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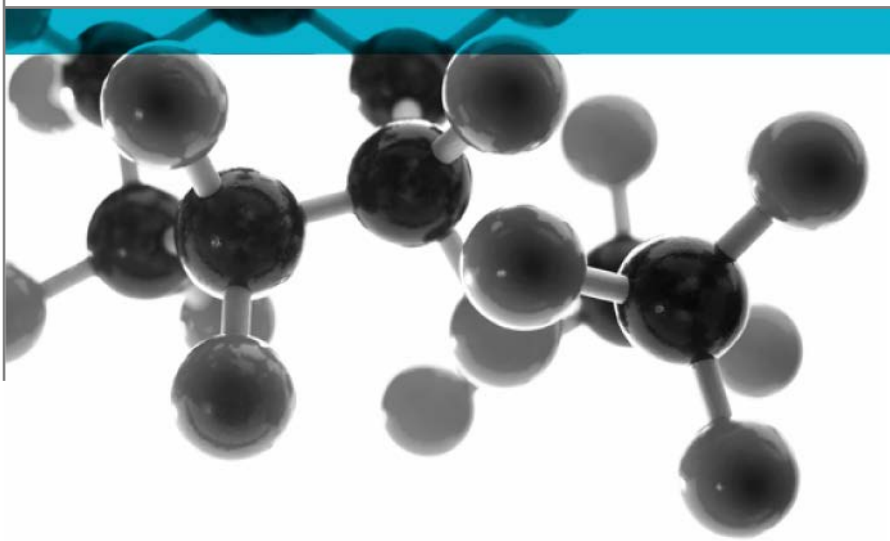
IEC 60331-11-21



Method of test defined in IEC 60331-11 / -21 for determining the circuit integrity of electric cables under fire conditions

A Report To: Berica Cavi S.P.A

Document Reference: 417736

Date: 8th October 2019

Issue No.: 1

Executive Summary

Objective To determine the performance of the following cable when it is subjected to the conditions of test specified in IEC 60331-21: 1999, utilising the test apparatus detailed in IEC 60331-11:1999 + A1: 2009.

Generic Description	Product reference	Diameter / thickness / c.s.a	Weight per unit length / density
Cable for fire detection sensors	"Eurosafe Flex"	8.70 ± 0.3mm	110kg/km
Individual components used to manufacture composite:			
Outer sheath	Unwilling to provide	Unwilling to provide	1.50kg/dm^3
Electrostatic screen	Unwilling to provide	Unwilling to provide	Unwilling to provide
Drain wire	Unwilling to provide	0.5mm^2	Unwilling to provide
Clear tape	Unwilling to provide	Unwilling to provide	Unwilling to provide
Conductor insulation	Unwilling to provide	Unwilling to provide	1.50kg/dm^3
Mica tape	Unwilling to provide	Unwilling to provide	170g/m^2
Conductors	Unwilling to provide	1.50mm^2	Unwilling to provide
Please see page 5 of this test report for the full description of the product tested			

Test Sponsor Berica Cavi S.P.A, Via Della Meccanica 2, 36040 Meledo di Sarego, Vicenza, Italy.

Test Results: **When tested in accordance with the procedures specified in IEC 60331-21: 1999, utilising the test apparatus detailed in IEC 60331-11: 1999 + A1: 2009, at a temperature of at least 750^{0}C and at a rated voltage of 1000 V-rms, the cable maintained it's circuit integrity for the full 195 minute test duration. (Consisting of a 180 minute flame application period, plus a 15 minute cool down period).**

Date of Test 24th September 2019

Signatories

Responsible Officer C. Jacques * Senior Technical Officer	Authorised S. Deeming * Business Unit Head

* For and on behalf of Warringtonfire.

Report Issued: 8th October 2019

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Test Details

Purpose of test

To determine the performance of a specimen of a cable when it is subjected to the conditions of test specified in IEC 60331-21: 1999, utilising the test apparatus detailed in IEC 60331-11:1999 + A1: 2009. The purpose of this test method is to determine whether a cable can maintain circuit integrity when it is exposed to the fire conditions described within the method.

Scope of test

IEC 60331-21: 1999 specifies a test procedure and gives a performance requirement, including a recommended flame application time, for cables of rated voltage up to and including 600/1000 V. It is intended to cover low voltage power cables and control cables with a rated voltage.

In accordance with section 7.1 of the test standard, a 90 minute flame application time was used.

IEC 60331-11: 1999 + A1: 2009 specifies the test apparatus to be used for testing cables required to maintain circuit integrity when subject to fire alone where the test condition is based upon a flame with a controlled heat output corresponding to a temperature of at least 750°C.

Fire test study group/EGOLF

Certain aspects of some fire test specifications are open to different interpretations. The Fire Test Study Group and EGOLF have identified a number of such areas and have agreed Resolutions which define common agreement of interpretations between fire test laboratories which are members of the Groups. Where such Resolutions are applicable to this test they have been followed.

Instruction to test

The test was conducted on the 24th September 2019 at the request of Bercia Cavi S.P.A, the sponsor of the test.

Provision of test specimens

The specimens were supplied by the sponsor of the test. Warringtonfire was not involved in any selection or sampling procedure.

