, commercial and light-industrial environments
61000-6-2	Part 6-2: Generic standards—Immunity for industrial environments	61000.6.2	Part 6.2: General standards—Immunity for industrial environments
61000-6-4	Part 6-4: Generic standards—Emission standard for industrial environments	61000.6.4	Part 6.4: Generic standards—Emission standard for industrial environments
61131		AS IEC	
61131-1		61131	
61131-1	Part 1: General information	61131.1	Part 1: General information
61131-3	Part 3: Programming languages	61131.3	Part 3: Programming languages
61131-4	Part 4: User guidelines	61131.4	Part 4: User guidelines
CISPR		AS/NZS CISPR	
16		16	
16-1-2	Part 1-2: Radio disturbance and immunity measuring apparatus—Ancillary equipment—Conducted disturbances	16.1.2	Part 1.2: Radio disturbance and immunity measuring apparatus—Ancillary equipment—Conducted disturbances
16-1-4	Part 1-4: Radio disturbance and immunity measuring apparatus—Ancillary equipment—Radiated disturbances	16.1.4	Part 1.4: Radio disturbance and immunity measuring apparatus—Ancillary equipment—Radiated disturbances

*Reference to International Standard**Australian Standard*

CISPR

AS/NZS CISPR

16-2-1 Part 2-1: Methods of measurement
of disturbances and immunity—
Conducted disturbance
measurements

16.2.1 Part 2.1: Methods of measurement
of disturbances and immunity—
Conducted disturbance
measurements

Only normative references that have been adopted as Australian or Australian/New Zealand Standard have been listed.

The terms 'normative' and 'informative' have been used in this Standard to define the application of the appendix to which they apply. A 'normative' appendix is an integral part of a Standard, whereas an 'informative' appendix is only for information and guidance.

CONTENTS

1	General	15
1.1	Scope and object.....	15
1.2	Compliance with this standard.....	16
1.3	Normative references	16
2	Type tests	19
2.1	Equipment to be tested (equipment under test/EUT).....	19
2.2	Special features for immunity and EMC tests.....	20
2.3	Withstand test conditions	21
2.4	Verification procedure	21
2.5	Requirements for test programmes and proper functioning verification procedures (PFVPs) to be provided by the manufacturer.....	21
2.6	General conditions for tests.....	22
3	Terms and definitions	22
4	Normal service conditions and requirements.....	30
4.1	Climatic conditions and requirements	30
4.1.1	Operating ambient air temperature	30
4.1.2	Relative humidity	30
4.1.3	Altitude.....	30
4.1.4	Pollution degree	31
4.2	Mechanical service conditions and requirements	31
4.2.1	Vibrations	31
4.2.2	Shock	31
4.2.3	Free falls (portable and hand-held equipment).....	32
4.3	Transport and storage conditions and requirements	32
4.3.1	Temperature.....	32
4.3.2	Relative humidity.....	32
4.3.3	Altitude.....	32
4.3.4	Free falls (PLC units in manufacturer's original packaging).....	33
4.3.5	Other conditions	33
4.4	Electrical service conditions and requirements	33
4.4.1	AC and d.c. equipment power supply.....	33
4.4.2	Overvoltage category, control of transient overvoltages.....	33
4.4.3	Non-periodic overvoltages	33
4.5	Special conditions and requirements	33
5	Functional requirements	33
5.1	Functional power supply and memory back-up requirements	35
5.1.1	AC and d.c. power supply.....	35
5.1.2	Memory back-up.....	36
5.2	Digital I/Os	36
5.2.1	Digital inputs (current sinking)	37
5.2.2	Digital outputs for alternating currents (current sourcing).....	39
5.2.3	Digital outputs for direct current (current sourcing)	42

