Test Report No. 20873A-rev.1

First issue date: 12/04/2021

Sponsor

WALLBARN LTD.
Unit 16 Capital Business Centre, 22 Carlton Road
CR2 0BS South Croydon
UNITED KINGDOM

Trade name of the roof covering

M-Tray® modular green roof system

Manufacturer of the roof covering

WALLBARN LTD.
Unit 16 Capital Business Centre, 22 Carlton Road
CR2 0BS South Croydon
UNITED KINGDOM

Supplier of the roof covering

WALLBARN LTD.
Unit 16 Capital Business Centre, 22 Carlton Road
CR2 0BS South Croydon
UNITED KINGDOM

Nature of the tests

Test methods for external fire exposure to roofs: Test 4: Method with two stages incorporating burning brands, wind and supplementary radiant heat, according to CEN/TS 1187:2012: Test 4.

PREPARED BY	APPROVED BY
Laurens Devynck (Signature)	Bart Sette General Manager Ghent

This report consists of 10 pages including 1 annex

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1. DATA CONCERNING THE TEST SPECIMENS

Type of specimen: Recycled PP tray, filled with lightweight growing media with plants in it.

The firm Wallbarn LTD. has provided the laboratory, on 05/01/2021, with 4 mounted roof specimens. These roof specimens were prepared conforming to the prescriptions of the above-mentioned standard. The laboratory did not supervise the specimen fabrication.

Sampling by	:	David Holloway
Sampling date	:	18/12/2020
Sample ID	:	20-04-B24
Production place	:	White down Farm, Tadley, Hampshire, RG23 8PF
Production line	:	Row/Bed 24
Production date	:	14/04/2020
Identification within the quality system	:	IMS.T.810v1

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2. DESCRIPTION OF THE TEST ROOF DECK

This description is based on information given by the sponsor.

	Nominal values (1)	Measured values (2)
M-Tray® modular green roof system		
SUBSTRATE		
Material	Fibre cement board	
Thickness (mm)	12	
Density (kg/m³)	1280	
Flame retardants	No	(3)
ROOF COVERING		
1.1 First layer: 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/m²)	None	
Thickness (mm)	2	(4)
Mass of the tray (g)	4400	(4)
Flame retardants	No	(3)
Fixing method	Loose laid	Loose laid
1.2 Top layer: 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%)		
Compost	6,6	(3)
Coir	4	(3)
Lytag	50	(3)
Expanded clay	39 - 40	(3)
Trade name	M-Tray® modular green roof system	
Manufacturer / Supplier	Sedum Growers Ltd	
Reinforcement (nature and g/m²)	None	
Thickness (mm)	70 - 80	(3)
Surface weight (g/m²)	80000 (*)	(3)
Flame retardants	No	(3)
Fixing method	Loose laid in the tray	Loose laid in the tray

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1.3 Top layer: Plants		
Material	Sedum spp. (succulent plants) and 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 (%) *Sedum spp.* *Wildflowers*	 90 10	 (3) (3)
Trade name	M-Tray® modular green roof system	
Manufacturer / Supplier *Sedum spp.* *Wildflowers*	 Jelitto (https://www.jelitto.com) John Chambers (https://www.johnchamberswildflowers.co.uk/)	
Height of the plants above the growing media (mm)	20 – 30 mm	(4)
Surface weight (g/m²) sedum spp. (mature plants, not seeds) *Dry (35 RH%)* *Standard (55 RH%)* *Humid (85 RH%)*	 4000 8000 - 10000 15000	 (3) (3) (3)
Surface weight (g/m²) wildflowers (mature plants, not seeds) *Dry (35 RH%)* *Standard (55 RH%)* *Humid (85 RH%)*	 3500 7000 - 9000 13000	 (3) (3) (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)

Position of the specimen:

The specimens were tested in the flat position. No joints were applied to the specimens, due to the nature of the system.

Conditioning

The test specimens were subjected to ambient conditions between the completion of construction/delivery of the test specimen and the start of the test.

Deviations in terms of conditioning

The specimens have not been conditioned in accordance with the requirements of clause 4 of EN 13238:2010, as detailed in CEN/TS 1187:2012 section 7.5.

Impact of the deviation: In accordance with clause 7.10.1 of ISO/IEC 17025:2017 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 remains valid.

3. TEST RESULTS AND OBSERVATIONS

a) Moisture content

Due to the nature of the specimens, the moisture contents before and after the penetration tests were determined. This was achieved using a protimeter

	Penetration 1	Penetration 2	Penetration 3
Before (RH%)	94,1	207	138
After (RH%)	101	99,9	112

b) Calibration

Calibration date: 08/02/2021

Burner No:	**1**	**2**	**3**	**4**
Heatflux (kW/m²)	11,1	12,1	11,8	11,4
Criterium (kW/m²)	12 ± 1,5	12 ± 1,5	12 ± 1,5	12 ± 1,5

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c) Test results

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:	**1**
Duration of flaming after withdrawal of the test flame (min:sec)	00:00
Maximum flame spread distance (mm)	0
Time to fire penetration (min:sec)	Did not penetrate
Nature of the penetration	N.a.

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

Specimen No:	**2**	**3**	**4**	**Average**
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.	-
Additional observations: None of the specimens ignited.				

Photo of the test specimen before and after the test: annex 1.

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4. DIRECT FIELD OF APPLICATION OF TEST RESULTS

a) Summary of the test results

	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

b) Roof pitch

The roof as described has been tested with a roof pitch of 0°.

The test results apply to roofs with a pitch of ≤ 10°, as defined in § 4.10.1 of the standard.

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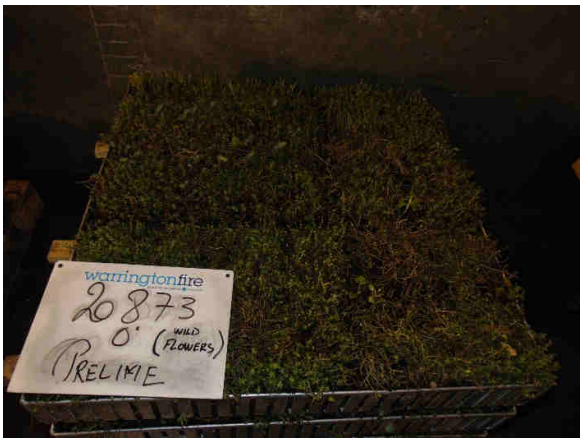
Photo of the test specimen before and after the test

Preliminary: Before

After



Penetration 1: Before

After

Penetration 2: Before

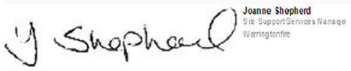
After

Photo of the test specimen before and after the test

Penetration 3: Before

After

Revision History

Issue (revision) No: Rev 1	Re-issue Date: 15/09/2023
Revised by: Joanne Shepherd	Approved by: Mikel Nachtergaele
 Joanne Shepherd Senior Technical Support Services Manager Warringtonfire	 Mikel Nachtergaele Project assistant

Reason for Revision:
This document supersedes and replaces all previous issues and revisions of the reports, which are void from their date of issue. The only update in this revision of the test report is the amendment to the conditioning statement at the end of section 2. No other changes have been made to the report. The revision author and approver have only considered and reviewed the conditioning statement in section 2; they have not carried out a full peer review on any other aspect of the original report, which had been prepared and approved by the author and approver stated on page 1 of this report.