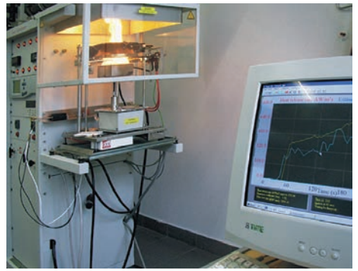
Additional Services

Measurements of flammability and flame propagation can also be performed. A 45° small burner test and a draft free chamber equipped with a vertical Bunsen burner are used for testing small sample bars similar to UL94 V and for tests on samples (305 mm x 75 mm) according to AITM 2.0002 respectively.
Furthermore the Oxygen Index according to EN ISO 4589-2 can be determined.

7 *Oxygen Index apparatus*

Equipment

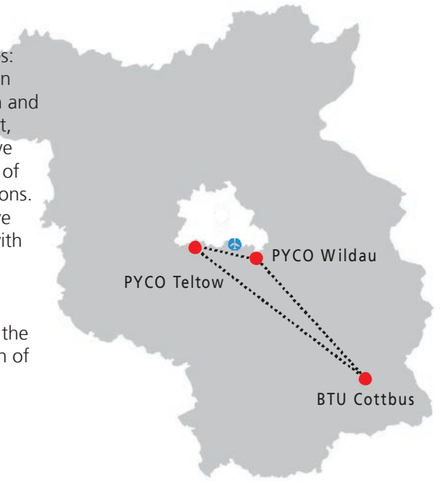
- Cone Calorimeter, manufactured by Fire Testing Technology Ltd (East Grinstead, UK)
- Oxygen Index apparatus, manufactured by Fire Testing Technology Ltd (East Grinstead, UK)
- 45° small burner test, in-house development in co-operation with W&P GEAT GmbH (Berlin, Germany)
- Vertical small burner test according to AITM 2.0002, manufactured by Dr.-Ing. Georg Wazau, Mess- und Prüfsysteme GmbH (Berlin, Germany)



8 *Fire test in the cone calorimeter, with the combustion process being presented simultaneously*

Location Berlin-Brandenburg

New solutions require new approaches: The location of the research institute in Teltow, where the metropolis of Berlin and the federal state of Brandenburg meet, offers optimal conditions for innovative scientific research. Here, the products of tomorrow emerge from ideas and visions. Therefore, the institute's scientists have formed a creative research network with renowned universities, well-known large-scale enterprises, and various innovative medium-sized companies. Additionally, new synergy arises from the integration in the third largest location of aerospace industry in Germany.



Fraunhofer Research Institution for Polymeric Materials and Composites PYCO

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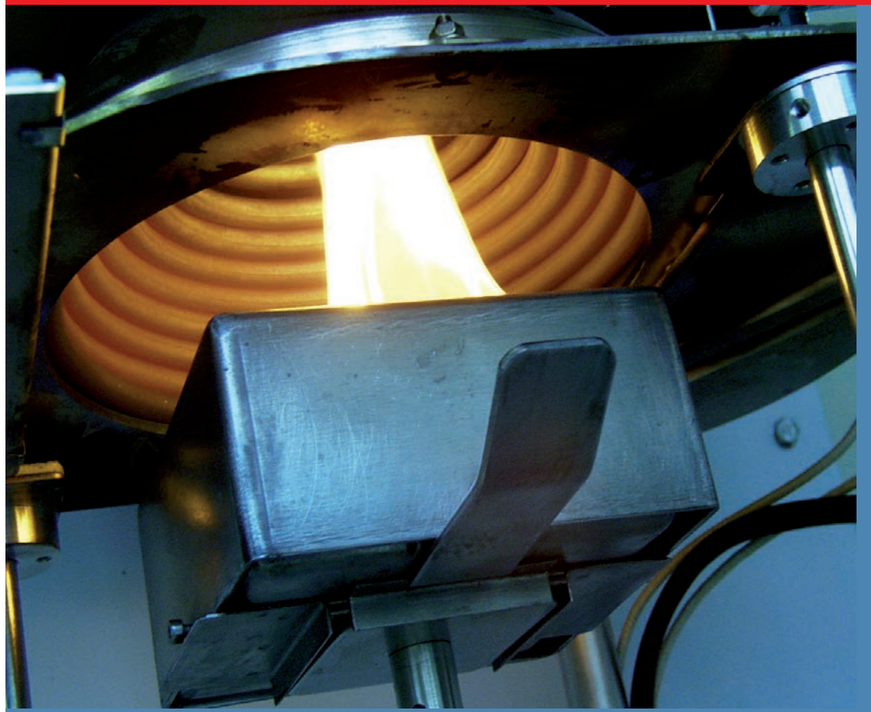
Prices and processing time on request.