5.3	Analogue I/Os	43
5.3.1	Analogue inputs.....	43
5.3.2	Analogue outputs.....	43
5.4	Communication interface requirements.....	44
5.5	Main processing unit(s) and memory(ies) of the PLC-system requirements	44
5.6	Remote input/output stations (RIOSs) requirements	44
5.7	Peripherals (PADTs, TEs, HMIs) requirements	44
5.8	PLC-system self-tests and diagnostics requirements	45
5.9	Functional earthing.....	45
5.10	Mounting requirements	45
5.11	General marking requirements	46
5.11.1	Functional identifications	46
5.11.2	Module location and module identifications.....	46
5.11.3	Functional earth terminals markings	46
5.12	Requirements for normal service and functional type tests and verifications.....	46
5.13	Requirements for information on normal service and function.....	46
6	Normal service and functional type tests and verifications	46
6.1	Climatic tests	46
6.2	Dry-heat and cold withstand tests.....	47
6.2.1	Variation of temperature	48
6.2.2	Cyclic damp heat withstand test	49
6.3	Mechanical tests	50
6.3.1	Vibration (type test associated with normal service conditions).....	50
6.3.2	Shock (type test associated with normal service conditions)	50
6.3.3	Free fall (type test associated with normal service conditions).....	51
6.3.4	Free fall (type test associated with transport and storage conditions)	51
6.3.5	Plugging/unplugging of removable units.....	51
6.4	Verification of special functional requirements for power ports and memory back-up – Special immunity tests for power ports	51
6.4.1	Verification of functional equipment power input port (a.c. or d.c.).....	52
6.4.2	External energy supply variation tests (immunity tests).....	53
6.4.3	Improper equipment power supply connection tests.....	56
6.4.4	Verification of memory back-up requirements	57
6.5	Verification of input/output requirements	57
6.5.1	General	57
6.5.2	Verification of digital inputs.....	58
6.5.3	Verification of digital outputs	58
6.5.4	Verification of analogue I/Os.....	59
6.6	Verification of communication interface requirements	60
6.7	Verification of MPU requirements	60
6.8	Verification of remote I/O stations	61
6.8.1	Response time test.....	61
6.8.2	Loss of communication test	61
6.8.3	Verification of other requirements	61
6.9	Verification of peripheral (PADTs, TEs, HMIs) requirements.....	61
6.10	Verification of PLC-system self-tests and diagnostics	61
6.11	Verification of markings and manufacturer's documentation.....	61
7	General information to be provided by the manufacturer.....	62
7.1	Information on type and content of documentation.....	62

7.1.1	Information on catalogues and datasheets	62
7.1.2	Information on user's manuals	62
7.1.3	Information on technical documentation	62
7.2	Information on compliance with this standard	62
7.3	Information on reliability	63
7.4	Information on other conditions	63
7.5	Information on shipping and storage	63
7.6	Information on a.c. and d.c. power supply	63
7.7	Information on digital inputs (current sinking)	63
7.8	Information on digital outputs for alternating currents (current sourcing)	64
7.9	Information on digital outputs for direct current (current sourcing)	64
7.10	Information on analogue inputs	65
7.10.1	Information on analogue input static characteristics	65
7.10.2	Information on analogue input dynamic characteristics	65
7.10.3	Information on analogue input general characteristics	66
7.10.4	Information on analogue input miscellaneous characteristics	66
7.11	Information on analogue outputs	66
7.11.1	Information on analogue output static characteristics	66
7.11.2	Information on analogue output dynamic characteristics	66
7.11.3	Information on analogue output general characteristics	67
7.11.4	Information on analogue output miscellaneous characteristics	67
7.12	Information on communication interfaces	67
7.13	Information on main processing unit(s) and memory(ies) of the PLC-system	67
7.14	Information on remote input/output stations (RIOs)	68
7.15	Information on peripherals (PADTs, TEs, IMLs)	69
7.16	Information on self-tests and diagnostics	69
8	Electromagnetic compatibility (EMC) requirements	69
8.1	General	69
8.2	Emission requirements	70
8.2.1	General requirements for emission	70
8.2.2	Emission limits in the low-frequency range	70
8.2.3	Emission limits in the high-frequency range	70
8.3	EMC immunity requirements	70
8.3.1	General	71
8.3.2	Performance criteria	72
8.3.3	Immunity levels	73
8.3.4	Voltage dips and interruptions power ports	75
8.4	Requirements for EMC tests and verifications	76
8.5	Requirements for information on EMC	76
9	Electromagnetic compatibility (EMC) type tests and verifications	76
9.1	Electromagnetic compatibility-related tests	76
9.2	Test environment	77
9.3	Measurement of radiated interference	77
9.4	Measurement of conducted interference	77
9.5	Electrostatic discharge	78
9.6	Radiofrequency electromagnetic field – Amplitude modulated	78
9.7	Power-frequency magnetic fields	79
9.8	Fast transient bursts	79
9.9	High-energy surges	80

