

Evolving Excellence



AS/NZS61439 Fully Compliant Switchboard System

AUSTRALIAN DESIGNED, OWNED AND PRODUCED

Originally named Vector, this system has been designed through many years of switchboard manufacturing experience and has resulted in a high quality, efficient design and construction technique. This allows excellent response times to pricing, drafting and manufacturing. Names were changed in 2024 to protect consumers against alternate products using the same branding that are not to the same standard and development of testing.

We continue to evolve and improve the VeCab™ and VeCab™ *SHIFT* system through advanced engineering and testing.

We are very proud to provide full compliance with AS/NZS61439 and actively promote this through our industry.

TECHNICAL SPECIFICATIONS

Form of protection:	IP43 / IP54 IP56 Option with special sheet metal additions.
Fault Level:	as nominated (up to 100kA)
Connection:	Top or Bottom, Front or Rear Connect.
Colour:	External: Ripple Charcoal Doors: X15 Orange Ripple or RAL 7035 light grey. Internal parts: Pearl White, Shelves Charcoal. Plinth: Charcoal.
Frame Construction:	2mm machine folded steel. End Walls, roof sections fully welded and ground smooth 3mm base sections fully welded and ground smooth Assembled with M6 socket head trilob screws.
Busbar:	HDHC Cu Plain Copper Bar (tinned available on request)
Gland Plate Options:	2mm mild steel 6mm-8mm Switchpanel 3-5mm Aluminium
Door Construction:	2mm machine folded steel, double return for rigidity.
Door Latches:	Chrome plated 1/4 turn locks, heavy duty 6mm latch.
Door Sealing:	Close fitting neoprene.
Hinges:	Die Cast Black Hinge, Nylon Removable Pin
Internal escutcheons:	2mm steel.
Mounting:	Floor mounted with access holes in plinth for fixing.
Standard Height:	2125mm + gland plates and screw heads, 2200 for vented roof. 1945mm as a reduced height assembly.
Depth:	445mm + Door projections for single depth, 905 for double deep 885mm + Door projections for double depth or rear connection. 1325mm + Door projections for special extra deep projects.

ADDITIONAL OPTIONS AND CUSTOMISATION

VeCab™ can be provided with a new filtered, forced ventilation arrangement to improve temperature performance and reduce manufacturing costs.

Tested to 8kV impulse test. Operational voltage up to 690VAC and tested for short circuit interruption.

FORMS OF CONSTRUCTION

VeCabTM can be assembled in several different forms to comply with AS/NZS61439 and to suit the application

Internal separation to IPXXB

Form 1

Form 2a, Form 2b and the variant of 2bi

Form 3a, Form 3b and the variants of 3ah and 3bh

Form 4a, Form 4b and the variants 4aih and 4bih

Annex ZD.

BENEFITS

This system allows efficient use of switchboard footprint. Space is an ever present issue with real estate available for switch rooms reducing.

Easy extension and modification to arrangements with a minimum of downtime provides for future flexibility for users.

VARIED ARRANGEMENTS

The versatility of the system is evident when considering the options available.

A general fixed arrangement can be used where all circuit breakers have bolted connections.

Alternate to this bus plugs can be used giving the system a high level of adjustability by reducing potential down time during alterations.

The highest level is withdrawable where each cell can be isolated then withdrawn from the switchboard, taken away for service or modification and then brought back to the board for re-installation. This system is ideal for motor control assemblies and critical installations.

PAINT

Due to the demanding nature of the construction industry, VeCabTM uses a scratch resistant paint to ensure the high quality finish lasts into the future. The standard arrangement of a textured charcoal body allows high efficiency in stock and commencing construction. Special orders of the frame the same as doors can be provided.

Ripple finish paint is available in X15 orange or RAL7035 Grey as the most suitable colour for switchboard doors. This finish provides a cleaner look than the traditional gloss finish that shows every mark and scratch.

SPECIAL ORDERS

Variable colours to special order



BUSBAR SYSTEM

Our unique main busbar system utilises an array of smaller bars. This arrangement permits us to do all of our main runs without punching. This speeds up assembly and reduces errors in manufacturing.

In addition to this, the interconnection at joining sections for longer switchboards is very simple and the fish plates are slid back and provided within the assembly when shipping, reducing the need for a box of joining hardware that often gets misplaced.

