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EXTERNAL FIRE EXPOSURE TO ROOF TEST REPORT No EUI-24-RT4-0000503

Test report date: **14th March 2025**

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

Other reference document: **BS EN 13238:2010** – Reaction to fire tests for building products – Conditioning procedures and general rules for selection of substrates

Product: The roof system consists of a resin-bound stone decking installed on pedestals, which are positioned above rigid foam insulation layers. This rigid foam insulation layers are placed over a waterproofing membrane, which was applied on top of an OSB deck.
Referenced: Resin Bound Gravel System

Sponsor: **RYNO SYSTEMS LTD**

Castlepoint Global Headquarters, Castle way
Adress2
AB41 9RG, Ellon
UNITED KINGDOM

Testing laboratory: **EFECTIS UK/Ireland Limited**

Unit 15F, Kilroot Business Park, Larne Road
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1. DOCUMENT TRACKING

Revision Index.	Modification	Comments	Date		
0	Original document	/	14th March 2025	Writer	GRE
				Approver	MKE

2. OBJECT

The results reported in this document are intended to determine the capacity to resist penetration by fire of the sample described in Section 3 using the external fire exposure to roofs test specified in CEN/TS 1187:2012 – Test methods for external fire exposure to roofs Test 4 – Method with two stages incorporating burning brands, wind and supplementary radiant heat

3. INFORMATION ABOUT THE TESTED PRODUCT

3.1. SAMPLING

The tested sample has not been subjected to sampling; thus, the results apply to the sample as received.

3.2. DELIVERY

The specimens were supply by the sponsor of the test and were received on the 21/10/2024.

3.3. GENERAL INFORMATION ABOUT THE TESTED PRODUCT

The information below were provided by the applicant who attests their accuracy.

Manufacturer / Supplier	**RYNO SYSTEMS LTD** Castlepoint Global Headquarters, Castle way Adress2 AB41 9RG, Ellon UNITED KINGDOM	
Identification of the product	Resin Bound Gravel System	
General description	Description	The roof system consists of a resin-bound stone decking installed on pedestals, which are positioned above rigid foam insulation layers. This rigid foam insulation layers are placed over a waterproofing membrane, which was applied on top of an OSB deck.
	Thickness	180 mm & 495 mm
	Density	250 kg/m^3
	Mass per unit area	41 kg/m^2

3.4. DETAILED DESCRIPTION OF THE LAYERS

3.4.1. Roof covering details

Layers	Characteristics	Value/Description	Unit
Resin bound stone	Material	Resin bound stone	-
	Trade name	Resin bound gravel	-
	Manufacturer/supplier	Ryno ltd	-
	Thickness	25 mm	mm
	Colour	Breccia	-
	Coating reference and manufacturer/supplier (if applicable)	N/A	-
	Mass per unit area	41	kg/m^2
	Density	Not provided by the sponsor of the test.	Kg/m^3
	Thermal conductivity	Not provided by the sponsor of the test.	W/m.K
	PCS value	Not provided by the sponsor of the test.	MJ/m^2
	Reaction to fire classification, according to EN 13501-1	Not provided by the sponsor of the test.	-
	Fire retardant treatment (if applicable)	N/A	-
	Fixing/application method	The aggregate was mixed with the resin and discharge on top of the stabilisation mesh.	-
	Fixing reference and manufacturer/supplier (if applicable)	Resin part A, reference 67633 – Stonebound HB UV Part A (TERRACO). Resin part B, reference 67634 – Stonebound HB UV Part B (TERRACO). Catalyst, reference 67606 – Stonebound UV Catalyst (TERRACO).	-

N/A: Not applicable

Layers	Characteristics	Value/Description	Unit
Stabilisation mesh	Material	PET (Polyethylene terephthalate)	-
	Trade name	Stabilisation mesh	-
	Manufacturer/supplier	Ryno ltd	-
	Thickness	2	mm
	Colour	Black	-
	Coating reference and manufacturer/supplier (if applicable)	N.A	-
	Mass per unit area	Not provided by the sponsor of the test.	kg/m^2
	Density	Not provided by the sponsor of the test.	Kg/m^3
	Thermal conductivity	Not provided by the sponsor of the test.	W/m.K
	PCS value	Not provided by the sponsor of the test.	MJ/m^2
	Reaction to fire classification, according to EN 13501-1	Not provided by the sponsor of the test.	-
	Fire retardant treatment (if applicable)	N/A	-
	Fixing/application method	Loose laid on baseboard beneath	-
	Fixing reference and manufacturer/supplier (if applicable)	N/A	-