9.10	Conducted radiofrequency interference	80
9.11	Damped oscillatory wave (for zone C only)	81
9.12	Voltage dips and interruptions	81
10	Electromagnetic compatibility (EMC) information to be provided by the manufacturer	82
11	Safety requirements	82
11.1	Equipment types and protection	82
11.1.1	Open PLC-system equipment	82
11.1.2	Enclosed PLC-system equipment	82
11.2	Protection against electrical shock	84
11.2.1	Permissible limits for accessible parts	84
11.2.2	Dielectric strength	85
11.2.3	Ports requiring protection	85
11.2.4	Protection in normal condition	86
11.2.5	Protection in single-fault condition	87
11.2.6	Secondary circuits which do not pose a risk of electrical shock	88
11.3	Protection against the spread of fire	89
11.3.1	Limited power circuits	89
11.4	Clearance and creepage distances requirements	90
11.4.1	Clearances relating to overvoltage category II	91
11.4.2	Clearances for micro-environment where voltages are known and controlled	92
11.4.3	Creepage distances for basic and supplementary insulation	93
11.4.4	Creepage distances for double/reinforced insulation	96
11.4.5	Creepage for field-wiring terminals	96
11.5	Flame-retardant requirements for non-metallic materials	96
11.5.1	Non-metallic enclosure material	96
11.5.2	Non-metallic material supporting live parts	96
11.5.3	Non-metallic parts	97
11.5.4	Decorative and labelling materials	97
11.5.5	Internal wiring or interconnection cables	97
11.6	Temperature limits	97
11.7	Enclosures	97
11.7.1	Open equipment	98
11.7.2	Enclosed equipment	98
11.8	Operator-accessible hazardous live field-wiring terminal constructional requirements	98
11.9	Provisions for protective earthing	98
11.9.1	Protective earthing requirements for enclosed equipment	99
11.9.2	Protective earthing requirements for open equipment	99
11.10	Wiring	100
11.10.1	Internal wiring	100
11.10.2	Interconnection wiring	100
11.10.3	Equipment power input cord	100
11.11	Switching devices	101
11.12	Components related to safety requirements	101
11.13	Battery requirements	101
11.14	Maximum voltage and minimum voltage	101
11.15	Markings and identification	101
11.15.1	External wiring terminals identification	102

