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and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
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European Technical Assessment

ETA-22/0369
of 15 February 2023

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the
European Technical Assessment:

Deutsches Institut für Bautechnik

Trade name of the construction product

M2 Light

Product family
to which the construction product belongs

Renderings and rendering kits intended for fire resisting
applications

Manufacturer

HBT Hochbau-Brandschutz-Technik GmbH
Neue Bahnhofstraße 46
34621 Frielendorf
DEUTSCHLAND

Manufacturing plant

Werk 1

This European Technical Assessment
contains

12 pages including 2 annexes which form an integral part
of this assessment

This European Technical Assessment is
issued in accordance with Regulation (EU)
No 305/2011, on the basis of

EAD 350140-00-1106, Edition September 2017

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Specific Part

1 Technical description of the product

Object of this European Technical Assessment (ETA) is the rendering kit for establishing the fire protective rendering "M2 Light". The final product will be assessed in accordance with the EAD 350140-00-1106¹ option 3.

The rendering kit consists of the factory-made, mineral dry mix "M2 Light", the primer for steel elements "ISIGRUND MFP S" (mandatory if the steel cannot be sandblasted) or "Hempel's Speed-Dry Alkyd 43140" (on steel pre-treated by sandblasting), the factory-made priming plaster (VSP) "M1" and, if necessary e.g. for decorative purposes or outdoor application, the surface coating "HBT Kasilfarbe".²

The fire protective rendering "M2 Light" is manufactured on site from the above components.

The primer "Hempel's Speed-Dry Alkyd 43140" is a short to medium oil alkyd resin according to the EU Directive 2004/42/EC³, which is applied as a very fast drying corrosion protection for steel elements in layer thicknesses of 60 µm to 100 µm on substrates prepared by sandblasting.

The synthetic bonding agent "ISIGRUND MFP S" is a water-based polymer dispersion that improves the adhesion of sprayed plasters especially on substrates that cannot be prepared by sandblasting or are already coated. The plaster shall be applied while the bonding primer is still wet (fresh in fresh).

During the tests of the fire protective rendering on steel components with regard to fire resistance duration, both the primer "Hempel's Speed-Dry Alkyd 43140" and "ISIGRUND MFP S", were used.

The priming plaster "M1" based on Portland cement, is used as a pre-spray mortar (VSP), which improves the adhesion of the fire protective layer to the substrate. It complies with EN 998-1⁴, class CS IV.

The freshly mixed priming plaster is applied in a layer thickness of approximately 5 mm with a mixing pump e.g. PUTZMEISTER mixing pumps MP 22 or MP 25 or by hand.

Before applying the fire protective plaster "M2 Light", the pre-spray mortar layer shall be thoroughly dry. The drying time is at least 3 days. Mechanical surface treatment (levelling, roughening) is only possible after at least 24 hours.

The dry mix "M2 Light" is a factory-made, homogenous coarse powder of light grey colour, which essentially consists of Portland cement and hydrated lime as binding agents, lightweight aggregates such as Perlite, mineral filler and additives². When mixed with water, the dry mix "M2 Light" is a plaster suitable for mechanised application that complies with EN 998-1⁴, class CS II.

The layer effective for fire protection is created when the dry mix "M2 Light" for manufacturing the fire protective rendering "M2 Light" is mechanically mixed with a defined amount of clean water and applied directly to the prepared substrate.

The fresh plaster can be applied manually or with commercially available equipment for wet processing, e.g. commercially available plastering machines or mixing pumps.

¹ "Renderings and rendering kits intended for fire resisting applications", Edition September 2017, published first in the Official Journal of the EU N° C 435/07 of 15 December 2017, p 152

² The characteristics of the kit's components are deposited with DIBt.

³ Directive 2004/42/EC of the European Parliament and of the Council of 21 April 2004 on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain paints and varnishes and vehicle refinishing products and amending Directive 1999/13/EC

⁴ DIN EN 998-1:2017-02 Festlegungen für Mörtel im Mauerwerksbau – Teil 1 Putzmörtel

English translation prepared by DIBt

The applied fire protective rendering "M2 Light" is a multi-layer product, that hardens and forms the final fire protective product, which sticks completely on the substrate (steel, concrete) and delays effectively the input of heat in case of fire.

The total thickness of the fire protective rendering "M2 Light" applied depends on the intended period of fire resistance, on the substrate and on the type of element to protect.

The technical characteristics of the final fire protective rendering "M2 Light" and of the components are given in Annex 1.

The silicone-based surface coating "HBT-Kasilfarbe" is available in different colours and can be applied by spraying or with a brush. It is supplied in buckets.