N/A: Not applicable

Layers	Characteristics	Value/Description	Unit
Base board	Material	Aluminium 6063-T6	-
	Trade name	BB25 Baseboard	-
	Manufacturer/supplier	Ryno ltd	-
	Thickness	25 mm overall, with 2 mm on top surface and 1.5 mm support legs.	mm
	Colour	Mill finished alumnium	-
	Coating reference and manufacturer/supplier (if applicable)	N/A	-
	Mass per unit area	10.3	kg/m^2
	Density	Not provided by the sponsor of the test.	Kg/m^3
	Thermal conductivity	Not provided by the sponsor of the test.	W/m.K
	PCS value	Not provided by the sponsor of the test.	MJ/m^2
	Reaction to fire classification, according to EN 13501-1	Class A	-
	Fire retardant treatment (if applicable)	N/A	-
	Fixing/application method	Screwed to aluminium joist	-
	Fixing reference and manufacturer/supplier (if applicable)	Reference: BBF baseboard screw Manufacturer: Ryno ltd Dimension: Ø 6.3mm x 15 mm length	-

N/A: Not applicable

Layers	Characteristics	Value/Description	Unit
Aluminium joist	Material	Aluminium 6063-T6	-
	Trade name	DS25 Aluminium joist	-
	Manufacturer/supplier	Ryno ltd	-
	Thickness	25 mm	mm
	Colour	Mill finished aluminium	-
	Coating reference and manufacturer/supplier (if applicable)	N/A	-
	Mass per unit area	2	kg/m^2
	Density	Not provided by the sponsor of the test.	Kg/m^3
	Thermal conductivity	Not provided by the sponsor of the test.	W/m.K
	PCS value	Not provided by the sponsor of the test.	MJ/m^2
	Reaction to fire classification, according to EN 13501-1	Class A	-
	Fire retardant treatment (if applicable)	N/A	-
	Fixing/application method	Clip into adjustable pedestals	-
	Fixing reference and manufacturer/supplier (if applicable)	N/A	-

N/A: Not applicable

Layers	Characteristics	Value/Description	Unit
Self-levelling adjustable joist support pedestal with clip-on head	Material	Polypropylene	-
	Trade name	RDA-C self levelling adjustable pedestal	-
	Manufacturer/supplier	Ryno ltd	-
	Thickness	25 mm & 340 mm	mm
	Colour	Black	-
	Coating reference and manufacturer/supplier (if applicable)	N/A	-
	Mass per unit area	2	kg/m^2
	Density	Not provided by the sponsor of the test.	Kg/m^3
	Thermal conductivity	Not provided by the sponsor of the test.	W/m.K
	PCS value	Not provided by the sponsor of the test.	MJ/m^2
	Reaction to fire classification, according to EN 13501-1	Not provided by the sponsor of the test.	-
	Fire retardant treatment (if applicable)	N/A	-
	Fixing/application method	The pedestal was installed on the waterproofing membrane using a loose-laid method.	-
	Fixing reference and manufacturer/supplier (if applicable)	N/A	-

N/A: Not applicable

Layers	Characteristics	Value/Description	Unit
Rubber pad (under pedestal)	Material	Rubber pad	-
	Trade name	Base rubber shockpad	-
	Manufacturer/supplier	Ryno ltd	-
	Thickness	3	mm
	Colour	Black	-
	Coating reference and manufacturer/supplier (if applicable)	N/A	-
	Mass per unit area	Not provided by the sponsor of the test.	kg/m^2
	Density	Not provided by the sponsor of the test.	Kg/m^3
	Thermal conductivity	Not provided by the sponsor of the test.	W/m.K
	PCS value	Not provided by the sponsor of the test.	MJ/m^2
	Reaction to fire classification, according to EN 13501-1	Not provided by the sponsor of the test.	-
	Fire retardant treatment (if applicable)	N/A	-
	Fixing/application method	The rubber pad was installed using a loose-laid method.	-
	Fixing reference and manufacturer/supplier (if applicable)	N/A	-

