AS/NZS 61439 standard update

Quick facts and the main details

POWER DISTRIBUTION AND PROTECTION

AS/NZS 61439 – Quick facts

What is AS/NZS 61439

AS/NZS 61439 is a series of standards for low voltage switchgear and control gear assemblies that is replacing the AS/NZS 3439 series. It is a copy of the IEC 61439 series with 'in-country notes' specific to Australia and New Zealand.

The IEC 61439 series is the current IEC series for low voltage switchgear and control gear assemblies and has been fully adopted in Europe since 2014.

When will it be applicable ?

MAY 2016 TO MAY 2021 - THE TRANSITION PERIOD

- Either AS/NZS 3439 or AS/NZS 61439 may be specified for switchboard design and construction

AFTER MAY 2021

- AS/NZS 3439 can no longer be referenced
- Only AS/NZS 61439 is acceptable for specification
- For upgrades to existing switchboards built to previous standards
  - Replacing like for like electrical components is allowable
  - Any modifications to the switchboard itself will require that section to be upgraded to the new standard, which may require upgrading to a whole new switchboard.

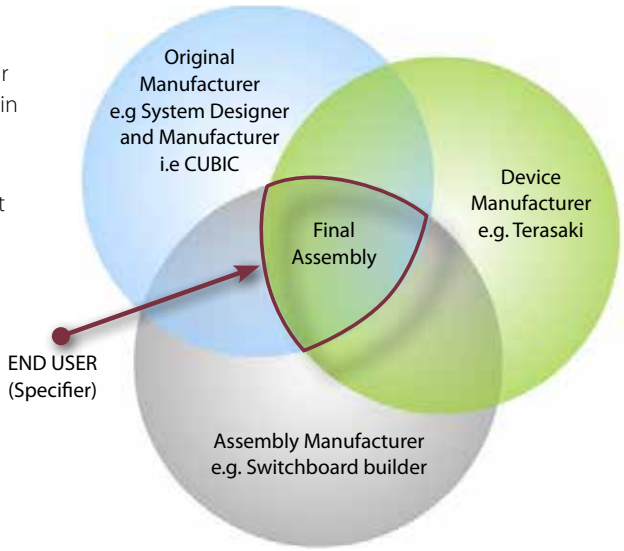
Why the standard is changing ?

The current standard AS/NZS 3439 was first introduced in 1998. There have since been many changes and improvements to electrical switchgear, design, manufacture and safety processes. Due to some areas of common misunderstanding in the old standard the new standard aims to clarify legal and financial responsibilities in specification, testing, design and build between user and the assembly manufacturer.

What is the process required ?

The Original Manufacturer* designs and tests their switchboard system with their desired switchgear brand up, to their target specifications for the characteristics in Annex D - Table D.

Testing the "most onerous" arrangements is the most efficient test regime, as the standard allows verification by referencing a more onerous test arrangement but not from a less onerous test arrangement.



For a new project

1) The user* (e.g. end user or user's representative i.e. the consultant engineer) completes the Annex C details and includes with the project tender documents

2) The assembly manufacturer* (e.g. the switchboard builder) designs the switchboard to the requirements given by the user using a combination of the designs that were tested by the original manufacturer.
To prove design verification, the assembly manufacturer must be able to provide documentation as per Annex D - Table D1. See page 6

3) Upon successful award of the tender the assembly manufacture assembles the switchboard as per the documentation from the original manufacturer. When complete, the assembly manufacturer performs routine verification before supplying the switchboard.

- If a user incorrectly specifies details, then they may need to have corrections made via a - variation of works with the assembly manufacturer.
- If an assembly manufacturer supplies a switchboard not to the required specification - or that does not have supporting verification documentation, then they are potentially responsible to amend or incur the cost for correction.
- If a switchboard is specified correctly by the user and also designed and assembled as per the original manufacturer's documentation, then the original manufacturers documentation will come under investigation should a performance issue occur.

*terms defined within the standard.
Note: the assembly manufacturer and original manufacturer may be the same or different companies.

"NHP recommends that Verification Documentation is submitted, checked and approved by the specifier at tender time to ensure a compliant switchboard."

How to verify a switchboard design

To comply with AS/NZS 61439, all switchboards and panelboards require documentation to prove their performance characteristics meet or exceed the requirements for the installation as specified. This documentation comes in two parts:

- Design Verification – compiled by the assembly manufacturer proving their design is the same or better than the verification documentation from original manufacturer. If the assembly manufacturer makes their own design, they become the original manufacturer.
- Routine Verification – checks completed by the assembly manufacturer on the assembled switchboard.