If an application of the fire protective rendering "M2 Light" is intended under conditions of high humidity (areas with constant more than 85 % RF), an additional top-coat of "HBT-Kasilfarbe" shall be provided, which can also be used for decorative purposes. The manufacturer's recommendations for this use are considered mandatory.

2 Specification of the intended use in accordance with the applicable European Assessment Document (EAD) N° 350140-00-1106

The fire protective rendering kit "M2 Light" is intended to protect load-bearing steel elements as beams and columns without lathwork in case of fire.

The performances in section 3 can only be assumed for valid if the specifications and conditions mentioned in section 3.4 as well as the manufacturer's instructions are taken into account when using the fire protective rendering.

The test and assessment methods on which this European Technical Assessment (ETA) is based, lead to an assumption of working life of the fire protective rendering "M2 Light" of at least 25 years in final use.

The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

3 Performance of the product and references to the methods used for this assessment

3.1 Safety in case of fire (BWR 2)

3.1.1 Reaction to fire

Essential characteristic	Performance
Reaction to fire	Class A1 in accordance with EN 13501-1 ⁵

* the final product contains less than 1 V-% organic ingredients

⁵ EN 13501-1:2019-05 Fire classification of construction products and building elements, Part 1 Classification using test data from reaction to fire tests

English translation prepared by DIBt

3.1.2 Resistance to fire

3.1.2.1 Resistance to fire and necessary thickness of the rendering on steel elements without lathing for the classification of the steel elements protected by "M2 Light"

The fire tests and the evaluation of the results on the fire protection effect of the fire protection plaster cladding "M2 Light" on steel components without plaster base were carried out taking into account EAD 350140-00-1106¹ in accordance with EN 13381-4⁶.

Provided that the deviation in thickness and density of the fire protective rendering from the nominal values are not greater than 10 %, the assessment considers the following for the design of the minimum thickness of the rendering:

- steel beams and steel columns with open cross sections and a maximum web height of 639 mm as well as hollow profile cross sections made of all steel grades except S185, S460 and S500.
- section factors (surface extent/surface area; A_m/V) of $\leq 80 \text{ m}^{-1}$ up to 340 m^{-1}
- fire resistance periods of 30 minutes up to 180 minutes

The results for designing the required minimum thickness of the rendering "M2 Light" for open cross sections depending on the intended fire resistance period, the section factor and the type of element to be protected are summarized in Annex 2, Tables 1 to 5.

The design of the minimum thickness of the rendering on hollow steel sections shall be carried out in accordance with EN 13381-4⁶, considering the type of cross section (circular or rectangular hollow sections) and using the tables for design of Annex 2 in conjunction with EN 1993-1-2 Eurocode 3⁷. In doing so, the minimum thickness of the fire protective rendering shall be rounded up accordingly.

3.3 Hygiene, health and the environment (BWR 3)

Essential characteristic	Performance
Content and release of dangerous substances	No dangerous substances ⁸

The manufacturer's detailed written declaration concerning the chemical composition of the components of the rendering kit "M2 Light" as described in clause 1 was assessed by DIBt and is deposited with DIBt.

3.4 General aspects of durability

Durability testing shall be an integral part of assessing the basic works and performance requirements. The following specific provisions for use shall be complied with to ensure the durability of the performance.

The testing and evaluation of the relevant fire performance under environmental stress conditions of type Z₂ – product intended for use under frost-protected indoor conditions at a permanent relative humidity below 85 % RF - was carried out in accordance with EAD 350140-00-1106¹, clause 2.2.12.

Result:

The final rendering "M2 Light" without any lathing is fit for use as a rendering for fire protective application on load-bearing steel elements or on elements of concrete, reinforced concrete or prestressed concrete to improve or maintain the fire resistance of the element under use conditions of type Z₂.

⁶ EN 13381-4:2013-08 Test methods for determining the contribution to fire resistance of load-bearing components; Part 4: Passive fire protection measures for steel components

⁷ EN 1993-1-2:2010-12 Eurocode 3: Design of steel structures - Part 1-2: General rules - Structural fire design

⁸ In accordance with the Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 (published in the Official Journal of the EU N° L 353 of 31/12/2008, p 1)

3.5 General aspects of establishing the fire protective rendering

For establishing the fire protective rendering "M" Light" only the components described in section 1 shall be used.

The manufacturer's instructions for executing shall be considered when establishing the fire protective rendering "M2 Light".

It is in the responsibility of the manufacturer to ensure that all necessary information is communicated completely and correctly to the establisher. The full fire protective performance of the rendering can only be assumed, if the execution on site is carried out by trained workers, who have some experience with this kind of product.

