



2011-10-12

# SUMMARY REPORT OF ROUND-ROBIN EN ISO 11925-2

**Tiia Rynänen**  
VTT Expert Services Ltd

	<b>Round-Robin EN ISO 11925-2</b>	
--	---------------------------------------	---



## **PURPOSE OF THE ROUND-ROBIN**

The round robins among the EGOLF members are organised because of assuring the quality of test results.

During the EGOLF meetings in Berlin 2009 EGOLF TC1 decided to organise a round robin concerning the European test standard EN ISO 11925-2:2002.

The results of this round robin give information about

- EGOLF laboratories being able to perform the EN ISO 11925-2 test in a proper way
- variability in equipment, test procedures and tools
- reproducibility and repeatability

The round robin exercise was organised by the EGOLF member VTT Expert Services Ltd.

## **SCOPE OF THE ROUND-ROBIN**

### **TEST METHOD**

The tests were performed according to the standard EN ISO 11925-2:2002. Below is a short description of the test method:

- The specimens are ignited with a 20 mm high propane gas flame. The flame is impinged on the bottom edge of the specimen (edge exposure) or 40 mm above the bottom edge (surface exposure) or both. The specimen is exposed to flame for 15 s or 30 s.
- If the flame application time is 15 s, the total test duration is 20 s from the time at which the flame is first applied, and if the flame application time is 30 s, the total test duration is 60 s.
- For each test specimen is recorded whether an ignition occurs (flaming longer than 3 s), whether the flame tip reaches 150 mm above the flame application point and the time at which this occurs.
- The occurrence of burning particles is observed with filter paper placed below the specimen - whether ignition of the filter paper occurs.
- For each exposure condition a minimum of six specimens (250 mm x 90 mm) of the product shall be tested, three cut lengthwise and three crosswise.

### **SAMPLES**

**Sample 1** was wood insulating fibreboard, thickness 12 mm and density 260 kg/m<sup>3</sup>, with expected flame spread time to 150 mm under 60 s.

**Sample 2** was polystyrene foam, thickness 55 mm and density 30 kg/m<sup>3</sup>, with expected flame spread time to 150 mm under 20 s.

**Sample 3** was vapour barrier foil (HDPE-tissue with PE surface), thickness 0,3 mm and area weight 132 g/m<sup>2</sup>. This was selected because of melting properties and burning particles.

## Round-Robin EN ISO 11925-2



Flame application time and exposure conditions for the samples in this round robin were as follows:

**Sample 1** 30 s surface and edge exposure

**Sample 2** 15 s surface exposure

**Sample 3** 15 s surface and edge exposure

### TIME FRAME

The Round-Robin was performed from 2010 and until 2011.

### NUMBER OF PARTICIPANTS AND TESTS

Following forty laboratories participated and tested the three samples.

Austria	MA 39 - VFA der Stadt Wien
Belgium	Warringtonfiregent
Czech Rep.	PAVUS, a. s.
Denmark	DBI, Danish Institute of Fire and Security Technology
Finland	VTT Expert Services Ltd
France	CSTB, Centre Scientifique et Technique du Bâtiment
Germany	BAM, Bundesanstalt für Materialforschung und –Prüfung
Germany	MPA Stuttgart, Materialprüfungsanstalt Universität Stuttgart
Germany	MFPA Leipzig, Leipzig Institute for Materials Research and Testing
Germany	MPA Bau Hannover
Germany	MPA Braunschweig
Germany	MPA NRW, Materialprüfungsamt Nordrhein-Westfalen
Germany	Prüfinstitut Hoch
Germany	TU München (B), Forschungslabor für Haustechnik
Germany	ift Rosenheim, Centre for Fire Testing, Nuremberg
Hungary	EMI
Israel	SII - Associate member
Italy	CSI
Italy	LAPI, Laboratorio Prevenzione Incendi SpA
Latvia	MeKA, Forest and Wood Products Research and Development Institute
Lithuania	Fire Research Centre
Netherlands	BDA Groep
Norway	SINTEF NBL
Poland	ITB, Building Research Institute
Portugal	LNEC, National Laboratory for Civil Engineering
Russia	VNIPO, All Russian Institute for Fire Protection
Slovakia	FIRES s.r.o
Slovenia	ZAG, Slovenian National Building and Civil Engineering Institute
Spain	AITEX, Research Association for the Textile Industry.
Spain	Applus - LGAI
Spain	CIDEMCO TECHNOLOGICAL RESEARCH CENTRE
Spain	CTF AIDICO AIDIMA
Spain	Gaiker
Spain	Leitat - Technological Center
Sweden	SP Technical Research Institute of Sweden
Switzerland	Swissi Process Safety GmbH
UK	FRS (BRE)

	<b>Round-Robin EN ISO 11925-2</b>	
--	---------------------------------------	---



UK	Chiltern International Fire
UK	Exova Warringtonfire
USA	FM Approvals USA - Associate member

## **RESULTS**

### **VARIABILITY IN EQUIPMENTS AND TEST PROCEDURE**

All other parts of the equipment in the laboratories were according to the standard except distance between the underside of the test specimen and filter paper (in 18 laboratories). This distance will influence on ignition of filter paper.

