

TEST REPORT

Nº **2014EP2342**

DATE OF RECEPTION	24/10/2014	APPLICANT FINNISH INSTITUTE OF OCCUPATIONAL HEALTH (FIOH), TOPELIUKSENKATU, 41 AB FI-00250 HELSINKI HELSINKI Att. Sanna-Kaisa Katajamäki
DATE TEST	Starting: 05/11/2014 Ending: 06/11/2014	
DESCRIPTION AND IDENTIFICATION OF SAMPLES	SAMPLES REFERENCED: -"FABRIC REF. 264 949". Ref. 264 949. Knitted fabric Protection LITE, 60% Merino Wool/ 38% Lenzing FR, 2% Beltron, 200±20 g/m ² , according to the customer.	
TESTS CARRIED OUT	- ELECTRIC ARC TEST	

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, grey colour with a weight according to the customer of $200 \pm 20 \text{ g/m}^2$

Test conditions	
Class	Class 1
Testing atmosphere	21,10 °C 32,80 % RH
Test current	4 kA \pm 5%
Calibration test current	3981 A
Average direct exposure incident energy	121,8 kJ/m ²
Arc duration	500 ms \pm 5%
Average real arc duration	485,25 ms
Test voltage	400 V \pm 5%
Average real test voltage	403,275 V
Average real Arc Energy	165,3 kJ
Gap between electrodes	(30 \pm 1) mm
Distance between the electrodes and sample	(300 \pm 5) mm

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RESULTS

ELECTRIC ARC TEST

Electrodes type

Electrodes Cu/Al

Measurement uncertainty

Temperature 1,78 °C

Equivalent energy $\pm 9,80 \text{ kJ/m}^2$

Time $\pm 0,390 \text{ s}$

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

05/11/2014 - 06/11/2014

Observation or deviation of the standard

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RESULTS

ELECTRIC ARC TEST

Testing date 06/11/2014

Reference FABRIC REF. 264 949

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

FABRIC REF. 264 949

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	61,01 kJ/m ²	60,90 kJ/m ²	72,38 kJ/m ²	77,08 kJ/m ²
	Calorimeter 2	61,92 kJ/m ²	64,59 kJ/m ²	69,14 kJ/m ²	70,03 kJ/m ²
Time to delta peak temperature t_{max}	Calorimeter 1	23,45 s	20,45 s	18,80 s	18,50 s
	Calorimeter 2	23,90 s	19,30 s	21,30 s	21,60 s
Comparison: Maximum incident energy allowed to avoid second-degree burn injury	Calorimeter 1	125,38 kJ/m ²	120,50 kJ/m ²	117,59 kJ/m ²	117,04 kJ/m ²
	Calorimeter 2	126,07 kJ/m ²	118,49 kJ/m ²	121,93 kJ/m ²	122,42 kJ/m ²
Delta peak temperature ΔT_p	Calorimeter 1	11,05 °C	11,03 °C	13,11 °C	13,96 °C
	Calorimeter 2	11,22 °C	11,70 °C	12,52 °C	12,69 °C
Comparison: Maximum delta peak temperature allowed to avoid second-degree burn injury	Calorimeter 1	22,71 °C	21,83 °C	21,30 °C	21,20 °C
	Calorimeter 2	22,84 °C	21,47 °C	22,09 °C	22,18 °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 ≤ 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 ($E_{it} - t_{max}$) are below corresponding Stoll values