Conditioning of specimens

The specimens were received on the 12th August 2019 and were conditioned at a temperature of 25 ± 5°C and a relative humidity of (50±20)% until constant mass was achieved.

Burner verification procedure

The verification procedure for the burner was conducted in accordance with Annex A of IEC 60331-11: 1999 + A1: 2009 at the start of the test day. Temperature measurements recorded by each thermocouple were logged using an Omega 'HH1384' four channel thermometer and datalogger at 1 second intervals over a period of 10 minutes and then averaged. This determined the gas & air flow rates and the position of the burner that were used for the subsequent cable test.

The gas and air flows were provided through the use of M&W Instruments mass flow controllers, model numbers 'D-6341-DR' and 'D-6361-DR'.

Description of Test Specimens

The description of the system given below has been prepared from information provided by the sponsor of the test. This information has not been independently verified by Warringtonfire**.** All values quoted are nominal, unless tolerances are given.

General description		Cables for fire detection sensors
Product reference of composite		"Eurosafe Flex"
Name of manufacturer of composite		Berica Cavi S.p.a.
Diameter of composite		8.70 ± 0.30 mm (stated by sponsor) 8.92mm (determined by Warringtonfire)
Weight per unit length of composite		110kg/km (stated by sponsor) 93.6kg/km (determined by Warringtonfire)
Cable marking		BERICA CAVI S.P.A. ITALY EUROSAFE FLEX 2x1.50 0.6/1 kV EN 50200 (PH120) (FE180) IEC 60332-3-24 CE Year/Lot
Number of cores x core size		2 x 1.50 mm^2
Voltage rating		0.6/1kV
Outer sheath	Generic type	LSZH compound **See Note 1 Below**
	Product reference	**See Note 1 Below**
	Colour	"Red"
	Thickness	**See Note 1 Below**
	Density	1.50kg/dm^3
	Flame retardant details	**See Note 1 Below**
	Name of manufacturer	**See Note 1 Below**
Electrostatic screen	Generic type	Aluminium / polyester tape
	Product reference	**See Note 1 Below**
	Thickness	**See Note 1 Below**
	Density	**See Note 1 Below**
	Name of manufacturer	**See Note 1 Below**
	Flame retardant details	**See Note 1 Below**
Drain wire	Generic type	Annealed tinned copper
	Product reference	**See Note 1 Below**
	Cross-sectional area	0.50mm^2
	Density / weight per unit area	**See Note 1 Below**
	Name of manufacturer	**See Note 1 Below**

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Clear tape (surrounding the two conductors)	Generic type	Polyester tape
	Product reference	**See Note 1 Below**
	Colour	"Transparent"
	Thickness	**See Note 1 Below**
	Density / weight per unit area	**See Note 1 Below**
	Name of manufacturer	**See Note 1 Below**
Conductor insulation	Generic type	LSZH compound **See Note 1 Below**
	Product reference	**See Note 1 Below**
	Colour	"Red – Black"
	Thickness	**See Note 1 Below**
	Density	1.50kg/dm^3
	Flame retardant details	**See Note 1 Below**
	Name of manufacturer	**See Note 1 Below**
Tape	Generic type	Mica tape
	Product reference	**See Note 1 Below**
	Colour	"White"
	Thickness	**See Note 1 Below**
	Weight per unit area	170g/m^2
	Name of manufacturer	**See Note 1 Below**
	Flame retardant details	**See Note 1 Below**
Conductors	Generic type	Annealed red copper Cl. 5
	Product reference	**See Note 1 Below**
	Total cross-sectional area of each conductor	1.50mm^2
	Weight per unit length per strand	**See Note 1 Below**
	Number of strands per conductor	**See Note 1 Below**
	Name of manufacturer	**See Note 1 Below**
Brief description of manufacturing process		**See Note 1 Below**

Note 1: The sponsor of the test was unwilling to provide this or further information.

The description of the specimens as given above is not as detailed as would usually be the case for descriptions included in Warringtonfire test reports and the description may not fully comply with the requirements of the test standard. In all other respects however the tests were conducted fully in accordance with the requirements of the test standard and the test results are valid.

Test Results

Applicability of test result

The test results relate only to the specimen of the cable in the form in which it was tested. Small differences in the composition of the product may significantly affect the performance during the test and may therefore invalidate the test results. Care should be taken to ensure that any product, which is supplied or used, is fully represented by the specimen, which was tested.

Results of test

When tested in accordance with the procedures specified in IEC 60331-21: 1999, utilising the test apparatus detailed in IEC 60331-11: 1999 + A1: 2009, at a temperature of at least 750^{0}C and at a rated voltage of 1000 V-rms, the cable maintained it's circuit integrity for the full 195 minute test duration. (Consisting of a 180 minute flame application period, plus a 15 minute cool down period).

Consequently, the cable satisfied the 180 minute performance requirement as recommended in clause 7 of the standard.

Validity

The specification and interpretation of fire test methods are the subject of ongoing development and refinement. Changes in associated legislation may also occur. For these reasons it is recommended that the relevance of test reports over five years old should be considered by the user. The laboratory that issued the report will be able to offer, on behalf of the legal owner, a review of the procedures adopted for a particular test to ensure that they are consistent with current practices, and if required may endorse the test report.

Revision History

Issue No :	Re-issue Date:
Revised By:	Approved By:
Reason for Revision:	

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