N/A: Not applicable

Layers	Characteristics	Value/Description	Unit
Rigid insulation	Material	PIR insulation	-
	Trade name	Thermaboard	-
	Manufacturer/supplier	Kingspan	-
	Thickness	50 mm, incorporating 2 layers of 25 mm.	mm
	Colour	N/A	-
	Coating reference and manufacturer/supplier (if applicable)	N/A	-
	Mass per unit area	1.75	kg/m^2
	Density	70	Kg/m^3
	Thermal conductivity	0.022	W/m.K
	PCS value	Not provided by the sponsor of the test.	MJ/m^2
	Reaction to fire classification, according to EN 13501-1	F	-
	Fire retardant treatment (if applicable)	N/A	-
	Fixing/application method	The insulation boards were installed using a loose-laid method.	-
	Fixing reference and manufacturer/supplier (if applicable)	N/A	-

N/A: Not applicable

Layers	Characteristics	Value/Description	Unit
Waterproofing membrane	Material	Waterproofing membrane	-
	Trade name	Bituminous Roof Membrane	-
	Manufacturer/supplier	IKO	-
	Thickness	4 mm	mm
	Colour	Black	-
	Coating reference and manufacturer/supplier (if applicable)	N/A	-
	Mass per unit area	3.2	kg/m^2
	Density	80	Kg/m^3
	Thermal conductivity	Not provided by the sponsor of the test.	W/m.K
	PCS value	Not provided by the sponsor of the test.	MJ/m^2
	Reaction to fire classification, according to EN 13501-1	Not provided by the sponsor of the test.	-
	Fire retardant treatment (if applicable)	N/A	-
	Fixing/application method	Loose laid onto OSB boards.	-
	Fixing reference and manufacturer/supplier (if applicable)	N/A	-

N/A: Not applicable

3.4.2. Decking/supporting construction

Layers	Characteristics	Value/Description	Unit
Oriented Strand Board	Material	Plywood	-
	Trade name	18 mm OSB 3 board	-
	Manufacturer/supplier	Cordiners timber & building supplies	-
	Thickness	18 mm	mm
	Colour	N/A	-
	Coating reference and manufacturer/supplier (if applicable)	N/A	-
	Mass per unit area	Not provided by the sponsor of the test.	kg/m^2
	Density	Not provided by the sponsor of the test.	Kg/m^3
	Thermal conductivity	Not provided by the sponsor of the test.	W/m.K
	PCS value	Not provided by the sponsor of the test.	MJ/m^2
	Reaction to fire classification, according to EN 13501-1	Not provided by the sponsor of the test.	-
	Fire retardant treatment (if applicable)	Not provided by the sponsor of the test.	-
	Fixing/application method	The OSB board was installed on the sample holder using a loose-laid method.	-
	Fixing reference and manufacturer/supplier (if applicable)	N/A	-

N/A: Not applicable

4. TESTS

4.1. SPECIMENS PREPARATION

Specimens have been supplied by the sponsor and assembled by EFECTIS, according to the specifications of the standard.

The dimensions have been checked as follows:

Sample Nr	Length (mm)	Width (mm)	Conformity C / NC
A	840	840	C
B	840	840	C
C	840	840	C
D	840	840	C

4.2. CONDITIONING

Prior to tests, specimens have been conditioned at a temperature of (23 ± 2) °C and relative humidity of (50 ± 5) %, at least 48 h and until stabilisation of mass, according to BS EN 13238 standard.

4.3. TESTING

Stage 1 test have been performed on the 8th of November 2024.
Stage 2 test have been performed from 7th of November 2024 to 22nd of November 2024

Tests have been performed in accordance with the procedure described in the test standard.

