

WHITE PAPER

IEC 62271-200: EDITION 3.0: 2021

How do I comply with the newest high-voltage switchgear and controlgear regulation?

DISCOVER THE PATH TO COMPLIANCE FOR SWITCHGEAR ASSEMBLY MANUFACTURERS



CONTENTS

Introduction.....3

DESIGN CONSIDERATIONS4

TESTING CHANGES5

Conclusion.....6

About Intertek.....6

Contact us.....7



IEC 62271-200: EDITION 3.0: 2021
HIGH VOLTAGE SWITCHGEAR AND CONTROLGEAR - PART 200:
AC METAL- ENCLOSED SWITCHGEAR AND CONTROLGEAR FOR
RATED VOLTAGE ABOVE 1KV AND UP TO AND INCLUDING 52KV

INTRODUCTION

With continuous advancements in technologies and increased quality and regulatory requirements, standards are periodically updated to align with industry developments. IEC 62271-200 is the part of the IEC 62271 series of standards for metal-enclosed switchgear and controlgear for rated voltage from 1kV to 52kV. In 2021, these standards were updated to the third edition.

For switchgear assembly manufacturers, it's important to understand the changes between the second and third edition of IEC 62271-200 and what these mean for you. Part 200 of the standard is particularly important because the enclosure of all medium voltage switchgear must comply with this, irrespective of the type of dielectric insulation (Air/sf6/oil/solid insulation etc.)

In this whitepaper we will explore part 200 of the standard, covering the general rules and the specific requirements for various devices like circuit breakers, disconnectors and earthing switches, load break switches and switch fuse combination enclosures. We cover this in two sections on both the changes relevant to product design, and those impacting testing.

Intertek's experts can help guide you through the compliance process, partnering with you at key points in your product development cycle to ensure you are meeting the latest IEC 62271 requirements.

While this whitepaper specifically explores part 200 of the new standard, we can support you with all aspects of the IEC 62271 standard:

STANDARD PART	DESCRIPTION	
IEC 62271-1	High-voltage switchgear and control gear - Part 1: Common specifications for alternating current switchgear and controlgear	<ul style="list-style-type: none">• Part 1: Updated to Edition 2.1 in Oct 2021
IEC 62271-100	High voltage switchgear and control gear - Part 100: Alternating current circuit-Breaker	<ul style="list-style-type: none">• Part 100: Updated to Edition 3.0 in July 2021
IEC 62271-103	High-voltage switchgear and control gear - Part 103: Alternating current switches for rated voltage above 1kv up to and including 52kv	<ul style="list-style-type: none">• Part 103: Updated to Edition 2.0 in May 2021
IEC 62271-105	High-voltage switchgear and control gear - Part 105: Alternating current switch-fuse combinations for rated voltages above 1 kV up to and including 52Kv	<ul style="list-style-type: none">• Part 105: Updated to Edition 3.0 in June 2021
IEC 62271-200	High-voltage switchgear and control gear - Part 200: AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52kV	<ul style="list-style-type: none">• Part 200: Updated to Edition 3.0 in May 2021

