Technical Information

TI110 – Optimised for calorific value powder coatings

Powder coatings optimised for calorific value are used in the fire protection sector for the application of ceiling panels and partition wall systems. In ceiling tile systems optimized for calorific value, the optimised powder coating contributes to meeting the required specifications. Fleece or adhesives must also be taken into account in the overall assessment, as they have an additional influence on the fire behaviour.

The contribution of powder coating systems optimised for calorific value is described below.

Powder coatings are preparations/mixtures of the following substance classes:

- Organic binder/hardener
- Additives
- Pigments
- Extender

Oxidation/combustion of organic components produces decomposition products, smoke and heat energy (exothermic reaction). In order to ensure the contribution of thermal energy in meeting the specifications for gross heat of combustion/ smoke development, powder coating systems optimised for calorific value must be optimised in terms of

- Packing density
- hiding power
- Thin film design

The consequence of opacity-optimised thin-film powder coating systems, due to the reduction of the organic content, is an increased specific weight [kg/m3].

When coating the construction product/product with powder coating, attention must also be paid to the applied coating volume (Film thickness, electrostatic wrap-around, perforation/perforation) on the construction product/product to ensure optimised smoke development/heat of combustion (DIN EN ISO 13501-1).

Further information:

- www.bam.de
- www.fire-testing.com

Construction products are classified according to the applicable rules regarding their fire behaviour. DIN EN ISO 13501-1 describes the harmonised procedure for classifying the fire behaviour of construction products.

Powder-coated construction products or products are categorised as "non-homogeneous construction products". The powder coating itself is defined as a "non-substantial component of the construction product".

By defining powder coating as an (external) non-substantial component of a construction product, test methods and key figures can be determined in order to make the influence of the powder coating on the fire behaviour of a construction product/product measurable.

The following criteria apply to "external, non-substantial components":

Class A 1
PCS ≤ 2.0 MJ/kg or
PCS ≤ 2.0MJ/m2

and

FIGRA0.2MJ ≤ 20 W/s
LFS < sample outer edge
THR 600s ≤ 4 .0MJ
The conditions s1 and d0

Class A2
PCS ≤ 4.0MJ/m2

PCS: gross heat of combustion (calorific value) [MJ/kg or MJ/m2]
FIGRA0.2MJ: heat release rate at a THR threshold of 0.2 MJ [W/s]
LFS: lateral flame spread [m]
THR600s: total heat released during 600s [MJ]
s: defines the smoke development
d: classifies the properties of the burning droplet

Test results: **IGP-DURA®*mix* 3302A90100U00** (powder coating optimized for calorific value for ceiling panels)

The specific heat of combustion of *IGP-DURA®mix* **3302A90100U00** was determined at the MPA Materialprüfanstalt Stuttgart. The test result is article and shade-related and cannot be transferred to other shades as an official test certificate.

The specific heat of combustion of other shades can be approximately calculated using a theoretical model in a preliminary project phase.

MPA Stuttgart, test report 16-901 0393-B:

IGP-DURA®mix **3302A90100U00:** PCS = 16.957 MJ/kg

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The test results indicate the specific heat of combustion (calorific value) in [MJ/kg]. The theoretical calorific value in [MJ/m2] can be calculated from the values of the specific heat of combustion, the specific weight of the powder coating and the applied Film thickness and thus the fire protection class of the powder coating can be assigned (e.g. A1 or A2). It is also checked whether the additional requirements are met.

Specific heat of combustion [MJ/kg] × Film thickness [m] × Specific weight [kg/m3]