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Extended application report for roofs/roof coverings exposed to external fire No. 22050C

Owner of the extended application report

IKO PLC
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Normative references

This extended application (EXAP) report concerns test results obtained in accordance with test method CEN/TS 1187:2012 – test method 4. The extended application process is carried out in conformity with the following extended application documents: CEN/TS 16459:2019 and EN 15725: External fire exposure of roofs and roof coverings – Extended application of test results from CEN/TS 1187.

The extended application process also applies rules (if any) as defined in the following product standard(s) and/or EAD(s): EN 13707:2004.

This extended application report consists of 13 pages.

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1. DETAILS OF PRODUCT CONCERNED

1.1. Nature

Product Technical Specifications: Bituminous waterproofing membrane
Product family: EN 13707:2004
End-use application: Waterproofing roof membrane

1.2. Description

This description is based on information given by the sponsor.

	Nominal values (1)	Measured values (2)
SUPPORTING DECK		
Material	OSB/3	
Thickness (mm)	18	
Density (kg/m³)	620 ± 40	
PRIMER		
Material	Synthetic Rubber based Primer	
Trade name	IKOpro Bonding Agent	
Manufacturer / supplier	IKO PLC	
Flame retardants	None	
Solid content (m%)	38	
Surface weight (g/m²)	200	
Application	Roller applied	
VAPOUR BARRIER		
Material	Air & Vapour Control Layer – Vapour barrier with polyester reinforced aluminium core and coated with a SBS modified, self-adhesive bitumen coating. The membrane is protected and the underside with a release film backing and coating on the top surface with a mineral finish	
Trade name	IKO Ultra SA Air & Vapour Control Layer	
Manufacturer / Supplier	IKO PLC	
Reinforcement (material + g/m²)	Polyester 175 g/m² Aluminium 46 g/m²	
Mineral finish (material + g/m²)	Medium Grey Mineral 590 g/m²	
Thickness (mm)	2,5	(3)
Surface weight (g/m²)	2400	(3)
Flame retardants	None	(3)
Fixing method	Adhered	
Reaction to fire according to EN 13501-1	NPD	
ADHESIVE		
Material	Moisture cured single part PU Adhesive (Insulation-Green)	
Trade name	IKOpro High Performance PU Adhesive (Insulation-Green)	
Manufacturer / supplier	IKO PLC	
Flame retardants	None	
Weight percentage (w%)	100	
Surface weight (g/m²)	200	
Application	Pour from tin	

INSULATING LAYER		
Material	Polyisocyanurate (PIR) Insulation board with a multi-layer gastight aluminium facing and backing	
Trade name	IKO Enertherm Gold Insulation Board	
Backing/facing material (g/m²)	Multi-Layer Gastight Aluminium 197 g/m²	
Manufacturer	IKO Insulations	
Supplier	IKO Insulations	
Thickness (mm)		
Single-layered	50 &140	(3)
Double-layered	140 + 50 & 140 + 100	(3)
Density (kg/m³) of the foam	± 32	(3)
Flame retardants	Yes	(3)
Fixing method	Adhered	
Reaction to fire according to EN 13501-1	E, according to classification report 20678B.	
PRIMER		
Material	Synthetic Rubber based Primer	
Trade name	IKOpro Bonding Agent	
Manufacturer / supplier	IKO PLC	
Flame retardants	None	
Solid content (m%)	38	
Surface weight (g/m²)	200	
Application	Roller applied	
ROOF COVERING		
First layer		
Material	Self-adhesive (heat-activated) SBS bituminous underlay with a polyester reinforcement. There is a mineral finish on top.	
Trade name	IKO Ultra H-A Underlay	
Manufacturer / Supplier	IKO PLC	
Mineral finish (material + g/m²)	Grey slate mineral 600 g/m²	
Reinforcement (material + g/m²)	Polyester 175 g/m²	
Thickness (mm)	2,5	(3)
Surface weight (g/m²)	2250	(3)
Flame retardants	None	(3)
Fixing method	Self-adhesive	
Top layer		
Material	Torched on SBS bituminous cap sheet with a polyester reinforcement. There are mineral granules as mineral finishing on top.	
Trade name	IKO Ultra Gold 20	
Manufacturer / Supplier	IKO PLC	
Mineral finish (material + g/m²)	Black slate mineral 1235 g/m²	
Reinforcement (material + g/m²)	Polyester 270 g/m²	
Thickness (mm)	3,8	(3)
Surface weight (g/m²)	4750	(3)
Flame retardants	Yes	(3)
Fixing method	Torched on	

