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European Technical Assessment

ETA - 20/1228
of 02/02/2021

General Part

Technical Assessment Body Issuing the European Technical Assessment:	**Element Materials Technology Rotterdam B.V.**
Trade Name of the Construction Product:	**HENSOTHERM® 421 KS**
Product Family to Which the Construction Product Belongs:	35. Fire Protective Products Reactive Coating for the Fire Protection of Steel Elements
Manufacturer:	**Rudolf Hensel GmbH Lauenburger Landstr 11, D-21039 Börnsen, Germany**
Manufacturing Plant(s):	**Rudolf Hensel GmbH Lauenburger Landstr 11, D-21039 Börnsen, Germany**
This European Technical Assessment Contains:	50 pages including 1 Annex 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 350402-00-1106 Fire Protective Products: Reactive Coatings For Fire Protection of Steel Elements.
This Version is a Corrigendum To:	ETA 20/1228, issued on 16/12/2020 Note: ETA 20/1228 of 16/12/2020 replaced ETA 16/0251 of 2020/11/19

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1. Technical Description of the Product

HENSOTHERM® 421 KS is a spray or brush/roller applied intumescent paint formulated for the fire protection of structural steel elements.

In accordance with EAD 350402-00-1106, HENSOTHERM® 421 KS may be considered as a reactive coating kit that includes one or more primers and/or topcoats (Option 3).

According to the manufacturer's declaration, the product specification has been compared with Annex XVII of REACH and the ECHA Candidate List of Substances of Very High Concern to verify that that it does not contain such substances.

In addition to the specific clauses relating to dangerous substances contained in this European technical assessment, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Regulation, these requirements need also to be complied with, when and where they apply.

2. Specification of the Intended Use(s) in Accordance with the Applicable European Assessment Document (hereinafter EAD)

The intended use of HENSOTHERM® 421 KS is to fire protect various sizes of structural steel 'I/H' shaped sections (beams and columns) and hollow sections (circular and rectangular/square hollow columns as well as rectangular/square hollow beams) up to fire resistance classifications of R120 and R180, respectively. The analyses considered design temperatures in the range from 350°C to 750°C.

HENSOTHERM® 421 KS has been tested and assessed as being capable on maintaining fire resistance performance on 'I/H' shaped sections up to 150 minutes. Therefore, table of results for additional fire resistance periods that are not foreseen by the standard classification classes also form part of the evaluation.

The fire protection coating in conjunction with HENSOGRUND 1966E, HENSOGRUND 2K, HENSOGRUND AQ, HENSOGRUND WB Green and HENSOGRUND WB Green/ HENSOTOP WB Green primers and HENSOTOP 84, HENSOTOP 84 AQ and HENSOTOP WB Green topcoats has a performance determined for a reaction to fire classification in accordance with EN 13501-1 of Class E.

The provisions made in this ETA are based on an assumed working life of the applied coating for the intended use of 10 years, for environmental categories Types Z_1, X and Y. EAD 350402-00-1106 also allows to assume 25 years working life where the ETA applicant can offer sufficient additional documented proof for the technical examination. Rudolf Hensel GmbH have supplied additional information for Type Z_2 to both Warringtonfire and BAM, who have both independently verified that the data supplied demonstrates the use of HENSOTHERM® 421 KS for a working life of 25 years in environmental condition Type Z_2. Therefore, 25 years working life is assumed for environmental category Type Z_2. The above provisions are made provided that it is subject to appropriate use and maintenance according to manufacturer's instruction. The indications given on the intended working life cannot be interpreted as a guarantee given by the producer, but are to be used as a means for selecting the appropriate product in relation to the expected economically reasonable working life of the works.

HENSOTHERM® 421 KS has been assessed as being compatible with the following primers:

Primers				
Primer Reference	Primer Type	Tested Nominal Primer DFT (mm)	Permitted Primer Thickness Range (mm).[1]	
			Minimum	Maximum
TEKNOLAC PRIMER 0168-00[2]	Alkyd resin, solvent based[2]	0.056	0.028	0.084
TEKNOCRYL AQUA COMBI 2780[3]	Water-borne primer based on acrylate dispersion and alkyd[3]	0.038	0.019	0.057
HENSOGRUND 1966E[2]	Short oil alkyd[2]	0.08	0.04	0.12
HENSOGRUND 2K[2]	Two component epoxy[2]	0.075	0.038	0.113
HENSOGRUND AQ[2]	Water-based acrylic[2]	0.06	0.03	0.09
HENSOGRUND 2K (Galvanized)[4]	Two component epoxy[4]	0.05	0.025	0.075
HENSOGRUND AQ (Galvanized)[4]	Water-based acrylic[4]	0.05	0.025	0.075
HENSOGRUND WB Green	Water Based Acrylic[2]	0.066	0.033	0.204
HENSOGRUND WB Green	Water Based Acrylic[2]	0.136	0.033	0.204
HENSOGRUND WB Green/HENSOTOP WB Green	Water Based Acrylic[2]/Water Based Acrylic[2]	0.09/0.09	0.045/0/045	0.135/0.135
HENSOGRUND WB Green (Galvanized)	Water Based Acrylic[4]	0.066	0.033	0.099

