IEC 61439-1 & 2 standard

The reference for safe and reliable LV switchboards
IEC61439-1 & 2
The power of a standard adapted to your needs

IEC standards are today legal or market references. The new IEC 61439-1 & 2 is the reference for the construction of electrical LV switchboards.

IEC 61439 fully satisfies the requirements of designers and users of new generation LV switchboards: safety of persons and equipment, electrical availability, long-term reliability and conformity.

To guarantee these essential values, the standard sets a wide range of requirements. These include designing a “system” compliant in all aspects, checking interactions and consistency between switchgear and equipment, providing protection against electrical, mechanical and structural hazards, and simplifying system maintenance and upgrading cycles.

Schneider Electric/IEC Standard: a long success story

Ever since the construction of its first electrical switchboard, Schneider Electric has never ceased its commitment to Assembly Manufacturers to guarantee “fully compliant” systems, and so much more. Schneider Electric has always considered that conformity of its solutions to IEC standards was a minimum, a springboard allowing it to go further still in its offer to users. And indeed, in its role as Original Manufacturer, Schneider Electric constantly proves on an everyday basis that it does so.

30 years experience in the construction of tested switchboards (and the associated standards).

100% of switchboard architectures are tested and conform to IEC standards.

Full support
For panel-builders and contractors

3 million Schneider Electric tested LV electrical distribution switchboards in operation world-wide.
Standard IEC 61439 clearly defines the type of verifications that must be conducted by both organisations involved in final conformity of the solution: the Original Manufacturer, guaranteeing assembly system design and the Assembly Manufacturer, responsible for the final conformity of the switchboard.

Original Manufacturer
The organisation that has carried out the original design and the associated verification of an assembly system. He is responsible for the "Design verifications" listed by IEC 61439-2 including many electrical tests.

Assembly Manufacturer (Panel builder)
The organisation (whether or not the same as the OM) responsible for the completed assembly. He is responsible for "Routine verifications" on each panel produced, according to the standard. If he derivates from the instructions of the original manufacturer he has to carry out again design verifications.

End-User
Should ask for a certified LV switchboard. By systematically requesting routine verifications, he ensures that the assembly system used is compliant.

Specifier
> Specifies the needs and constraints for design, installation, operation and upgrading of the complete system.
> Checks that its requirements have been fully integrated by the Assembly Manufacturer. Depending on the application, the specifier could be the end-user or a design office.

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Project specification*

* Schneider Electric has developed a specification guide.
The main 10 functions of standard IEC 61439

Safety

Voltage stress withstand capability

<table>
<thead>
<tr>
<th>Needs &amp; design requirements</th>
<th>Design verification</th>
<th>Routine verification</th>
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</table>
| Insulation to withstand long-term voltages, transient and temporary overvoltages guaranteed through clearances, creepage distances and solid insulation. | > Measurement of clearances and creepage distances  
> Power frequency dielectric test  
> Impulse withstand voltage test, when clearances are greater than specified values | > Visual inspection of clearances (subject to design conditions and creepage distances)  
> Power frequency dielectric test |

Current-carrying capability

<table>
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| Protect against burns by limiting excessive temperatures:  
> when any single circuit is continuously loaded to its rated current and  
> when any circuit is continuously loaded to its rated current multiplied by its rated diversity factor. | > Temperature rise tests  
> Or comparison with a tested reference design, under restrictive conditions  
> Or, under very restrictive conditions, calculations with safety margins (including 20% derating of devices) | > Visual inspection  
> Random verification of tightness |

Short-circuit withstand capability

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| Withstand short-circuit thanks to short-circuit protection devices, short-circuit coordination, and capability to withstand the stresses resulting from short-circuit currents in all conductors. | > Short-circuit tests (Icc and Icw) of the main circuit, including the neutral conductor, and of the protection circuit  
> Or comparison with a tested reference design under restrictive conditions | > Visual inspection |

Protection against electric shock

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| Hazardous live parts are not accessible (basic insulation protection) and accessible conductive parts are not hazardous for life (fault protection, and continuity of protective equipotential bonding). | > IP XXB test and verification of insulating materials  
> Mechanical operation tests  
> Verification of dielectric properties  
> Measurement of the resistance between each exposed conductive part and the PE terminal  
> Short-circuit strength of the protection circuit | > Visual inspection of basic and fault protection  
> Random verification of tightness of the protective circuit connections |

Protection against fire or explosion hazard

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| Protect persons against the fire hazard: resistance to internal glowing faulty elements, through selection of materials and various design provisions. | > Glow wire test  
> Special test according to IEC TR 61641, where specified | None |
The main 10 functions of standard IEC 61439 contribute to the achievement of 3 basic goals: compliance with end-user requirements.