(1) Based on the information given by the sponsor
(2) Values verified by the laboratory
(3) Unverifiable by the laboratory
(4) Known by the laboratory

Summary of parameters and tested systems:

	A-1	A-2	A-3	A-4
Top coat	IKO Ultra Gold 20	IKO Ultra Gold 20	IKO Ultra Gold 20	IKO Ultra Gold 20
Fixing method	Torched on	Torched on	Torched on	Torched on
Underlayer	IKO Ultra H-A underlay	IKO Ultra H-A underlay	IKO Ultra H-A underlay	IKO Ultra H-A underlay
Fixing method	Self-adhered	Self-adhered	Self-adhered	Self-adhered
Insulation	**Enertherm ALU/GOLD 50 mm**	**Enertherm ALU/GOLD 140 mm**	**Enertherm ALU/GOLD 140+50 mm**	**Enertherm ALU/GOLD 140+100 mm**
Fixing method	Adhered	Adhered	Adhered	Adhered
Vapour barrier	IKO Ultra SA AVCL	IKO Ultra SA AVCL	IKO Ultra SA AVCL	IKO Ultra SA AVCL
Fixing method	Adhered	Adhered	Adhered	Adhered
Primer	IKOpro Bonding Agent	IKOpro Bonding Agent	IKOpro Bonding Agent	IKOpro Bonding Agent
Support	OSB/3 (18 mm; 620 kg/m³)			

2. TEST REPORTS & RESULTS IN SUPPORT OF THIS EXTENDED APPLICATION

2.1. Test reports

Name of the laboratory	Name of the sponsor	Test report ref. No.	Test dates	Test method
WFRGENT N.V. Ghent, Belgium	IKO PLC	22050A	04/05/2022	CEN/TS 1187:2012-test method 4
WFRGENT N.V. Ghent, Belgium	IKO PLC	22050B	04/05/2022, 14/04/2023 & 15/04/2023	CEN/TS 1187:2012-test method 4

Deviations from test standard: Number of tested samples for report 22050A. Only one preliminary and one penetration test have been carried out instead of the standard one preliminary and three penetration tests.

2.2. *Test samples*

Test report ref. No.	Sampling procedure	Conditioning	Number of samples tested
22050A	AVCP 3	(*)	4 x 2
22050B	AVCP 3	(*)	4

(*) Impact of the deviation: In accordance with clause 7.10.1 of ISO/IEC 17025 parts (b) [assessment of risk levels by the laboratory], (c) [evaluation of the significance of the non-confirming work], (d) [decision on acceptability] and (e) [customer notification], WFRGent has evaluated the risk of the deviation to the test outcome to be non-material and therefore concludes the test outcome remain valid.

2.3. *Test results*

2.3.1. *Test results on CEN/TS 1187:2012 – test method 4*

Test conditions: 22050A

Specimen No.	A-1(')	A-2(')	A-3(')	A-4(')
Date of test	04/05/2022	04/05/2022	04/05/2022	04/05/2022
Roof pitch	0°	0°	0°	0°
Room temperature at start of test (°C):	21	21	21	21
Substrate	OSB/3 (18 mm; 620 kg/m³)			

(') The conditions of preliminary test correspond with the conditions of the penetration test.

PRELIMINARY IGNITION TEST WITH BURNING BRANDS (STAGE 1)

Specimen No:	A-1'	A-2'	A-3'(*)	A-4'
Duration of flaming after withdrawal of the test flame (min:sec)	00:00	00:00	00:00	00:00
Maximum flame spread distance (mm)	85	87	90	90
Time to fire penetration (min:sec)	Did not penetrate	Did not penetrate	Did not penetrate	Did not penetrate
Nature of the penetration	N.a.	N.a.	N.a.	N.a.

