



TEST REPORTS

ACCREDITED BY:





CERTIFICATE OF MEMBERSHIP

UPVC WINDOW AND DOOR MANUFACTURERS ASSOCIATION

This is to certify that

M/s GEALAN Pvt. Ltd.

(Membership ID: UWDMA/P/24-25/100936)

is an active member of uPVC Window and Door
Manufacturers Association (UWDMA) from February 2024
to January 2025.

Treasurer

President

UPVC Window and Door Manufacturers Association

Communication Address: C-55, Okhla Industrial Area, Phase-I, New Delhi - 110020

Ms. Shobhita Mishra | +91-9560908115 | skill@uwdmaindia.org

Email: skill@uwdmaindia.org | Web: www.uwdmaindia.org



Confederation of Indian Industry

Membership Certificate

This is to certify that

GEALAN Pvt Ltd

is an Annual Member of Indian Green Building Council (IGBC)

Bearing Membership No IGBCMM220037

This certificate shall be valid up to December 2024

K S Venkatagiri
Executive Director
CII - IGBC

Gurmit Singh Arora
Chairman
Indian Green Building Council

B Thiagarajan
Vice Chairman
Indian Green Building Council

Indian Green Building Council

CII - Sohrabji Godrej Green Business Centre, Survey No. 64, Near Hitech City, R R Dist, Hyderabad - 500 084
T: +91 40 4418 5132 / 33 F: +91 40 4418 5189 E: igbc@cii.in W: igbc.in



CERTIFICATE

*This is to certify that the
Quality Management System of*

GEALAN PRIVATE LIMITED

Head Office: 1st Floor, Door No.1-18/HIE/NR-2, Holiday Inn Express & Suits,
Nanakramguda, Hyderabad, Telangana, 500032

Factory: warehouse -I, Part -II, Sy.No.98/A(Part), Industrial Park, Mucherla Village,
Hathnoora Mandal, Sangareddy District, 502296- Telagana

has been assessed and found to conform to the requirements of

ISO 9001:2015

This Certificate is valid for the following scope:

UPVC PROFILES FOR WINDOWS AND DOORS

Certificate No.	:BQSR16572
Registration Date	:02/07/2022
Issue Date	:07/07/2022
Expiry Date	:01/07/2023
Recertification Date	:01/07/2025



Director

BQSR QUALITY ASSURANCE PVT. LTD.

Key Location: 183 Broadway, Ste 210 Hicksville, New York NY 11801, USA

Operations Office: D 303, 104-108, Nisarg Plaza, Wakad, Pune - 411057. | Web: www.bqsrcert.com

Accredited by IAS (0360 Saturn Street, Suite 100, Brea, California 92821 U.S.A.)





Prüfbericht - Nr.: Test Report No.:		IND/BLR/CH/2021/6326		Seite 1 von 3 Page 1 of 3	
ULR NO:		TC568821500006326F			
Auftraggeber: Client:		GEALAN PRIVATE LIMITED 1 st floor, Door No-1-18/HIE/NR-2, Holiday Inn Express Suits, Nanakramguda, Gachibowli, Hyderabad, Ranga Reddy, Hyderabad 500032, India			
Gegenstand der Prüfung: Test item:		GEALAN PRIMA SERIES 60×45MM SLIDER 2 TRACK FRAME PROFILE			
Bezeichnung: Identification:		-		Serien-Nr.: Serial No./ Document Submitted: Email Dated: 14.07.2021	
Wareneingangs-Nr.: Receipt No.:		21072021		Eingangsdatum: Date of receipt: 21.07.2021	
Order No.:		166569052		Testing Period: 21.07.2021 to 26.07.2021	
Prüfört: Testing location:		TÜV Rheinland India Pvt Ltd, Plot No.27B, 2nd cross, Electronic City Phase I Industrial Area, Hosur Road, Bangalore - 560 100, Karnataka, India.			
Prüfgrundlage: Test specification:		Customer's Requirement: Vicat Softening Temperature acc. to EN 12608-1: 2016, Annex-A			
Prüfergebnis: Test Result:		Refer Page No. 2 to 3			
Prüflaboratorium/ Testing Laboratory:					
zusammengestellt/ compiled by:			kontrolliert/ checked by:		
27.07.2021 Nitin Gate Asst. Manager – Polymer Section, Material Testing Laboratories, Industry Services			27.07.2021 Ranabir Pal Sr. Manager - Polymer Section, Material Testing Laboratories, Industry Services		
Datum Date	Name Name	Unterschrift Signature	Datum Date	Name Name	Unterschrift Signature
Sonstiges/ Other Aspects: Nil					
Abkürzungen: ok / P = entspricht Prüfgrundlage fail / F = entspricht nicht Prüfgrundlage n.a. / N = nicht anwendbar					
Abbreviations: ok / P = passed fail / F = failed n.a. / N = not applicable					
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products. Sampling not done by TUVRI. Test item submitted by client. Sampling not done by TUVRI. Decision rule will be applied at 95% confidence level of measurement uncertainty with coverage factor k=2 while stating the conformity if applicable.</i>					

Prüfbericht - Nr.:

Test Report No.:

IND/BLR/CH/2021/6326

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ULR NO:

TC568821500006326F

TEST RESULTS

Discipline: Mechanical

Product Group: Plastic and Plastic Products



Photograph of sample as in received condition

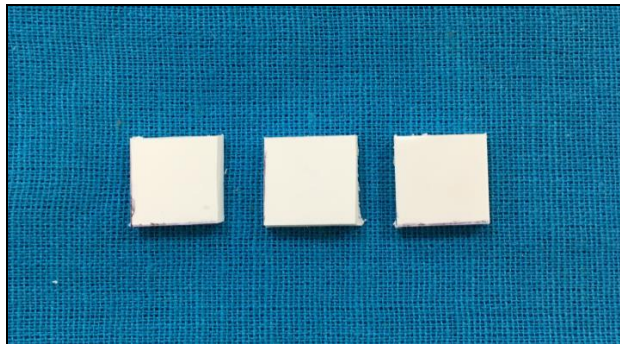
Test Name: Vicat Softening Temperature acc. to EN 12608-1: 2016, Annex-A

Test Method: EN 12608-1:2016, ISO 306:2013 Method B50

Pre- Conditioning: Specimen conditioned at 23±2°C & 50±5% RH for 88 hours

Test Condition: Heating rate - 50°C/h
Force - 50 N
Penetration – 1 mm

Requirement: Min. 75°C (Average)



Photograph of prepared specimens

**Prüfbericht - Nr.:***Test Report No.:***IND/BLR/CH/2021/6326****Seite 3 von 3***Page 3 of 3*

ULR NO:

TC568821500006326F**Observation:**

Sl. No.	Vicat Softening Temperature (VST), °C	Average, °C
1	78.7	79.1
2	78.4	
3	80.1	

Conclusion: Tested sample meet the requirement of client's specification.**---- End of Report ----**



Prüfbericht - Nr.: <i>Test Report No.:</i>		Seite 1 von 3 <i>Page 1 of 3</i>			
IND/BLR/CH/2021/6327					
ULR NO:		TC568821500006327F			
Auftraggeber: <i>Client:</i>		GEALAN PRIVATE LIMITED 1 st floor, Door No-1-18/HIE/NR-2, Holiday Inn Express Suits, Nanakramguda, Gachibowli, Hyderabad, Ranga Reddy, Hyderabad 500032, India			
Gegenstand der Prüfung: <i>Test item:</i>		GEALAN PRIMA SERIES 60×45MM SLIDER 2 TRACK FRAME PROFILE			
Bezeichnung: <i>Identification:</i>		Serien-Nr.: <i>Serial No./ Document</i> Email Dated: 14.07.2021 Submitted:			
-					
Wareneingangs-Nr.: <i>Receipt No.:</i>		Eingangsdatum: <i>Date of receipt:</i>			
21072021		21.07.2021			
Order No.:		Testing Period:			
166569052		21.07.2021 to 26.07.2021			
Prüfört: <i>Testing location:</i>		TÜV Rheinland India Pvt Ltd, Plot No.27B, 2nd cross, Electronic City Phase I Industrial Area, Hosur Road, Bangalore - 560 100, Karnataka, India.			
Prüfgrundlage: <i>Test specification:</i>		Customer's Requirement: Flexural Modulus of elasticity acc. to EN 12608-1: 2016, Annex-A			
Prüfergebnis: <i>Test Result:</i>		Refer Page No. 2 to 3			
Prüflaboratorium/ Testing Laboratory:					
zusammengestellt/ compiled by:		kontrolliert/ checked by:			
Nitin Gate 27.07.2021 Asst. Manager – Polymer Section, Material Testing Laboratories, Industry Services		Ranabir Pal 27.07.2021 Sr. Manager - Polymer Section, Material Testing Laboratories, Industry Services			
Datum <i>Date</i>	Name <i>Name</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name <i>Name</i>	Unterschrift <i>Signature</i>
Sonstiges/ Other Aspects: Nil					
Abkürzungen: ok / P = entspricht Prüfgrundlage fail / F = entspricht nicht Prüfgrundlage n.a. / N = nicht anwendbar					
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Prüfbericht - Nr.:

