Heat resistance testing of switch disconnectors

Requested by: ABB Oy

VTT EXPERT SERVICES LTD

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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 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 (300 °C). Therefore a special heat resistance test was designed for the above mentioned purpose. The customer specified that the switch-disconnector product family should last at least in similar temperature condition as a F300 (300 °C for 120 min) classified powered smoke and heat control ventilator (the test class F300 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 dielelectric strength tests (after the fire tests).

The Auxiliary Contacts (secondary switching device to give indication of the state of operation) were not tested.

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.

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:
A6	OT250E12	OKA250P3B	REKA FRHT-EMC 4x120/70 F4A 0.6/1kV	2CMR201077A1001-Z23
A7	OT400E03	OKA400P3B	REKA FRHT-EMC 4x240/120 F4A 0.6/1kV	2CMR201052-Z23
A8	OT630E03	OKA600P3B	2 x REKA FRHT-EMC 4x240/120 F4A 0.6/1kV	2CMR201058-Z23

Drawings and customer delivered Information of the products: Appendix 1

Manufacturer of the tested enclosed switch-disconnectors: ABB

Date of test 21st November 2016.

Witness Jukka Lintamo, ABB

Test set-up

Fire tests

The tests were performed at the VTT Expert Services Ltd structural fire test hall (Kivimiehentie 4) in Espoo, Finland. The test set-up consisted of a furnace, a current circuit and measuring devices. The specimens were fixed to brackets and the brackets were placed inside the furnace in the tests.

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 (declared by the manufacturer). For personnel 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.