(') The conditions of preliminary test correspond with the conditions of the penetration test.
(*) Reused in the official test 22050B.

PENETRATION TEST WITH BURNING BRANDS, WIND AND SUPPLEMENTARY RADIANT HEAT (STAGE 2)

Specimen No:	A-1	A-2	A-3(*)	A-4	Average
Time to fire penetration (min:sec)	Did not penetrate	Did not penetrate	Did not penetrate	Did not penetrate	Did not penetrate
Nature of the penetration	N.a.	N.a.	N.a.	N.a.	-
Damaged depth of the insulation layer (mm)	30	50	90	85	-
Last damaged layer	PIR	PIR	PIR	PIR	-
Additional observations: All specimens ignited and experienced carbonization and melting. Specimen A-1: Flaming ceased after 28:39. Specimen A-2: Flaming ceased after 36:51. Specimen A-3: Flaming ceased after 33:21. Specimen reignited after 42:12 with flames being extinguished after 60:00. Specimen A-4: Flaming ceased after 40:43.					

(*) Reused in the official test 22050B.

Test conditions: 22050B

Specimen No.	1	2	3	4
Date of test	04/05/2022	04/05/2022	14/04/2023	15/04/2023
Roof pitch	0°	0°	0°	0°
Room temperature at start of test (°C):	21	21	21	21
Substrate	OSB/3 (18 mm; 620 kg/m^3)			

Build-up: OSB/3 + IKOpro Bonding Agent + IKO Ultra SA Air & Vapour Control Layer + IKOpro High Performance PU Adhesive (Insulation-Green) + IKO Enertherm Gold Insulation Board (140 + 50 mm) + IKOpro Bonding Agent + IKO Ultra H-A Underlay + IKO Ultra Gold 20

	Specimen number	Time to fire penetration (min:sec)	Duration of flaming after withdrawal of test flame (min:sec)	Maximum flame spread distance (mm)
Stage 1	1	Did not penetrate	00:00	90
Stage 2	2	Did not penetrate	(-)	(-)
	3	Did not penetrate	(-)	(-)
	4	Did not penetrate	(-)	(-)
	Average	Did not penetrate	(-)	(-)

(-) not applicable

2.4. Additional supporting data used in the extended application process

2.4.1. Observations and additional supporting data

- The reaction to fire classification of IKO Enertherm Gold Insulation Board is Euroclass E, according to classification report No. 20678B. This declared reaction to fire classification has been verified with the classification report.
- The reaction to fire classification of IKO Ultra SA Air & Vapour Control Layer is NPD.

3. RESULTS OF THE EXTENDED APPLICATION

3.1. Principles applied for the extension of the field of application

This extended application procedure is based on:

CEN/TS 16459:2019 §5.1:
Option 1: by use of additional test results which, together with the initial test result, enables consideration of a larger range of one or several product parameters and end-use application parameters.
Option 2: by use of test results in combination with application of calculation methods (§5.3 of CEN/TS 16459:2019) relating the product and end-use application parameters to the fire performance.
Option 3: by use of historical data, see §5.4 of CEN/TS 16459:2019, and other relevant information e.g. data from previous tests.

3.2. Procedure

Under annex D of the above-mentioned standard, extrapolation rules are stated which are relevant to the test method and type of product used for this extrapolation. The paragraphs below are relevant for the extrapolation, performed in this report.

3.2.1 *Rules for extrapolation according to §5 and annex D of CEN/TS 16459:2019 – Test method 4 of CEN/TS 1187:2012*