5. RESULTS

5.1. PRELIMINARY TEST (STAGE 1):

5.1.1. Results

Parameters	Test 1	Test 2
Specimen reference	180 mm	495 mm
Test date	08/11/2024	08/11/2024
Sample number	A	B
Including of joint	No	No
Burning brand location	Centre	Centre
Tested pitch (°)	0°	0°
Room temperature (°C)	16	16
Room relative humidity (%)	73	73
Duration of flaming (mins) (If it exceeds 5 min)	No flaming observed.	No flaming observed.
Flame spread in any direction (mm)	0	0
Maximum flame spread > 381 mm	No	No
Time to penetration (mins)	No penetration observed	No penetration observed
Nature of fire penetration	N/A	N/A

N/A Not applicable

5.1.2. Observation

No specific observation.

5.2. PENETRATION TEST (STAGE 2):

5.2.1. Results

Parameters	Test 1	Test 3	Test 4	Test 5
Specimen reference	180 mm	180 mm	180 mm	495 mm
Test date	07/11/2024	08/11/2024	15/11/2024	22/11/2024
Sample number	C	E	F	G
Including of joint	No	No	No	No
Burning brand location	Centre	Centre	Centre	Centre
Tested pitch (°)	0°	0°	0°	0°
Room temperature (°C)	24	21.5	24	20
Room relative humidity (%)	53	52	45	34
Time to penetration by fire (min:s)	≥ 60 min	≥ 60 min	≥ 60 min	≥ 60 min
Nature of fire penetration	N/A	N/A	N/A	N/A
Occurrence of melting	No	No	No	No
Production of flaming molten droplets or debris	No	No	No	No
Production of non-flaming molten droplets or debris	No	No	No	No
Time of mechanical failure or development of holes without penetration by fire	≥ 60 min	≥ 60 min	≥ 60 min	≥ 60 min

N/A Not applicable

Note: Test 2 was terminated prematurely due to an apparatus failure during the testing process. Consequently, an additional test was conducted to replace it. To avoid any confusion in the results, the test 2 (sample D) was removed from this test report.

5.2.2. Observations

Test 1	
Time (min)	**Observation**
00 min 00 s	Sample exposed to radiant heat.
06 min 00 s	No sustained flaming observed during or after the application of the burning brand.
19 min 00 s	Deformation noticed on the surface of the specimen. Slight discoloration also noticed.
21 min 00 s	Smoke noticed.
27 min 00 s	Dark discoloration noticed on the surface of the specimen.
29 min 30 s	No smoke or penetration observed on the underside of the specimen.
39 min 20 s	Crack noticed on the surface of the specimen. Small spalling also noticed.
45 min 00 s	N.N.T.R.
59 min 30 s	No smoke or penetration observed on the underside of the specimen.
60 min 00 s	End of the test.

N.N.T.R. Nothing New To Report

Test 3	
Time (min)	**Observation**
00 min 00 s	Sample exposed to radiant heat.
06 min 00 s	No sustained flaming observed during or after the application of the burning brand.
15 min 00 s	Deformation noticed on the surface of the specimen.
26 min 00 s	Dark discoloration noticed on the surface of the specimen. Small spalling noticed.
29 min 30 s	No smoke or penetration observed on the underside of the specimen.
45 min 00 s	N.N.T.R.
59 min 30 s	N.N.T.R.
60 min 00 s	End of the test.

N.N.T.R. Nothing New To Report

Test 4	
Time (min)	**Observation**
00 min 00 s	Sample exposed to radiant heat.
06 min 00 s	No sustained flaming observed during or after the application of the burning brand.
15 min 00 s	Deformation noticed on the surface of the specimen.
26 min 00 s	Dark discoloration noticed on the surface of the specimen.
29 min 30 s	No smoke or penetration observed on the underside of the specimen.
45 min 00 s	N.N.T.R.
59 min 30 s	No smoke or penetration observed on the underside of the specimen.
60 min 00 s	End of the test.

N.N.T.R. Nothing New To Report

Test 5	
Time (min)	**Observation**
00 min 00 s	Sample exposed to radiant heat.
06 min 00 s	No sustained flaming observed during or after the application of the burning brand.
07 min 00 s	Deformation noticed on the surface of the specimen.
23 min 00 s	Dark discoloration noticed on the surface of the specimen.
29 min 30 s	No smoke or penetration observed on the underside of the specimen.
45 min 00 s	N.N.T.R.
59 min 30 s	No smoke or penetration observed on the underside of the specimen.
60 min 00 s	End of the test.

