

TEST REPORT

N° **2014EP2215**

DATE OF RECEPTION	06/10/2014	<p>APPLICANT</p> <p>FINNISH INSTITUTE OF OCCUPATIONAL HEALTH (FIOH), TOPELIUKSENKATU, 41 AB FI-00250 HELSINKI HELSINKI</p> <p>Att. MS. SANNA KARKKULA</p>
DATE TEST	Starting: 22/10/2014 Ending: 24/10/2014	
DESCRIPTION AND IDENTIFICATION OF SAMPLES	<p>SAMPLES REFERENCED:</p> <p>-“KNITTED FABRIC REF. 264 931”.</p> <p>REF. 264 931 KNITTED FABRIC 109 TOTAL SERIE, 50% MERINO WOOL, 50% LENZING, 220 g/m² ACCORDING TO THE CUSTOMER.</p>	
TESTS CARRIED OUT	<p>- ELECTRIC ARC TEST</p>	

ATTACHED

SAMPLE(S)

SEALED

PAGE

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OF

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RESULTS

ELECTRIC ARC TEST

Standard UNE-EN 61482-1-2:2008+ERRATUM:2008 equivalent to EN 61482-1-2:2007 equivalent to IEC 61482-1-2:2007

Principle of the Box test method Determine the behaviour of materials against to thermal risk when exposed to heat energy from electric arc with specific characteristics Materials performance for this procedure is determined from the amount of the heat transmitted through the specimen and other thermal parameters

Sample type Knitted fabric composed by one layer, blue colour with a weight according to the customer of 220 g/m²

Test conditions	
Class	Class 1
Testing atmosphere	22,33 °C 39,20 % RH
Test current	4 kA ± 5%
Calibration test current	3996 A
Average direct exposure incident energy	163 kJ/m ²
Arc duration	500 ms ± 5%
Average real arc duration	494 ms
Test voltage	400 V ± 5%
Average real test voltage	403,075 V
Average real Arc Energy	174,175 kJ
Gap between electrodes	(30 ± 1) mm
Distance between the electrodes and sample	(300 ± 5) mm

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RESULTS

ELECTRIC ARC TEST

Electrodes type

Electrodes Cu/Al

Measurement uncertainty

Temperature 1,78 °C
Equivalent energy ± 9,80 kJ/m²
Time ± 0,390 s

Technician performing the test

Israel Soriano

Person verifying the test report

Lucía Martínez

Pre-treatment

Pre-treatment by FIOH: five washing cycles according to manufacturer's care instructions and ISO 6330:2012

Pre-conditioning of the test specimens

24h. in indoor ambient conditions between (18-28)°C and between (45-75)% RH

Starting and ending pre-conditioning date

22/10/2014 - 24/10/2014

Observation or deviation of the standard

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RESULTS

ELECTRIC ARC TEST

Testing date 24/10/2014

Reference KNITTED FABRIC REF. 264 931

VISUALLY OBTAINED DATA

Property	Measurement	Specimen 1	Specimen 2	Specimen 3	Specimen 4
	Class	4 kA Class 1	4 kA Class 1	4 kA Class 1	4 kA Class 1
Burning time	Video	0,000 s	0,000 s	0,000 s	0,000 s
Hole formation >5mm.	Visual	no	no	no	no
Melting through to the inner side	Visual	no	no	no	no
Embrittlement	Visual	no	no	no	no
Damage on the outside	Visual	no	no	no	no
Charring on the outside	Visual	yes	yes	yes	yes
Dripping	Visual	no	no	no	no
Shrinkage	Calculated	no	no	no	no