Our distribution busbar system is also designed with as few punched joints as possible. Connection for MCCBs up to 630A is via a tested plug arrangement.

Both bar systems have been tested up to 100kA 1 sec

ANNEX ZD ArcProof

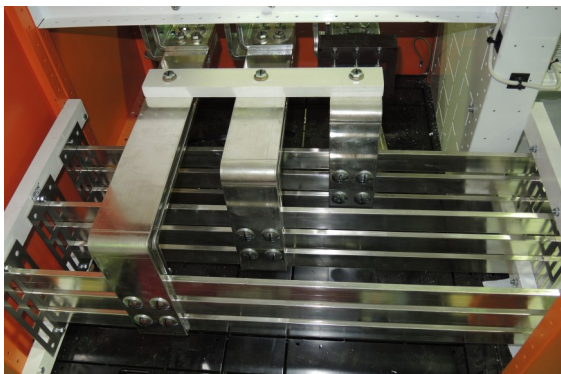
These days we are constantly reminded of the dangers of high power equipment. With our VeCabTM appendix ZD compliance, you can rest assured you are getting the best protection.

VeCabTM has varied arc fault tests up to 100kA.

Where looking after personnel and property is a priority

CONSTRUCTION EXAMPLE

High Current Busbar



STANDARD FRAME AND EXTERNAL SHELL

By assembling the external frame and structure in black, we can provide the most efficient stock of parts to allow immediate response to assembly start up.

Doors are provided in either of the two selected colours as standard and additional options available on request. The delay is reduced for custom colour doors as the base assembly can still be produced.



AIR FLOW AND HEAT DISSIPATION

In order to comply with the relevant standards, temperature rise verification is required.

This ensures the nominated ratings of equipment are substantiated.

Without tests, additional derating factors are required in calculation and can result in ratings below your requirements.

VeCab™ has successfully tested a full tier of ten 250A circuit breakers, all fully rated at 250A.

This is done by advanced design in air movement and heat dissipation.

This system still complies with IP ratings and our Annex ZD arc fault containment tests.

Many switchboards don't have the required ventilation and only have louvres in doors. These louvres may have an adverse impact on short circuit interruption or arc fault by releasing the gasses or the arc forwards towards the operator.



Verification and reports to AS/NZS61439 compliance

We are continuing to develop, evolve and test the system. Check with us for more testing.

Lifting Test

2500kg *Test to AS/NZS61439*

Corrosion Test

Severity A and Severity B *Test to AS/NZS61439*

Short Circuit Testing

Main Bus *Test to AS/NZS61439*
Main Bus 50kA 3 sec
up to 100kA 1 sec

Vertical Bus up to 100kA 1 sec

Vertical/Horizontal Bus 63kA 1 sec 40mm x 6.3mm Cu Busbar
Vertical/Horizontal Bus 63kA 1 sec 100mm x 6.3mm Cu Busbar
Vertical/Horizontal Bus 100kA 1 sec 125mm x 6.3mm 2 x 60mm x 10mm Cu Busbar

ACB Outgoing/Incoming Bus 100kA interruption

Circuit breaker short circuit interruption

Schneider
ABB
Siemens
NHP

Temperature rise

Test to AS/NZS61439
6000A Main Bus Arrangement (force ventilation)
5600A Main Bus Arrangement (restricted ventilation)
4000A Main Bus Arrangement (restricted ventilation)
1700A Main Bus Arrangement (restricted ventilation)

NW25 at 2500A fully rated
NW32 at 3200A fully rated
MTZ63 at 6000A load

Appendix ZD Arc Fault Containment

Various standard tests and special tests *Test to AS/NZS61439*

IP Test

Test to AS60529
IP43 Standard Construction
IP54 Additional sealing (including vents)
IP54W c/w roof section for outdoor installation
IP65 and IP66 modular shell
IP65 and IP66 with custom shell (available in aluminium and stainless for corrosion protection)

Additional Service Tests

Test to AS/NZS61439
1000VAC service rating
8kV dielectric test

Protective Earth Test

Test to AS/NZS61439

Secondary Insulation Option

Test to AS/NZS61439
Self adhesive high temperature wrapping.
1000VAC dielectric strength
Tested to IEC61439 Ref 10.9.2

Technical Report for Product Brochure: VeCab™ Modular Switchboard System with ArcProof Design

Introduction:

The VeCab modular switchboard system incorporates our innovative Arc Proof design, developed to meet stringent safety standards for Arc Fault Containment as per AS/NZS61439 Annex ZD. This cutting-edge design is the result of decades of research into arc faults and represents a transformative approach to mitigating arc flash hazards within electrical systems.

