



PUBLIC SUMMARY REPORT OF THE  
EGOLF EN 13823  
ROUND ROBIN 2015-2016

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## 1. Purpose of the round-robin

Round robin exercises are important for the determination of the trueness and precision of fire test methods, and national accreditation bodies request that accredited fire laboratories participate in such exercises as part of the documentation.

A round robin exercise on the EN 13823 test was performed in EGOLF during 2015 and 2016.

The aims of this round robin exercise have been:

- to confirm that EGOLF laboratories are able to perform the EN 13823 test in a proper way;
- to provide information about the reproducibility and repeatability for EN 13823;
- to give an indication for each participating laboratory regarding its performance when performing tests according to EN 13823;
- to provide an indication of the variability in equipment, procedures and tools.

## 2. Scope of the round-robin

### 2.1 Test method

The tests in the round robin were performed according to the procedure described in EN 13823, the Single Burning Item test.

Some definitions from EN 13823:

**FIGRA<sub>0,2 MJ</sub>** (Fire Growth RATE), in W/s, is defined as the maximum of the quotient of heat release rate from the specimen and the time of its occurrence using a HRR<sub>av</sub>-threshold of 3 kW together with a THR-threshold of 0.2 MJ.

**FIGRA<sub>0,4 MJ</sub>**, in W/s, is defined as the maximum of the quotient of heat release rate from the specimen and the time of its occurrence using a HRR<sub>av</sub>-threshold of 3 kW together with a THR-threshold of 0.4 MJ.

**LFS** (Lateral Flame Spread) is defined as the occurrence of sustained flames reaching the far edge of the long specimen wing at any height between 500 mm and 1 000 mm.

**SMOGRA** (SMOke Growth RATE), in m<sup>2</sup>/s<sup>2</sup>, is defined as the maximum of the quotient of smoke production rate from the specimen and the time of its occurrence using a SPR<sub>av</sub>-threshold of 0.1 m<sup>2</sup>/s together with a TSP-threshold of 6 m<sup>2</sup>.

**THR<sub>600 s</sub>**, in MJ, is defined as the total heat release from the specimen in the first 600 s of exposure to the main (primary) burner flames.

**TSP<sub>600 s</sub>**, in m<sup>2</sup>, is defined as the total smoke production from the specimen in the first 600 s of exposure to the main (primary) burner flames.

## 2.2 First and second phase of the round robin

Prior to testing the round robin samples, each participant completed three questionnaires:

- 1 The first questionnaire included details about the equipment used for realization of SBI tests concerning e.g. the test chamber, the trolley, the burner, the burner control system, the exhaust duct, the pressure transducer, the smoke measurement system, the gas sampling and analysis, the data acquisition, the software, and the experience of the operators.
- 2 The second questionnaire included details about the evaluation software. Parts of the questions concerned certain procedures before, during and after testing as well as possibilities for calibrations. Other questions concerned information about parameters which can be measured, recorded, and displayed during the test.
- 3 The third questionnaire was connected to EGOLF Standard Method SM7rev. Each participant used its software to evaluate the 5 validation files. Afterwards the validation results were checked by the round robin organizers. If the results were in accordance with the values given SM7rev, the participant got permission to perform the tests with the round robin samples. Otherwise the participant needed to update its software or correct its results in another way.

After this rather theoretical exercise, the practical part of the SBI round robin with testing of specimens followed.

## 2.3 Test specimens

Two kinds of materials were chosen in order to cover Euroclasses B and D. The material having most likely Euroclass B was a decorative wall paper glued on plasterboard. Whereas a class D material was represented by a non-fire retardant treated particle board.

## 2.4 Time frame

The questionnaires concerning the SBI equipment and evaluation software were sent to the participants early September 2015.

The test specimens were distributed to all participating labs early January 2016, and the last test results were received in March 2016. The analysis of test results was finished in March 2017.

## 2.5 Number of participants and tests

29 laboratories participated in the round robin. All test laboratories were anonymous in the exercise and were identified by a participant ID-number only. Below the laboratories are listed by their countries in alphabetical order.

Country	Laboratory
Austria	IBS Linz
Belgium	Warringtonfire Gent NV
Czech Republic	PAVUS a.s. - Fire testing laboratory
Denmark	DBI
Estonia	TÜV Eesti Oü
Finland	VTT Expert Services Ltd.
France	CSTB
	Efectis France
	LNE
Germany	MPA Bau Hannover
	MPA Braunschweig
	MFPA Leipzig GmbH
	MPA NRW
	MPA Universität Stuttgart
Italy	CSI SpA
	Istituto Giordano SpA
	LAPI SpA
Latvia	MeKA
Lithuania	Fire Research Center (GTC)
The Netherlands	Efectis Nederland BV
	Peutz
Poland	ITB
Slovenia	ZAG Ljubljana Fire Laboratory
Spain	Fundación Gaiker
	Fundación TECNALIA Research & Innovation
Sweden	SP Sveriges Tekniska Forskningsinstitut
Turkey	Era Laboratuvarlari A.Ş.
UK	Exova Warringtonfire
USA	FM Approvals USA

Two test materials were to be tested three times in each laboratory. The maximum achievable number of tests was then 87 for each product. For the particle board 87 single tests were performed, while there were 86 single tests of the wallpaper on plaster board due to problems with one single test in one of the labs.

### 3. Test results

The following results were reported:

- $FIGRA_{0,2 MJ}$  (W/s)
- $FIGRA_{0,4 MJ}$  (W/s)
- $THR_{600 s}$  (MJ)
- $SMOGRA$  ( $m^2/s^2$ )
- $TSP_{600 s}$  ( $m^2$ )
- LFS (y/n)
- Flaming particles or droplets (y/n)

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.

### 4. Assessment of the outcome of the round robin

The round robin exercise has shown that most of the participants perform testing according to EN 13823 with results within acceptable limits of repeatability and reproducibility.

The products particle board and wallpaper on gypsum board were chosen because these type of products have been tested widely according to different kinds of reaction-to-fire test methods, and also in the SBI test. The particle board is a product with “normal” combustibility (as wood), and the wallpaper on gypsum board would be a product with better reaction-to-fire behaviour than the particle board. Both products were supposed to show a predictable behaviour in this test method, which is important regarding the purpose of the round robin exercise, where the variability of the test results caused by the tested products should be kept to a minimum.

For both the tested products, the results are comparable with the results from similar products in the 1997 round robin. There are no data from similar products in the 2004 round robin, but the average accuracy values  $s_r/m$  and  $s_R/m$  seem to be in the same range for the three round robins.

The repeatability and reproducibility are in general better for parameters related to heat release than for parameters related to smoke production. This was also the case for the two previous round robins.

The repeatability for smoke production is not very high, especially for the SMOGRA measurements, but may be regarded as acceptable. The results are, however, in the same range as for the two previous SBI round robins performed in 1997 and 2004. Smoke production is in general a property with relatively low repeatability compared to other types of measurements, and this is a topic that should be investigated further.

## References

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