TECHNISCHE INFORMATION TI 110

Powder coatings optimised for combustion heat

In the area of fire protection, powder coatings that are optimised for combustion heat are used with ceiling panels and partition systems. In the case of ceiling panels that are optimised for combustion heat, the optimised powder coatings contributes to satisfying the required specifications. Rheologic properties or adhesives are to be included in the overall context, as they also influence burning behaviour.

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The contribution of powder coating systems that are optimised for combustion heat is described below:

Powder coatings represent preparations / mixtures of the following material classes:

- organic binders/hardeners
- additives
- pigments
- extenders

The oxidation/combustion of organic matter leads to the formation of degradation
products, smoke and heat energy (exothermic reaction). To ensure the contribution of heat energy in meeting the specifications of the gross heat of combustion/smoke formation, powder coating systems must be
optimised for combustion heat in terms of:

- packing density,
- covering power,
- and thin layering.

Due to the reduction of the organic component, the consequence of thin-film powder coating systems that are optimised for
covering power is a higher specific weight [kg/m^3].

When applying powder coating on the
(construction) product, attention must also be paid to the applied coating volume (layer thickness, electrostatic throwing, perforation) to ensure optimised smoke formation/ combustion heat (DIN EN ISO 13501-1).

Construction products are classified in terms of their fire behaviour according to the valid rules. The harmonised procedure for classifying the burning behaviour of construction products is described in DIN EN ISO 13501-1.

Powder-coatings (construction) products are classified as “non-homogeneous construction products”. The powder coatings itself is defined as a “non-substantial component of the construction product”.

Due to the definition of powder coating as an (external) non-substantial component of the construction product, testing methods and specifications can be determined for it to measure the influence of the powder
coating on the burning behaviour of a
(construction) product.

For more information:
www.bam.de/de/geraete_objekte/fg73_sbi
www.fire-testing.com/html/instruments/sbi

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

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

and

$FIGRA_{0.2MJ}$ ≤ 20 W/s
LFS < outer edge of sample
THR 600s ≤ 4.0 MJ
Conditions - s1 and d0

Class A2
PCS ≤ 4.0 MJ/m²

PCS:	gross heat of combustion (combustion value) [MJ/kg or MJ/m²]
$FIGRA_{0.2MJ}$:	heat release rate at a THR threshold value of 0.2 MJ [W/s]
LFS:	lateral flame spread [m]
THR_{600s}:	total heat released during 600s [MJ]
s:	defines the smoke development
d:	classifies the property of the burning dripping

Test results: IGP-DURA®*mix* 3302A90100U00
(powder coating optimised for combustion heat used with ceiling panels)

The specific heat of combustion of IGP-DURA®*mix* 3302A90100U00 was determined at the MPA Materials Testing Institute in Stuttgart. The test result is based on the product and shade and can not be transferred as an official test certificate to other shades.

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

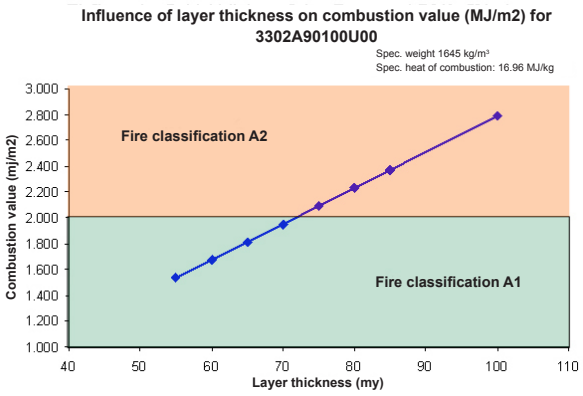
MPA Stuttgart, Test Report 16-901 0393-B:

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

The test results indicate the specific heat of combustion (combustion value) in [MJ/kg]. Using the values of the specific heat of combustion, the specific gravity of the powder coating and the applied layer thickness, the theoretical energy value in [MJ/m²] can be calculated and thus assigned to the fire classification of the powder coating (e.g. A1 or A2). Moreover, it is ascertained whether the additional requirements have been satisfied.

Spec. heat of combustion [MJ/kg] x layer thickness [m] x spec. weight [kg/m³]

$$\frac{MJ \times m \times kg}{kg \quad m^3} \rightarrow \frac{MJ \times \cancel{m} \times \cancel{kg}}{kg \quad m^3} \rightarrow \frac{MJ}{m^2}$$



For all inorganic pigmented finished products of the IGP-DURA®*mix* 3302A….U00 series, a fire classification of A1 is achievable at a layer thickness of < 60µm; this is to be examined for each individual case. Organic pigmented products may vary.

The manufacturer of the finished product of the "external, non-substantial component" must have a certified inspection institute confirm the classification of the burning behaviour using individual tests. IGP have no influence on many factors that affect the component; therefore, they cannot provide any final guarantees or confirmations regarding the burning behaviour.