When establishing the fire protective rendering "M2 Light", at least some samples should be prepared in parallel for determining the density, to demonstrate the conformity of the executed rendering with the requirements of his ETA.

It is also necessary to check the thickness of the freshly applied rendering after application e.g. by a penetration needle or depth gauge. The results shall be recorded. The measured thickness of the protective layer shall never fall below the rated minimum thickness at any point.

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with the European Assessment Document EAD N° 350140-00-1106¹ the following legal basis applies: Decision of the commission N° 1999/454/EC⁹.

For the assessment and verification of constancy of performance (AVCP) system 1 shall be applied (see Annex 2 in conjunction with Article 65 (2) of the Regulation (EU) N° 305/2011) according to the following table:

Product	Intended use	performance	System
Rendering kit "M2 Light"	fire protective application on load-bearing steel elements, elements of concrete, reinforced concrete and prestressed concrete for improvement or maintenance of fire resistance	reaction to fire, period of fire resistance relevant characteristics	1

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

The technical details necessary for the implementation of the system 1 for assessment and verification of constancy of performance are laid down in the control plan (confidential part of this ETA) deposited with Deutsches Institut für Bautechnik.

The CE-marking for the kit shall be affixed on every component (stick-on label or directly on the packing unit) and the commercially accompanying documents. The declaration of performance shall be done in accordance with this ETA.

Issued in Berlin on 15 February 2023 by Deutsches Institut für Bautechnik

Otto Fechner
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beglaubigt:
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⁹ Decision of the commission N° 1999/454/EC of 22 June 1999 (OJ of the EU L 178 of 14 July 1999, p 42), amended by EC Decision 2001/596/EC of 8 January 2001(OJ of the EU L 209 of 2 August 2001, p 2)

ANNEX 1

TECHNICAL CHARACTERISTICS OF THE RENDERING

"M2 Light"

Characteristic	Nominal level	Test method
Nominal density of the rendering system	1200 kg/m ³ ±10%	See control plan
Bulk density of the dry mix "M2 Light"	680 kg/m ³	
Compression strength after 28 d	2, 35 N/mm ²	
tensile bending strength	0,92 N/mm ²	

Additional declarations for the components

Characteristic	Nominal level/value
priming plaster "M1" (VSP)	
bulk density	1740 kg/m ³ ±10 %
Compression strength after 28 d	16,0 N/mm ²
tensile bending strength	11,5 N/mm ²
primer "ISIGRUND MFP S",	
color	milky white
density (dispersion)	1,15 ± 0,05 g/m ³
pH-Wert	7
solids content	42 ± 1%
anti-corrosion primer "Hempel's Speed-Dry Alkyd 43140"	
density (dispersion) ¹	1,3 ± 0,2 kg/l
solids content	43 ± 2%
surface coating "HBT Kasilfarbe"	
density (emulsion)	1,6 g/cm ³ ± 10%
VOC	< 40 g/l

¹ The density of the dispersion depends on the pigments (color)

ANNEX 2

Fire protective rendering "M2 Light"
Design of the minimum thicknesses for open steel profiles