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RESULTS

ELECTRIC ARC TEST

Standard

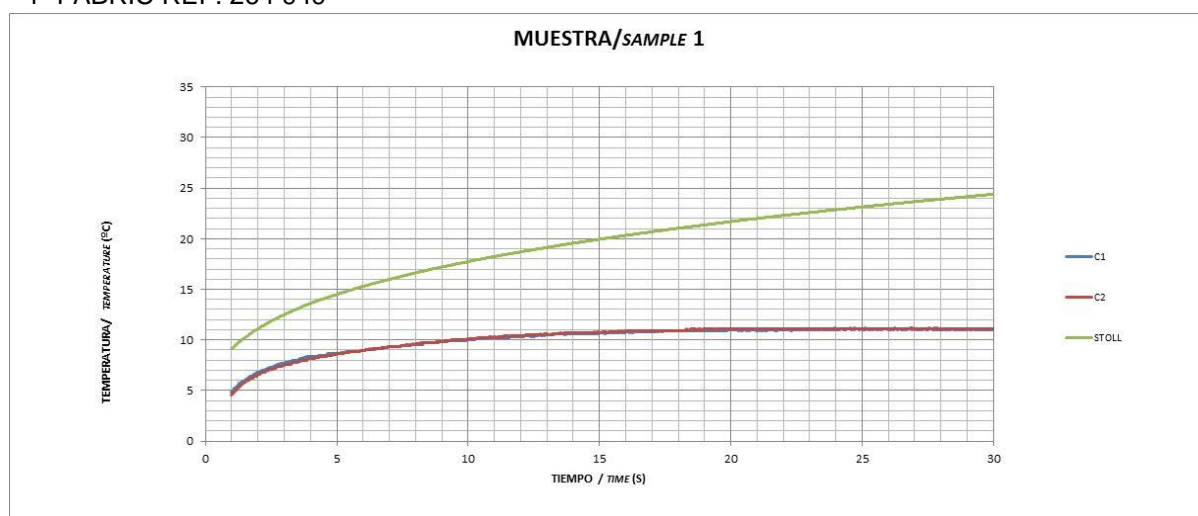
UNE-EN 61482-1-2:2008+ERRATUM:2008 equivalent to EN 61482-1-2:2007 equivalent to IEC 61482-1-2:2007