Test Report No.:

IND/BLR/CH/2021/6327

Seite 2 von 3

Page 2 of 3

ULR NO:

TC568821500006327F

TEST RESULTS

Discipline: Mechanical

Product Group: Plastic and Plastic Products



Photograph of sample as in received condition

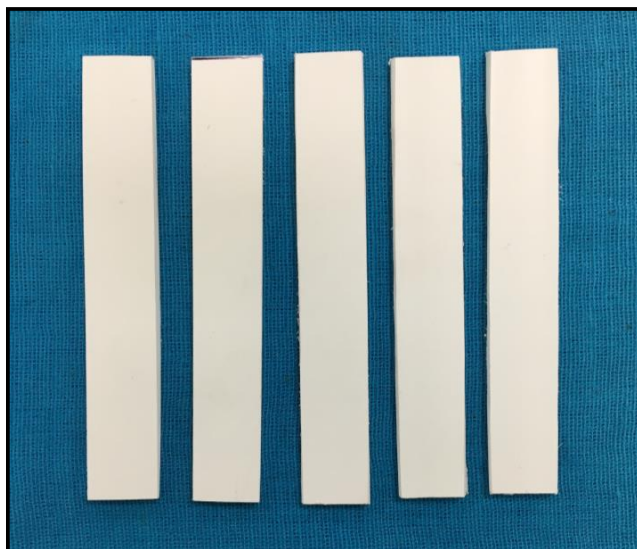
Test Name: Flexural Modulus of elasticity acc. to EN 12608-1: 2016, Annex-A

Test Method: EN 12608-1:2016, ISO 178:2019 Method A

Pre- Conditioning: Specimen conditioned at 23±2°C & 50±5% RH for 88 hours

Test Condition: Test Speed: 2 mm/min

Requirement: Flexural modulus: Min. 2200 N/mm² (Average)



Photograph of prepared specimens

**Prüfbericht - Nr.:**Test Report No.: **IND/BLR/CH/2021/6327****Seite 3 von 3**

Page 3 of 3

ULR NO: **TC568821500006327F****Observation:**

Specimen No.	Flexural Modulus of Elasticity, N/mm ²	Average, N/mm ²
1	2735	2907
2	3026	
3	2988	
4	2909	
5	2878	

Conclusion: Tested sample meet the requirement of the client's specification.**---- End of Report ----**

**सेन्ट्रल इंस्टिट्यूट ऑफ पेट्रोसायन
टेक्नोलॉजी**

यन एवं पेट्रोसायन विभाग,
एन एवं उर्वरक मंत्रालय, भारत सरकार)
सी.एल. पोस्ट, आई.डी.ए.,
- २, चेरलापल्ली, हैदराबाद - ५०० ०५१.
फ़ोन : ०४०-२७२६३७५०, २७२६३६१५
फैक्स : ९१-४०-२७२६४०५१
ईमेल : cipethyderabad@yahoo.co.in
hyderabad@cipet.gov.in
वेब : www.cipet.gov.in



**CENTRAL INSTITUTE OF PETROCHEMICALS
ENGINEERING & TECHNOLOGY**

(Department of Chemicals & Petrochemicals,
Ministry of Chemicals & Fertilizers, Govt. of India)
H.C.L. Post, IDA - Phase - II,
Cherlapally, Hyderabad - 500 051.
Phone : 040-27263750, 27263615
Fax : 91-40-27264051
E-mail : cipethyderabad@yahoo.co.in
hyderabad@cipet.gov.in
Web : www.cipet.gov.in

सिपेट / हैदराबाद / पीटीसी / २०२१-२२

CIPET/HYD/PTC/2021-22

दिनांक: २६.०७.२०२१

Date: 26.07.2021

सेवा में,
To

M/s. Gealan Private Limited.,
1-18/HIE/NR, 1st Floor.,
Holiday inn Express Building, Road No.2
Financial Dist. Gachibowli
Hyderabad, Telangana- 500 032

विशय :- परीक्षण प्रतिवेदन - संदर्भ में ।

Sub : Issue of test report
Ref: Your Letter No. WO/2021-22/001, dtd.10.06.2021

प्रिय महोदय, / Dear Sir,

उपरोक्त विषय के संदर्भ में, कृपया इस पत्र के साथ परीक्षण प्रतिवेदन सं : 210403
दि: 26.07.2021 तथा प्रतिपुष्टी प्राप्त संलग्नीय हैं । कृपया इसे भरकर हमें वापस
लौटा दें ।

With reference to the above cited subject, we are enclosing herewith Revised Test Report
No.2104034 dated: 26.07.2021 and Invoice. We are also enclosing herewith feedback form
Kindly fill it and sent it back to us.

धन्यवाद तथा अच्छी सेवा के आश्वासन के साथ ।

Thanking you and assuring you of our best services.

आपका भवदिय, / Yours faithfully,


AUTHORISED SIGNATORY

संलग्न : यथोक्त / Encl : As above



सेन्ट्रल इंस्टिट्यूट ऑफ पेट्रोसायन इंजीनियरिंग एण्ड टेक्नोलॉजी

(रसायन एवं पेट्रोसायन विभाग, रसायन एवं उर्वरक मंत्रालय, भारत सरकार)

एच.सी.एल. पोस्ट, आई.डी.ए., फेस - २, चेरलापल्ली, हैदराबाद - ५०० ०५१.

CENTRAL INSTITUTE OF PETROCHEMICALS ENGINEERING & TECHNOLOGY

(Department of Chemicals & Petrochemicals, Ministry of Chemicals & Fertilizers, Govt. of India)

H.C.L. Post, IDA - Phase - II, Cherlapally, Hyderabad - 500 051.

Phone : 040-27263750, 27263615, Fax : 91-40-27264051

E-mail : cipethyderabad@yahoo.co.in / hyderabad@cipet.gov.in Web : www.cipet.gov.in

Plastics Testing Centre



0131995

Test Certificate

Page 1 of 2

Date: 26.07.2021

Issued to: M/s. Gealan Private Limited.,
1-18/HIE/NR, 1st Floor.,
Holiday inn Express Building, Road No.2
Financial Dist. Gachibowli
Hyderabad, Telangana- 500 032

Ref: Your Letter No.WO/2021-22/001, dtd.10.06.2021

TEST REPORT AS PER:- ASTM/ASTM/ISO
PART A: PARTICULARS OF SAMPLE SUBMITTED

REPORT NO :2104034

- a) Name of the Sample : UPVC Profile as stated by party
- b) Grade/Variety/Type/Size/Class : Nil
- c) Declared values, if any : Nil
- d) Code No. : Nil
- e) Batch No. and Date of Manufacture : Nil
- f) Quantity : 01 meter x 06 Nos.
- g) Mode of Packing : Loose
- h) Seal : Nil
- i) Any other information : Samples received on 23.04.2021
- j) Date of initiation of testing : 23.04.2021
- k) Date of completion of testing : 21.06.2021

PART B: SUPPLEMENTARY INFORMATION

- a) Reference to sampling Procedure : Nil
- b) Supporting documents for the measurement taken and result derived : Nil
- c) Deviation from the test method as prescribed: Nil
in relevant work instructions, if any
- d) Statement of conformity as per the test result obtained : As per Part-C
- e) Decision Rule applicable or not : Nil



0131995

Test Certificate

Continuation Sheet

REPORT No. 2104034

Page 2 of 2

PART - C

TEST RESULTS

S. No.	Test	Test Method	Result Obtained	Unit
1.	Vicat Softening Point (VST) @ 50N Load	EN 306/ ASTMD 1525	86.0	°C
2.	Flexural Modulus of Elasticity	ASTMD 790/EN178	4362.5	MPa
3.	Heat Stability	ASTMD 1204	No Dimensional Change observed Confirmed	-
4.	a) Colour Fastness after weathering test (visual assessment) b) Colorimetric Assessment	EN 513	Test Under Progress	-
5.	Behaviour after Heating at 150 °C (30minutes)	EN 478	No Cracks/Bubbles Observed	-
6.	Tensile Impact Strength	EN 8256	675.0	kJ/m2
7.	Resistance to Impact by falling mass (1 m height/1 kg load) @ -10 °C for 1 hr	EN 477/EN 12608- 2003	(0/10)0% No Failure Observed Confirmed	-
8.	Density	ASTMD 792	1.50	g/cc
9.	Fire Resistance	UL-94	V-0 (Self Extinguishers, Flame put off within 2seconds)	-
10.	Heat Reversion (1hr @ 100 °C)	EN 479	1.8	%
11.	Limiting Oxygen Index (%)	ASTMD 2863	49.0	%
12.	Thermal Conductivity	ASTME 1530	0.050	W/mk
13.	Tensile Strength	ISO 527/ASTMD 638	47.5	Mpa
14.	Elongation at break		7.4	%
15.	Hardness (Shore-D)	EN 53505/ ASTMD 2240	84.0	D
16.	Water Absorption	ASTMD 570	0.01	%
17.	Izod Impact Strength (Notched)	EN 180/ASTMD 256	25.1	kJ/m2

PART D: REMARKS

Nil

NB: 1. This Test Report/Certificate is issued only for the samples submitted to CIPET.

