

Low Voltage White Paper

IEC TS

63107

KEMA Labs

▲ Bringing safer products to worldwide market with the new IEC TS63107

LV switchgear assemblies are undoubtedly the components of the electric installation more subjected to the direct intervention of personnel (operations, maintenance, etc.). In case of wrong action or external fault (caused i.e. by animals) an Arc faults may happen and result in catastrophic damages to both switchgear assemblies and humans. Besides, there may be operational losses to critical production processes, which are forced to downtime in case of breakdown. Within a few milliseconds, high amounts of energy are released, generating heat, a pressure wave and toxic gases, like an explosion. Such damages might be reduced by using arcing fault mitigation devices with a quenching time of less milliseconds.

Recently officially published, therefore now available for utilization, the IEC TS 63107 states the requirements for integration and testing of internal arc-fault mitigation systems in low-voltage switchgear and control gear assemblies – PSC-assemblies according to IEC 61439-2 to demonstrate their correct operation.

KEMA Labs experts, as a member of the IEC Project Team PT63107, have given a strong contribution, working closer with more than 30 worldwide experts to elaborate the new Technical standard, which brings some new safety concept on the LV Switchgear assembly market.

Which is the scope of the TS63107?

- ▶ The TS states the requirements for integration and testing of IAMS (Internal Arc Mitigation System, see fig. 1) in Low-voltage PSC-assemblies according to IEC 61439-2 to demonstrate their correct operation.
- ▶ **It does not address personnel safety or damage to the PSC-assembly. These requirements are dealt with IEC TR 61641.**
- ▶ IAMS consist of control devices (IACD) **and** arc-fault reduction devices (IARD) complying with their relevant product standards.

Requirements with respect to construction and performance as well as to testing for the reliable function of an IAMS under built-in conditions are also addressed.

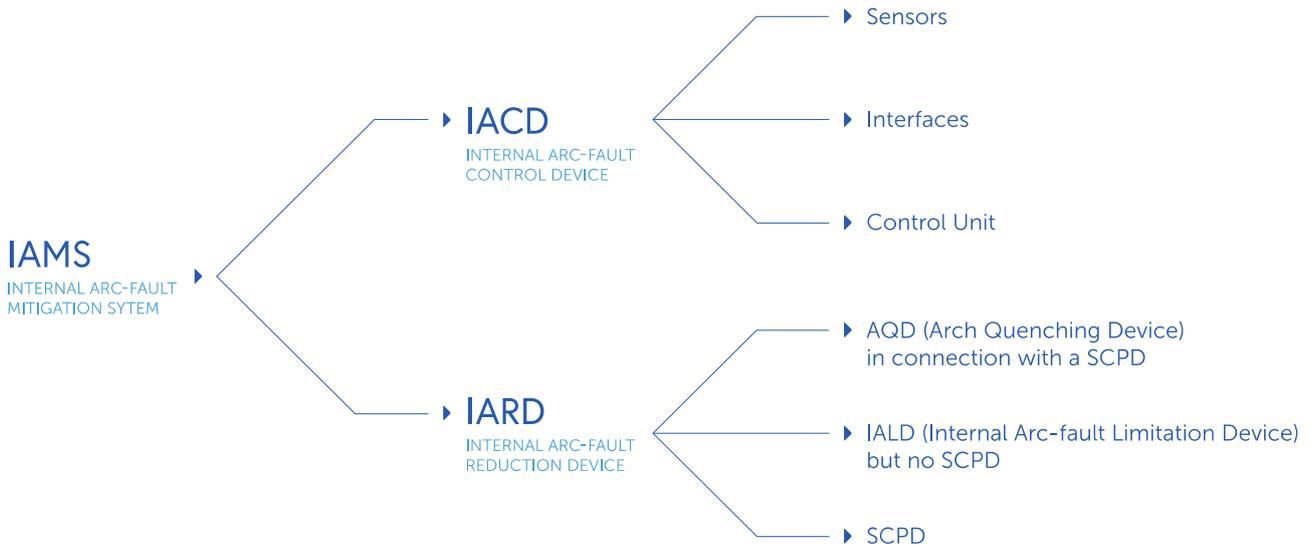


FIG.1

Which are the product standards for the Arc Mitigation Systems?

The arc mitigation systems have their own product standard as the IEC 60947-9-1 (Arc Quenching Devices) and IEC 60947-9-2 (Active arc-fault combined mitigation systems - Optical-based internal arc-detection and combined mitigation devices).

The [Fig.2](#) and [Fig.3](#) below, shows the relationship of the existing standard with the new IEC TS63107.

