TEST REPORT

Test Report Issue To:
Greenlam Industries Limited
Vill-Paterh Bhonku, P.O.-Panjehra,Tehsil-Nalagarh,
Distt- Solan (HP). Nalagarh-174101

Test Report No : I221007002-1
Date of Issue: 10/11/2022

Sample Booking/Receipt : 07/10/2022
Date of Start of Testing: 13/10/2022
Date of Completion of Test: 15/10/2022

Customer Relationship Number : **A1120022**

Sample Description :
1.5mm Thick Greenlam High pressure FR Grade laminate

Kind Attention: Mr. Ankush Kumar
E-Mail: ankush.kumar@greenlam.com
Contact No: 9805043863

Customer Reference Number :

Sample Drawn By : Test Sponsor

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Kaushal Kumar Thakur
Reviewed & Authorized By

This is Digitally Signed Report and hence doesn't require Physical Signature

1. INTRODUCTION

Determination of compliance of **Greenlam High pressure FR Grade laminate** for **R1 HL1, HL2 & HL3** testing as per various test methods referred by **R1 category** of **EN 45545-2:** Requirements for fire behavior of materials and components.

2. TEST METHOD & REFRENCES

EN 45545-2:2020; Requirements for fire behavior of materials and components
EN ISO 5659-2:2017; Determination of optical density by a single-chamber test
ISO 5660-1:2015; Heat Release rate (cone calorimeter method) and smoke production rate (dynamic measurement)
ISO 5658-2:2006; Lateral spread on building and transport products in vertical configuration.
T11.01 of EN 45545-2:2020; Determination of Conventional Index of Toxicity

3. SPECIMEN DETAIL

The testing laboratory has not been involved in the selection of the specimen.

Trade Name	Greenlam High pressure FR Grade laminate
Generic Identification	GL/113/NM/3502
Mass per unit area/ Density	1380 Kg/m^3
Thickness	1.5mm
Face Tested	Suede Finish
Form in which specimen was tested	Sheet
Colour	Frosty White decor with brown core

4. CONDITIONING

The specimens were conditioned at 23±2°C and 50±5% RH till constant mass.

5. TEST PROCEDURES & RESULT

5.1 Parameter: MARHE (Maximum average rate of heat emission)

Test Method: T03.01 (ISO 5660-1: 50 kW/m^2)

1 specimen of Size 100mm in length, 100mm in width and 1.5mm in thickness has been placed 25 mm below the irradiance- controlled system which is set at an irradiance of 50 kW/m^2 with an electric igniter above the top of retainer frame. Oxygen Analyzer output has been set to 20.95±0.01%. Burning of specimen reduces the percentage of oxygen, which gives rise in Heat Release Rate (HRR) value and related parameters. ARHE values were recorded during test. Test for 2 more specimens performed in same manner and results were recorded.

Wire Grid Used (Yes/No)	Yes
Constant, C	0.045
Heat Flux, in kW/m^2	50
Separation, in mm	25

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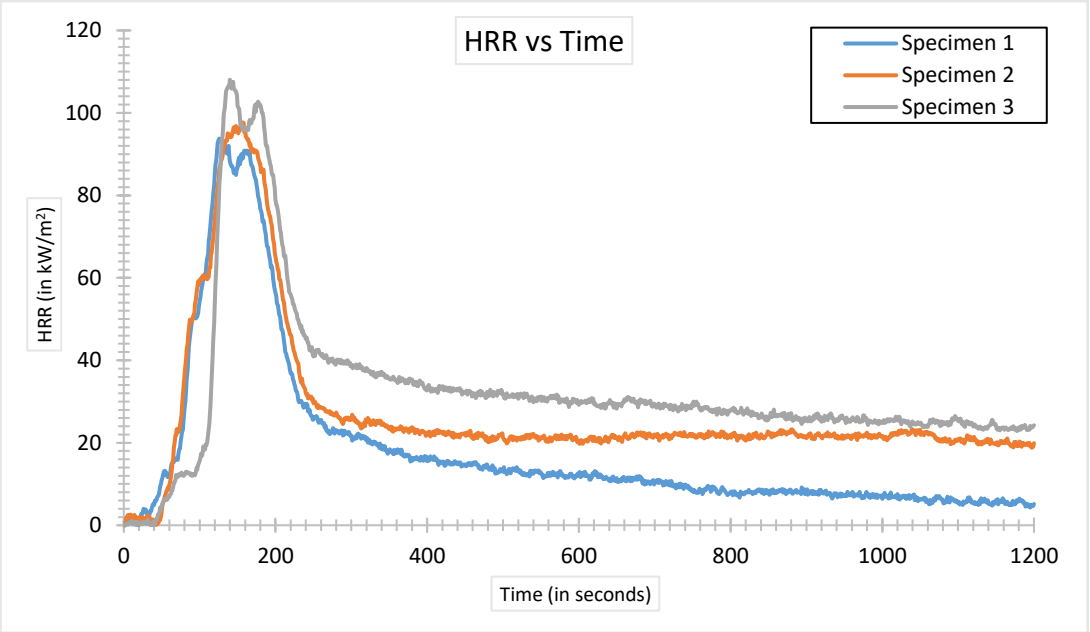
Parameter	Specimen			Mean
	1	2	3	
MARHE (kW/m²)	48.30	50.48	46.59	**48.56**
qA, max(kW/m²)	93.77	97.69	108.04	-
qA,180 (kW/m²)	41.59	49.87	46.09	45.85
qA,300 (kW/m²)	34.86	41.99	43.32	-
Time to Ignition(s)	127	93	89	-
Test Duration(s)	1200	1200	1200	-