In test procedure there were following deviations:

- two of the laboratories made the tests only in one direction (3 test specimens per sample)
- one laboratory made the tests with edge exposure to side edge of the test specimen (specimen turned 90°).

### **SUMMARY OF TEST RESULTS**

Burning behaviour of sample 3 was irregular and this was the reason for high degree on uncertainty in test results. Because of that mainly results of sample 1 and 2 are examined in the conclusion of this round robin.

### **DATA PROCESSING**

Two methods of statistical analysis were used depending on type of test result.


- The number of the yes and no results as well as their relative proportions and degree of uncertainty were calculated same way as in EN ISO 11925-2 Annex B.
- The data of flame spread time to reach 150 mm was analysed according to ISO 5725-2:1994

### **TEST RESULTS**

Uncertainty of whether the flame tip reached 150 mm was 20 % for sample 1, 30 % for sample 2 and 85 % for sample 3. Reason for high uncertainty of sample 3 was the material. Time to reach 150 mm of sample 1 and 2 deviated remarkable in some laboratories from the results of other laboratories. Reason for that could not be found in test equipments, test reports or photos, but it can be reminded that the following items are important in measuring flame spread:

- exact timing for flame spread from the moment the gas flame contacts the test specimen to the moment the flame tip reaches 150 mm
- flame application: size of gas flame, distance, exposure time
- checking the distance from the flame application point to 150 mm
- test shall be carried in light circumstance where the flame tip can be see in test specimen.

Results of time the flame tip reached 150 mm after removal of outliners for sample 1 and 2 are presented in Table 1.

	<b>Round-Robin EN ISO 11925-2</b>	
--	---------------------------------------	---

*Table 1. Results of flame spread time after removal of outliners.*

Material	Sample 1 surface exposure	Sample 1 edge exposure	Sample 1 surface and edge exposure	Sample 2 surface exposure
Number of laboratories	33 (34)	30 (36)	34 (37)	32 (36)
General mean value $m$ (s)	51	50	50	14
Repeatability standard deviation $s_r$ (s)	3	4	4	2
Reproducibility standard deviation $s_R$ (s)	5	6	6	3
Variation coefficient $s_r / m$ %	6	8	9	11
Variation coefficient $s_R / m$ %	9	12	12	18


Uncertainty of ignition of filter paper was 0 % for sample 1, 20 % for sample 2 and 85 % for sample 3. Reason for high uncertainty of sample 3 was the material itself as written above. Probably ignition of filter paper was observed in some labs after the test as the whole test specimen has burned. This estimation is based on photos taken after the test. This explains the uncertainty of sample 2. According to the standard ignition of filter paper is observed during the test (test duration is 20 s or 60 s).

#### RESULTS IN DEPENDENCE OF ATTENDING A EGOLF TRAINING COURSE

There were more deviations in test results in the laboratories without attendance at EGOLF courses but also in laboratories with attendance. This indicates that it is important for a laboratory to attend at EGOLF courses and to follow instructions given in the course. If there are many people in the laboratory how carry out the test and everybody has not attended the EGOLF course the laboratory shall have courses inside the laboratory. Laboratories shall also have detailed instructions according to EGOLF course in the national language. The EGOLF course material shall also be clear and detailed with photos and pictures if necessary.

#### RESULTS COMPARED TO CLASSIFICATION CRITERIA IN EN 13501-1

For classification there are only yes/no results for compliance parameters; whether flame tip reaches 150 mm ( $F_s$ ) during the test (20s or 60 s) and ignition of the filter paper (flaming droplets). In Table 2 are presented the portions of laboratories were the sample has failed the criteria for classification.

	<b>Round-Robin EN ISO 11925-2</b>	
--	---------------------------------------	---

*Table 2. Portion of laboratories where the sample has failed the classification criteria.*

Sample - ignition type	Failed the criteria <sup>1)</sup> for Fs (%)	Failed the criteria <sup>2)</sup> for flaming droplets (%)
1 - surface and edge	90 <sup>1)</sup>	2
2 - surface	85 <sup>2)</sup>	10
3 - surface and edge	37 <sup>2)</sup>	75

- 1) Criteria in classes B, C and D:  $F_s \leq 150$  mm within 60s  
Criteria in class E:  $F_s \leq 150$  mm within 20 s
- 2) Ignition of filter paper.

### **ASSESSMENT OF THE OUTCOME OF THE ROUND-ROBIN**

Most of the participating laboratories were able to perform the test according to the standard EN ISO 11925-2. Laboratories shall have detailed instructions for testing according to EGOLF courses in the national language.

Equipments in laboratories were according to the standard.

The distance of filter paper from the test specimen is not defined clearly in the standard. There is requirement only for the distance between the underside of the specimen and the top of horizontal plate above the metal grid. Obviously this was the reason why there was deviation in distance in many laboratories.