### Maintenance and modification capability

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| Capability to preserve continuity of supply without impairing safety during Assembly maintenance or modification. Through basic and fault protection and optional removable parts. | > IP tests  
> Mechanical operation tests (especially for removable parts) | > Effectiveness of mechanical actuating elements  
> Check protection of persons against electric shocks |

### Electro-Magnetic Compatibility

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<tbody>
<tr>
<td>Properly function and avoid generation of EMC disturbances through incorporation of electronic devices complying with the relevant EMC standard, and their correct installation.</td>
<td>&gt; EMC tests according to product standards or generic EMC standards</td>
<td>None</td>
</tr>
</tbody>
</table>

### Capability to operate the electrical installation

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| Properly function, according to:  
> The The electrical diagram and the specifications (voltages, co-ordination, etc.) by selecting, installing and wiring the appropriate switching devices.  
> The specified operating facilities (Access to Man-Machine Interfaces, etc.) through accessibility and identification. | > By inspection  
> Impulse withstand voltage test of isolating distance for optional withdrawable units | > Visual inspection  
> Effectiveness of mechanical actuating elements and function test (where relevant) |

### Capability to be installed on site

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| Withstand handling, transport, storage and installation constraints, and be capable to be erected and connected through selection or design of the enclosure and the external terminals, and by means of provisions and documentation. | > By inspection  
> Lifting test, taken from IEC 62208 | > Number, type and identification of terminals for external conductors |

### Protection of the Assembly against environmental conditions

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| Protect the Assembly against mechanical and atmospheric conditions through selection of materials and various design provisions. | > IP test  
> IK test  
> Corrosion test  
> UV test (outdoor only) | None |
IEC 61439 and Schneider Electric

From small tertiary to large industrial sites, Schneider Electric requirements but also improving significantly safety, operating

Small tertiary / buildings

Offers

Safety

“Linergy” busbar

- Provides optimum performance in Icw withstand (1s short circuit) with a third of the weight of equivalent rating Copper busbar. Front access to all phase connections enables direct and safer maintenance approach.
- Some 3 times lighter than a standard copper busbar for equivalent short-circuit performances.

“Acti9” circuit-breakers

Guarantee total safety during maintenance and absolute protection against electric shocks, provide zero-risk lockdown, protect loads, etc.

Functional units and panel components

Guarantee electrical continuity of Prisma Plus switchboards thanks to scribe system.

Fastening grids

Attached to front plates, door hinges and panels, they guarantee electrical continuity at the 1st assembly ¼ turn.

Continuity of service

“Compact NSX” circuit-breakers

Total discrimination, remote indication of motor overloads and actuation of a contact switch (SDTAM module), direct access to maintenance indicators, etc.

“Polypact” row splitter blocks

For practical and reliable device rows: total insulation, reliable connection without maintenance.

“Distribloc” centralised splitter blocks

Modular quick-connection monobloc splitter blocks

Compliance with end-user requirements

Specifier guide

A reference support designed by Schneider Electric to guarantee fully compliant specifications (end-users) and assemblies (Assembly Manufacturer).

* Using only Schneider Electric devices guarantees the compliance with IEC as well as the reliability of installations.
solutions: 100% compatible!
designed a plenty of solutions answering to IEC61439-1 & 2 availability and cost control...for a long time."

Large industrial sites

**Offers**

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### Safety

**Locking of live parts**
- High level of safety and protection, preventing all on-load operations: IP20 shields, connections protected by a plug-in outlet, access possible to switchgear only after opening the circuit-breaker and withdrawing the drawers, status indicators to prevent risk of error, etc.

**Thermal monitoring**
- Thermal monitoring of temperature rises using probes installed at the heart of the sensitive areas (e.g. busbars, drawer contacts), thus reducing the likelihood of failure and shortening maintenance times.

**“PolyFast” system**
- The PolyFast partitioned terminals guarantee perfect insulation of connection against electric shocks.
- A Schneider Electric exclusivity!

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### Continuity of service

**“Tesys U” motor feeder**
- Modular concept offering excellent open-endedness, without uncabling the power base.
- Functional units replaced or added easily, without need for tools.
- 3 in 1 systems are available: simple, open-ended and compact.

**Modularity of functional switchboards**
- Can be modified or upgraded easily.
- Free spaces are provided for "last minute" addition of motor feeders or new functions.

**“Masterpact” circuit-breakers**
- Designed to automatically monitor and manage the energy sources of the LV distribution network, thus guaranteeing installation reliability.

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### Compliance with end-user requirements

**Specifier guide**
- A reference support designed by Schneider Electric to guarantee fully compliant specifications (end-users) and assemblies (Assembly Manufacturer).

**Withdrawable drawers**
- All switchboard upgrades are possible with power on, without interruption of service and completely safely.
- 3 positions: connected, test and disconnected.
- Switchboard configurations and settings are made on the front face.

**Withstand to harsh environments**
- Excellent mechanical strength for installations in seismic areas and for sensitive applications.
- Various degrees of protection (IP30, IP41 or IP54) for installations in corrosive atmospheres (e.g. cement works, iron and steel, etc.).

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Schneider Electric
Product inside*
Few upgrades for enhanced safety and durability

IEC 61439 -1 & -2* = Only "Tested assemblies"

IEC 60439 -1 = "Type Tested" & "partially Type Tested"

Overview of the main verification changes (IEC 61439 vs IEC 60439)

> Design verification
- Increased requirements for insulating materials and transient overvoltages withstand tests.
- Temperature rise verification:
  - Verification by test of each functional unit loaded alone with its rated current
  - Clear methods for the selection of representative samples of an Assembly system to be tested
  - Test done in 4 steps: individual functional units, main and distribution busbars, and complete Assembly
  - Heating resistors only allowed to simulate circuits adjacent to a circuit under test
  - Possible verification by comparison with a tested design under strict conditions, including derating
  - Exemption of test (calculation) only allowed up to 1600 A instead of 3150 A under strict conditions, including a 20% derating.
- Possible short-circuit withstand verification by comparison with a tested design under strict condition
- 200 operating cycles instead of 50 for locking, interlocking and withdrawable parts
- Lifting test (from IEC 62208)
- Corrosion resistance test for metallic parts (from IEC 62208).

> Routine verification
- More detailed list of the verifications
- More severe requirements for clearances