



PUBLIC SUMMARY REPORT OF THE  
EGOLF EN-ISO 1182  
ROUND ROBIN 2010

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

The aims of this round robin exercise have been:

- to confirm that EGOLF laboratories are able to perform the EN ISO 1182 test in a proper way
- to provide information about the reproducibility and repeatability for EN ISO 1182
- to give an indication for each participating laboratory regarding its performance when performing tests according to EN ISO 1182
- to provide an indication of the variability in equipment, procedures and tools

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

#### **TEST METHOD**

The tests in the round robin were performed according to the procedure described in EN ISO 1182, the non-combustibility test.

Each participant performed in advance a calibration of the furnace according to the procedure set out in EN ISO 1182, clause 7.3.

The participants were requested to determine the organic content of the mineral wool according to EN 13820.

The test results according to EN ISO 1182 clause 8 have been calculated, and represent the basis for analysing the performance of the different laboratories. The statistical analysis was performed according to ISO 5725 *Accuracy (trueness and precision) of measurement methods and results*.

The test results in this report are designated as follows:

- $\Delta T_f$  = temperature difference in the furnace [K]
- $\Delta T_s$  = temperature difference on the sample surface [K]
- $\Delta m$  = mass loss [%]
- $t_f$  = duration of sustained flaming [s]

## TEST SPECIMENS

2 different products were tested:

- Calcium silicate board, thickness 12 mm, nominal density 870 kg/m<sup>3</sup>.
- Mineral wool, thickness 50 mm, nominal density 160 kg/m<sup>3</sup>, binder content of 4 % w/w corresponding to a PCS of 1.1 to 1.2 MJ/kg; typical  $\Delta T_f$  of between 17 and 20 °C (n=5) according to the manufacturer

Cylindrical test specimens were prepared as described in clause 5 in EN ISO 1182, with required height 50 mm and diameter 45 mm. The specimens of the calcium silicate board were made by putting together several layers until the required specimen height was reached. Examples of test specimens are shown in Figure 1.

5 specimens of each product were tested.



**Figure 1** A typical test specimen of the calcium silicate board to the left, and of the mineral wool to the right.

## TIME FRAME

The furnace calibrations were performed before 30 September 2010.

The tests for the round robin were performed during the autumn 2010. The last results were received 25 February 2011.

## NUMBER OF PARTICIPANTS AND TESTS

28 laboratories participated in the round robin exercise. Each laboratory tested 5 specimens of calcium silicate and 5 specimens of mineral wool according to EN ISO 1182.

Additionally, 21 laboratories have determined the organic content of the mineral wool according to EN 13820.

Below is a list of 28 laboratories who participated and completed the round robin exercise. The laboratories are listed by the countries in alphabetical order. The order given below does not correspond to the laboratory identification numbering given in the full report from the round robin.

Belarus	RIFS
Belgium	Exova Warringtonfiregent
Czech Rep	PAVUS
Denmark	DBI
Finland	VTT
France	CSTB
Germany	Ift
	MFPA Leipzig
	MPA Braunschweig
	MPA Stuttgart
	MPA Bau Hannover
	MPA NRW
	Prüfinstitut HOCH
	TU München
Italy	CSI
Lithuania	Fire Research Centre
Norway	SINTEF NBL
Portugal	LNEC
Russia	VNIPO
Slovenia	ZAG
Spain	APPLUS LGAI
	CTF AIDICO AIDIMA
	Gaiker
Sweden	SP
Switzerland	Swissi Process Safety GmbH
UK	BRE
	Exova Warrington
USA	FM Approvals USA

## **TEST RESULTS**

The test results were analysed according to *ISO 5725-2. Accuracy (trueness and precision) of measurement methods and results – Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method*. The data was analysed for consistency and outliers, using both graphical and numerical techniques.

The general mean values, the repeatability standard deviation  $s_r$  and the reproducibility standard deviation  $s_R$  were calculated for each of the measured variables after removal of outliers among the data. The repeatability- and reproducibility standard deviations calculated as a percentage of the general mean value for the two tested materials are shown in Table 1.

**Table 1** Calculated values for the repeatability- and reproducibility standard deviations as a percentage of the general mean value for the testing of calcium silicate board and mineral wool according to EN ISO 1182.

	Repeatability standard deviation, $s_r$		Reproducibility standard deviation, $s_R$	
	Calcium silicate board	Mineral wool	Calcium silicate board	Mineral wool
$\Delta T_f$ [K]	41.4 % (31.6 %)	27.9 % (17.82 %)	63.3 % (32.0 %)	58.3 % (32.0 %)
$\Delta T_s$ [K]	30.8 % (28.9 %)	19.7 % (16.2 %)	44.2 % (40.3 %)	53.3 % (30.7 %)
$\Delta m$ [%]	2.4 % (9.0 %)	10.6 % (9.1 %)	4.7 % (11.0 %)	17.6 % (11.0 %)
$t_f$ [s]	Not applicable			

Numbers in brackets are calculated based on the statistical model from Table A.3 in EN ISO 1182:2010(E).

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

The round robin exercise has shown that most of the participating EGOLF laboratories will obtain results within acceptable limits when testing according to EN ISO 1182.

However, the repeatability and reproducibility of the method is relatively low, this is also the experience from earlier round robin exercises.

The non-combustibility test method is an old and internationally highly recognized test method with a wide-spread use. We would, however, recommend that the possibility to revise the test method is assessed, to obtain a better repeatability and reproducibility of the test results.