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RESULTS

ELECTRIC ARC TEST

Reference

KNITTED FABRIC REF. 264 931

COMPUTER OBTAINED DATA

Class		4 kA (Class 1)			
Property	Measurement	Specimen 1	Specimen 2	Specimen 3	Specimen 4
Transmitted incident energy E_{it}	Calorimeter 1	67,07 kJ/m ²	64,27 kJ/m ²	85,79 kJ/m ²	65,86 kJ/m ²
	Calorimeter 2	69,67 kJ/m ²	64,38 kJ/m ²	83,20 kJ/m ²	66,94 kJ/m ²
Time to delta peak temperature t_{max}	Calorimeter 1	24,95 s	21,00 s	25,95 s	25,30 s
	Calorimeter 2	24,80 s	24,75 s	25,75 s	25,55 s
Comparison: Maximum incident energy allowed to avoid second-degree burn injury	Calorimeter 1	127,65 kJ/m ²	121,43 kJ/m ²	129,12 kJ/m ²	128,17 kJ/m ²
	Calorimeter 2	127,43 kJ/m ²	127,35 kJ/m ²	128,83 kJ/m ²	128,54 kJ/m ²
Delta peak temperature ΔT_p	Calorimeter 1	12,15 °C	11,64 °C	15,54 °C	11,93 °C
	Calorimeter 2	12,62 °C	11,66 °C	15,07 °C	12,13 °C
Comparison: Maximum delta peak temperature allowed to avoid second-degree burn injury	Calorimeter 1	23,13 °C	22,00 °C	23,39 °C	23,22 °C
	Calorimeter 2	23,08 °C	23,07 °C	23,34 °C	23,29 °C
Stoll criterion for sample		PASS	PASS	PASS	PASS

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RESULTS

ELECTRIC ARC TEST

Standard

UNE-EN 61482-1-2:2008+ERRATUM:2008 equivalent to EN 61482-1-2:2007 equivalent to IEC 61482-1-2:2007

**IN ACCORDANCE WITH THE ACCEPTANCE CRITERIA ACCORDING TO
UNE-EN 61482-1-2:2008+ERRATUM:2008, FOR CLASS 1**

PASS

Requirement for the standard compliance UNE-EN 61482-1-2:2008+ERRATUM:2008

a) Burning time \leq 5 s

b) No melting through to the inner side

c) No hole bigger than max. 5 mm. in every direction (in the innermost layer)

d) Heat flux all eight value pairs (Eit - tmax) are below corresponding Stoll values

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RESULTS

ELECTRIC ARC TEST

Standard

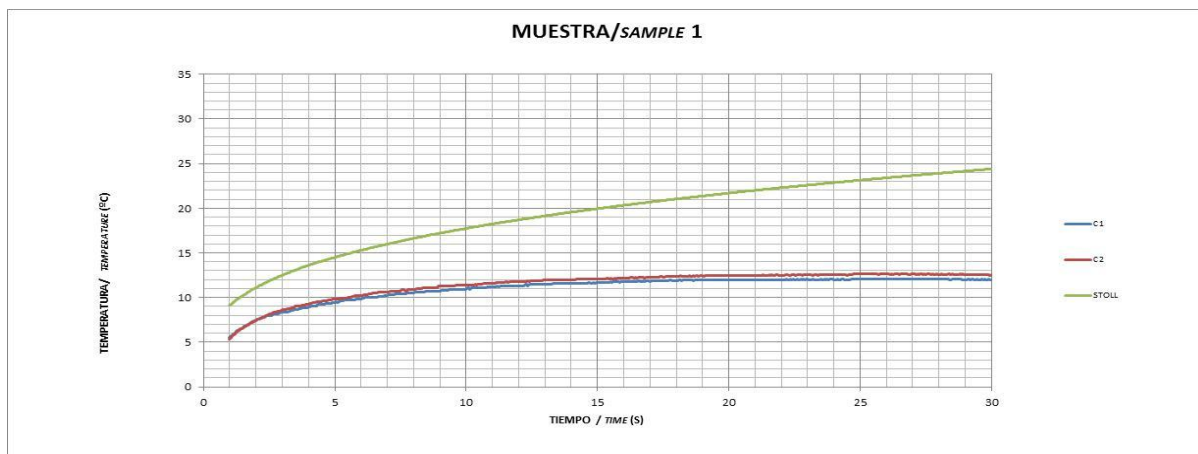
UNE-EN 61482-1-2:2008+ERRATUM:2008 equivalent to EN 61482-1-2:2007 equivalent to IEC 61482-1-2:2007