[1] The permitted theoretical minimum and maximum DFTs can not be less or exceed the DFT for each product as recommended by the manufacturer. The practical information given by the manufacturer must be followed

[2] The generic approval is applicable to other primers from the same generic group. The approval does not cover galvanized steel

[3] The approval is applicable to the specific primer. The approval does not cover galvanized steel

[4] The approval is applicable to the specific primer. The approval covers galvanized steel

HENSOTHERM® 421 KS has been assessed as being compatible with the following top coats:

Top Coat				
Top Coat Reference[1]	Top Coat Description	Tested Nominal Top Coat DFT (mm)	Permitted Top Coat Thickness Range (mm)	
			Minimum	Maximum[2]
BIORA 20	Acrylic resin, water based	0.061	0.061	0.091
HENSOTOP 84 AQ	Acrylic resin, water based	0.05	0.05	0.075
HENSOTOP 84	Acrylic resin, solvent based	0.05	0.05	0.075
HENSOTOP SB (up to Type Y exposure)	Acrylic resin, solvent based	0.055	0.055	0.082
HENSOTOP SB (up to Type X exposure)	Acrylic resin, solvent based	0.095	0.095	0.142
HENSOTOP WB	Acrylic resin, water based	0.05	0.05	0.075
TEKNOCRYL 100	Acrylic, modified	0.05	0.05	0.075
HENSOTOP 2K PU	Acrylic polyurethan, solvent based	0.07	0.07	0.105
HENSOTOP WB Green	Water Based Acrylic	0.076	0.076	0.114

[1] The approval is limited to the specific product

[2] The permitted theoretical maximum DFT cannot exceed the DFT for each product as recommended by the manufacturer. The practical information given by the manufacturer must be followed

HENSOTHERM® 421 KS has been assessed as having passed the requirements for durability according to EAD 350402-00-1106 with and without the following top coats:

Top Coat Reference[1]	Top Coat Description	Approved Top Coat Colours	Durability Approvals Based On The Carried Out Testing			
			Type Z_2	Type Z_1	Type Y	Type X
BIORA 20	Acrylic resin, water based	All Colours	✓	✓		
HENSOTOP 84 AQ	Acrylic resin, water based	All Colours	✓	✓		
HENSOTOP 84	Acrylic resin, solvent based	All Colours	✓	✓		
No Top Coat	-	-	✓	✓	✓	
HENSOTOP WB	Acrylic resin, water based	All Colours	✓	✓	✓	
HENSOTOP WB Green	Water Based Acrylic	All colours	✓	✓	✓	
TEKNOCRYL 100	Acrylic modified top coat	All Colours	✓	✓	✓	
HENSOTOP SB	Acrylic resin, solvent based	All Colours	✓	✓	✓	✓
HENSOTOP 2K PU	Acrylic polyurethan, solvent based	All Colours	✓	✓	✓	✓

[1] The approval is limited to the specific product.

HENSOTHERM® 421 KS was subjected to the identification testing in accordance with the methods of identification defined in Table 4 of EAD 350402-00-1106. Test for technical characterisation has been done as described in Annex E (Thermoanalytical analyses (TG) and Infrared spectroscopy analyses (IR)).

3. Performance of the Product and References to the Methods Used for its Assessment

<table>
<tr><td colspan="2">Product: Reactive coating</td><td>Intended use: Fire protection of structural steel elements</td></tr>
<tr><td>Assessment method</td><td>Essential characteristic</td><td>Product performance</td></tr>
<tr><td colspan="3">BASIC WORKS REQUIREMENT 2: SAFETY IN CASE OF FIRE</td></tr>
<tr><td>EN 13501-1</td><td>Reaction to fire</td><td>Class E</td></tr>
<tr><td>EN 13501-2</td><td>Fire resistance</td><td>(R15 to R120) - IncSlow
(I/H Beams and Columns)
and
(R15 to R180) - IncSlow
(Circular and Rectangular/Square Hollow Column as well as Rectangular/Square Hollow Beams)
(see Annex A)*</td></tr>
<tr><td colspan="3">BASIC WORKS REQUIREMENT 3: HYGIENE, HEALTH AND THE ENVIRONMENT</td></tr>
<tr><td>Manufacturer’s declaration and EN 16516</td><td>Content, emission and or release of dangerous substances</td><td>Product specification doesn’t contain dangerous substances given in Annex XVII of REACH and the ECHA Candidate List of Substances of Very High Concern
Use categories: IA1 and S/W2
Results for reactive coating to EN 16516 after 3 and 28 days:</td></tr>
<tr><td colspan="3">
<table>
<tr><td></td><td colspan="2">3 Days</td><td colspan="2">28 Days</td></tr>
<tr><td></td><td>Restriction</td><td>HENSOTHERM® 421 KS</td><td>Restriction</td><td>HENSOTHERM® 421 KS</td></tr>
<tr><td>R-Value</td><td>N/A</td><td>-</td><td>≤1</td><td>≤1</td></tr>
<tr><td>TVOC</td><td>≤10000µg/m^3</td><td>≤10000µg/m^3</td><td>≤1000µg/m^3</td><td>≤1000µg/m^3</td></tr>
<tr><td>TSVOC</td><td>N/A</td><td>-</td><td>≤100µg/m3</td><td>≤100µg/m^3</td></tr>
<tr><td>Total VOC without NIK</td><td>N/A</td><td>-</td><td>≤100µg/m3</td><td>≤100µg/m^3</td></tr>
</table>
</td></tr>
<tr><td colspan="3">BASIC WORKS REQUIREMENT 4: SAFETY AND ACCESSIBILITY IN USE</td></tr>
<tr><td>EAD 350402-00-1106 Clause 2.2.4 and Clause 2.2.5</td><td>Adhesion and Durability</td><td>• Primer and top coat compatibility
• Type X durability
• Type Y durability
• Type Z_1 durability
• Type Z_2 durability</td></tr>
<tr><td>EAD 350402-00-1106 Clause 2.3.5</td><td>Identification</td><td>Thermoanalytical analyses (TG) and Infrared spectroscopy analyses (IR)</td></tr>
</table>