Traditional Approach to Arc Fault Containment:

Historically, arc fault management involved constructing switchboards akin to "bomb-proof" enclosures, featuring: Larger cells: Robust, heavily compartmentalized switchboard units.

Multiple bolts and locks: Strong locking mechanisms designed to ensure doors remained secure in the event of an arc fault.

This approach aimed to contain the powerful energy released by an arc fault, preventing it from escaping, but the overall method relied on large, cumbersome enclosures.

Arc Proof Innovation:

The Arc Proof design introduces a revolutionary method for addressing arc faults, focusing on quenching the arc rather than merely containing it. This is achieved by using specially tested insulation applied to critical areas of the switchboard. The design ensures that any arc is controlled and self-extinguished in a predictable manner.

Key highlights include:

Selective Insulation: Insulation is strategically applied in critical areas to control the arc, ensuring it travels predictably and is quenched effectively.

Uninsulated Joints and Supports: Key joints and supports are deliberately left uninsulated for easy inspection and maintenance access.

Controlled Arc Path: The system ensures that if an arc is initiated, it follows a predictable and controlled path, minimizing risk and damage.

Testing and Observations:

The Arc Proof design has undergone rigorous testing to validate its effectiveness under real-world arc fault conditions.



Test Fundamentals:

Test Current: 50,000 amps (prospective RMS).

Fault Interruption Time: Ranging from 22 milliseconds to 36 milliseconds, showcasing the system's rapid fault detection and mitigation.

Key Test Observations (as per ZD.7 standards):

- ZD.7(a) 1: Flash and Sparks – A controlled flash and minor sparks were observed during testing, which were contained effectively within the switchboard.
- ZD.7(a) 2: External Doors Intact – All external doors of the switchboard remained intact and secure during and after the arc fault.
- ZD.7(a) 3: No Component Dislodged – No internal components were dislodged during the test, indicating the structural integrity of the switchboard.
- ZD.7(b) 1: Fully Operational – The switchboard remained fully operational following the arc fault test, with no disruption to its functionality.
- ZD.7(b) 2: Pass – The design passed all test criteria, confirming that the system is fully compliant with the relevant safety standards.

Arc Proof Testing Insights:

Testing involved fault scenarios on the line side of protective devices, along with arc tests on both vertical and horizontal bus bars, as well as take-off and incoming cable connections. These tests went beyond standard procedures, focusing on the special tests that do not rely on the limitation of protection devices to interrupt arc faults. This allows for a more comprehensive understanding of how the system handles arc events.

Safety and PPE Considerations:

One of the significant advantages of the ArcProof design is the reduced need for extensive personal protective equipment (PPE) during normal operation, unlike traditional systems that may require higher-level PPE to guard against arc flashes, the ArcProof system ensures that:

Standard PPE Category 0 is sufficient, as the design prevents arc flashes from occurring outside the switchboard. This enables personnel to approach and operate the switchboard more efficiently and comfortably, without the need for specialized high-category arc flash PPE, improving operational safety and ease. **Note #**

Conclusion:

The Arc Proof design in the VeCab™ modular switchboard system is a pioneering solution for arc fault containment. It goes beyond traditional containment methods by quenching and controlling arc faults, ensuring predictable arc travel and self-extinguishment. Extensive testing, including a 50,000-amp test current and rapid fault interruption, proves its effectiveness in protecting both personnel and equipment.

This innovative design not only meets but surpasses industry standards, providing a safer, more efficient, and maintenance-friendly approach to arc fault containment. The Arc Proof system represents the future of electrical safety, allowing personnel to work with confidence, knowing the risks associated with arc faults have been mitigated effectively.

Note # Normal operation is limited to general switching tasks or operation of control equipment with all doors closed.



The image shows the testing process with cotton gauze mounted in front of the assembly to represent operator zone.