Design verification

AS/NZS 61439-1 Table D1 gives a table of characteristics to be verified and nominates which of the 3 methods below are available to use for each characteristic.

VERIFICATION BY TEST
The switchboard or relevant section of the switchboard is designed and assembled the same as the tested assembly.

VERIFICATION BY COMPARISON
The switchboard or relevant section of the switchboard is designed and assembled in a way that differs from the test, but the characteristics of the deviation satisfies the conditions within the standard.

VERIFICATION BY ASSESSMENT
This includes the correct application of design rules and calculations, including use of appropriate safety margins.

AS/NZS 61439 – The main details

Key points

- The Electrical Safety Act takes precedence over any standard
  - As an example, for Victoria clause 54 states:
  "A person must not supply or offer to supply electrical equipment unless—
  (a) the equipment complies with the minimum standards prescribed for equipment of that class;"

  Therefore, **all** switchboards are required to satisfy a switchboard standard, including smaller boards; however, in AS/NZS 61439 the requirements are dependent on ratings i.e.
  - Short circuit verification is not required under 10kA or 17kA when protected by current-limiting devices
  - Temperature rise limit verification by calculation may only be completed for assemblies not exceeding 1600A (or single compartment ASSEMBLY not exceeding 630A)
- AS/NZS 61439 has 8 parts:
  - Part 0 - A guide for specifiers to be used at tender
  - Part 1 - General rules
  - Part 2 – Low voltage switchgear and control gear assemblies
  - Part 3 - Distribution boards intended to be operated by ordinary persons
  - Part 4 - Assemblies for construction sites
  - Part 5 - Assemblies for power distribution in public networks
  - Part 6 - Busbar trunking systems
  - Part 7 - Marina, camping, market and charging

- Should an assembly manufacturer deviate from the original manufacturer documentation, then the assembly manufacturer is deemed to be the original manufacturer in respect of those arrangements.
- If a user accepts a switchboard without verification to one or more characteristics in Annex D, then they are at risk of being financially and legally responsible for any issues that may arise.
- Verification by comparison to a reference design requires demonstrating that the new characteristics are the same or better than the tested design.
- The "In-Country Notes" that modify IEC 61439 to AS/NZS 61439 only affect the Assembly Manufactures requirements. Therefore any Original Manufacturers test documents to IEC 61439 may be used to support the assembly manufacturers verification assessment of the switchboard design to AS/NZS 61439.
- Test certification to AS/NZS 3439 may be used for verification characteristics to AS/NZS 61439 only if the test methods required are the same. For example:
  - Short circuit tests remain the same and may be used
  - Heat rise test requirements differ, therefore may require further testing

What are the main differences between AS/NZS 3439 (Old) and AS/NZS 61439 (New)

Area of difference	AS/NZS 3439 (OLD)	AS/NZS 61439 (NEW)
Term for a compliant switchboard	Type Test (TT) Partial Type Test (PTT)	Design Verified *(TT & PTT no longer used)*
Heat rise testing	Maybe undertaken in "Free air"	Must be completed as a complete system [1]
Temperature limits of copper conductors	ΔT of 70K above a mean ambient of 35°C	ΔT of 105K from a mean of 35°C Therefore, a maximum theoretical mean of 140°C on the copper [2]
Heat rise calculation using IEC 60890	Allowed up to 3150A	for a single compartment ASSEMBLY not exceeding 630A or for ASSEMBLIES not exceeding 1600A
Device substitution	Undefined	Allowed if not exceeding 3150 A and conditions in Table 13 are satisfied

[1] Testing with all covers fitted and electrical components connected.
[2] ΔT of 105K is specified in the standards as this is the maximum temperature rise before copper starts to anneal. This theoretically could allow a maximum absolute temperature of 140°C on the copper busbar. However, as under the new standard tests must be conducted as a complete system, other temperature limits will be reached before 140°C on the busbar. For example electrical components terminal and air temperature limits.

What about ARC fault containment

Under AS/NZS 3439 arc fault containment is an option to be specified, with local AS/NZS test procedures described in Annex ZD.

Under AS/NZS 61439 arc fault containment remains an optional specification with the local AS/NZS Annex ZD being included but also referencing the option of IEC TR 61641. The IEC arc fault containment test requirements are more descriptive and robust thus giving a higher level of safety.

