SCREENING

We set up a fire resistance testing apparatus that can perform two tests on up to nine flame retardant coatings at the same time. The reactive fire protection coatings are applied onto steel plates 75 mm x 75 mm in size. Two thermocouples welded on the uncoated side of the steel plate record the specimens' temperatures during the fire test. The samples are set into a vermiculite specimen holder that covers the edges of the samples. Only the coated specimen front is exposed to the heat. The 1 m^3-furnace has two burners to generate the standard temperature time curve. Also the hydrocarbon curve or temperature ramps can be generated as well. This method is very suitable for screening because it enables the user to test many samples during only one trial.

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Sicherheit in Technik und Chemie

FIRE RESISTANCE: BENCH-SCALE TESTING

Division 7.5

STT MUFU+

STT MuFu+ stands for standard time temperature muffle furnace. The additional plus indicates the substantial modifications we added to the original muffle furnace, including a high-temperature endoscope, an adjusted specimen mount and an adapted temperature control to enable STT testing in a small electrical oven. The endoscope is used to evaluate the growth of the intumescing coating online during the fire test. Besides the standard time temperature curve user-defined curves and ramps up to 1000 °C are also possible.

The temperature on the back of a coated steel plate (75 mm x 75 mm) is recorded during the test to evaluate the performance of the coating. The specimen is positioned vertically in the door of the furnace. The method produces representative residues that can be used for advanced analysis after testing. The STT MuFu+ generates reliable, repeatable results on fire resistance on the small scale.

HIGH PERFORMANCE BURNER

The high-performance burner is a small-scale test to simulate extreme fire scenarios and thus to test high-performance fire protective systems. Flame temperatures of up to 1800°C are achieved with this propane oxygen burner. The flow of both gases is controlled to adjust the flame temperature and size. Flame-retardant coatings can be assessed and compared with each other with this set-up through application on a steel substrate 75 mm x 75 mm in size. During the test the coated sample is embedded in a ceramic plate, which protects the surroundings as well as the applied thermocouples from fire. The distance between the sample and the burner can be set within a range of 50 - 350 mm. Additionally, the angle at which the flame hits the sample can be varied.

COMPOSITES IN FIRE STABILITY

The bench-scale test stand is suitable for the exploratory analysis of new material concepts for load bearing components. With the burner, a flame is applied directly at irradiations of up to 200 kW/m²; compression loads of up to 230 kN can be applied to an area of 150 mm x 150 mm. The distance between the burner and the sample can be varied. Thermal expansion is prevented by an integrated water-cooling system. Realistic strain levels are generated for a wide spectrum of load bearing materials such as fibre reinforced composites. Additional vertical guidance prevents kinking while allowing representative buckling.