11.15.2	Live parts	102
11.15.3	Protective earth terminals markings.....	102
11.15.4	Enclosed Class II equipment	102
11.15.5	Equipment supplied by SELV/PELV.....	103
11.15.6	Rating information	103
11.16	Requirements for safety type tests and verifications	103
11.17	Requirements for safety routine tests and verifications	103
11.17.1	Requirement for dielectric strength verification	103
11.17.2	Requirement for protective earthing verification.....	103
11.18	Requirements for information on safety.....	103
12	Safety type tests and verifications	104
12.1	Safety-related mechanical tests and verifications	104
12.1.1	Impact withstand test.....	104
12.1.2	Operator accessibility tests.....	105
12.1.3	General examination of openings.....	105
12.1.4	Wire flexing test.....	106
12.1.5	Temperature test	106
12.1.6	Protective coating test	106
12.1.7	Rigidity test	106
12.1.8	Clearance and creepage verification.....	107
12.1.9	Field-wiring terminals constructional verification	107
12.2	Safety-related electrical tests	107
12.2.1	Dielectric withstand verification test.....	107
12.2.2	Protective earthing continuity test.....	109
12.2.3	Stored energy injury risk test	110
12.2.4	Overload test.....	110
12.2.5	Endurance test	110
12.3	Single-fault condition tests	111
12.3.1	Single-fault condition – General.....	111
12.3.2	Single-fault condition – Breakdown of components test	111
12.3.3	Single-fault condition – Protective impedance test.....	112
12.3.4	Single-fault condition – isolation transformers test.....	112
12.4	Limited power circuits test.....	112
13	Safety routine tests	112
13.1	Dielectric withstand test	112
13.2	Dielectric withstand verification test.....	113
13.3	Protective earthing test	113
14	Safety information to be provided by the manufacturer	113
14.1	Information on evaluation of enclosures for open equipment (power dissipation).....	114
14.2	Information on mechanical terminal connection	114
Annex A (informative)	Illustration of PLC-system hardware definitions	115
Annex B (informative)	Digital input standard operating range equations.....	116
Annex C (normative)	Test tools.....	117
Annex D (informative)	Zone C – EMC immunity levels	120
Annex E (informative)	Overvoltage example.....	122
Bibliography	124

Figure 1 – EUT configurations	20
Figure 2 – Typical interface/port diagram of a PLC-system	34
Figure 3 – I/O Parameters.....	37
Figure 4 – U-I operation regions of current-sinking inputs	38
Figure 5 – Temporary overload waveform for digital a.c. outputs.....	40
Figure 6 – Temporary overload waveform for digital d.c. outputs.....	42
Figure 7 – Third harmonic immunity test	52
Figure 8 – Gradual shut-down/start-up test	54
Figure 9 – Fast supply voltage variation test	55
Figure 10 – Slow supply voltage variation test	56
Figure 11 – EMC immunity zones.....	71
Figure 12 – Impact withstand test procedure.....	104
Figure 13 – Dielectric withstand test procedures	109
Figure A.1 – Programmable controller system (PLC-system).....	115
Figure C.1 – Jointed test finger	117
Figure C.2 – 15 mm × 3 mm test pin	118
Figure C.3 – 100 mm × 4 mm test pin	118
Figure C.4 – 100 mm × 3 mm test pin	119
Figure E.1 – Creepage distances of circuits where recurring peak voltages are generated	122
Table 1 – General conditions for tests.....	22
Table 2 – Operating ambient air temperature of PLC-systems.....	30
Table 3 – Sinusoidal vibrations service conditions for PLC-systems.....	31
Table 4 – Free fall on concrete floor for portable and hand-held equipment	32
Table 5 – Free fall on concrete floor in manufacturer’s original packaging	33
Table 6 – Rated values and operating ranges of incoming power supply.....	35
Table 7– Voltage interruptions (functional requirements).....	36
Table 8 – Standard operating ranges for digital inputs (current sinking)	39
Table 9 – Rated values and operating ranges for current sourcing digital a.c. outputs	40
Table 10 – Rated values and operating ranges (d.c.) for current-sourcing digital d.c. outputs	42
Table 11 – Rated values and impedance limits for analogue inputs.....	43
Table 12 – Rated values and impedance limits for analogue outputs.....	43
Table 13 – Dry-heat and cold withstand tests.....	47
Table 14 – Change of temperature, withstand and immunity tests	48
Table 15 – Cyclic (12 + 12) damp-heat test.....	49
Table 16 – Immunity vibration test	50
Table 17 – Immunity shock test.....	50
Table 18 – Free-fall immunity/withstand tests (portable and hand-held equipment)	51
Table 19 – Free-fall withstand test (units within manufacturer's original packaging)	51
Table 20 – Insertion/withdrawal of removable units	51
Table 21 – Voltage ripple and frequency range immunity test.....	52

