

Extended application report for roofs/roof coverings exposed to external fire No. 20873C

Owner of the extended application report

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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 document: CEN/TS 16459:2019: 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 ETAG(s): None.

This extended application report consists of 12 pages.

1. DETAILS OF PRODUCT CONCERNED

1.1. Nature

Product Technical Specifications: modular green roof system

Product family: None

End-use application: modular green roof system

1.2. Description

	Nominal values (1)	Measured value (2)
M-Tray® modular green roof system		
SUBSTRATE		
Material	Fibre cement board	
Thickness (mm)	12	
Density (kg/m ³)	1280	
Flame retardants	No	(3)
ROOF COVERING		
1.1 <u>First layer</u> : Recycled polypropylene tray carrier		
Material	A re-granulated PP tray carrier, made from post-consumer PP (PCR). The form of the tray is obtained through injection moulding.	
PP/PCR type	PP2117 x yy/zz, PP2131F20 yy/zz, PP2123 x yy/zz, PP 2126 x yy/zz, PP2132 z yy/zz, PP2143 x yy/zz, PP2154 x yy/zz, and PP2182 x yy/zz	
Trade name	M-Tray® modular green roof system	
Manufacturer	Techmarkets Ltd	
Supplier	Wallbarn Ltd	
Reinforcement (nature and g/m ²)	None	
Thickness (mm)	2	(4)
Mass of the tray (g)	4400	(4)
Flame retardants	No	(3)
Fixing method	Loose laid	Loose laid
1.2 <u>Top layer</u> : Lightweight growing media		
Material	The carrier tray is filled with substrate, in which the plants can grow. This substrate a mixture of compost, coir, lytag and expanded clay.	
Weight percentage (w%)		
<i>Compost</i>	6,6	(3)
<i>Coir</i>	4	(3)
<i>Lytag</i>	50	(3)
<i>Expanded clay</i>	39-40	(3)
Trade name	M-Tray® modular green roof system	
Manufacturer / Supplier	Sedum Growers Ltd	
Reinforcement (nature and g/m ²)	None	
Thickness (mm)	70 - 80	(3)
Surface weight (g/m ²)	80000 (*)	(3)
Flame retardants	No	(3)
Fixing method	Loose laid in the tray	Loose laid in the tray

1.3 Top layer: Plants		
A) Sedum spp.		
Material	Succulent plants fully rooted into the substrate / lightweight growing media.	
Relative amount of plants (when wildflowers are present) (%)	90	(3)
Trade name	M-Tray® modular green roof system	
Manufacturer / Supplier	Jelitto (https://www.jelitto.com)	
Height of the plants above the growing media (mm)	20 – 30 mm	(4)
Surface weight (g/m ²) sedum spp. (mature plants, not seeds)		
<i>Dry (35 RH%)</i>	4000	(3)
<i>Standard (55 RH%)</i>	8000 – 10000	(3)
<i>Humid (85 RH%)</i>	15000	(3)
Amount of organic material of the toplayer (%)	100	(3)
Flame retardants	No	(3)
Fixing method	Seeds are sown in the growing medium and nurtured until fully grown.	(3)
B) Wildflowers (optional)		
Material	Wildflowers fully rooted into the substrate / lightweight growing media. The wildflowers are a mix of different species, typically found in the UK.	
Relative amount of plants (when present) (%)	10	(3)
Trade name	M-Tray® modular green roof system	
Manufacturer / Supplier	John Chambers (https://www.johnchamberswildflowers.co.uk/)	
Height of the plants above the growing media (mm)	20 – 30 mm	(4)
Surface weight (g/m ²) wildflowers (mature plants, not seeds)		
<i>Dry (35 (unit)(%RH?))</i>	3500	(3)
<i>Standard (55 (unit)(%RH?))</i>	7000 – 9000	(3)
<i>Humid (85 (unit)(%RH?))</i>	13000	(3)
Amount of organic material of the toplayer (%)	100	(3)
Flame retardants	No	(3)
Fixing method	Seeds are sown in the growing medium and nurtured until fully grown.	(3)

(1) Based on the information given by the sponsor

(2) Values verified by the laboratory

(3) Unverifiable by the laboratory

(4) Not verified by the laboratory

(*) surface weight of 80000 g/m², based on moist of the substrate at a depth of 70-80 mm (with 20-30 mm of rooted sedum spp./wildflowers on top filling the 100 mm deep trays)

Summary of tested systems & parameters

	B-1	B-2
Plants	Sedum spp. And wildflowers	Sedum spp.
Fixation method	Seeds are sown in the growing medium and nurtured until fully grown.	
Lightweight growing media	A mixture of compost, coir, lytag and expanded clay.	
Fixation method	Loose laid in tray	
Tray carrier	Recycled PP	
Fixing method	Loose laid	
Substrate	Fibre cement board (12 mm ; 1280 kg/m ³)	

