



Single Burning Item – SBI 915

Fire Testing System in Accordance with EN 13823

Analyzing & Testing

Single Burning Item – SBI 915

FIRE TESTING SYSTEM FOR DETERMINING THE REACTION OF BUILDING PRODUCTS TO FIRE WHEN EXPOSED TO THERMAL ATTACK TO A SINGLE BURNING ITEM, IN ACCORDANCE WITH EN 13823

The knowledge of the fire behavior of building products has been increasing in importance in recent times. The characteristic fire properties are the national regulations of all European member states and are crucial in the evaluation of the possible utilization of a building product.

Real Scale Scenario

The SBI test method assesses the reaction-to-fire performance of building products in room corner scenario. This characteristic is present in the national regulations of all European member states and plays an important role in evaluating possible uses of building products.

The SBI test is in accordance with DIN EN 13823 for classification into the European classes A1, A2, B, C and D (EN 13501). The classification “table” covers building/ construction products under the CPR (Construction Products Regulation) excluding a few product groups like floorings and so-called linear products, e.g., cables.

FIGRA Classification Parameter

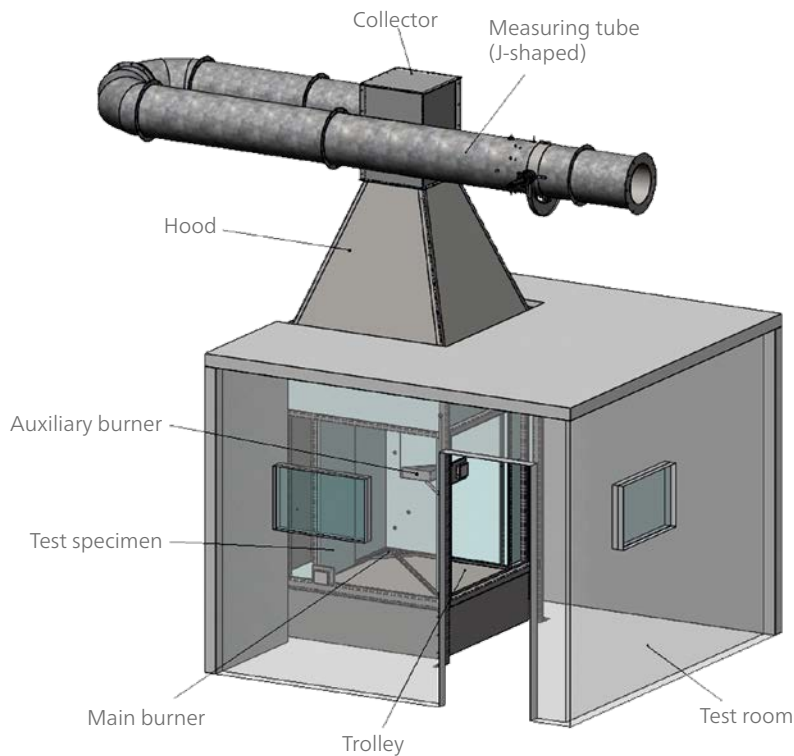
FIGRA is one of the main parameter for classification of building products based on the SBI test. It is used for the prediction of the burning behavior of a great number of building products in real-life fire scenarios. The NETZSCH SBI 915 system evaluates the potential contribution of a surface lining to the development of a fire.

FIGRA Index



- It is defined as the growth rate of the burning intensity, HRR, during an SBI test
- It is calculated as the maximum value of the function: heat release rate/elapsed test time
- The unit is given in [W/s]
- Detailed information in EN 13823





Method

The product specimen is mounted on the trolley rig forming a room corner. It is exposed to flames with a heat release of 30 kW for a period of 20 minutes. Heat and smoke production is measured within the ducting for the exhaust hood, and flame spread is observed during the test. The specimen consists of two parts which form a right-angled corner. A triangular propane diffusion gas burner acts as the heat and ignition source.

The fire behavior of the specimen is observed for 20 minutes. The test configuration has a floor but no ceiling. Floor, specimen and burner are located on a trolley that can be removed from the room for easy mounting of the specimens.

A hood collects the combustion gases. The gases are transported through a collector where the heat output is used for calculating the release rate (HRR), THR and FIGRA while the amount of smoke is used for calculating SPR, TSP and SMOGRA. Flame spread and burning droplets/particles are visually observed.