9 *Main building*

Fraunhofer PYCO

FRAUNHOFER RESEARCH INSTITUTION FOR POLYMERIC MATERIALS AND COMPOSITES PYCO

Application Lab for Fire Smoke Toxicity Evaluation

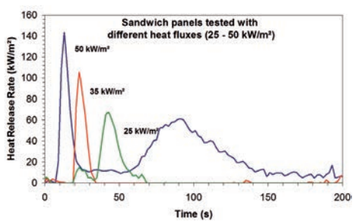


Application Lab for Fire Smoke Toxicity Evaluation

Fire performance is an important parameter for polymeric materials used in various areas of life. Material behavior at elevated temperatures and in case of fire need to be evaluated. High-performance materials with improved flame resistance are required. There are various testing methods to determine single parameters and classifications according to numerous standards.

Cone Calorimeter

The Cone Calorimeter (ISO 5660) is used to determine different measurements for characterization of fire performance simultaneously. The Heat Release Rate (HRR) – the most important parameter to determine a fire's hazard level – is measured via oxygen consumption during the combustion process. Carbon monoxide and carbon dioxide yield in the exhaust gases are determined. Formation of smoke and soot are registered. Furthermore, the sample mass is monitored continuously.



1 Heat Release Rates of sandwich panels tested at different heat fluxes

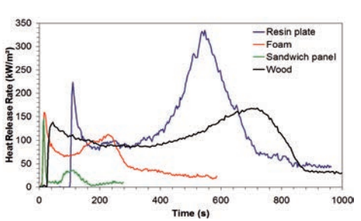
Principles

The measurement of the heat release is based on the oxygen consumption principle which is the most widely used method for determining Heat Release Rates. The effective heat of combustion of a large variety of commonly used organic materials is about 13.1 MJ per kilogram of oxygen consumed. This relationship was found in 1917 by Thornton and verified by Huggett in 1980 for various organic materials.

The smoke formation is measured by a red helium-neon laser beam crossing the exhaust duct. The extinction of light intensity is registered by photo diodes and the extinction coefficient is determined using Beer's Law. The Total Smoke Release (TSR) and the Specific Extinction Area (SEA) are calculated.

Method

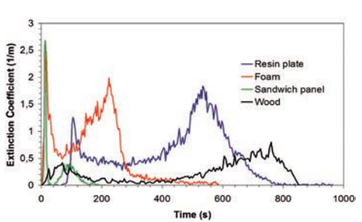
A cone shaped infrared radiator irradiates the sample surface with a defined heat flux which depends on the fire scenario. It is continuously adjustable from low values of about 25 kW/m² simulating a small fire to about 100 kW/m² representing a heavy fuel fire. Lower values are often used to determine parameters of materials made from unprotected natural fibers, foams and fabrics. A heat flux of 50 kW/m² is found suitable for testing of sandwich panels and glass or carbon fiber-reinforced fire protected composite materials used for cabin walls and interior of aircraft and railway vehicles. Higher heat fluxes of 75 to 100 kW/m² are mainly used for exploratory testing. A spark ignitor supports ignition of the gases released during thermal decomposition of the sample.



2 Heat Release Rate curves of different materials

Analysis

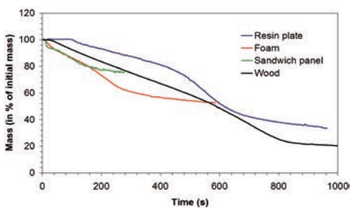
Data are collected every one to five seconds to allow a continuous monitoring of the combustion process. A variety of measurements are taken. Time to ignition is registered as well as duration of combustion and flame out. The concentration of oxygen, carbon monoxide and carbon dioxide is monitored in order to determine the heat release rate. Significant parameters as the peak value of the Heat Release Rate (HRR_{peak}), the Maximum value of the Average Rate of Heat Emission (MARHE) and the Total Heat Release (THR) evolved during the combustion process are calculated.



3 The extinction coefficient indicates smoke formation during combustion process

APPLICATION LAB FOR FIRE SMOKE TOXICITY EVALUATION

Total Smoke Release (TSR) and Specific Extinction Area (SEA) are calculated using the measured Extinction Coefficient (EXT). The report usually includes a description of the behavior of samples during the test and pictures of the residue. A database of about 2500 files can be used for comparison and evaluation of materials.

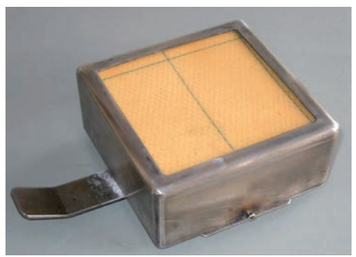


4 Sample mass during combustion process

Application

Cone Calorimeter tests are conducted on various materials for different applications. Lightweight materials for aircraft, automotive and railway applications are tested as well as construction materials. Sandwich panels, fiber-reinforced plastics, composite materials and foams can be tested. Usually at least three samples of a material should be tested.

The Sample size is 100 mm x 100 mm. The Thickness depends on the application of the materials. In general samples that are thinner than 6 mm should be tested with a substrate as used in end-use-application. Maximum thickness is 50 mm.



5 Sample holder with sandwich-panel

6 Char layer covered sample surface