Table 1 Fire resistance period 30 min

Design temperature [°C]	300	350	400	450	500	550	600	650	700	750
A_m/V [m ⁻¹]	minimum thickness of applied dry rendering [mm]									
≤ 80	16,0	12,5	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0
80	17,0	13,5	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0
90	17,5	14,0	11,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0
100	18,5	15,0	12,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0
110	19,0	15,5	12,5	10,0	10,0	10,0	10,0	10,0	10,0	10,0
120	19,5	16,0	13,0	10,5	10,0	10,0	10,0	10,0	10,0	10,0
130	20,0	16,5	13,5	11,0	10,0	10,0	10,0	10,0	10,0	10,0
140	20,5	17,0	14,0	11,5	10,0	10,0	10,0	10,0	10,0	10,0
150	21,0	17,5	14,5	12,0	10,0	10,0	10,0	10,0	10,0	10,0
160	21,5	18,0	15,0	12,5	10,0	10,0	10,0	10,0	10,0	10,0
170	22,0	18,5	15,5	13,0	10,5	10,0	10,0	10,0	10,0	10,0
180	22,0	19,0	16,0	13,0	11,0	10,0	10,0	10,0	10,0	10,0
190	22,5	19,0	16,0	13,5	11,0	10,0	10,0	10,0	10,0	10,0
200	22,5	19,5	16,5	14,0	11,5	10,0	10,0	10,0	10,0	10,0
210	23,0	19,5	16,5	14,0	12,0	10,0	10,0	10,0	10,0	10,0
220	23,0	20,0	17,0	14,5	12,0	10,0	10,0	10,0	10,0	10,0
230	23,5	20,0	17,0	14,5	12,5	10,0	10,0	10,0	10,0	10,0
240	23,5	20,5	17,5	15,0	12,5	10,5	10,0	10,0	10,0	10,0
250	24,0	20,5	17,5	15,0	13,0	10,5	10,0	10,0	10,0	10,0
260	24,0	20,5	18,0	15,0	13,0	11,0	10,0	10,0	10,0	10,0
270	24,0	21,0	18,0	15,5	13,0	11,0	10,0	10,0	10,0	10,0
280	24,5	21,0	18,0	15,5	13,5	11,5	10,0	10,0	10,0	10,0
290	24,5	21,0	18,5	16,0	13,5	11,5	10,0	10,0	10,0	10,0
300	24,5	21,5	18,5	16,0	13,5	11,5	10,0	10,0	10,0	10,0
310	24,5	21,5	18,5	16,0	14,0	12,0	10,0	10,0	10,0	10
320	25,0	21,5	19,0	16,5	14,0	12,0	10,0	10,0	10,0	10,0
330	25,0	22,0	19,0	16,5	14,0	12,0	10,0	10,0	10,0	10,0
340	25,0	22,0	19,0	16,5	14,5	12,5	10,5	10,0	10,0	10,0

Table 2 Fire resistance period 60 min

Design temperature [°C]	300	350	400	450	500	550	600	650	700	750
A_m/V [m ⁻¹]	minimum thickness of applied dry rendering [mm]									
≤ 80	28,0	23,5	19,5	16,5	13,0	10,5	10,0	10,0	10,0	10,0
80	29,0	25,0	21,0	17,5	14,5	11,5	10,0	10,0	10,0	10,0
90	30,5	26,0	22,5	19,0	16,0	13,0	10,5	10,0	10,0	10,0
100	32,0	27,5	23,5	20,0	17,0	14,5	12,0	10,0	10,0	10,0
110	33,0	28,5	25,0	21,5	18,5	15,5	13,0	10,5	10,0	10,0
120	34,0	29,5	26,0	22,5	19,5	16,5	14,0	12,0	10,0	10,0
130	35,0	30,5	27,0	23,5	20,5	17,5	15,0	12,5	10,5	10,0
140	35,5	31,5	27,5	24,0	21,0	18,5	16,0	13,5	11,5	10,0
150	36,5	32,0	28,5	25,0	22,0	19,0	16,5	14,5	12,0	10,0
160	37,0	33,0	29,0	25,5	22,5	20,0	17,5	15,0	13,0	11,0
170	38,0	33,5	30,0	26,5	23,5	20,5	18,0	15,5	13,5	11,5
180	38,5	34,0	30,5	27,0	24,0	21,0	18,5	16,0	14,0	12,0
190	39,0	34,5	31,0	27,5	24,5	21,5	19,0	17,0	14,5	12,5
200	39,5	35,0	31,5	28,0	25,0	22,0	19,5	17,5	15,0	13,0
210	40,0	35,4	32,0	28,5	25,5	22,5	20,0	18,0	15,5	13,5
220	40,5	36,0	32,0	29,0	26,0	23,0	20,5	18,0	16,0	14,0
230	40,5	36,5	32,5	29,5	26,0	23,22	21,0	18,5	16,5	14,5
240	41,0	37,0	33,0	29,5	26,5	24,0	21,5	19,0	17,0	15,0
250	41,5	37,0	33,5	30,0	27,0	24,0	21,5	19,5	17,0	15,0
260	42,0	37,5	33,5	30,5	27,0	24,5	22,0	19,5	17,5	15,5
270	42,0	38,0	34,0	30,5	27,5	25,0	22,5	20,0	18,0	16,0
280	42,5	38,0	34,5	31,0	28,0	25,0	22,5	20,5	18,0	16,0
290	42,5	38,5	34,5	31,0	28,0	25,5	23,0	20,5	18,5	16,5
300	43,0	38,5	35,0	31,5	28,5	25,5	23,0	21,0	18,5	17,0
310	43,0	39,0	35,0	31,5	28,5	26,0	23,5	21,0	19,0	17,0
320	43,5	39,0	35,5	32,0	29,0	26,0	23,5	21,5	19,0	17,0
330	43,5	39,5	35,5	32,0	29,0	26,5	24,0	21,5	19,5	17,5
340	44,0	39,5	36,0	32,5	29,5	26,5	24,0	22,0	19,5	17,5