STOLL CURVES

Specimen 1

Reference

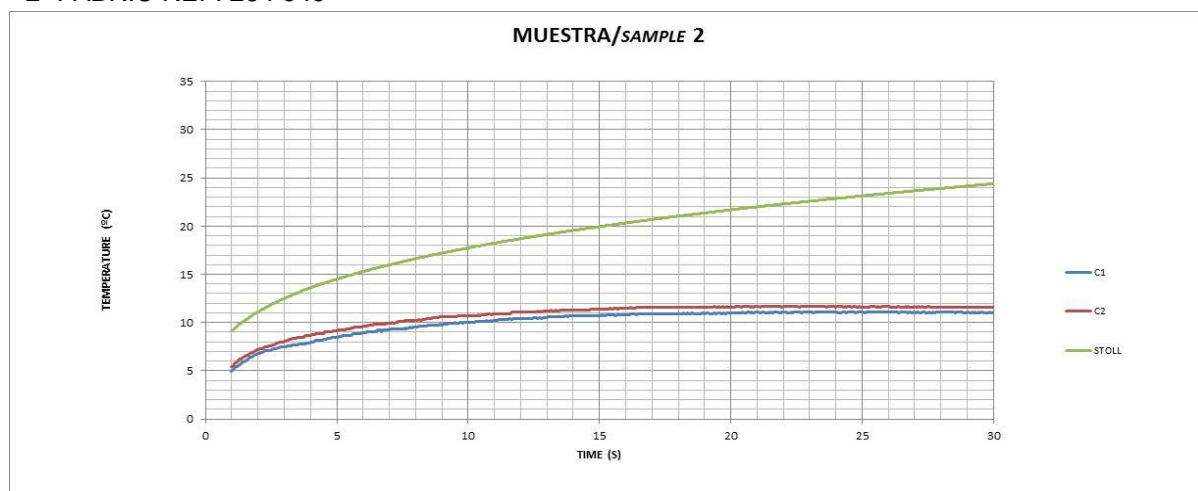
1- FABRIC REF. 264 949



Specimen 2

Reference

2- FABRIC REF. 264 949



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RESULTS

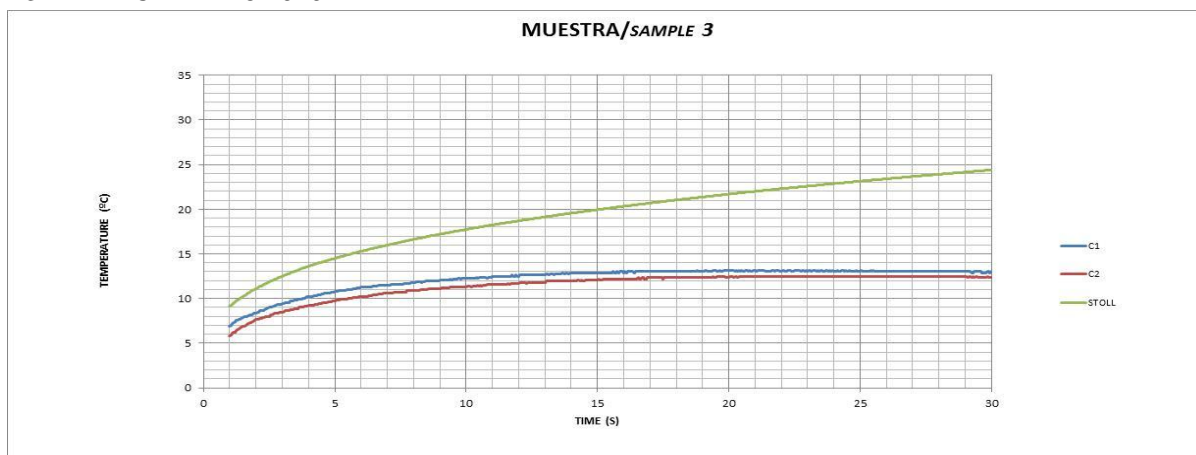
ELECTRIC ARC TEST

STOLL CURVES

Specimen 3

Reference

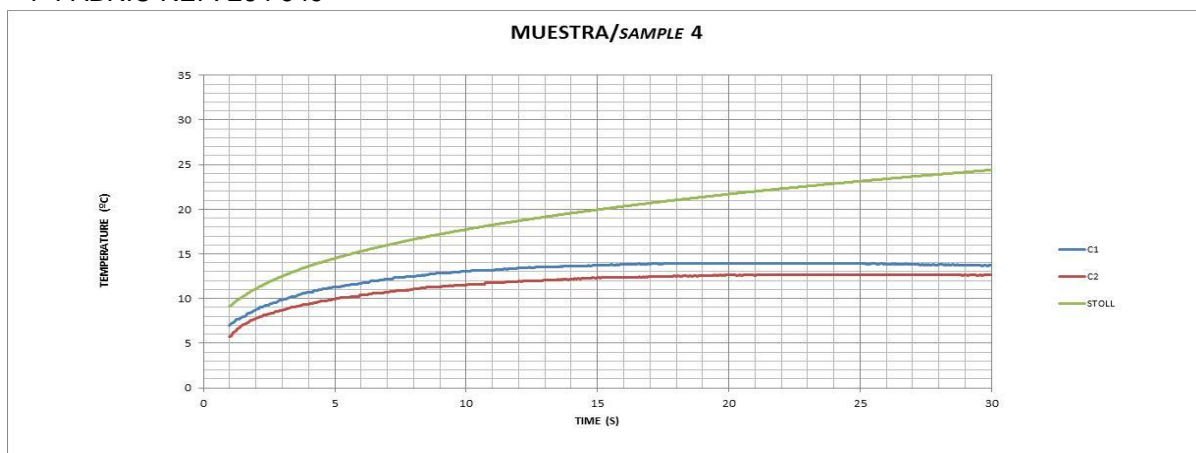
3- FABRIC REF. 264 949



Specimen 4

Reference

4- FABRIC REF. 264 949



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RESULTS

ELECTRIC ARC TEST

Reference

FABRIC REF. 264 949

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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