KEMA Labs

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Internal Arc Testing of Switchgear Assemblies

Validating Equipment Performance to Ensure Safety and Reliability Under Extreme Conditions

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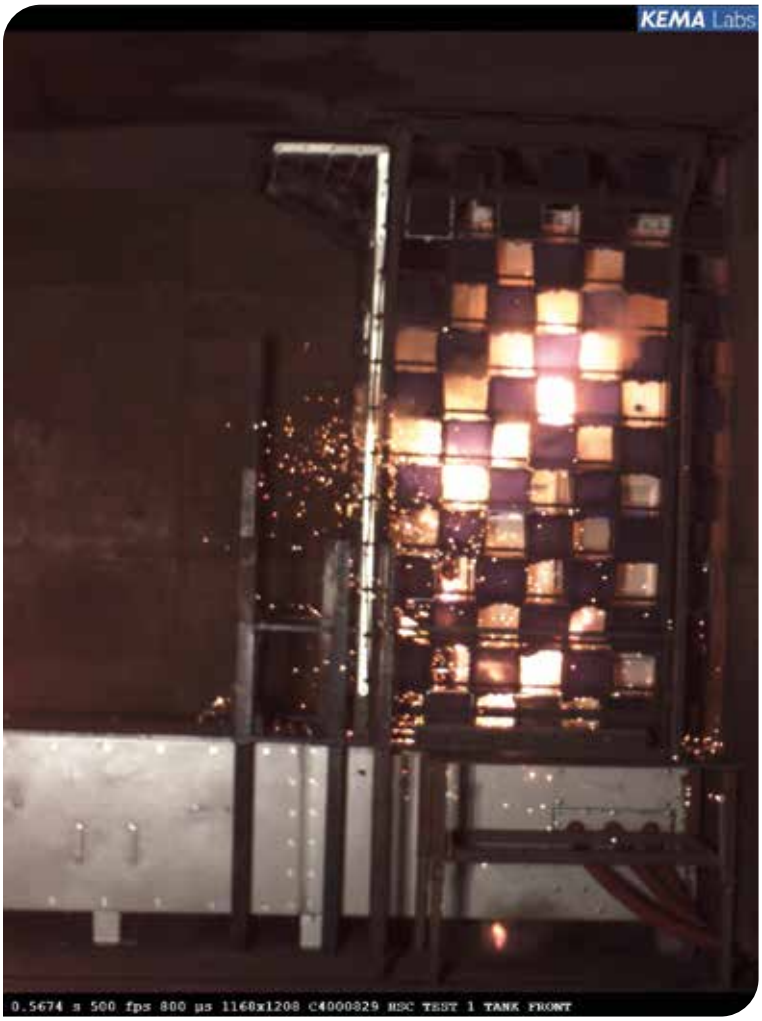
Internal Arc test of Switchgear Assemblies

At KEMA Labs, safety is at the core of everything we do. Ensuring the reliability and protection of electrical equipment is essential to prevent hazardous situations that could put people and infrastructure at risk. An internal arc test is a critical assessment that validates the safety conditions of equipment under the extreme scenario of an internal arc fault. This test evaluates how securely the equipment behaves during such a violent fault, ensuring protection for both the surrounding environment and personnel.
Through Lab Testing, we replicate actual internal arc events, pushing equipment to its limits to assess its resilience and containment capabilities. By verifying compliance with international safety standards, we deliver the highest level of confidence in real-world protection, safeguarding people, infrastructure, and the power systems we all rely on.



Focus on Standards and Performances

KEMA Labs conducts internal arc classification (IAC) testing in accordance with IEC 62271-200, IEC 62271-202, and IEEE Std C37.20.7, ensuring compliance and safety under arc fault conditions:

Main Features

- Highly specific internal arc test bay for maximum customer efficiency during shifts with moveable ceiling
- Testing in pressure-tight cells with dynamic pressure measurements.

