

## **Heat resistance testing of switch disconnectors**

Requested by: ABB Oy

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Protection and Connection  
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**Order** Minna Vainionpää, 27.9.2016

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**Task** **Heat resistance testing of switch-disconnectors**

**Test method** ABB Oy assigned VTT Expert Services ltd (VTT) to develop a special heat resistance test method and furthermore to test the heat resistance of its switch-disconnector products. The switch-disconnectors are intended to be used in conjunction with powered smoke and heat control ventilators and therefore the switch-disconnector could also be installed inside a smoke reservoir and subjected to heat during its operation.

The customer assigned VTT to verify that the switch-disconnectors are able to withstand the same temperatures as the powered ventilators. A product standard exists for switch-disconnectors (IEC 60947-3) but it does not include high heat resistance testing and furthermore no (switch-disconnector specific) test standard exists to verify the functionality of the switch-disconnectors when subjected to heat (200 °C). Therefore a special heat resistance test was designed for the above mentioned purpose. The customer specified that the switch-disconnectors should last at least in similar temperature condition as a F200 (200 °C for 120 min) classified powered smoke and heat control ventilator (the test class F200 refers to the standard EN 12101-3 for powered heat and smoke exhaust ventilator). The following chapters document the planned special testing.

The test series included the fire tests and dielectric strength tests (after the fire tests) to define the insulation resistance of the test specimen.

The functionality of the switch-disconnector auxiliary contact (secondary switching device to give indication of the state of operation) was inspected after the fire test.

**Test specimen** Switches are mechanical switching devices capable of making, carrying and breaking currents under normal circuit conditions. Disconnectors are mechanical devices that fulfil in the open position the requirements specified for the isolation function (according to IEC 60947-1). Switch disconnectors combine the properties of (load) switches and disconnectors.

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The test results relate only to the sample tested

The following table 1 presents the test specimen. An assessment was made to evaluate the coverage of the test regarding the whole product family. The assessment is presented in Appendix 4.

*Table 1. Test specimen*

Specimen ID	Model of the switch	Model of the enclosed switch:	Cable:	Drawings:
A3	OT100F4N2	OTL75T4U	REKA FRHT-EMC 4x50/25 F4A 0.6/1kV	- KOT60790 / OTLK33S - OTL70 90T3
A4	OT40F4N2	OTL16T4B	REKA FRHT-EMC 4x10/10 F4A 0.6/1kV	- KOT60915 / OTLK11B - OTL16 36T3
A5	OT80F4N2	OTL36T4B	REKA FRHT-EMC 4x25/16 F4A 0.6/1kV	- KOT60915 / OTLK11B - OTL16 36T3

Drawings and customer delivered

Information of the products:

Appendix 1

Manufacturer of the tested enclosed switch-disconnectors: ABB

**Date of tests** 25<sup>th</sup> – 26<sup>th</sup> October 2016.

**Witnesses** Jukka Lintamo (ABB)

**Test set-up** Fire tests

The tests were performed at the VTT Expert Services Ltd (VTT) small test laboratory (Kivimiehentie 4) in Espoo, Finland. The test set-up consisted of a furnace, a fume chamber, a current circuit and measuring devices. The specimens were fixed inside the furnace and the furnace inside the fume chamber.

A power circuit loop was built up from a power supply through the specimen in the furnace in order to be able to define the functionality of the test specimen. Each specimen had a separate power circuit loop. The power loop equipment is presented in table 2. The test current was adjusted to the operating range maximum value. For safety reasons the voltage was kept small. The current loop current was measured and verified by calibrated equipment prior to test and during the test.

The test results relate only to the sample tested