Product / End-use parameter for which an extended application is obtained	Extended application based on	Rule or statement
Thickness or Mass per unit area or Density	§ D.2 General rules of CEN/TS 16459:2019	"Following the classification of the roofing systems to EN 13501–5 using the maximum and minimum values of the given parameter for the component layer under investigation, where no change in class occurs, the resulting classification for the roofing system is valid within and including the limits of the component layer."
Reaction-to-fire classification (EN 13501–1) of any layer in the roofing system	§ D.2 General rules of CEN/TS 16459:2019	Substitution is possible for a component or layer with the same or better reaction-to-fire classification when tested in the same end use application provided that the substitute component or layer is of the same generic product group. Note that this rule excludes the substitution of the external (top) layer.
Surfacing on lower side (backing) of any layer in the roof system.	§ D.2 General rules of CEN/TS 16459:2019	The % of organic content of the surfacing product (by mass) shall not be increased. Note that this rule excludes the substitution of the external (top) layer.
Surfacing on upper side (facing) of any layer in the roof system.	§ D.2 General rules of CEN/TS 16459:2019	The % of organic content of the surfacing product (by mass) shall not be increased. Note that this rule excludes the substitution of the external (top) layer.
Roof pitch	§ D.2 General rules of CEN/TS 16459:2019	"Covered by CEN/TS 1187, test 4 and EN 13501-5."
Number of layers	§ D.3.3. Reinforced bitumen sheets of CEN/TS 16459:2019	"As tested"
Substrate or underlying construction details	§ D.3.3. Reinforced bitumen sheets of CEN/TS 16459:2019	"Where the roofing system is laid directly onto a combustible substrate such as plywood or particle board of a tested thickness, the classification results apply to all such roof covering systems using thicker boards made from the same type of combustible substrate." Test with vapour control layer with defined reaction to fire class E or better. The vapour control layer can then be replaced with product of equal or better performance. Where the roof covering system is laid and tested on an insulation layer, the classification obtained shall apply to the insulation thicknesses between those tested provided that the generic insulation product remains unchanged, see insulation layer information below.
Reinforcement: mass per unit area, type of material; position within layer etc.	§ D.3.3. Reinforced bitumen sheets of CEN/TS 16459:2019	Tests on a given mass of reinforcement per unit area will apply to lower masses. Limits to be agreed
Spacing and type of mechanical fixing (fasteners)	§ D.3.3. Reinforced bitumen sheets of CEN/TS 16459:2019	As tested.

Type of material Insulation	§ D.3.3. Reinforced bitumen sheets of CEN/TS 16459:2019	"As tested; general principle: Make sure that the tested component has no better reaction-to-fire classification than indicated in a product specification [e.g. Declaration of performance (DOP)]."
Thickness Insulation	§ D.3.3. Reinforced bitumen sheets of CEN/TS 16459:2019	Where the roof covering system is laid and tested on an insulation layer, the classification obtained shall apply to the insulation thicknesses between those tested provided that the generic insulation product remains unchanged.
Density Insulation	§ D.3.3. Reinforced bitumen sheets of CEN/TS 16459:2019	As tested at nominal density as defined in the relevant Product standards The classification obtained shall apply to the insulation densities between those tested provided that the generic insulation product remains unchanged.

To evaluate the product parameter "**Insulation thickness and number of layers**" tests were performed according to CEN/TS 1187:2012 on:

- A-1: system with IKO Enertherm Gold Insulation Board 50 mm
- A-2: system with IKO Enertherm Gold Insulation Board 140 mm
- A-3: system with IKO Enertherm Gold Insulation Board 140 + 50 mm
- A-4: system with IKO Enertherm Gold Insulation Board 140 + 100 mm

Other parameters of the system were kept the same between the samples.
As a conclusion, there were no significant differences. Based on visual observations and the burn time during the penetration test, the laboratory selected the system with IKO Enertherm Gold Insulation Board 140 + 50 mm as the worst-case system.
Therefore, this worst-case result can be considered the upper limit for results of the range insulation thicknesses and number of layers. The laboratory concludes the EXAP program end the worst-case system is officializes in report 22050B.