Table 22 – Third harmonic immunity test.....	52
Table 23 – Gradual shut-down/start-up test	54
Table 24 – Supply voltage variation tests	55
Table 25 – Voltage interruptions immunity test (Functional tests).....	56
Table 26 – Back-up duration withstand test.....	57
Table 27 – Change of energy source test.....	57
Table 28 – Overload and short-circuit tests for digital outputs	59
Table 29 – Emission limits	70
Table 30 – EMC immunity zones, example regarding surge	72
Table 31 – Criteria to prove the performance of a PLC-system against EMC disturbances	72
Table 32 – Enclosure port tests, Zones A and B.....	73
Table 33 – Conducted immunity tests, Zone B	74
Table 34 – Conducted immunity tests, zone A.....	75
Table 35 – Voltage dips and interruptions (EMC requirements).....	76
Table 36 – Radiated emission measurement.....	77
Table 37 – Conducted emission measurement.....	77
Table 38 – Electrostatic discharge immunity test.....	78
Table 39 – Radiated electromagnetic field immunity test.....	78
Table 40 – Power-frequency magnetic field immunity test.....	79
Table 41 – Fast transient burst immunity test.....	79
Table 42 – High-energy surge immunity test	80
Table 43 – Conducted r.f. immunity test.....	80
Table 44 – Damped oscillatory wave immunity test	81
Table 45 – Voltage dips and interruptions immunity test (EMC tests)	81
Table 46 – Shock protection requirements for open and enclosed equipment.....	86
Table 47 – Limits of output current and output power for inherently limited power sources.....	90
Table 48 – Limits of output current, output power and ratings for over-current protective devices for non-inherently limited power sources.....	90
Table 49 – Minimum clearances in air corresponding to overvoltage category II conditions (except for field wiring terminals) for basic/supplementary insulation.....	91
Table 50 – Minimum clearances in air corresponding to overvoltage category II conditions (except for field wiring terminals) for double /reinforced insulation	92
Table 51 – Minimum clearances in air at field-wiring terminals	92
Table 52 – Minimum clearances in air for micro-environment where the voltages are known and controlled	93
Table 53 – Classification of material group according to comparative tracking index (CTI).....	93
Table 54 – Minimum creepage distances for other than printed circuit boards (1).....	94
Table 55 – Minimum creepage distances for printed circuit boards (1), (6), (9) (basic and supplementary insulation)	95
Table 56 – Minimum creepage distances related to recurring peak voltages on printed wiring boards without protective coating (1) (pollution degrees 1 and 2).....	96
Table 57 – Temperature limits	97
Table 58 – Impact withstand test (1)	104

Table 59 – Operator accessibility tests (1)	105
Table 60 – Dielectric withstand voltages for impulse a.c. power-frequency and d.c. tests for basic/supplementary insulation (5)	108
Table 61 – Dielectric withstand voltages for impulse a.c. power frequency and d.c. tests for double/reinforced insulation (5)	109
Table 62 – Overload test circuit values	110
Table 63 – Endurance test circuit values.....	111
Table 64 – Routine dielectric withstand test (5).....	113
Table D.1 – Enclosure port tests, Zone C.....	120
Table D.2 – Conducted immunity tests, Zone C.....	121

FOREWORD

This third edition includes the following significant technical changes with respect to the previous edition.