For a more details on the AS/NZS 61439 standard please refer to:
Technical News Issue #78- The evolution of Switchboard Standards

AS/NZS 61439.1 – Annex D Table D1 (Modified)
By original manufacturer : By assembly manufacturer

#	Description	IEC test	Documentation required	NHP CUBIC Modular verification
1	• Resistance to corrosion • Thermal stability • Resistance to abnormal heat and fire • Resistance to UV radiation • Lifting • Mechanical impact (N/A) • Marking	IEC 60068-2-30/11 IEC 60068-2-2 IEC 0695-2-10/11 ISO 4892-2 10.2.5 IEC 62262 10.2.7	• Test certificate required • Test certificate required • Test certificate or assessment required • Test certificate or assessment required - Outdoor only • Test certificate required • Only required for Part 3 - Distribution boards • By assembly manufacturer	Covered in DEKRA overall report. See page 11-12 NA indoor use only Not required By assembly manufacturer
2	Degree of protection of enclosures	IEC 60529	Test certificate or assessment required AND Routine test verification	Covered in DEKRA overall report. See page 13-15 AND Routine test verification
3	Clearances	IEC 60529	Test certificate and/or Routine test verification AND Routine test verification	Covered in DEKRA overall report. See page 16 AND Routine test verification
4	Creepage distances	Annex F and IEC 60664	Test certificate and/or Routine test verification AND Routine test verification	Covered in DEKRA overall report. See page 16 AND Routine test verification
5	Effective continuity between the exposed conductive parts of the assembly and the protective circuit Short circuit withstand strength of the protective circuit	10.5.2 10.5.3	Test certificate required Test certificate or comparison with a reference design required AND Routine test verification	Covered in DEKRA overall report. See page 16 AND Routine test verification
6	Incorporation of switching devices and components	10.6	Assessment required AND Routine test verification	Covered in DEKRA overall report. See page 17 - Appendix C Including Terasaki ACB and MCCB components AND Routine test verification
7	Internal electrical circuits and connections	10.7	Assessment required AND Routine test verification	Covered in DEKRA overall report. See page 17 AND Routine test verification
8	Terminals for external conductors	10.8	Assessment required AND Routine test verification	Covered in DEKRA overall report. See page 17 AND Routine test verification
9	Dielectric properties; Power-frequency withstand voltage Impulse withstand voltage	IEC 61180	Test certificate required As well as Routine test verification Test certificate or assessment required AND Routine test verification	Covered in DEKRA overall report. See page 18 AND Routine test verification
10	Temperature rise limits	10.10.2.3.5 10.10.2.3.7a 10.10.2.3.7b IEC 60890	Above 1600A per section or 630A single compartment test certificate required. OR A comparison to a tested design of great or equal value maybe used provided all points of Table 13 are satisfied. OR Below these values calculation using IEC TR 60890	Above 1600 A tests covered in DEKRA overall report See page 19 Below 1600A heat rise calculation done quickly and easily in Galaxy 3 software.
11	Short circuit withstand strength	IEC 60038 and IEC 60947	Not required under 10 kAs^{-1} or 17 kA with protection on the incomer. Above 17 kA a test report is required for equal to or great than the fault current of the switchboard	Covered in DEKRA overall report. See page 19
12	Electromagnetic compatibility (EMC)	IEC 61000	Test or Assessment with device manufacturers recommendation required	Covered in DEKRA overall report. See page 19 assessment with device manufacturers recommendation
13	Mechanical operation	10.13	Test Certificate required AND Routine test verification	Covered in DEKRA overall report. See page 20 AND Routine test verification

How can NHP's Cubic modular system assist

CUBIC modular is a highly tested verified system in compliance with AS/NZS 61439

CUBIC possess a deep knowledge of the new IEC 61439 standard thanks to its representation on the IEC committee as the only switchboard company independent from a switchgear brand.

CUBIC Overall IEC 61439 Test Verification Certificate (directly applicable to AS/NZS 61439)

This 33-page certificate summarises all test data and simplifies the AS/NZS 61439 design verification process for CUBIC assembly manufacturers, end users and consultants when doing the subsequent document auditing.

All CUBIC IEC 61439 testing in this certificate has been independently witnessed by DERKA laboratories for non-biased verification.