IEC 61439-1

Low-voltage switchgear and controlgear assemblies — General rules



IEC 61439-2

Low-voltage switchgear and controlgear assemblies — Power switchgear and controlgear assemblies



IEC TR 61641

Enclosed low-voltage switchgear and controlgear assemblies - Guide for testing under conditions of arcing due to internal fault



IEC 60947-9-1

Low-voltage switchgear and controlgear assemblies — General rules

IEC 60947-9-2

Active arc-fault combined mitigation systems — Optical-based internal arc-detection and combined mitigation devices

FIG.2

IEC 61482-1-1

Live working —
Protective clothing against the thermal hazards of an electric arc

Test method 1: Determination of the arc rating of flame resistant materials for clothing

IEC 61482-1-2

Live working —
Protective clothing against the thermal hazards of an electric arc

Test method 2: Determination of arc protection class of material and closing by using a constrained and directed arc (box test)

IEC TS 63107

IEC 60364-4-42

Protection for safety —
Protection against thermal effects

IEC 60364-5-53

Selection and erection of electrical equipment —
switchgear and controlgear

FIG.3

Which are the differences between the TS63107 and the TR 61641?

One of the most common question is related to the existing Technical Report IEC61641 and its specifics when compared to the new IECTS63107.

These two documents have a completely different scope even when referring to the result of an internal arc fault on the switchgear assembly.

The Technical report IEC61641 gives guidance on the method of testing of assemblies under condition of arcing fault, therefore the purpose is to assess the ability of the assemblies to limit the risk of personnel injury, damage of the assembly and its suitability for further service as a result of an internal arcing fault.

It is, therefore, clear that the two IEC documents have a completely different scope and shall be not chosen as alternatives.

Future prospect and further procedure

During the development of the TS 63107 the project team raised the question on how to reorganize / harmonize the classification of TR61641 with respect to the new features coming out of IAMS in PSC-ASSEMBLIES.

The following procedure has been determined

- ▶ Keep IEC TR 61641 separate from 61439 series and start the maintenance project IEC TR 61641 edition 4
- ▶ After the IEC TS 63107 was published in April 2020, it is now being analyzed how it is positioned in the market and what conclusions can be drawn for the maintenance of the IEC TR 61641

Who is responsible for the correct use and installation of this system?

In order to install, and most importantly, to correctly use the IAMS, the new TS specifies additional tests to demonstrate the correct functioning of the entire arc protection system under built-in conditions.

This means that the original manufacturer and / or the assembly manufacturer, further to the design verification to be performed as per the IEC61439-2 below described:

Construction

- 10.2 Strengh of materials and parts
- 10.3 Degree of protection of enclosures
- 10.4 Clearances and creepage distances
- 10.5 Protection against electric schock and integrity of protective circuits
- 10.6 Incorporation of switching devices and components
- 10.7 Internal electrical circuits and connections
- 10.8 Terminals for external conductors

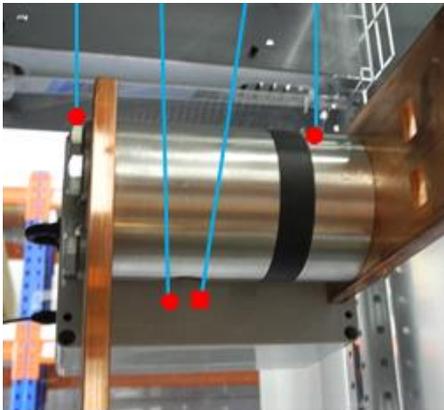
Performance

- 10.9 Dielectric properties
- 10.10 Verification of temperature rise
- 10.11 Short-circuit withstand strengh
- 10.12 Electromagnetic compatibility
- 10.13 Mechanical operation

Shall perform the additional design verification tests by the new TS63107 includes the following:

- 10.10.1 Additional tests to verify the temperature-rise
- 10.11.1 Additional tests to verify the short-circuit withstand strength of the AQD-circuit (wanted, internal, metallic short-circuit)
- 10.101.2 Verification of arc-fault detection by test
- 10.101.3 Verification by test that unintended operation will not occur
- 10.101.4 Verification of an IAMS in PSC-assemblies by test
- 10.101.5 Performance after powering or repowering

KEMA Labs Low Voltage, located in Berlin, thanks to its long and recognized experience in testing of Low Voltage components and mainly switchgear assembly, has recently performed several tests both for assembly and IAMS manufacturers to check the combination of these systems.



Example of measuring points on the AQ



Ignition point and status indication of arc fault detection test

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