SBI Determines the Reaction-To-Fire Behavior of Building Products



Made in Germany

Trendsetting Technology

Conform to Standard

Assembly Frame

The assembly frame is made of steel in a square design and lined with 2-cm-thick calcium silicate panels. The dimensions are 245 cm x 148 cm x 148 cm (HxWxD).

Specimen Trolley

The trolley is a welded square tube design made of steel and lined with calcium silicate panels. It has an air inlet, which ensures constant airflow. Placement of the specimen on the trolley should approximate the real-life situation as closely as possible. This includes the substrate beneath the specimen and mounting. The maximum dimensions of the specimen can amount to 20 cm in length x 49.5 cm in width x 150 cm. Up to 8 angle holders are available to support the specimen.

Main and Auxiliary Burners

The main burner is installed in the sample corner at the base. It

is made of stainless steel and has a triangular shape. The bottom is closed with an integrated pipe connection for the gas supply; the top of the burner is open. The auxiliary burner is affixed to the assembly frame. Both burners include a check valve, ignition burner and flame detector.

Exhaust Hood, Collector and Measuring Section

The hood is made of stainless steel and insulated with replaceable Vermiculite panels. The collector is also made of stainless steel but insulated with mineral wool panels. The measuring section is a J-shaped, double-walled measuring tube also insulated with mineral wool. It contains a bidirectional sensor (or hemispherical probe in accordance with EN 13823:2020) for measuring the differential pressure, a type-K thermocouple, a gas sample probe and a light measuring system with a connection to compressed air flushing for the measurement of heat and smoke production. The assembly offers sensors for measuring room temperature and relative air humidity at ambient pressure.

Test Chamber

The walls of the test chamber carry a self-supporting ceiling, which allows for a maximum load of 100 kg/m². For opening,

a door and windows made of glass are integrated.

Exhaust Fan with Accessories

A direct-driven radial fan (process fan) allows for a maximum exhaust temperature of 300°C during continuous operation. The use of a frequency converter allows for exact and continuously regulation of requested flow rates.

Light Receiver, Light Emitter and Analyzer

The optical components of the silicon photo receiver are protected against heat and are fixed in an aluminum housing. The halogen point light source has 10 W and 2900 K color temperature. The diameter of the light beam amounts to 25 mm. For gas analysis, a Siemens ULTRAMAT/OXYMAT 6E is used for the detection of O₂, CO₂ and CO. Gas measurement is in accordance with the standard.

Efficient Peltier Cooling Device for Smoke Gas

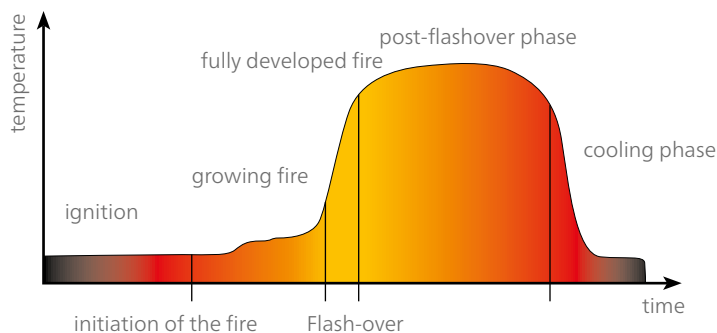
The sampling gas is cooled by a controlled Peltier cooler, which can be set down to -10°C. This eliminates any need for the expensive thermostat for gas cooling and/or drying agent which are commonly used.

Test Criteria Within the Euro Class System

- Total Heat Release (THR) – The total heat released in the evaluation period
- Lateral Flame Spread (LFS) – A simple measure of whether flames spread to the edge of the specimen
- Burning Time/Speed
- Fire Growth Rate Index (FIGRA) – The speed at which heat release increases throughout the full test duration
- Total Smoke Production (TSP) – The total smoke produced during the evaluation period
- Smoke Growth Rate (SMOGR) – The rate at which smoke production increases during the full 20-min exposure period
- Flaming droplets/particles – Any droplets/particles which continue to flame for longer than 10 s when they reach the ground are recorded during the first 10 min of the test