N.N.T.R. Nothing New To Report

6. CONCLUSIONS

The test results relate to the behaviour of the test specimens of a product 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 in use.
The attention is drawn on the fact that the results obtained with the sample being the subject of the present test report cannot be generalised without justification of the representativeness of the samples and tests.

Belfast, on 14th March 2025

SIGNED

Guillaume REMY
Project leader

APPROVED

Maurice McKEE
Testing Technical Supervisor

END OF TEST REPORT

APPENDIX A. DRAWINGS

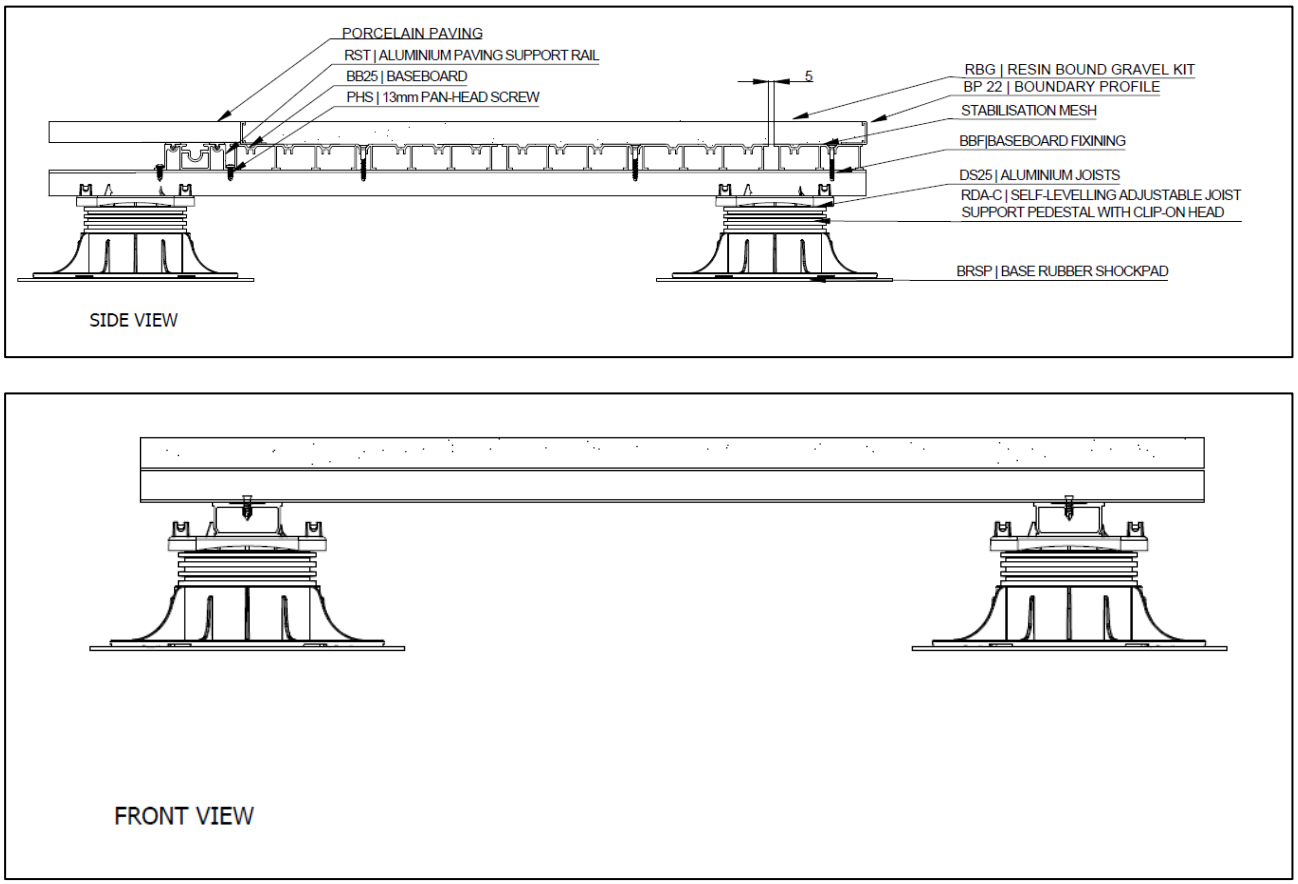

Figure 1: Detailed view of the system to be tested.