System/ parameter	A-1	A-2	A-3	A-4
Parameters of the system : Insulation thickness and number of layers	IKO Enertherm Gold Insulation Board 50 mm	IKO Enertherm Gold Insulation Board 140 mm	IKO Enertherm Gold Insulation Board 140 + 50 mm	IKO Enertherm Gold Insulation Board 140 + 100 mm
Maximum flame spread distance (in preliminary test) (mm)	85	87	90	90
Percentage (%) of maximal flame spread (380 mm)	22,4	22,9	23,7	23,7
After withdrawal of the test flame, specimens burn for < 5 min (in preliminary test) (min :sec)	00:00	00:00	00:00	00:00
Penetration (Yes/No)	No	No	No	No
Within the Broof(T4) classification	Yes	Yes	Yes	Yes

4. EXTENDED APPLICATION RESULTS

4.1. Application range – product family

This extended application for the product as described in §1.2, is valid for the following end-use applications:

- Range of layer 0: The top layer: IKO Ultra Gold 20

Material:	Torched on SBS bituminous cap sheet with a polyester reinforcement. There are mineral granules as mineral finishing on top.
Thickness:	3,8 mm
Surface weight:	4750 g/m²
Reinforcement:	Polyester 270 g/m² or less
Mineral finish:	Black slate mineral 1235 g/m²
Use of fire retardants:	Yes
Fixing method:	Torched on

- Range of layer 1: The top layer: IKO Ultra H-A Underlay

Material:	Self-adhesive (heat-activated) SBS bituminous underlay with a polyester reinforcement. There is a mineral finish on top.
Thickness:	2,5 mm
Surface weight:	2250 g/m²
Reinforcement:	Polyester 175 g/m² or less
Mineral finish:	Grey slate mineral 600 g/m²
Use of fire retardants:	No
Fixing method:	Torched on

- Range of layer 2: Adhesive: IKOpro Bonding Agent, as tested and described in §1.2.

- Range of layer 3: PIR insulation with IKO Enerthem Gold Insulation Board

Thickness:	
Single-layered	50 – 140 mm
Double-layered	140 + 50 mm – 140 + 100 mm
Density:	32 kg/m³
Facing/backing:	Multi-Layer Gastight Aluminium 197 g/m²
Reaction to fire classification:	E or better (*)
Fixing method:	Adhered

(*) The reaction to fire classification of IKO Enertherm Gold Insulation Board is Euroclass E, according to the classification report No. 20678B.

- Range of layer 4: Adhesive: IKOpro High Performance PU Adhesive (Insulation-Green), as tested and described in §1.2.

- Range of layer 5: Vapour control layer: IKO Ultra SA Air & Vapour Control Layer

Reaction to fire classification:	NPD

- Range of layer 6: Primer: IKOpro Bonding Agent, as tested and described in §1.2.

- Range of layer 7: Supporting deck

Range of supporting deck:	OSB3 (18 mm or more ; 620 kg/m³)

4.2. Fire performance parameters

All products as described in §1.2. and within the field of application as defined in §4.1., can be considered to obtain reaction to fire test results that are better or comply with the following:

PRELIMINARY TEST (STAGE 1)

Parameter	Criteria				Compliance			
	Class B_{ROOF}(t4)	Class C_{ROOF}(t4)	Class D_{ROOF}(t4)	Class E_{ROOF}(t4)	Class B_{ROOF}(t4)	Class C_{ROOF}(t4)	Class D_{ROOF}(t4)	Class E_{ROOF}(t4)
Burn time	< 5 min	< 5 min	< 5 min	≥ 5 min	Yes	Yes	Yes	No
Flame spread distance	< 0,38 m	< 0,38 m	< 0,38 m	No limit	Yes	Yes	Yes	Yes
Penetration	None	None	None	None	Yes	Yes	Yes	Yes

PENETRATION TEST (STAGE 2)

Parameter	Criteria			
	Class B_{ROOF}(t4)	Class C_{ROOF}(t4)	Class D_{ROOF}(t4)	Class E_{ROOF}(t4)
Penetration	≥ 60 min	< 60 min ≥ 30 min	< 30 min	< 30 min
Parameter	**Compliance**			
	Class B_{ROOF}(t4)	Class C_{ROOF}(t4)	Class D_{ROOF}(t4)	Class E_{ROOF}(t4)
Penetration	Yes	No	No	No

5. ADDITIONAL STATEMENT

The extended application results relate to the behaviour of a product/product family under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the product/product family in use.

Provisions of Regulation (EU) 305/2011, commonly known as the Construction Products Regulation (CPR), prevail over any conflicting provisions in the harmonised standards and technical specifications.

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