2. The results stated above related only to the items tested

3. The report shall not be reproduced in full/part without written approval of the laboratory.

4. The quality of the subsequent production lot has to be ensured by the purchaser.

5. Any anomaly/discrepancy in this report should be brought to the notice of CIPET within 30 days from the date of issue

AUTHORISED SIGNATORY



ATMY ANALYTICAL LABS PVT.LTD.

I-30, DLF Industrial Area, Phase-1, Faridabad (Haryana) INDIA
Phone: +91-129-4019544
info@atmylabs.com, www.atmylabs.com

- Testing
- Research
- Innovation

TEST REPORT

Report No.: 2107100075

Page 1 of 10
Date: 05-08-2021

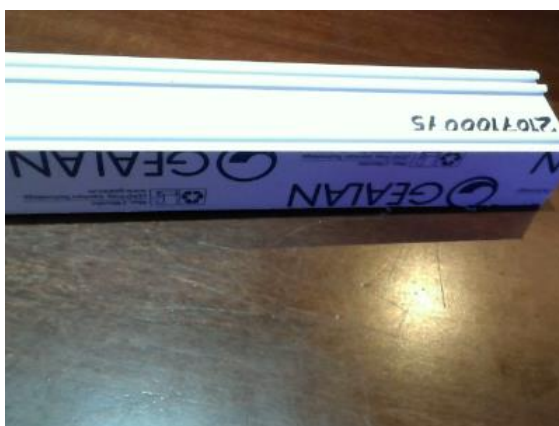
Issued To:

M/s GEALAN PVT. LTD.

1ST FLOOR, DOOR NO. - 1-18/HIE/NE-2, HOLIDAY INN EXPRESS
SUITS, NANAKRAMGUDA, GACHIBOWLI, RANGA REDDY
TELANGANA - 50032

Sample Description : SLIDING FRAME 2 TRACK 60 MM SERIES
Sample Received Date : 10-07-2021
Sample Drawn By : Client
Specification : **BS 476: Part-7:1997 & BS 476: Part 5:1979**
Test Requested : Fire Resistance & Ignitability Test
Test Method : BS 476-Part-7:1997 & BS 476-Part-5:1979.
Test Result : Refer to Attached Pages.

SAMPLE PICTURE



Authentication: To Check authenticity of Test report (s), Scan QR code to get original data.



Govt. Approved Laboratory
ISO 9001 : 2015, ISO 14001:2015 & OHAS 1800:2007 Certified Laboratory

Terms & Conditions:-

1. Sample will not be retained more than one month for chemical and three month for mechanical unless specified instructed. 2. Sample analysis conducted on as received basis and followed by customer description unless specified otherwise. 3. The laboratory will not be liable for sample destroy/damage during testing, unless instructed otherwise. 4. Any complaints matter about this report should be communicated in written, within 7 days of issue of this report. 5. The result listed refer only to the tested samples and applicable parameters as described by customer. Endorsement of product is neither inferred nor implies. 6. Total liability of our laboratory is limited to the invoiced amount only. 7. This report cannot be used as an evidence in a court of law without the written approval of the laboratory.

MSF 5.10.01





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TEST REPORT

Report No.: 2107100075

Page 2 of 10
Date: 05-08-2021

I. FIRE TEST (as per Std. BS 476-part-7:1997)

Fire Resistance

Test Performed on : 12-07-2021 to 15-07-2021

Sample Description:

Product: uPVC Profile (Sliding Frame 2 Track 60mm Series)
Specification: - -
Sample Quantity: 02
Sample ID: 2107100075
Date of sample received: 10.07.2021
Date of Test Performed: 12.07.2021



"This test report is for the exclusive use of Atmy clients and is provided pursuant to the agreement between Atmy and its client. The laboratory will not be liable to any party, other than to the clients with the agreement, for any loss, expense or damage occasioned by the use of this report. Total liability of laboratory is limited to the invoiced amount only. This report cannot be used as evidence in a court of law without the written approval of Atmy".

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TEST REPORT

Report No.: 2107100075

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Date: 05-08-2021

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Authentication: To Check authenticity of Test report (s), Scan QR code to get original data.



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TEST REPORT

Report No.: 2107100075

Page 4 of 10
Date: 05-08-2021

1.0 SUMMARY

The objective of test was to determine of surface spread flame classification of the product "uPVC profile" in accordance with BS 476 Part – 7:1997. The test was performed in accordance with the procedures specified in the standard (BS 476 Part-7:1997) and the specimens were tested in the form of a composite. Test result of the product depicted that the sample tested has "Class -1" surface spread of flame in accordance with the class specified in the standard. The detailed results are summarized in the table-1.

Remarks:

The test results relate only to the behavior of the test specimens of the product under the particular conditions of test; they are not intended to be the sole criterion for assessing the potential fire Hazard of the product in use.

Authentication: To Check authenticity of Test report (s), Scan QR code to get original data.



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MSF 5.10.01





TEST REPORT

Report No.: 2107100075

Page 5 of 10
Date: 05-08-2021

2.0 TEST DETAILS

2.1 Conditioning of Specimen:

Prior to the test, the specimens were prepared and conditioned in accordance with standard at a temperature $23 \pm 2^{\circ}\text{C}$ and relative humidity of $50 \pm 5\%$.

2.2 Form in which the specimens were tested:

Composite

2.3 Exposed faces:

The one face of the specimens was exposed to the heating conditions of the test.

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TEST REPORT

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3.0 TEST RESULTS

3.1 The test results for individual samples are given in Table-1 below:

Table -1

Specimen No.	1	2	3	4	5	6
Spread of flame at first 1.5 minutes (mm)	55	58	55	57	54	57
Distance (mm)	Time of spread of flame to indicated distance (minutes : seconds)					
75 165 190 215 240 265 290 375 455 500 525 600 675 710 750 785 825						
Time of maximum spread of flame (minutes, seconds)	01:02	01:02	01:03	01:03	01:02	01:02
Distance of maximum spread of flame (mm)	69	69	70	70	70	69
Comments	None					

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4.0 CLASSIFICATION CRITERIA

4.1 Classification of Surface spread of flame

Classification	Spread of flame at 1.5 min.		Final spread of flame	
	Limit (mm)	Limit for one specimen in sample (mm)	Limit (mm)	Limit for one specimen in sample (mm)
Class 1	165	165 + 25	165	165 + 25
Class 2	215	215 + 25	455	455 + 45
Class 3	265	265 + 25	710	710 + 75
Class 4	Exceeding the limits for class 3			

5.0 CONCLUSION:

In accordance with the class definitions specified in the standard, the test results shows that the sample tested has **"Class -1"** surface spread of flame.

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II. IGNITABILITY TEST (as per Std. BS 476:part 5:1979)

Ignitability Test

Test Performed on : 02-08-2021 to 05-08-2021

SAMPLE DESCRIPTION:

Product: uPVC Profile (Sliding Frame 2 Track 60mm Series)
Specification: --
Sample Quantity: 02
Sample ID: 2107100075
Date of sample received: 10.07.2021
Date of Test Performed: 05.08.2021



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TEST PURPOSE:

To determine the ignitability characteristics of the exposed surface of essentially flat, rigid or semi-rigid building materials, UPVC profile or composites, when tested in the vertical position to the specified in British Standard 476: Part 5:1979 "Method of test for ignitability".

TEST CONDITIONING:

Three specimens were conditioned for 48 hours at temp. $23 \pm 2^{\circ}\text{C}$ and relative humidity $50 \pm 5\%$.