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 date	Test method
WFRGENT N.V. Ghent, Belgium	WALLBARN LTD	20873A&B	08/02/2021	CEN/TS 1187:2012-test method 4

Deviations from test standard: Number of tested samples

2.2. Test samples

Test report ref. No.	Sampling procedure	Conditioning (+Ageing if relevant)	Number of samples tested
20873A	AVCP 3	Based on the relative humidity	4
20873B	AVCP 3	Based on the relative humidity	2x2

2.3. Test results

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

Test conditions: 20873B

Test date: 08/02/2021

Room temperature at start of test (°C): 18

Roof pitch: 0°

PRELIMINARY IGNITION TEST WITH BURNING BRANDS (STAGE 1)

Specimen No:	B-1'(*)	B-2'
Duration of flaming after withdrawal of the test flame (min:sec)	00:00	00:00
Maximum flame spread distance (mm)	0	0
Time to fire penetration (min:sec)	Did not penetrate	Did not penetrate
Nature of the penetration	N.a.	N.a.

(') Preliminary test corresponding with the penetration test in stage 2

(*) Reused in the official test 20873A

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

Specimen No:	B-1(*)	B-2	Average
Time to fire penetration (min:sec)	Did not penetrate	Did not penetrate	Did not penetrate
Nature of the penetration	N.a.	N.a.	-
Additional observations: None of the specimens ignited.			

(*) Reused in the official test 20873A

Test conditions: 20873A

Test date: 08/02/2021

Room temperature at start of test (°C): 18

Roof pitch: 0°

Build-up: Fibre cement board + tray carrier + lightweight growing media + plants (Sedum spp. And wildflowers)

	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	0
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

- None

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 §D: 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.

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 ⁽¹⁾. The paragraphs below are relevant for the extrapolation, performed in this report.

(1) Annex C: "Application rules for test results from CEN/TS 1187 test 3, per product group"

3.2.1 Rules for extrapolation according to annex D of CEN/TS 16459:2019 - method 4

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.

To evaluate the product parameter “**plant species**” tests were performed according to CEN/TS 1187:2012 on:

- 20873B-1: system with Sedum spp. and wildflowers
- 20873B-2: system with Sedum spp.

As a conclusion, there were no significant differences between the tested systems, the laboratory selected **Sedum spp. and wildflowers** based on the largest number of different plan species, which can have an effect on the reaction to fire classification.

Therefore this worst case result can be considered the upper limit for results of the range of tested cap sheets. This concludes the EXAP-program.

System/ parameter	B-1	B-2
Parameters of the system	Sedum spp. and wildflowers	Sedum spp.
Maximum flame spread distance (in preliminary test) (mm)	0	0
Percentage of maximal flame spread (380 mm) (%)	0	0
After withdrawal of the test flame, specimens burn for < 5 min (in preliminary test) (min)	00:00	00:00
Penetration (Yes/No)	No	No
Within the Broof(T4) classification	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: Plants

Range of species:	Sedum spp. and wildflowers (optional)
Relative amount of plants	
<i>Sedum spp.</i>	100 % Sedum spp.
<i>Sedum spp. + wildflowers</i>	90 % Sedum spp. + 10 % wildflowers
Length of the plants:	
<i>Sedum spp.</i>	20 – 30 mm
<i>Wildflowers (optional)</i>	20 – 30 mm
Surface weight sedum spp. (mature plants, not seeds):	
<i>Humid (85 RH%)</i>	15000 g/m ²
Surface weight wildflowers (mature plants, not seeds) (optional):	
<i>Humid (85 (%RH?))</i>	13000 g/m ²
Organic content:	100 %
Fixing method:	Seeds are sown in the growing medium and nurtured until fully grown.

➤ Range of layer 1: The lightweight growing media

Compounds:	Compost, coir, lytag and expanded clay
Weight percentage:	
<i>Compost</i>	6,6 w%
<i>Coir</i>	4 w%
<i>Lytag</i>	50 w%
<i>Expanded Clay</i>	39 - 40 w%
Thickness:	70 - 80 mm
Surface mass:	80000 g/m ² (based on the moist on the bottom of this layer)
Fixing method:	Loose laid in tray carrier

➤ Range of layer 2: Tray carrier

Material:	A re-granulated PP tray carrier, made from post-consumer PP (PCR).
Thickness:	2 mm
Height:	100 mm
Fixing method:	Loose laid

➤ Range of layer 3: Substrate: Non-combustible board (Euroclass A2)

Thickness:	12 mm or more
Density:	1280 kg/m ³ or more

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 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	Yes
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	Yes	Yes	Yes

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.

PREPARED BY

APPROVED BY

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