- a) DC power port requirements have been moved from Clause 8 to Clause 5.
- b) Correction of the following tests of Clause 6:
 - voltage range test;
 - fast supply voltage variation test;
 - slow supply voltage variation test;
 - gradual shut-down/start-up test.
- c) Change of EMC requirements in Clause 8:
 - requirements for radiofrequency interference in Table 33 changed from 3 V to 10 V for Zone B equipment;
 - reference to EMC basic standards with the last version;
 - reference to generic standards 61000-6-x;
 - cable length aligned to generic standards.
- d) Correction of the following tests in Clause 9:
 - voltage dips and interruptions – power port type tests and verifications.
- e) New organization of Clause 11:
 - equipment types and protection;
 - open PLC-system equipment;
 - enclosed PLC-system equipment:
 - Class I equipment;
 - Class II equipment;
 - Class III equipment;
 - protection against electric shock;
 - definition of secondary circuits which do not pose a risk of electric shock:
 - Class 2 circuit;
 - limited voltage/current circuit;
 - limited voltage circuit;
 - limited energy circuit ≤ 30 V a.c. or 42,2 V peak;
 - limited impedance circuit;
 - protection against the spread of fire within limited power circuits;
 - protective earthing requirements for enclosed equipment;
 - minor improvements in different subclauses;
 - impulse test only for verification of clearances.

INTRODUCTION

IEC 61131-2 is part of a series of standards on programmable controllers and the associated peripherals and should be read in conjunction with the other parts of the series.

Where a conflict exists between this and other IEC standards (except basic safety standards), the provisions of this standard should be considered to govern in the area of programmable controllers and their associated peripherals.

Compliance with IEC 61131-2 cannot be claimed unless the requirements of 7.2 are met.

Service and physical environment requirements are specified in Clause 4. Functional requirements are specified in Clause 5. Electromagnetic compatibility requirements are specified in Clause 8. Safety requirements are specified in Clause 11.

Terms of general use are defined in IEC 61131-1. More specific terms are defined in each part.

AUSTRALIAN STANDARD

Programmable controllers**Part 2:
Equipment requirements and tests****1 General****1.1 Scope and object**

This part of IEC 61131 specifies requirements and related tests for programmable controllers (PLCs) and their associated peripherals (for example, programming and debugging tools (PADTs), human-machine interfaces (HMIs), etc.) which have as their intended use the control and command of machines and industrial processes.

PLCs and their associated peripherals are intended to be used in an industrial environment and may be provided as open or enclosed equipment. If a PLC or its associated peripherals are intended for use in other environments (light industrial, commercial, residential), then the specific requirements, standards and installation practices for those other environments should be additionally applied to the PLC and its associated peripherals.

This standard also applies to any products performing the function of PLCs and/or their associated peripherals.

Equipment covered in this standard is intended for use in overvoltage category II (IEC 60664-1) in low-voltage installations, where the rated equipment supply voltage does not exceed a.c. 1 000 V r.m.s. (50/60 Hz), or d.c. 1 500 V. (If PLCs or their associated peripherals are applied in overvoltage category III installations, then additional analysis will be required to determine the suitability of the equipment for those applications.)

This standard does not deal with the functional safety or other aspects of the overall automated system. PLCs, their application programme and their associated peripherals are considered as components of a control system.

Since PLCs are component devices, safety considerations for the overall automated system including installation and application are beyond the scope of this standard. Refer to IEC 60364-1 or applicable national/local regulations for electrical installation and guidelines.

However, PLC safety as related to electric shock and fire hazards, electrical interference immunity and error detecting of the PLC-system operation (such as the use of parity checking, self-testing diagnostics, etc.), are addressed.

The object of this standard is

- to establish the definitions and identify the principal characteristics relevant to the selection and application of PLCs and their associated peripherals;
- to specify the minimum requirements for functional, electrical, mechanical, environmental and construction characteristics, service conditions, safety, EMC, user programming and tests applicable to PLCs and the associated peripherals.

This standard also specifies

- a) service, storage and transportation requirements for PLCs and their associated peripherals (Clause 4);
- b) functional requirements for PLCs and their associated peripherals (Clause 5);
- c) EMC requirements for PLCs and their associated peripherals (Clause 8);