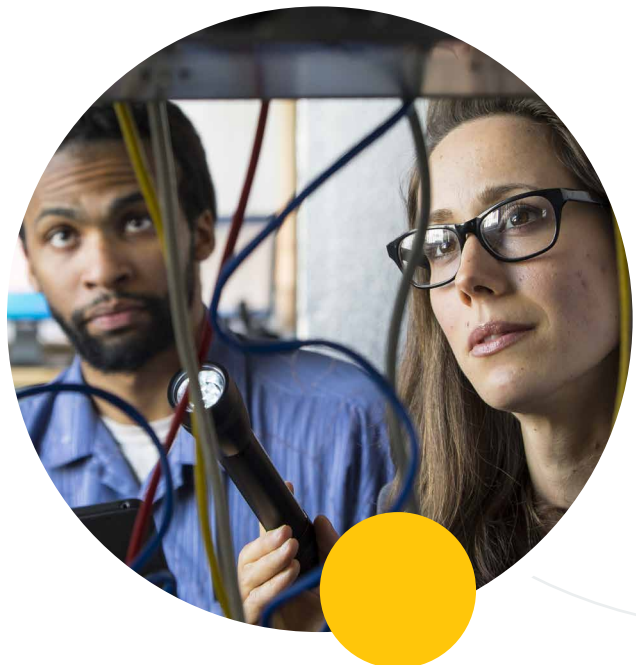
IEC 62271-200: EDITION 3.0: 2021

HIGH VOLTAGE SWITCHGEAR AND CONTROLGEAR - PART 200: AC METAL- ENCLOSED SWITCHGEAR AND CONTROLGEAR FOR RATED VOLTAGE ABOVE 1KV AND UP TO AND INCLUDING 52KV

DESIGN CONSIDERATIONS

There are multiple updates to the IEC 62271-200 standard which impact product design. The following part 200 third edition updates are relevant to design considerations:

- All clauses are aligned with IEC 62271-1:2017
- New definition of “in service”, “normal operating condition”, and “normal use”, plus many new subclauses and terminology added
- Internal arc testing on pole-mounted switchgear is taken out in the new edition and covered by IEC 62271-214:2019
- Latest edition of IEC 62271-100:2021, IEC 62271-103:2021, IEC 62271-105:2021 and IEC 62271-106:2021 are referred to in IEC62271-200: Edition 3
- IEC 62271-107 (alternating current fused circuit-switchers) and IEC IEEE 62271-37-013 (alternating current generator circuit-breakers) are also considered in the verification of making and breaking capacities
- High-voltage compartments: detailed explanation added for the type of compartment, LSC applicability and busbar extensible system
- The term “assembly” is included in terms and definition, and used as a synonym for “metal-enclosed switchgear and control gear”
- Term “metallic” is replaced by “metal”
- The gas-filled compartments with design pressures higher than 300 kPa (relative pressure) must be tested according to the requirements of IEC 62271-203
- Switchgear and control gear assemblies having a solid-insulation enclosure are covered by IEC 62271-201
- Earthing circuit: includes short circuiting between poles and pole to earthing circuit from each pole to earthing point and/or from the short-circuiting point of pole to earthing circuits to the earthing point provided
- For transport units to be assembled during final installation, the resulting earthing circuit must be capable of carrying its rated short-time and peak withstand currents and duration
- Parts of metal enclosures may form part of the earthing circuit
- Detailed explanation included for LSC categories in Annexure D
- In Canada, regulations require the isolating distance to be visible
- In Italy, gas-filled compartments having design pressure exceeding 0.2 bar (G) or a volume exceeding 2m³ must be designed as per the Italian pressure vessel code for electrical switchgear.



IEC 62271-200: EDITION 3.0: 2021

HIGH VOLTAGE SWITCHGEAR AND CONTROLGEAR – PART 200: AC METAL- ENCLOSED SWITCHGEAR AND CONTROLGEAR FOR RATED VOLTAGE ABOVE 1KV AND UP TO AND INCLUDING 52KV

TEST CHANGES

There are multiple updates to the IEC 62271-200 standard which impact product testing. The following part 200 third edition updates are relevant to design considerations:

- The resistance measurement on the main circuit is only needed before continuous current tests as a reference for routine tests and is no longer needed after the continuous current test
- Earthing circuit is excluded from resistance measurement in STC tests
- After STC tests on each earthing circuit, some deformation and degradation of earthing devices, earthing conductors, earthing connections and other conductive parts forming part of earthing circuit is permissible, continuity of the circuit has been preserved. The voltage drop must be tested at 30A (DC) in case of doubt, voltage drop must be lower than 3V
- Internal arc tests:
 - The tests must be made in all high-voltage compartments of a functional unit, as close as possible to the lateral side and furthest away from the wall of the room simulation
 - Test reports must be included with the last three half-cycles and the prospective RMS value, in addition to the RMS value of the AC component during the first half cycle, and duration of the test current
 - Reference of IEC TR 62271-307:2015 must be added to extend validity of test result
 - Additional requirement in acceptance criteria 1: "no openings with a dimension larger than 50mm occurred in the classified sides up to a height of 2000mm" added
 - Additional requirement in acceptance criteria 4: "Indicators do not ignite during the test and within 1 second after the current duration"
 - The ceiling height used for the indoor test is considered as minimum height for the shelter
 - Detailed explanation introduced for indicator positioning in case of protrusion at <2000mm height at classified side
 - Additional horizontal indicator must be placed at 100mm above the bottom exhaust duct, if duct is part of assembly
- For mechanical and electromechanical interlocks and locking devices, the number of attempts to defeat the interlocks and locking devices for verification is reduced
- The values are defined for the application of prospective forces or torque must be applied during the mechanical interlocks and locking devices test
- The number of attempts to verify the mechanical interlock to prevent access to the operation of motorized switching devices has been reduced
- Additional performance requirements in mechanical operation tests are added based on the mode of operations
- Additional verification requirements in mechanical operation tests have been added.



INTERTEK SERVICES

Our experts can help you with a wide range of associated services, including:

- ASTA & ASTA Diamond Mark
- ETL Listed Mark
- Arc flash hazard analysis & labelling
- Corrosion monitoring system
- Forensic engineering services
- Failure analysis and investigation

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CONCLUSION

As you can see, the third edition of IEC 62271-200 has introduced numerous changes which impact design and testing considerations for switchgear assembly manufacturers to ensure their products' compliance.

If you want to understand the next steps to ensure your products' compliance with the updated IEC 62271 standard, our experts are here to help. We can test to both the current and new editions of the IEC 62271 standard, and are helping our clients upgrade to the new edition in the best way for their business and requirements.

ABOUT INTERTEK

We offer a comprehensive range of consulting, design, testing, certification, and advisory services to help you make sure all aspects of your products are safe and compliant. With a network of over 1,000 laboratories across more than 100 countries, we can provide local certification at your sites, helping you to save time and money. Our certification marks are accepted by major electrical utilities and authorities around the world.

As an accredited third-party certification body, Intertek's testing and certification activities are fully independent of manufacturer or end-user interests. Intertek strictly follows ISO 17025 rules for laboratories and ISO 17065 rules for Certification Bodies. These processes are reviewed and validated for each manufacturer facility as well as for each commercial laboratory during each new test campaign. Intertek's process provides confidence that any laboratory contributing to the certification process undergoes stringent auditing by laboratory experts.

Contact us today to discuss your high-voltage (HV) and medium-voltage (MV) switchgear products.

International Considerations: ETL and ASTA Marks for Global Market Access

Across Europe and Asia, power transformers must be tested and certified for compliance with IEC standards. To demonstrate your product's compliance with these standards, Intertek recommends certification via the **ASTA Mark**.

In North America, these products must be tested and certified for compliance with IEEE, NEMA, and UL standards as they will be interacting with similarly regulated equipment as part of transmission systems. To demonstrate compliance with these standards, Intertek recommends certification via the **ETL Mark** as well as the **ASTA Mark** to allow access to the widest variety of global markets.

ASTA **Certificates** and **Reports** have international recognition, including a very high-profile in Asia and the Middle East, and are often specified by major end users. The ASTA marks and/or type test certificates clearly indicate that the product has been independently tested to comply with the relevant clauses of the applicable standards. Intertek offers a variety of ASTA tests and certificates; an Intertek expert can recommend the best solution for your products.



Intertek is a leading Total Quality Assurance provider to industries worldwide. Our network of more than 1,000 laboratories and offices in more than 100 countries, delivers innovative and bespoke Assurance, Testing, Inspection and Certification solutions for our customers' operations and supply chains. Intertek Total Quality Assurance expertise, delivered consistently with precision, pace and passion, enabling our customers to power ahead safely.

FOR MORE INFORMATION



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