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OBSERVATION:

Description	Specimens			Requirement	Conformity
	1	2	3		
1. Time of flaming removal of test flame	0	0	0	Not more than 10 sec.	Yes
2. Burning of the test specimen extending to the edges	No	No	No	Do not extent to any edge during flame application or within 10 sec period after removal of the test flame.	Yes

REMARKS: The above sample conforms to as per BS 476: Part 5: 1979 with respect to above test.

-----End of Report-----



D. Kumar
QUALITY MANAGER
Authorised Signatory

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TEST REPORT

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Issued To:

M/s GEALAN PVT. LTD.

1ST FLOOR, DOOR NO. - 1-18/HIE/NE-2, HOLIDAY INN EXPRESS
SUITS, NANAKRAMGUDA, GACHIBOWLI, RANGA REDDY
TELANGANA - 50032

Sample Description	: SLIDING FRAME 2 TRACK 60 MM SERIES
Sample Received Date	: 10-07-2021
Sample Drawn By	: Client
Specification	: --
Test Requested	: RoHS 2.0 (Pb,Cd,Hg,Cr6,PBB,PBDE,Phthalates)
Test Method	: Refer to Attached Pages.
Test Result	: Refer to Attached Pages.

SAMPLE PICTURE



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I. Chemical

1.

RoHS 2.0 (Pb,Cd,Hg,Cr6,PBB,PBDE,Phthalates)

Test performed on : 13-07-2021 to 15-07-2021

TEST PARAMETER	TEST METHOD	MDL (mg/kg)	RESULTS (mg/kg)	LIMIT (mg/kg)
Lead (as Pb) (CAS No. 7439-92-1)	IEC 62321-5:2013,	1.0	ND	Max 1000.0
Cadmium (as Cd) (CAS No. 7440-43-09)	IEC 62321-5:2013,	1.0	ND	Max 100.0
Mercury (as Hg) (CAS No. 7439-97-6)	IEC 62321-4:2013	2.0	ND	Max 1000.0
Hexa Chromium (as Cr+6) (CAS No. 10588-01-9)	IEC 62321-7-2:2017	1.0	ND	Max 1000.0
Sum of PBBs (Mono to Deca)				Max 1000.0
Monobromobiphenyl (CAS No. 92-52-4)	IEC 62321-6:2015 test performed by GC-MS	5.0	ND	
Dibromobiphenyl (CAS No. 92-86-4)	IEC 62321-6:2015 test performed by GC-MS	5.0	ND	
Tribromobiphenyl (CAS No. 59080-34-1)	IEC 62321-6:2015 test performed by GC-MS	5.0	ND	
Tetrabromobiphenyl (CAS No. 40088-45-7)	IEC 62321-6:2015 test performed by GC-MS	5.0	ND	
Pentabromobiphenyl (CAS No. 56307-79-0)	IEC 62321-6:2015 test performed by GC-MS	5.0	ND	
Hexabromobiphenyl (CAS No. 59080-40-9)	IEC 62321-6:2015 test performed by GC-MS	5.0	ND	
Heptabromobiphenyl (CAS No. 35194-78-6)	IEC 62321-6:2015 test performed by GC-MS	5.0	ND	
Octabromobiphenyl (CAS No. 6188-13-9)	IEC 62321-6:2015 test performed by GC-MS	5.0	ND	
Nonabromobiphenyl (CAS No. 27753-52-2)	IEC 62321-6:2015 test performed by GC-MS	5.0	ND	
Decabromobiphenyl (CAS No. 13654-09-6)	IEC 62321-6:2015 test performed by GC-MS	5.0	ND	

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TEST PARAMETER	TEST METHOD	MDL (mg/kg)	RESULTS (mg/kg)	LIMIT (mg/kg)
Sum of PBDEs (Mono to Deca)				Max 1000.0
Monobromodiphenyl ether (CAS No. 101-55-3)	IEC 62321-6:2015 test performed by GC-MS	5.0	ND	
Dibromodiphenyl ether (CAS No. 205047-7)	IEC 62321-6:2015 test performed by GC-MS	5.0	ND	
Tribromodiphenyl ether (CAS No. 49690-94-0)	IEC 62321-6:2015 test performed by GC-MS	5.0	ND	
Tetrabromodiphenyl ether (CAS No. 40088-47-9)	IEC 62321-6:2015 test performed by GC-MS	5.0	ND	
Pentabromodiphenyl ether (CAS No. 32534-81-9)	IEC 62321-6:2015 test performed by GC-MS	5.0	ND	
Hexabromodiphenyl ether (CAS No. 36483-60-0)	IEC 62321-6:2015 test performed by GC-MS	5.0	ND	
Heptabromodiphenyl ether (CAS No. 68928-80-3)	IEC 62321-6:2015 test performed by GC-MS	5.0	ND	
Octabromodiphenyl ether (CAS No. 32536-52-0)	IEC 62321-6:2015 test performed by GC-MS	5.0	ND	
Nonabromodiphenyl ether (CAS No. 63936-56-1)	IEC 62321-6:2015 test performed by GC-MS	5.0	ND	
Decabromodiphenyl ether (CAS No. 1163-19-5)	IEC 62321-6:2015 test performed by GC-MS	5.0	ND	

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TEST PARAMETER	TEST METHOD	MDL (mg/kg)	RESULTS (mg/kg)	LIMIT (mg/kg)
Phthalates				
Di-ethylhexylphthalate (DEHP) (CAS No. 117-81-7)	IEC 62321-8:2017 test performed by GC-MS	30.0	ND	Max 1000.0
Benzylbutylphthalate (BBP) (CAS No. 85-68-7)	IEC 62321-8:2017 test performed by GC-MS	30.0	ND	Max 1000.0
Dibutylphthalate (DBP) (CAS No. 84-74-2)	IEC 62321-8:2017 test performed by GC-MS	30.0	ND	Max 1000.0
Di-isobutylphthalate (DIBP) (CAS No. 84-69-5)	IEC 62321-8:2017 test performed by GC-MS	30.0	ND	Max 1000.0

Note:

- The maximum permissible limits are quoted from the European Parliament and Council Directive 2005/84/EC(amending Directive 2015/863 amending annex. II to Directive 2011/65/EU).
- MDL = Method detection limits
- N.D.= Not detected at the detection limits.
- mg/kg = ppm (parts per million); 0.1wt% = 1000ppm
- Lead content more than 85% in its alloys (Tin-Lead solder alloys) are exempted as per directives 2002/95/EC, Annexure article-7.

-----End of Report-----



P.N.Rao
SR. ANALYST

Authorised Signatory



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Report after 12,000 h

Revision 1

Artificial weathering climate S according to DIN EN 513/DIN EN 12608-1

to report number: 202120602-07

Customer:

GEALAN Pvt Ltd

Mr. G.A Jagadeesh Kumar
1st Floor, Fairfield by Marriott
Nankramguda, Hyderabad 500032
India

Contractor:

Polymer Service GmbH Merseburg

An-Institute at the Merseburg University of Applied Sciences
Business field
Elastomer modification/Elastomer and foil testing
Prof. Dr.-Ing. habil. Katrin Reincke
Geusaer Str. 81f
06217 Merseburg

Tel.: 03461 30889 55
Fax: 03461 30889 99
E-Mail: katrin.reincke@psm-merseburg.de
<http://www.polymerservice-merseburg.de>

Editor:

Dr. Katja Oßwald
Tel.: 03461 30889 72
katja.osswald@psm-merseburg.de

Order number: 202120602
Incoming orders: 06.12.2021
Report date: 15.06.2023
Revision date: 19.07.2023

Reason for revision: Correction of the Charpy characteristic values in the initial state.

This report comprises 9 pages and an appendix.

The tests were carried out in the PSM test laboratory "Mechanical Testing of Plastics", which is accredited by DAkkS according to DIN EN ISO/IEC 17025.

No. of the accreditation certificate: **D-PL-20227-01-00**,

List of accredited standards see www.psm-merseburg.de

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Geschäftsführung

Prof. Dr. Valentin Cepus (Vors.)
Prof. Dr. Wolfgang Grellmann
Prof. Dr. Katrin Reincke
Dr. Marcus Schoßig (Prokura)
Tel.: +49 3461 30889 50
Fax: +49 3461 30889 99
E-Mail: info@psm-merseburg.de

Post- und Lieferanschrift

Polymer Service GmbH Merseburg
Geusaer Str. 81f
06217 Merseburg
Internet
www.psm-merseburg.de

Task and object of investigation

The client provided a total of one specimen for the weather fastness test. Table 1 lists the designations of the specimens.