Table 3 Fire resistance period 90 min

Design temperature [°C]	300	350	400	450	500	550	600	650	700	750
A_m/V [m ⁻¹]	minimum thickness of applied dry rendering [mm]									
≤ 80	39,5	34,5	30,0	26,0	22,5	19,5	16,5	13,5	11,0	10,0
80	41,0	36,0	32,0	28,0	24,0	21,0	18,0	15,5	13,0	10,5
90	43,0	38,5	34,0	30,0	26,0	23,0	20,0	17,0	14,5	12,5
100	45,0	40,0	35,5	31,5	28,0	24,5	21,5	19,0	16,5	14,0
110		42,0	37,5	33,0	29,5	26,5	23,0	20,5	18,0	15,5
120		43,0	38,5	34,5	31,0	27,5	24,5	22,0	19,5	17,0
130		44,5	40,0	36,0	32,0	29,0	26,0	23,0	20,5	18,0
140		45,5	41,0	37,0	33,5	30,0	27,0	24,0	21,5	19,0
150			42,0	38,0	34,5	31,0	28,0	25,0	22,5	20,0
160			43,0	39,0	35,5	32,0	29,0	26,0	23,5	21,0
170			44,0	40,0	36,0	32,5	30,0	27,0	24,5	22,0
180			45,0	41,0	37,0	33,5	30,5	27,5	25,0	22,5
190			45,5	41,5	37,5	34,5	31,0	28,5	26,0	23,5
200				42,0	38,5	35,0	32,0	29,0	26,5	24,0
210				43,0	39,0	35,5	32,5	29,5	27,0	24,5
220				43,5	39,5	36,0	33,0	30,0	27,5	25,0
230				44,0	40,0	35,5	33,5	31,0	28,0	25,5
240				44,5	40,5	37,0	34,0	31,5	28,5	26,0
250				45,0	41,0	37,5	34,5	31,5	29,0	26,5
260				45,5	41,5	38,0	35,0	32,0	29,5	27,0
270					42,0	38,5	35,5	32,5	30,0	27,5
280					42,5	39,0	36,0	33,0	30,5	28,0
290					43,0	39,5	36,0	33,5	30,5	28,0
300					43,0	39,5	36,5	33,5	31,0	28,5
310					43,5	40,0	37,0	34,0	31,5	29,0
320					44,0	40,5	37,0	34,5	31,5	29,0
330					44,0	40,5	37,5	34,5	32,0	29,5
340					44,5	41,0	38,0	35,0	32,0	30,0

Table 4 Fire resistance period 120 min

Design temperature [°C]	300	350	400	450	500	550	600	650	700	750
A_m/V [m ⁻¹]	minimum thickness of applied dry rendering [mm]									
≤ 80		45,5	40,5	36,0	32,0	28,0	25,0	22,0	19,0	16,5
80			42,5	38,0	34,0	30,5	27,0	24,0	21,0	18,5
90			45,0	40,5	36,5	33,0	29,5	26,0	23,5	20,5
100				43,0	39,0	35,0	31,5	28,5	25,5	23,0
110				45,0	40,5	37,0	33,5	30,0	27,5	24,5
120					42,5	39,0	35,0	32,0	29,0	26,0
130					44,0	40,0	36,5	33,2	30,5	27,5
140					45,5	41,5	38,0	35,0	32,0	29,0
150						43,0	39,5	36,0	33,0	30,0
160						44,0	40,5	37,0	34,0	31,5
170						45,0	41,5	38,0	35,0	32,5
180							42,5	39,0	36,0	33,5
190							43,5	40,0	37,0	34,0
200							44,0	41,0	37,5	35,0
210							45,0	41,5	38,5	35,5
220							45,5	42,5	39,0	36,5
230								43,0	40,0	37,0
240								43,5	40,5	37,5
250								44,0	41,0	38,0
260								44,5	41,5	38,5
270								45,0	42,0	39,0
280								45,5	42,5	39,5
290									43,0	40,0
300									43,5	40,5
310									43,5	41,0
320									44,0	41,0
330									44,5	41,5
340									45,0	42,0

Table 5 Fire resistance period 180 min (I-Profiles)

Design temperature [°C]	300	350	400	450	500	550	600	650	700	750
A_m/V [m ⁻¹]	minimum thickness of applied dry rendering [mm]									
≤ 80							42,0	38,0	34,5	31,5
80							44,5	41,0	37,5	34,0
90								44,0	40,5	37,0
100									43,5	40,0
110										42,5
120										45,0