* Table of results for additional fire resistance periods that are not foreseen by the standard classification classes also form part of this ETA.

4. Assessment and Verification of Constancy of Performance (hereinafter AVCP) System Applied, with reference to its Legal Base

According to the decision 1999/454/EC of the European Commission Decision of date 22 June 1999 on the procedure for attesting the conformity of construction products pursuant to Article 20(2) of Council Directive 89/106/EEC as regards fire stopping, fire sealing and fire protective products, the system of assessment and verification of constancy of performance (see Annex V to the Regulation (EU) No 305/2011) given in the following table apply:

Products	Intended uses	Level or Class	System
Fire protective products (including coatings)	Fire protection of steel elements	Any	1

5. Technical Details Necessary for the Implementation of the AVCP System, as Provided for in the Applicable EAD

The manufacturer shall exercise permanent internal control, record and evaluate the results of factory production in accordance with the provisions laid down in the "Control Plan" related to this European Technical Assessment. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. The production control system shall ensure that the product is in conformity with this European Technical Assessment.

The manufacturer may only use verified by Technical Assessment Body initial/raw/constituent materials stated in the technical documentations related to this European Technical Assessment.

The approved body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.

In cases where the provisions of the European technical assessment and its "Control Plan" are no longer fulfilled the certification body shall withdraw the Certificate of Constancy and inform the relevant authorities e.g. NANDO, EOTA.

The Table 5 in EAD 350402-00-1106 presents an example of the properties that shall be controlled and minimum frequencies of control. The exact test method and threshold have been laid down in the factory production control plan, operated by the manufacturer and deposited at Element Materials Technology Rotterdam B.V.

Issued in Amsterdam, Netherlands on 02/02/2021

By

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Deputy TAB Manager

Annex A - Product Performance: Fire Resistance

1 This Annex relates to the use of HENSOTHERM® 421 KS for the fire protection of 'I/H' shaped sections (beams and columns) and hollow sections (circular and rectangular/square hollow columns as well as rectangular/square hollow beams). The precise scope is given in Tables 1 to 41 which show the total dry film thickness of HENSOTHERM® 421 KS (excluding primer and top coat) required to provide classifications of R15 to R120 for I/H sections and R15 to R180 for Hollow sections for various design temperatures and section factors. HENSOTHERM® 421 KS has been tested and assessed as being capable on maintaining fire resistance performance on 'I' and 'H' shaped sections up to 150 minutes. Therefore, table of results for additional fire resistance periods that are not foreseen by the standard classification classes also form part of this European Technical Assessment.

2 The product is approved on the basis of:

i) Approval testing in accordance with the principles of EN 13381-8:2013.

ii) A design appraisal against this ETA adopting the graphical analysis defined in Annex E of EN 13381-8:2013.

3 The data presented in the tables in this Annex refers to both beams (three-sided fire exposure) and columns (four sided exposure).

4 The data shown is applicable to steel sections blast cleaned to ISO 8501-1 Sa 2.5 or equivalent and primed with the compatible primers listed in this ETA. The compatible primers and top coats, and their permitted dry film thicknesses are provided in the body of this ETA. The data is also applicable to galvanized steel sections with the compatible primers.

5 The data for the 'I' and 'H' shaped beams and columns applies also to other shaped steel sections that have re-entrant details such as channels, angles and tees.

6. HENSOTHERM® 421 KS has been exposed to the slow heating regime (IncSlow) defined in Annex A of EN 13381-8: 2013 and has satisfied the requirements to provide classification according to EN 13501-2.