Table 1: Designations of the samples

No.	Product type	Product no..	Designation	Batch no.
1	PVC-U Profile	2105-1102	Prima sliding sash	2011213

The weather fastness test was carried out according to DIN EN 513:2019-03 [1] / DIN EN 12608-1:2020-11 [2], climate zone S for a weathering period of 12,129 h.

To evaluate the aging behavior of the specimens, a color measurement is performed every 1,000 h by using DIN EN ISO/CIE 11664-4:2020-03 [3] and a comparison against a reference - non-weathered test specimen – in accordance with DIN ISO 4582:2019-03 [4] by determining the fastness number using the nine-step gray scale in accordance with DIN EN 20105-A02:1994-10 [5].

Furthermore, the notched impact strength was determined at the end of the weathering according to ISO 179-1:2010-06 [6].

Experimental Weathering parameters

Table 2: Conditions for weathering test according to DIN EN 513:2019-03/DIN EN 12608-1:2020-11, climate zone (S)

Type of weathering device	Q-Sun Xe-2-HS, rotating specimen rack, synchronous run
Service and calibration (manufacturer)	2021-10-20, 2023-01-18
Light source	Xenon arc lamp, silica glass
Filter	Daylight-Q, daylight filter
Broadband irradiance	300–400 nm
Irradiance (300–800 nm) E	$(550 \pm 55) \text{ W} \cdot \text{m}^{-2}$
Irradiance (300–400 nm) E	$(60 \pm 2) \text{ W} \cdot \text{m}^{-2}$
Radiometer	UC20/TUV calibration-radiometer
Calibration date UC20/TUV	2021-10-15, 2022-10-14
Surface temperature sensor	Black-standard thermometer BST
Specified value black-standard temperature	$(65 \pm 3) ^\circ\text{C}$
Reference Black-standard thermometer	UC202/IBP calibration-radiometer
Calibration date UC202/IBP	2021-10-22, 2022-10-13
Surface temperature sensor	White-standard thermometer WST
Specified value white-standard temperature	$45\text{--}50 ^\circ\text{C}$
Specified chamber temperature	$(30 \pm 3) ^\circ\text{C}$
Specified value relative-humidity U	$(65 \pm 10) \%$
Exposure time	114 min
Spray cycle	6 min
Spraying	Exposed surface
Mounting of the test specimens	Specimen holders
Start of the weathering	2021-12-12
Ende of the weathering (calculated)	2023-05-06
Interruption of the test ($\geq 72 \text{ h}$)	none
Lamp replacement	
	Number 7
	Dates 2022-02-07, 2022-04-11, 2022-06-14, 2022-08-25, 2022-11-05, 2023-01-10, 2023-03-21
Total exposure time	12,129 h
Total irradiance (300–800 nm) H	$24 \text{ GJ} \cdot \text{m}^{-2}$

Color measurement

The test conditions for evaluating color change according to the standard DIN EN ISO/CIE 11664-4:2020-03 [3] are listed in Table 3.

Table 3: Test conditions for determining the color/color change according to DIN EN ISO/CIE 11664-4:2020-03

Equipment	Konica Minolta CM-36dG Spectrophotometer
Calibration by manufacture	2021-09-23, 2022-11-10
Colour space	CIELAB $L^*a^*b^*$
Observer	10°
CIE Illuminant	D65 (6504 K)
Geometry	di:8° – specular component included
Spectral Range	360 to 740 nm
Wavelength Interval	10 nm
Apertures	LAV – 25.4 mm
Material	2105-1102
Preconditioning of material	– Initial state: 16 h at 23 °C and 50 % relative humidity – Weathering, every 1,000 h
Specimen geometry	– Plate, 45 mm x 89 mm (Width x Length)
Tester	Dr. Schoßig

For the determination of the color distance a comparison of the reference sample (standard) and the samples for testing will be done. Within the scope of this test report, the color distances ΔE_{ab}^* according to CIELAB 1976 and additionally according to ISO/CIE 11664-6:2014-02 CIEDE2000 (ΔE_{00}) [7] are used to evaluate the change in color. The nomenclature can be found in Table 4.

Table 4: Nomenclature according to DIN EN ISO/CIE 11664-4:2020-03

Symbols	Designation
L^*	CIELAB-Lightness
a^*	CIELAB-Coordinate
$+a^*$	Red
$-a^*$	Green
b^*	CIELAB-Coordinate
$+b^*$	Yellow
$-b^*$	Blue
$\Delta E = \Delta E_{ab}^*$	a, b Color difference CIE 1976
ΔE_{00}	Color difference according to [7]

The CM-36DG spectrophotometer (FA. KONICA MINOLTA, INC) with CM-S100W SPECTRA MAGIC NX PRO software was used for the color measurements from a weathering duration of 1,000 h. The spectrophotometer was used to measure the color of the test specimens. The color measurements on the test specimens were performed with the largest aperture with a diameter of 25.4 mm ($A = 506.7 \text{ mm}^2$) at three different locations with three measurements each, and the evaluation software gives the averaged values as the result.

Evaluation of the color fastness with the gray scale

The evaluation of the change of color according to DIN EN 20105-A02:1994-10 was carried out in the light chamber LED Color Viewing Light M 2.0 Hybrid of the company JUST NORMLICHT GMBH (Weilheim/ Teck, Germany). The irradiation is performed by the LED lamps located in the ceiling of the light chamber. The specimens to be evaluated are placed in the center of the chamber on a 45 ° specimen stand. In the following Table 5 are the test parameters.

Table 5: Test conditions for determining the color change according to DIN EN 20105-A02:1994-10

Equipment	LED Color Viewing Light M 2.0 Hybrid
Illuminated Area	65 mm x 38 mm x 36 mm (Width x Height x Length)
CIE Illuminant	D65
Light source	LED
Color temperature Set / Current	D65 – 6500 K / 6569 K
Gray scale	DIN EN 20105-A02:1994-10, including half steps
Date of first use	2021-02-11 (VI / 2182) 2022-02-25 (VQ / 2182) 2023-04-24 (WA / 2712)
Batch / Certificate of Conformity	VI / 2182 (2018) VQ / 2182 (2022) WA / 2712 (2022)
Material	2105-1102
Preconditioning of material	– Initial state: 16 h at 23 °C und 50 % relative humidity – Weathering: every 1,000 h

Determination of Charpy-impact strength

The test parameters as well as the nomenclature for the determination of the notches Charpy impact strength according to ISO-1:2010-06 are listed in Table 6 as well as in Table 7.

Table 6: Test conditions according to ISO 179-1:2010-06

Used pendulum impact tester	Zwick HIT 25P
Method	ISO 179-1/1fA

Specimen	50 mm x 6 mm x profile wall thickness
Impact direction	flatwise – <i>f</i>
Notch type	A
Notch radius	0.25 mm ± 0.05 mm
Notch depth	Double V-notch, 1.5 mm on each side
Material description	see Table 1
Impact velocity	2.9 m s ⁻¹
Nominal impact energy of the pendulum hammer	2 J
Number of test specimen	10 per measurement series
Climate at pretreatment, 16 h	23 °C and 50 % relative humidity
Test climate	23 °C and 50 % relative humidity
Test date	2023-06-02

Table 7: Nomenclature for the non-instrumented impact test according to ISO 179-1:2010-06

Description	Symbol and/or calculation	Unit
<i>Charpy</i> impact strength of notched specimen	$a_{cN} = \frac{E_c}{h \cdot b_N}$	(kJ/m ²)
Corrected impact energy	E_c	(J)
Specimen width	b	(mm)
Remaining width at the notch base	b_N	(mm)
Specimen thickness	h	(mm)
Notch radius	r_N	(mm)
Support span	L	(mm)
Specimen length	l	(mm)
Mean value	$\bar{x}$	
Standard deviation	s	
Variance	v	
Mode of failure		
– Complete break	C	
– Hinge break	H	
– Partial break	P	
– Non-break	N	

Results

Colorimetric evaluation and color fastness

The results of the color measurement of the initial state are shown in Table 8 and the color changes due to artificial weathering are listed in Table 9.