APPENDIX B. PICTURES

B.1. INSTALLATION PROCESS

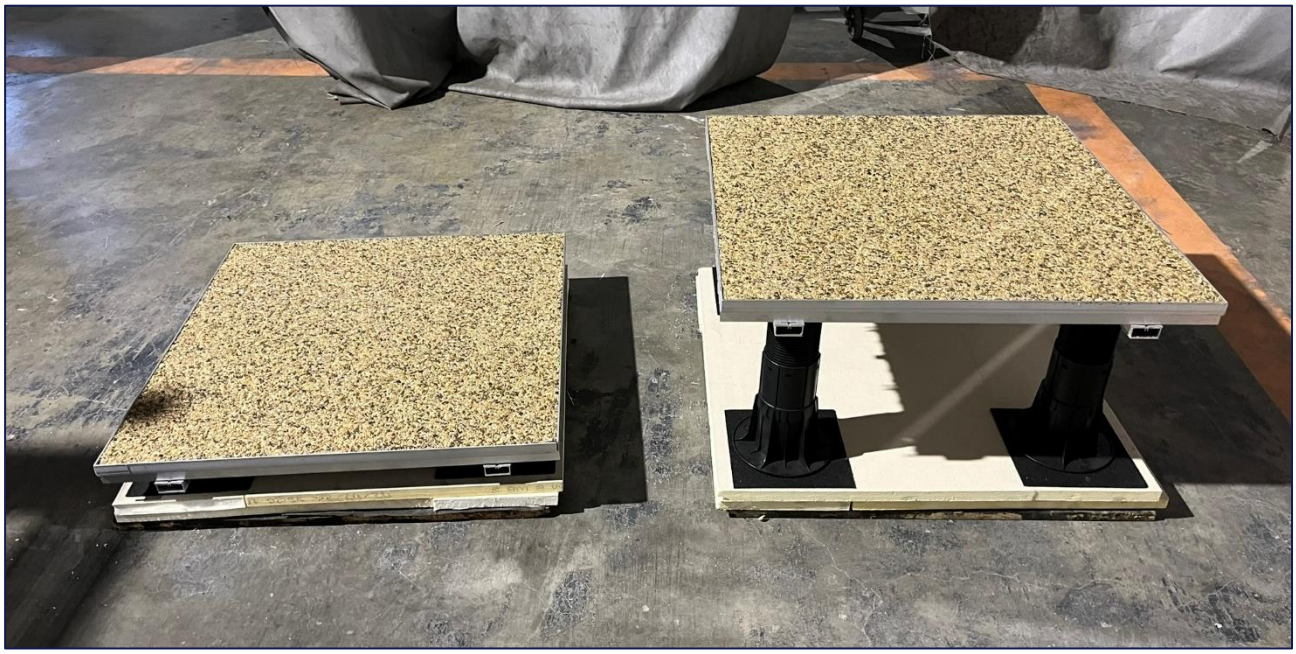

Figure 2: Overall view of the tested samples (180 mm and 495 mm)

Figure 3: Air seal (mortar sealant) performed at the top of the rigid insulation foam.

Figure 4:Top view of the sample prior the testing.

Figure 5:Sample configuration during testing.

B.2. DAMAGE ON SAMPLES AT END OF TESTING

B.2.1. SAMPLE A & B

No damage.

