

**ELECTROTECHNIC AND GAS DEPARTMENT**

Test Report n°

01SI00076

**Insulated Cables And Adhesive Tapes Laboratory**

PAGE : 1 OF 8



DATE : 2008/03/18

|                    |  |
|--------------------|--|
| <b>Product</b>     | Fire resisting cables, Rated voltages 450/750 V  |
| <b>Model type</b>  | FTG10OHM1AM1 2X1,5 mm <sup>2</sup> 450/750 V   |
| <b>Description</b> | See page 2 of this test report<br>Printing on outer black sheath : "SENSITHERM – FTG10OHM1AM1 450/750 V 2X1,5 IEC 60331-21 " |

|                     |   |
|---------------------|---|
| <b>Applicant</b>    | SENSITHERM SRL VIA BERLINGUER 15 20040 COLNAGO (MI) |
| <b>Manufacturer</b> | SENSITHERM SRL VIA BERLINGUER 15 20040 COLNAGO (MI) |

|                            |  |
|----------------------------|--|
| <b>Test carried out by</b> | Laboratorio cavi isolati e nastri adesivi - IMQ S.p.A.<br>Via Quintiliano, 43 - 20138 MILANO |
| <b>Scope of the test</b>   | Fire resisting (IEC 60331-21)  |

|   |   |                          |            |
|---|---|--------------------------|------------|
| <b>Date of samples receiving</b>              | 2008-03-13                                      |                          |            |
| (Sample shipped and sampled by the applicant) |   |                          |            |
| <b>Date of tests start</b>                    | 2008-03-17                                      | <b>Date of tests end</b> | 2008-03-17 |
| <b>This test report is composed by</b>        | 8 Pages, divided as follows :<br>8 report pages |                          |            |

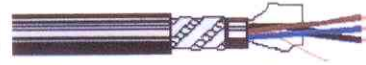
|   |  |
|---|--|
| <b>Cable Testing Lab Technician</b>   | <b>Approved by</b>   |
| F. Facchetti<br> | F. Giorgi<br> |

The results referred in this report are only relevant to the samples tested and described in this report.  
Only complete reproduction of this test report is permitted without written authorization of IMQ.

TECHNICAL DATA SHEET OF THE CABLE

**SENSITHERM S.r.l.**

**Fire Resisting Control & Power cables**  
**Micatape, G10 insulated, Screened, Armoured, LSOH outer sheath**



Type **MICA/G10/OS/LSOH/SWB/LSOH 450/750 V 2x1,5 mm<sup>2</sup>**  
**FTG10OHM1AM1 450/750 V 2x1,5 mm<sup>2</sup>**

**Conductor**  
Plain annealed copper conductor according to IEC60228 cl. 5.

**Insulation**  
Mica tape over the conductor  
Elastomeric compound G10 type according to EN 50363-0  
Thicknes of insulation > 0,8 mm  
Identification cores :  
Black, Blue

**Layin ap**  
Core stranded with at least 10 twists/meter

**Screen**  
Collective screen of plastic bonded aluminium tape with tinned drain wire.

**Inner Sheath**  
Halogen Free compound acc. to EN 50290-2-27  
Thicknes of jacket => 1,0 mm  
Overall diameter 10,5±0,3 mm

**Metallic protection**  
Galvanized steel wire braid acc. IEC 60502-1

**Outer sheath**  
LSOH compound M1 type according to EN 50290-2-27, black  
Thicknes of jacket => 1,8 mm  
Overall diameter 15,1±0,5 mm

**Marking**  
Sensitherm - FTG10OHM1AM1 450/750 V 2x1,5 IEC 60331-21

**Performance**  
Resistance to fire - Circuit Integrity acc. IEC 60331-21  
Reaction to Flame propagation a) Test of single cable acc. IEC 60332.1  
b) Test on bunched cable acc. IEC 60332-3-24  
Halogen content acc. CEI EN 50267-2-1

**Minimum bending radius**  
10 times overall diameter

**Technical data & Electrical properties**

Temperature range -30 + 90°C  
Temperature laying - 5 + 50°C  
Conductor resistance : < 13,3 Ohm/Km  
Insulation resistance : > 100 Mohm x Km  
Test voltage - Core/core : 3.000 V  
Core-screen : 1.000 V  
Screen-armour : 500 V  
Operating voltage max 750 V

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## **SUMMARY**

### **FIRE RESISTING TEST**

**4**

| <b>Reference Document</b>                | <b>Title of Document</b>  |
|--|---|
| Standard IEC 60331-11<br>I Ed. 1999 / 04 | Tests for electric cables under fire conditions - Circuits integrity<br>Part 11 : Apparatus - Fire alone at a flame temperature of at least 750 °C        |
| Standard IEC 60331-21<br>I Ed. 1999 / 04 | Tests for electric cables under fire conditions - Circuits integrity<br>Part 21: Procedures and requirements - Cables of rated voltages up to and 0,6/1kV |