Table 8: Color coordinates of the initial state

Designation	Color coordinates		
	L^*	a^*	b^*
2105-1102	95.15	-0.79	-0.41

Table 9: Color change and indication of fastness number

Time of exposure (h)	Dose of irradiation (GJ m ⁻²)	Color coordinates			Total color distance ΔE_{ab}^*	Fastness number
		ΔL^*	Δa^*	Δb^*		
1,000	2.10	0.49	-0.08	1.03	1.14	4–5
2,000	4.01	0.75	0.04	0.47	0.88	4–5
3,000	6.05	0.64	0.03	0.38	0.74	4–5
4,000	8.04	0.62	0.00	0.41	0.74	5
5,000	9.94	0.65	-0.01	0.47	0.80	4–5
6,061	12,01	0.73	-0.03	0.55	0.91	4–5
7,000	14.04	0.79	-0.04	0.58	0.98	5
8,000	15.94	0.84	-0.05	0.68	1.07	4–5 W
9,000	18.56	0.91	-0.03	0.68	1.14	4–5 W
10,101	20.35	1.00	-0.04	0.77	1.26	4 Str, Br
11,000		no measurement carried out				
12,129	24.02	1.03	-0.09	1.09	1.50	4–5 Str, Br

Abbreviations of qualitative terms (Table 2, ISO 105-A02:1993-09)

Bl	Bluer	W	Weaker
G	Greener	Str	Stronger
R	Redder	D	Duller
Y	Yellower	Br	Brighter

The colorimetric result after weathering is shown in appendix 1.

The results of the Charpy V-notch impact strength for the initial state as well as after weathering of 12,129 h are shown in Table 10.

Table 10: Charpy V-notch impact strength

Time of exposure (h)	b_N	h	E_c	a_{cN}
Initial state	3.08 ± 0.04	2.27 ± 0.04	0.482 ± 0.013	$68,9 \pm 1,57$
12,129	3.01 ± 0.05	2.28 ± 0.05	0.390 ± 0.015	56.8 ± 2.32

The protocol for determining the impact strength is shown in appendix 2.

Reference

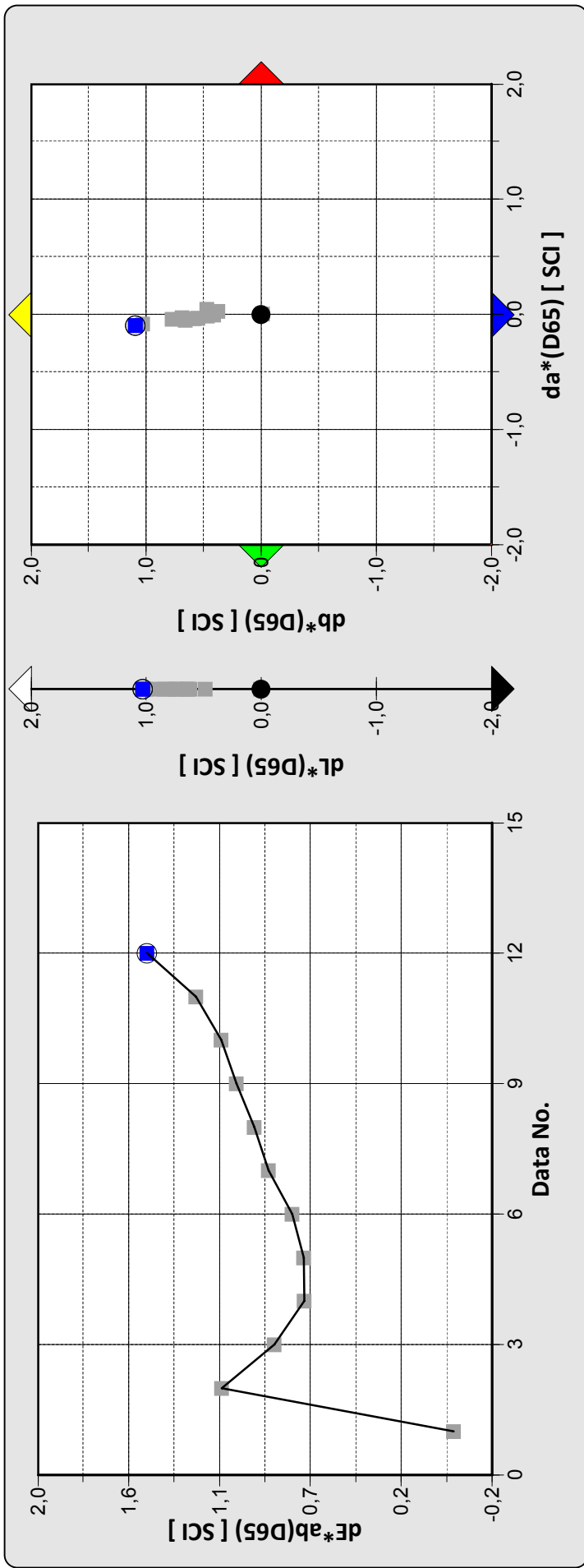
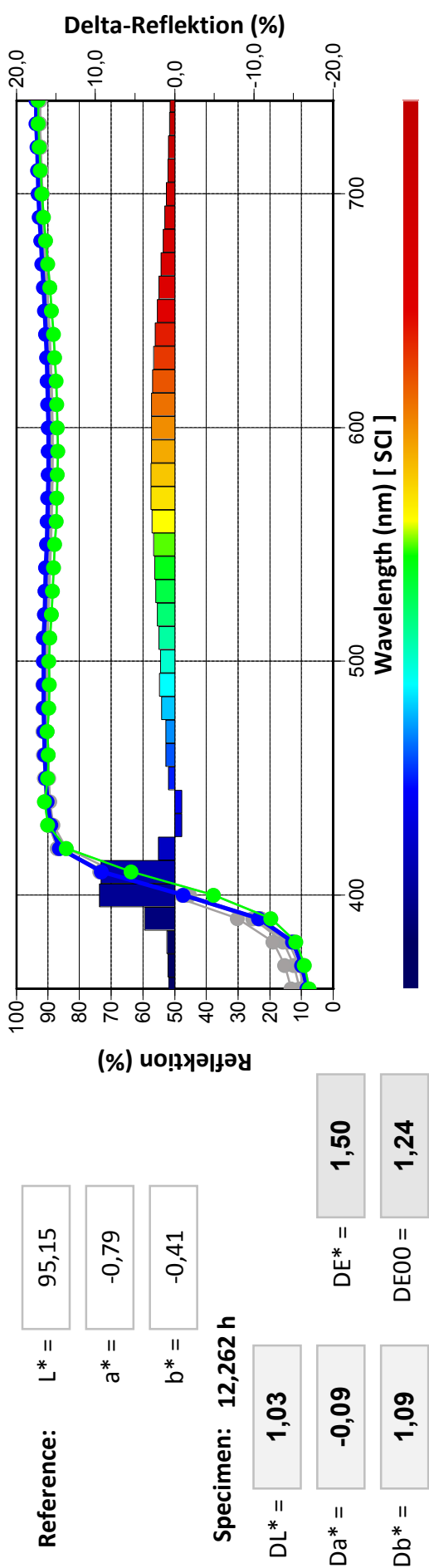
- [1] DIN EN 513 (2019-03): Plastics – Poly(vinyl chloride) (PVC) based profiles – Determination of the resistance to artificial weathering.
- [2] DIN EN 12608-1 (2020-11): Unplasticized poly(vinyl chloride) (PVC-U) profiles for the fabrication of windows and doors - Classification, requirements and test methods - Part 1: Non-coated PVC-U profiles with light coloured surfaces.
- [3] DIN EN ISO/CIE 11664-4 (2020-03): Farbmeterik – Teil 4: CIE 1976 L* a* b* Farbraum.
- [4] DIN ISO 4582 (2019-03): Kunststoffe – Bestimmung der Änderung der Farbe und anderer Eigenschaften nach Bestrahlung hinter Glas, nach natürlicher oder nach künstlicher Bewitterung.
- [5] DIN EN 20105-A02 (1994-10): Textilien – Farbechtheitsprüfungen – Teil A02: Graumaßstab zur Bewertung der Änderung der Farbe.
- [6] ISO 179-1 (2010-06): Plastics – Determination of charpy properties – Part 1: Non-instrumented impact test.
- [7] ISO/CIE 11664-6 (2014-02): Colorimetry – Part 6: CIEDE2000 Colour-difference formula.