B.2.2. SAMPLE C

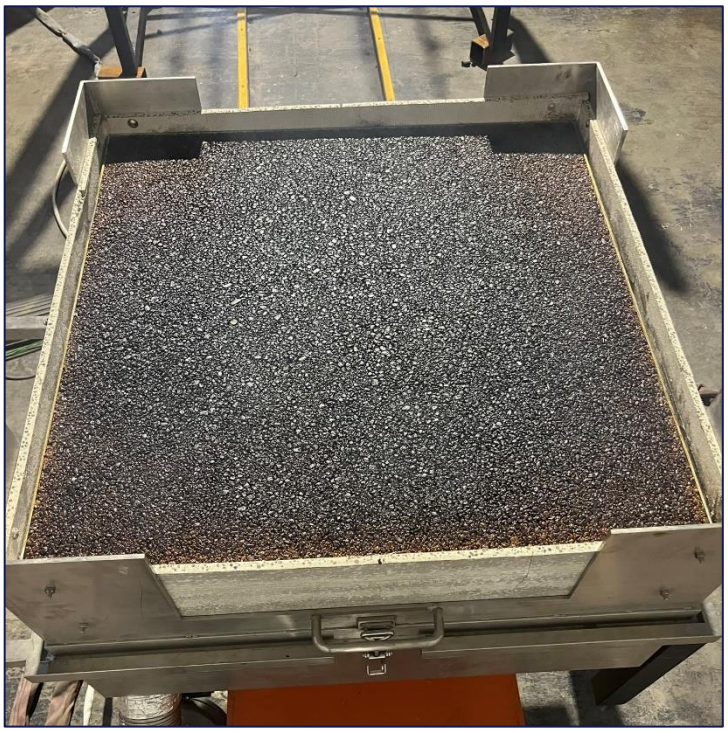

Figure 6: Damage investigation – Sample C – After 60 min of radiant heat exposure.

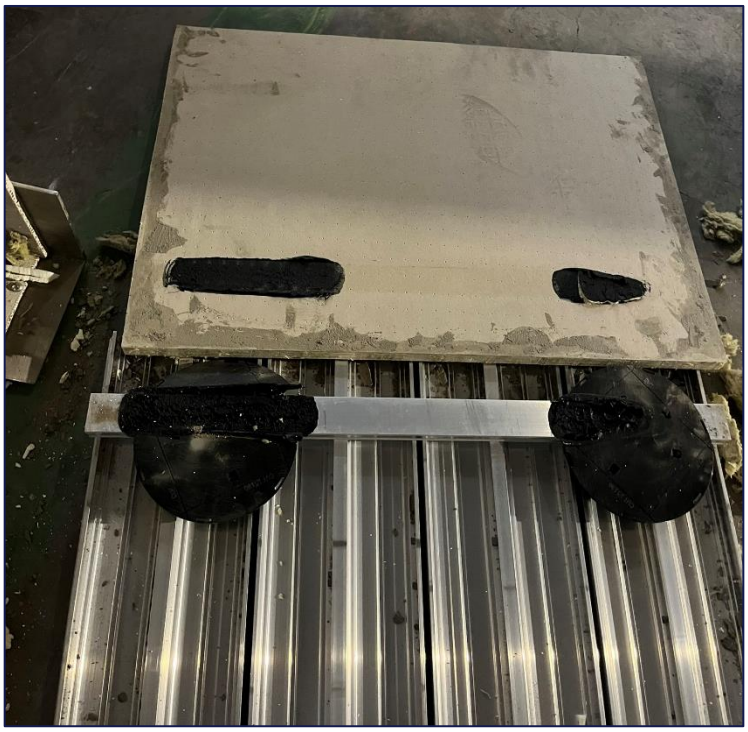

Figure 7: Damage investigation – Sample C – Pedestal and rigid foam insulation.

B.2.3. SAMPLE E

Figure 8: Damage investigation – Sample E – After 60 min of radiant heat exposure.

Figure 9: Damage investigation – Sample C – Non-exposed side of the specimen.

Figure 10: Damage investigation – Sample E – Pedestal.

B.2.4. SAMPLE F

Figure 11: Damage investigation – Sample F – After 60 min of radiant heat exposure.

Figure 12: Damage investigation – Sample F – Non-exposed side of the specimen.

Figure 13: Damage investigation – Sample F – Pedestal.

B.2.5. SAMPLE G

Figure 14: Damage investigation – Sample G – After 60 min of radiant heat exposure.

Figure 15: Damage investigation – Sample G – Side view.

Figure 16: Damage investigation – Sample G – Pedestal.

End of the test report.