Products Expertise

- MV Metal Enclosed Switchgear and Ring Main Units
- Medium Voltage Circuit Breaker Testing
- Prefabricated Substations including MV Switchgear Panels
- Low Voltage Switchgear and Panels

Selected applicable standards:

- IEC 62271-200
- IEC 62271-202
- IEEE Std C37.20.7

IEC 62271-200 Testing

The **IEC 62271-200 standard** defines **internal arc classification (IAC) for medium-voltage switchgear**, ensuring protection based on **who has access to the equipment and from which sides**:

- **Accessibility classification:**
  - **Type A** - Protection for **authorized personnel** operating the equipment
  - **Type B** - Protection for the **general public** who may be near the equipment
- **Classified sides of exposure:**
  - **F (Front)** - Ensures protection from arc faults occurring at the front side
  - **L (Lateral)** - Covers lateral exposure in case of an internal arc
  - **R (Rear)** - Guarantees safety from rear-side arc faults

This classification ensures that **switchgear manufacturers can certify their equipment for safe operation**, reducing **injury risks and improving compliance** with international safety regulations.

IEC 62271-202 Testing

For prefabricated substations, **IEC 62271-202** extends **IAC testing** to assess the safety of **enclosures housing MV switchgear**. It defines the following **accessibility levels**:

- **Type A** - Protection for **operators** working inside the substation
- **Type B** - Protection for the **general public** near the substation
- **Type AB** - **Combined protection**, ensuring safety for both operators and the public

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Arc Testing for North America

IEEE Std C37.20.7 Testing

Verifying Performance Features for North American Markets

For equipment installed in North American markets, IEEE Std C37.20.7 provides an equivalent framework for internal arc testing, defining accessibility levels and additional performance features:

Accessibility Types:

- **Type 1** - Equipment is **freely accessible only from the front**
- **Type 2** - Equipment is **freely accessible from all sides (front, back, and lateral sides)**

Performance Features (Suffixes):

- **A** - **Base rating** with no additional performance enhancements
- **B** - Contains a **low-voltage control or instrumentation compartment**
- **C** - Designed for **compartmentalized isolation**, preventing arc effects from spreading within the switchgear
- **D** - Specifically designed for **restricted access** installations, where space constraints limit accessibility

By **adhering to IEEE Std C37.20.7**, manufacturers can certify **switchgear for use in North America, ensuring that equipment meets safety and accessibility requirements for different operational environments**.

Global Type Testing and Certification

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KEMA Labs offers a range of worldwide recognized and accepted deliverables including:

Type Test Certificate of Internal Arc Performance

Proves that MV switchgear assembly has been fully tested according to relevant standard:

- all different types of compartments have been tested successfully,
- in case of more compartments of same design, the most onerous one has been tested successfully,
- drawings have been verified.

Type Test Certificate is fully in accordance with guidelines of STL (short-circuit testing liaison).

Report of Performance / Type Test Report

Proves that certain compartment, which is of particular interest to customer, has been fully tested according to relevant standard, and the drawings have been verified.

Test Report

Gives results in all other cases:

- test procedure has been adjusted by customer,
- tests were performed according to customer's special procedure,
- drawings have not been verified,
- test failed.

KEMA Labs is one of the founding member of STL (Short Circuit Testing Liaison) and most of the test and type test certification programs are conducted according to the relevant standard and the valid version of the STL Guide associated.
Other deliverables include Type Test Reports, Test Reports, Inspection Reports and Certificate of Conformity. These documents certify the quality and performance of products based on rigorous testing standards and help facilitate global trade by ensuring compliance with international regulations.

KEMA Labs is a well-recognized conformity assessment body, accredited according to ISO/IEC 17025, ISO/IEC 17020, and ISO/IEC 17065 standards.

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KEMA Labs is CESI's world-leading Testing, Inspections & Certification business unit. With locations worldwide we blend decades of expertise with cutting-edge technology to test all types of grid equipment, from low to ultra high voltage, ensuring top performance and full compliance with the most demanding safety standards.

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