Appendix

Appendix 1: Colorimetric result

Appendix 2: Protocol of the determination of the impact strength

12.12.2021





Determination of the Charpy impact properties acc. DIN EN ISO 179-1

Parameter table:

Order no.	: 202320116 UK07
Customer	: GEALAN Pvt Ltd
Standard	: acc.to DIN EN ISO 179-1
Method	: ISO 179-1/1fA
Pendulum impact tester	: Zwick/Roell HIT25P
Impact velocity	: 2,9 m/s
Nominal working capacity of the pendulum	: 2,0 Joule
Material	: PVC Profil Reference
Material composition and form	: 50 mm x 6 mm x Profile wall thickness
Test specimen production	: Double- V - Notch A
Number of test specimens	: 10
Climate	: Conditioning: 16 h standard climate (23 °C, 50 % rel. Humidity) Test: standard climate (23 °C, 50 % rel. Humidity)
Comments	: Impact occurs on the inner surface
Tester	: Ageev
Test date	: 14.12.2021
Test result	: $68,9 \pm 1,57 \text{ kJ/m}^2 \text{ P}^*$

Results table:

Nr	b mm	h mm	E_c J	a_{cN} kJ/m ²	Failure mode
1	3,10	2,34	0,498	68,7	P
2	3,10	2,25	0,498	71,4	P
3	3,14	2,27	0,479	67,2	P
4	3,06	2,31	0,479	67,7	P
5	3,06	2,29	0,476	68,0	P
6	3,08	2,29	0,496	70,3	P
7	3,07	2,22	0,457	67,1	P
8	3,14	2,23	0,479	68,4	P
9	3,00	2,30	0,491	71,2	P
10	3,09	2,22	0,472	68,7	P

Statistics table:

Series n = 10	b_N mm	h mm	E_c J	a_{cN} kJ/m ²
$\bar{x}$	3,08	2,27	0,482	68,9
s	0,04	0,04	0,0133	1,57
v	1,33	1,81	2,75	2,28



Determination of the Charpy impact properties acc. DIN EN ISO 179-1

Parameter table:

Order no.	: 202320116 UK07
Customer	: GEALAN Pvt Ltd
Standard	: acc.to DIN EN ISO 179-1
Method	: ISO 179-1/1fA
Pendulum impact tester	: Zwick/Roell HIT25P
Impact velocity	: 2,9 m/s
Nominal working capacity of the pendulum	: 2,0 Joule
Material	: PVC Profil Reference
Material composition and form	: 50 mm x 6 mm x Profile wall thickness
Test specimen production	: Double- V - Notch A
Number of test specimens	: 10
Climate	: Conditioning: 16 h standard climate (23 °C, 50 % rel. Humidity) Test: standard climate (23 °C, 50 % rel. Humidity)
Comments	: Impact occurs on the inner surface
Tester	: Ageev
Test date	: 02.06.2023
Test result	: $56,8 \pm 2,32 \text{ kJ/m}^2 \text{ C}^*$

Results table:

Nr	b _N mm	h mm	E _c J	a _{cN} kJ/m ²	Failure mode
1	3,00	2,32	0,377	54,2	H
2	3,01	2,33	0,401	57,2	H
3	3,04	2,20	0,394	58,9	H
4	3,08	2,24	0,404	58,5	H
5	3,01	2,24	0,406	60,2	H
6	3,07	2,26	0,409	58,9	H
7	2,98	2,28	0,363	53,4	H
8	2,93	2,34	0,384	56,1	H
9	2,96	2,35	0,380	54,6	H
10	3,05	2,23	0,382	56,2	H

Statistics table:

Series n = 10	b _N mm	h mm	E _c J	a _{cN} kJ/m ²
$\bar{x}$	3,01	2,28	0,390	56,8
s	0,05	0,05	0,0151	2,32
v	1,60	2,32	3,87	4,08



METHOD STATEMENT
PERFORMANCE MOCKUP
TEST FOR
SLIDING DOOR
GEALAN PRIVATE LIMITED

MS. No. : BF02/06/July/2023/MS 00
MS Date & Time : 06/July/2023 & 3:25PM
File Name : BF02-Gealan Sliding Door PMU MS
Control No. EITC/MSLT/02 Issue No.00 Issued August 2022

EMINENT INTERNATIONAL TESTING CENTRE PRIVATE LIMITED

Plot No 76/Part, EPIP, Industrial Park, Pashamailaram, Isnapur - 502307, Hyderabad, Telangana, India

Mail: info@eminent-itc.com

Website: www.eminent-itc.com

EMINENT INTERNATIONAL TESTING CENTRE

DUBAI

Office No. F181, Hamid
Sultan Bin Muawaiz Building,
Ras Al Khor, Dubai, UAE.
M: +971 562850957.

INDIA

Plot No. 76/Part, EPIP, Industrial Park,
Pashamailaram, Isnapur – 502307,
Hyderabad, Telangana, India.
M: +91 7025000043.

ACCREDITATION

LABORATORY AND SITE TESTING

ISO / IEC 17025: General requirements for the competence of testing and calibrating laboratories by

NABL – National Accreditation Board for Testing & Calibration Laboratories

www.nabl-india.org

The testing standard(s) which is / are a subject of this document falls wholly or partly under the accreditation checked below

ISO / IEC 17025 – NABL



It is not within our accreditation scope



TC-11560

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1. GENERAL

This method statement will be followed at the time of laboratory testing by Eminent International Testing Centre, Hyderabad, India to determine the performance adequacy of a sliding door specimen, installed by Gealan Private Limited. The tests will be performed in conformance with the accredited test procedures of *BS* test standards and according to the requirement of the project specification.

PROJECT DETAILS	
Project Name	
Client	
Consultant	
Architect	
UPVC Contractor	Gealan Private Limited

TEST SPECIMEN & PERTINENT INFORMATION	
Manufacturer	
Type	UPVC Sliding Door
Operation Type	Sliding
Specimen Size	2.4 x 2.4m
Specimen Area	5.76m ²
Specimen Flat / Curve	
Type of Glass	Toughened Glass
Glass Thickness	6mm
Weather Seal Dimension	
Weather Seal Type	
Fasteners Type & Material	
Fasteners Dimension	
Locking (if applicable)	

2. TEST PARAMETERS AND PERFORMANCE REQUIREMENTS

Test	Criteria	Reference
1. Water Tightness Test	BS EN 1027: 2016	
Test Pressure and duration	Refer table 1 in section 7.1.3.	BS EN 12208
2. Resistance to Wind Load Test	BS EN 12211: 2016	
Test Pressure		
P1	2200 Pa	Provided by client
P2	1100 Pa	
P3	3300 Pa	BS EN 12210

Note: The testing criteria were taken from the standard

3. DESCRIPTION OR MODIFICATION OR ADJUSTMENTS

Will be mentioned in final report (if any)

4. COMPLIANCE STATEMENT

- The sliding door will be tested as described in this document, in conformance with the test procedures of BS test standards and according to the requirement of the project specification.
- The effect of the test results relates only to the specimen tested and are valid under the conditions during the test.

5. TEST SEQUENCE AND PROGRAM

09:00 AM	Briefing
09:30 AM	Water Tightness Test
11:30 AM	Resistance to Wind Load Test (P1)
12:15 PM	Resistance to Wind Load Test (P2)
01:00 PM	Resistance to Wind Load Test (P3)

Note: Program sequence may vary depending on test results.

6. SPECIFICATION COMPLIANCE

Testing will be carried out under the direction of the Testing Engineer of EITC in compliance with the requirements of Project Specification and Standards.

7. TEST PROCEDURES

Specimen verification: Before starting the test, Testing Engineer should verify that the label stuck on the mock-up chamber and method statement has same file number.

Fit the chamber to the perimeter of the test specimen to cover the entire test specimen. Seal all the joints between test specimen and test chamber connections. The chamber shall be capable of withstanding the required differential test pressures. Blower is connected to provide positive or negative pressure difference across the specimen. At least one pressure tap will be kept inside the chamber to measure the pressure difference between each side of the specimen. The pressure tap shall be located in an area of the chamber in which pressure readings will not be affected by any supply air.

7.1. Static Water Penetration Test BS EN 1027: 2016

7.1.1. PREPARATION

- a. Install the specimen as intended for use in the actual condition without any variation which may affect the result of the test.
- b. The specimen shall be fully operable, cleaned and dry.
- c. Open and close all opening parts of the test specimen at least once before securing them in the closed condition.
- d. Arrange a single row of spray rack nozzles equidistant 400 mm apart (+/- 10 mm) and positioned 250 mm from the surface of the test specimen with the outer most nozzles at the sides inset not less than 50 mm nor greater than 250 mm from the sides of the specimen, (refer to the "c" value in the mock up diagram). The nozzle line shall be located not more than 150 mm above the topmost horizontal joint line of any moving frame or the glazing line of any fixed glazing.
- e. The nozzle axis shall be tilted in an angle $24^{\circ} \pm 2$ below the horizontal line for test.
- f. Use a single row of nozzle with each will spray an average 2 liters/minute spray.