TEST CRITERIA & EURO CLASSIFICATION

Main Classification	Smoke Classification	Flaming Droplets/ Particles Classification
A1 and B <ul style="list-style-type: none"> ▪ FIGRA ≤ 120 W/s ▪ LFS < edge of specimen ▪ THR_{600s} ≤ 7.5 MJ 	s1 <ul style="list-style-type: none"> ▪ SMOGRA ≤ 30 m²/s² ▪ TSP_{600s} ≤ 50 m² 	d0 No flaming droplets/ particles
C <ul style="list-style-type: none"> ▪ FIGRA ≤ 250 W/s ▪ LFS < edge of specimen ▪ THR_{600s} ≤ 15 MJ 	s2 <ul style="list-style-type: none"> ▪ SMOGRA ≤ 180 m²/s² ▪ TSP_{600s} ≤ 200 m² 	d1 No flaming droplets/ particles persisting > 10 s
D FIGRA ≤ 750 W/s	s3 –	d2 –



Fire model according to Troitzsch, J, Intern. Plastics Flammability Handbook, Carl Hanser Verlag, München, Wien, New York 1990.



FEATURES AT A GLANCE

- Base frame with calcium silicate lining
- Furnace with specimen trolley, exhaust hood, collector, measuring section, gas installation (gas installation with digital gas flow controller, pressure regulators and magnet valves), burners and sensors
- Test chamber with 2 windows, door, security ladder, handrail, accessible for service purposes
- Specimen trolley with calcium silicate lining
- Insulated extraction hood and collector made of stainless steel for protection from aggressive gases
- Main and auxiliary burners of stainless steel with filling, ignition device and flame detector
- Exhaust radial fan with volume flow control for constant exhaust flow (digital), with frequency converter
- Components for measuring data acquisition and control of all processes
- High-resolution color display with intuitive icons and menu functions
- Insulated measuring tube section with bidirectional probe, NiCrNi thermocouples, light measurement system and gas sampling probe
- "SBI Control" measuring and control unit with SBC, 32-GB SSD, SIEMENS gas analyzer, measuring gas processing, measuring and control modules and RS232 interface
- 19" PC rack, PC, monitor, printer
- Various options and accessories for extension of the exhaust system and calibration of the SBI system
- Single license for the SBI software



SBI 915 SOFTWARE

The Windows-based software (Windows® 7, 8.1, 10) of the SBI 915 is designed for data logging, processing and displaying the measurement results in accordance with EN 13823.

Graphical and numerical display of all test results

- Freely configurable display of results as chart, diagram, text or bar

User guidance for test procedure

- Graphic flow chart of test procedure
- Dialogs with device-specific user instructions
- Dialog for input of all relevant information according to standard
- Dialog for automated adjusting of gas analysis
- Conducting the test with automatic activation of valves and burner
- Monitoring of the test with regard to HRR and excess temperature in the exhaust duct
- Online calculation and display of all data relevant to the test, such as HRR, THR, SPR, TSP, FIGRA
- Storage of the test data in EXCEL-compatible file

Configuration of measurement points

- Allocation of name, measurement range and correction value for each channel
- Allocation and analysis of thresholds for each channel

Calibration of gas analysis

- Completely automated adjusting procedure
- Control of calibration gases via the software
- Start of adjustment procedure upon reaching stability

Calibration of test device according to standard (stability, step calibration test, Heptan calibration, light)

- Standard automated workflows; easy calibrations
- EXCEL file for analysis, allows for import of the calibration data and calculations in accordance with the standard
- Calibration certificates for the individual sensors

Test report


- Input mask for all test-relevant data according to standard
- Test report print in accordance with EN 13823 with graphical and numerical display options, including current calibration data
- PDF format
- Copying of report data to clipboard
- Export of test report to text file

Additional features

- Monitoring of measuring device with display of relevant messages, and shutdown when individual values exceed critical thresholds
- Storage of all test data in raw format (binary) with interface to EXCEL, or WORD via the clipboard
- Storage of all measuring data in CSV format

Firmware

- Control of the hardware via embedded PC
- 10" high-resolution display with PCAP for display and operation
- Control of all hardware components such as valves, gas analyzer, light measurement system, sensors for differential pressure and mass flow controller
- Monitoring of test with visual and acoustic signals



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