5.2 Parameter: Ds(4), VOF4 & CIT_g
Test Method: T10.01, T10.02 (EN ISO 5659-2: 50 kW/m²) and T11.01.

1 specimen of size 75mm in length, 75mm in width and 1.5mm in thickness has been placed 25 mm below the irradiance- controlled system which is set at an irradiance of 50 kW/m² in a Smoke density chamber. Light Transmittance has been set to 100%. Burning of specimen reduces the percentage of light transmittance, which give rise in density of smoke and related parameters. All the parameter like Ds (4), VOF_4, CITg 240 sec and CITg 480 sec were recorded during test. Test for 2 more specimens performed in same manner and results were recorded.

Wire Grid Used (Yes/No)	Yes
Heat Flux, in kW/m²	50
Separation, in mm	25

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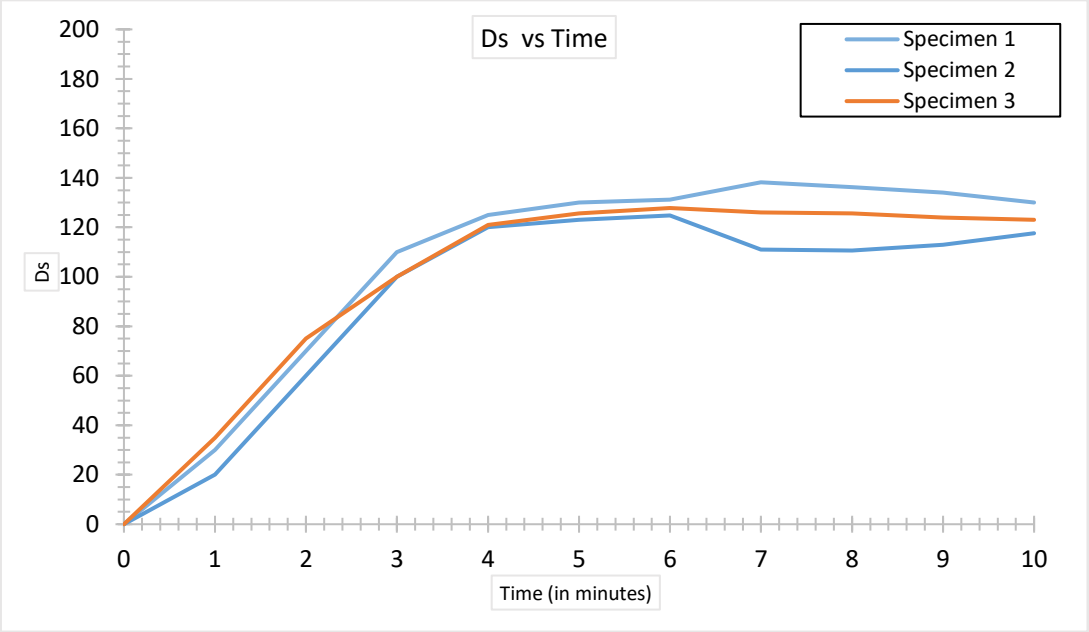
Parameter	Specimen			Mean
	1	2	3	
Ds(4)	138.2	124.8	127.9	130.3
VOF_4	288.4	279	282.6	283.3
CITg, 240s	0.18	0.17	0.17	0.17
CITg, 480s	0.39	0.34	0.35	0.36



5.3 Parameter: CFE

Test Method: T02 (EN ISO 5658-2)

1 specimen of size 800mm in length, 150mm in width and 1.5mm in thickness taken from longitudinal direction has been placed at an angle of 15^0 from the radiant heat panel system which is set at an irradiance defined in table 1 of ISO 5658-2:2006. Flame spread profile is recorded for each 50mm marked position and CFE value is calculated from calibration curve. Test for 2 more specimens performed in same manner and results were recorded.