Cubic modular technical data

Material	Electro-galvanised / iron-phosphated steel plate
Colour	Light grey - RAL 7035 / Orange RAL2000. Powder lacquered minimum 50µm
Busbar systems	System 225, 800, 2000 and 7000
Supply systems	TN-C, TN-S, TN-C-S, TT and IT up to 6300A
Internal separation	FORM 1, 2a, 2b, 3a, 3b, 4a, 4b and FORM 4, type 1-7
Multi Drawer	Up to 630 Amps Icc up to 120 kA
Electro-magnetic compatibility	EMC environment A and B
Rated current	Up to 6300 Amps
Dielectric properties	Up to 3.5 kV
Rated short-time withstand current	Up to 120 kA
Rated peak withstand current	Up to 264 kA
Rated voltage, insulation	1000V AC
Rated operational voltage	Up to 1000V, 50 Hz
Degree of protection	Up to IP54 – Indoor Use only
Vibration test	2 G in frequency area 2.5-500 Hz in three directions
Shock test	30 G in 12.5 ms in six directions
Seismic test	Earthquake test carried out with biaxial horizontal and vertical multi-frequency movements
Arcing test	IEC/TR 61641 as well as to AS/NZS 3439.1 Annex ZD
Surface treatment	Class C2 high, according to ISO 12944

For further details on the NHP CUBIC modular system, please contact your local NHP branch or email CUBIC-Solutions@nhp.com.au

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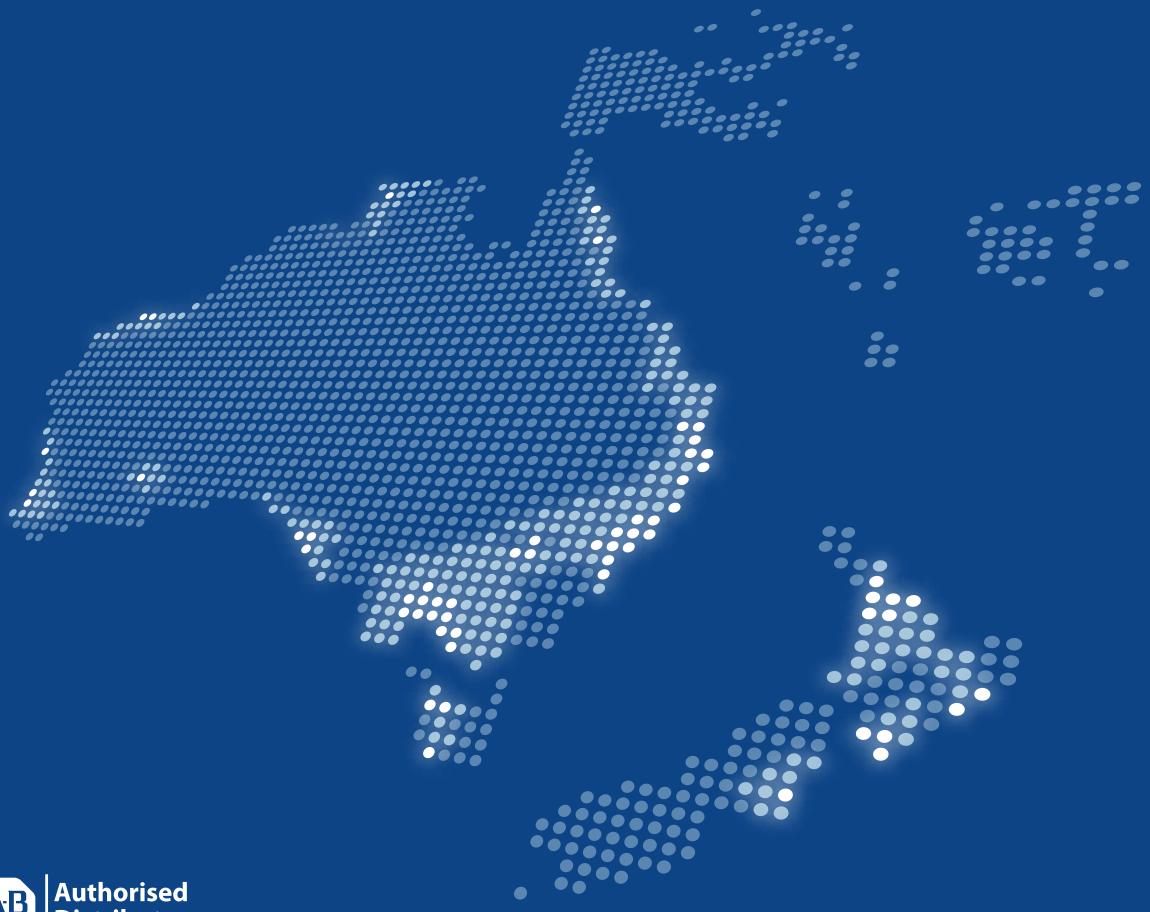

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