STOLL CURVES

Specimen 1

Reference

1- KNITTED FABRIC REF. 264 931



Specimen 2

Reference

2- KNITTED FABRIC REF. 264 931



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RESULTS

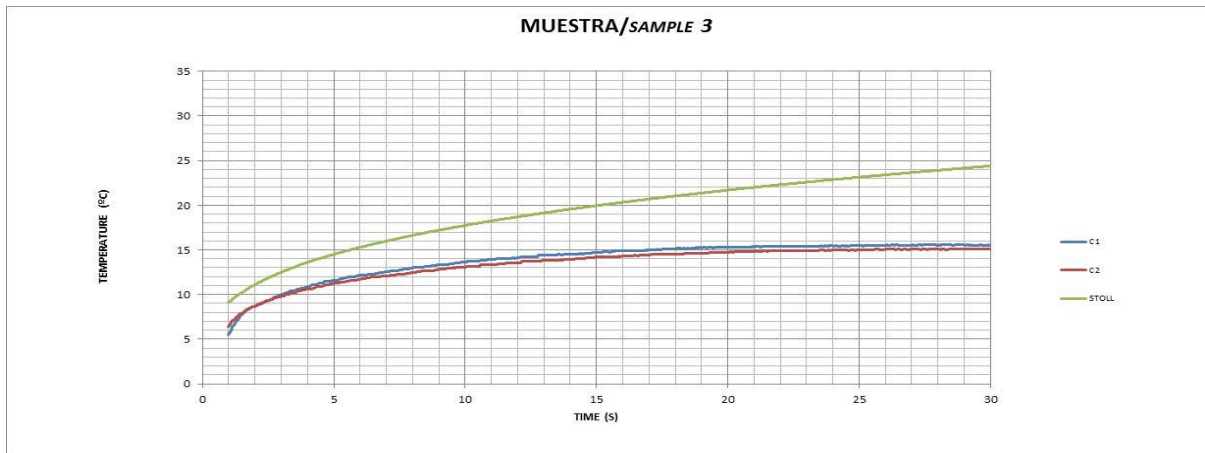
ELECTRIC ARC TEST

STOLL CURVES

Specimen 3

Reference

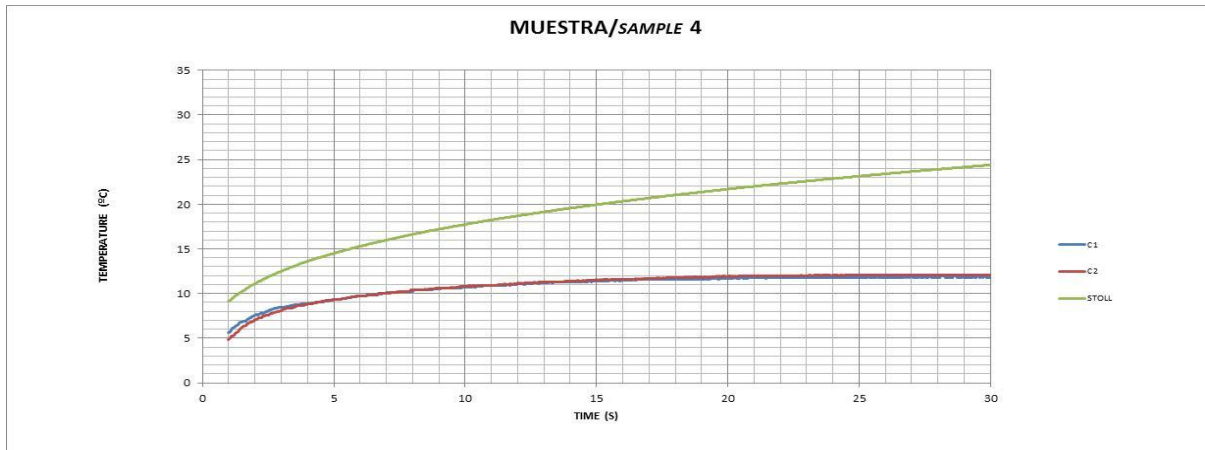
3- KNITTED FABRIC REF. 264 931



Specimen 4

Reference

4- KNITTED FABRIC REF. 264 931



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RESULTS

ELECTRIC ARC TEST

Reference

KNITTED FABRIC REF. 264 931

Original material



Tested material



Remark

The electric arc test is performed in: Cr. Villaviciosa de Odón a Móstoles (M-856) Km. 1,5 Móstoles 28935.

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Lucia Martinez
Head of PPE´s department

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