Number of specimens tested	3
Gas used in Pilot Flame	Propane

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Distance, in mm	Time to cross reference mark, in seconds		
	S1	S2	S3
50	45	52	38
100	51	58	43
150	64	67	55
200	72	98	62
250	90	105	130
300	107	110	164
350	235	197	180
400	-	-	-
450	-	-	-
500	-	-	-
550	-	-	-
600	-	-	-
650	-	-	-
700	-	-	-
750	-	-	-
800	-	-	-

Parameter	Test Specimen		
	S1	S2	S3
Maximum Flame Front, in mm	380	370	350
Ignition Time, in seconds	34	32	27
Duration of flaming debris, in seconds	No Flaming debris	No Flaming debris	No Flaming debris
Test Duration, in minute	30	30	30
CFE, in kW/m^2	21.3	22.1	22.9
Mean CFE, in kW/m^2	**22.1**		

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6.CONFORMITY

Tested specimen meets the requirements of **R1 HL1, R1 HL2 & R1 HL3 category of EN 45545-2:2020.**

Parameter	Test Method	Requirements of R1, HL3 of EN 45545-2:2020	Observed Results	Conformity (Confirm/Does not confirm
CFE (kW/m^2)	**T02 (EN ISO 5658-2)**	Minimum 20	22.1	Confirm
MARHE (kW/m^2)	**T03.01 (ISO 5660-1: 50 kW/m^2)**	Maximum 60	48.56	Confirm
Ds (4)	**T10.01 (EN ISO 5659-2: 50 kW/m^2)**	Maximum 150	130.2	Confirm
VOF_4	**T10.02 (EN ISO 5659-2: 50 kW/m^2)**	Maximum 300	283.3	Confirm
CIT_G	**T11.01 (EN 17084 Method 1: 50 kW/m^2)**	Maximum 0.75	0.36	Confirm

Classification Achieved: **R1 HL1/HL2/HL3 of EN 45545-2:2020**

7.LIMITATION

The results only relate to the behavior of the specimen of the element of construction under the particular conditions of test; they are not intended to be the sole criteria of accessing the potential fire performance of the element in use nor do they reflect the actual behavior in fires.

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8.PHOTOS

ISO 5660-1 Before test and After test Photo

ISO 5659-2 Before test and After test Photo

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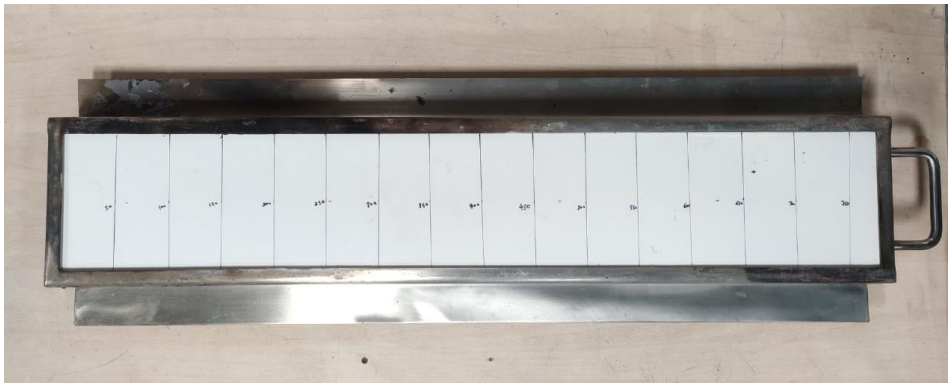

ISO 5658-2 Before test

ISO 5658-2 After test

.....End of Test Report.....

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Terms & Condition:

- The results are related only to the items Tested
- Total Liability of our Laboratory is limited to the invoiced Amount. No Liability will be accepted after Sample is taken back
- The Sample Description is given "As desired by the customers". Sample not drawn by us & Analysis Conducted on Received sample unless specified otherwise.
- Retained sample will be destroyed after 30 days from the date of issue of the test report unless instructed otherwise.
- Any Complaints or Retest request should be communicated within 15 days from the issue of the Test report.
- Test Report shall not be reproduced except in full, without Written approval of the Laboratory
- The Test report is not to be reproduced wholly or in parts & cannot be used as an evidence in a court of law & shall not be used in advertising media without our permission in writing.

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