**Test procedure**

- Verification procedure for source of heat and removed of the thermocouples from the rings
- The cable is placed horizontally on the supporting system, and securely clamped at one end and supported at the other end. The middle portion of the cable is supported by two metal rings
- each phase conductor is connected to a separate phase of the transformer output by a 2A fuse
- At the end of the cable remote from the transformer, each conductor is connected to one terminal of the load and the other terminals of indicative device are earthen
- The burner has been positioned according to configuration shown in the figure
- the burner is ignited and the propane and air flow rates adjusted to those obtained during verification procedure

**Test evaluation criteria**

- **Duration of survival:** The duration of survival, measured in minutes, to the point of failure shall be recorded up to a maximum survival time of 90 min. After which the flame shall be extinguished but the cable sample shall remain energised for a further 15 min.  
The criteria for determining the point of failure shall be as follows:
- The voltage is not maintained during the test duration, as indicated by fuse failure
- A conductor rupture during the test duration, as indicated by the lamp extinguishing

**Test results**

- During the test, no failure of any 2 A fuse occurs
- During the test, no extinguishing of lamps occurs
- Time of duration survival : 90 minutes of flame application and 15 minutes of cooling



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**Test N.1**

**FIRE RESISTING TEST**

**Test performed according to**

IEC 60331-11 I Ed. 1999  
IEC 60331-21 I Ed. 1999

**Test apparatus**

- **A cable supporting system:** two metal rings place approximately 300 mm apart; inside diameter of rings is approximately 150 mm; ring is made from a circular steel rod of (10 ± 2) mm in diameter
- **A continuity checking arrangement** is made as follow:  
a current of 0,25 A at the test voltage, pass through each conductor and it is provided by a three phase star transformer; at the other end of the sample, a suitable load and indicating device lamps is placed
- **Source of heat:** ribbon type propane gas burner face length of 500 mm with Venturi mixer having an accurate means of controlling the fuel and air input flow rates

**Samples identification**

Sample "A"

Completed cable

**Number of samples under test**

1 one

**Samples**

Length: 1200 mm

**Verification procedure for source of heat**

- Flame temperature measuring:  
two 1,5 mm mineral insulated thermocouples Type K mounted on the rings
- Position the burner:  
70 ± 10 mm horizontal central plane below the lowest point of the test sample 45 mm approximately vertical front face from the central vertical plane of the test sample
- Temperature: ( 750 + 50, - 0 ) °C

**Test conditions**

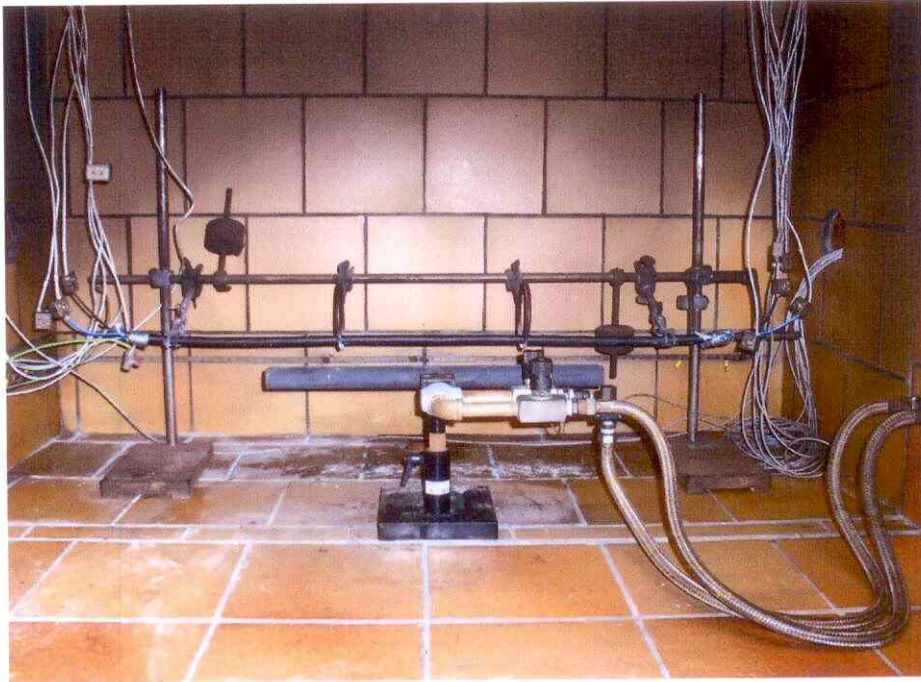
- **Flow rates** (at reference conditions of 1 bar and 20 °C)
  - Propane: (5 ± 0.25) litres/minute
  - Air (80 ± 5 ) litres/minute
- **Voltage applied between cores :** 750 V
- **Test temperature :** (750 + 50, - 0) °C
- **Test duration :** 90 minutes
- **Time of cooling after flame application :** 15 minutes

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**Sample before the test**



**Sample after the test**