7.1.2. TEST PROCEDURE

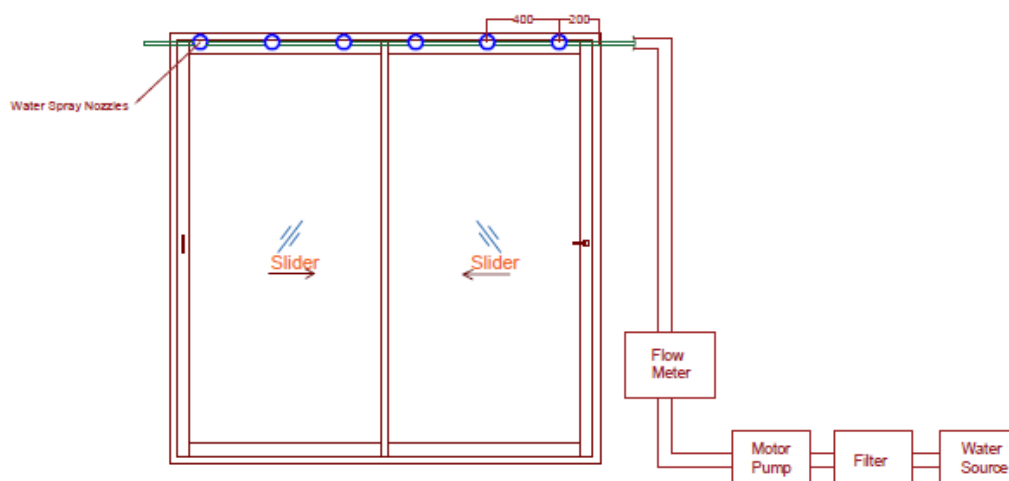
- a. Apply three pressure pulses with the duration of increase in test pressure shall not be less than 1 second and maintained for at least three (3) seconds, 10% greater than the maximum test pressure required for the test, without however being less than 500 Pascal.
- b. Spray the water at 0 pressure for the first 15 minutes and increase in an interval of 50 Pascal each lasting 5 minutes up to 300 Pascal, and from thereafter 150 Pascal interval until water emergence occurs along the internal side of the specimen. Note, the duration of each pressure step shall be within a tolerance of +1/-0 minute.
- c. If there would be an emergence of any water on the inside face, it shall be recorded at which test pressure level it has occurred, the location and extent of the leakage shall be noted on a drawing of the specimen.

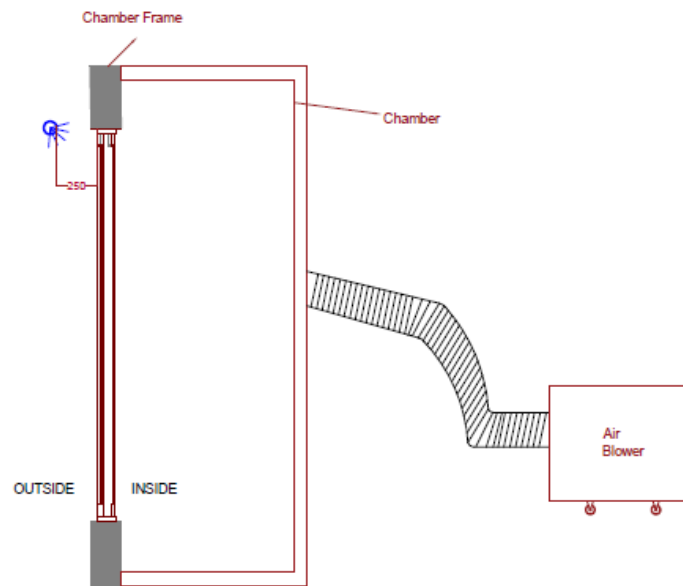
7.1.3. CLASSIFICATION (AS PER BS EN 12208)

Test Pressure (Pa)	Classification	Specifications
	Test Method A	
0	1A	Water spray for 15min
50	2A	15 + 5 min
100	3A	20 + 5 min
150	4A	25 + 5 min
200	5A	30 + 5 min
250	6A	35 + 5 min
300	7A	40 + 5 min
450	8A	45 + 5 min
600	9A	50 + 5 min
> 600	Exxx	Above 600 Pa in steps of 150 Pa, the duration at each step shall be 5 min
NOTE: a. Specimen that allows water penetration at 0 pressure before the expiration of 15 minutes cannot be classified.		

Table 1 - Water penetration classification

Equipment setup diagram





7.2. Wind Resistance Test BS EN 12211: 2016

7.2.1. PREPARATION

- Install the specimen as intended for use in the actual condition without any variation which may affect the result of the test. Prior to test, the sample shall be brought into the defined closing condition in accordance with the manufacturer's instructions.
- Assure the test rig stiffness and fixing of the specimen to be sufficient to avoid adverse effects on the performance of the specimen during testing.
- The test specimen shall be cleaned and dry.
- Fixed the measuring devices (Linear Displacement Transducers) in position at each end and at the center of the frame member to be measured. (a frame member could be part of the opening element or the fixed frame).

7.2.2. TEST PROCEDURE

P1 Application

- Apply three pressure pulses, each 10% greater than test pressure P1. The time to reach the maximum pressure shall be not less than one second and shall be sustained for at least 3 seconds.
- Apply the positive test pressure P1 at a rate not exceeding 100 Pascal /second and when the pressure has been applied for 30 seconds, record the frontal deflection or the frontal displacement.
- Reduce the pressure to 0 Pascal at a rate not more than 100 Pascal /second and after 60 +/- 5 seconds, record the residual frontal deflection or frontal displacement.
- Repeat the procedures a) to c) in the negative test pressures.

P2 Application

- a. Initially apply negative test pressure P2 and then the positive as is the last of the sequence of 50 impulses.
- b. Variation of the pressure from negative to positive and the reverse shall be 7 +/- 3 seconds, and keep P2 for at least 7 +/- 3 seconds.
- c. After application of the 50 cycles, open and close the moving parts of the specimen and record any damage or defects if found any.

P3 Application

- a. Variation from 0 Pascals to -P3 and back from -P3 to 0 shall take 7 +/- 3 seconds, and keep P3 for at least 7 +/- 3 seconds.
- b. Positive pressure is applied after a 7 +/- 3 seconds rest at 0 Pascal and application of the pressure shall be in the same duration as the negative test.
- c. After the safety test, record whether the test specimen remains closed and describe any part that has been dislodged, if any.

7.2.3. TEST RESULT

- a. After the safety test, record whether the test specimen remains closed and describe any parts of the test specimen which have become detached or broken.
- b. Uncertainty calculation (Decision Rule):
 - Total allowable deflection = TAD
 - Measured deflection = MD
 - Uncertainty = UIf,
 1. $MD \pm U$ & $MD < TAD$, then test is recorded as **Pass**.
 2. $MD - U$ & $MD < TAD$ but $MD + U > TAD$, then test is recorded as **Pass with comment**.
 3. $MD - U < TAD$ but MD & $MD + U > TAD$, then test is recorded as **Fail with comment**.
 4. $MD \pm U$ & $MD > TAD$, then test is recorded as **Fail**.

7.2.4. CLASSIFICATION OF WIND LOAD & RELATIVE FRONTAL DEFLECTION (AS PER BS EN 12210)

- a. Classification shall be according to the results of wind resistance tests to positive and negative test pressures.

Class	P1	P2*	P3
1	400	200	600
2	800	400	1200
3	1200	600	1800
4	1600	800	2400
5	2000	1000	3000
E _{xxxx} **	xxxx		
E ₂₂₀₀	2200	1100	3300

*This pressure (P2) having been repeated 50 times

**Specimen tested with wind loading above class 5, classified E_{xxxx}- where xxxx is the actual test pressure P1

Table 2 – Classification of wind load

- b. Relative frontal deflection of the most deforming framing member of the specimen measured at test pressure P1 shall be classified as below,

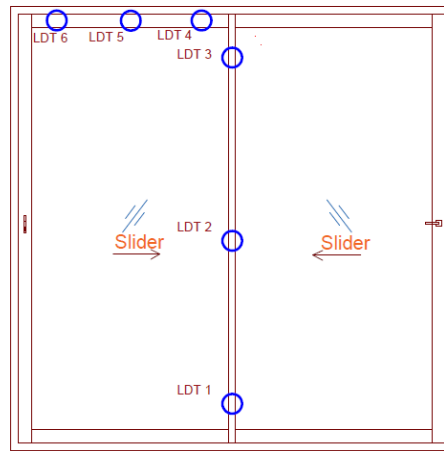
Class	Relative frontal deflection
A	< 1/150
B	< 1/200
C	< 1/300

Table 3 – Classification of relative frontal deflection

- c. Wind loads and relative frontal deflection shall be combined into one overall classification as indicated below,

Wind load class	Relative frontal deflection		
	A	B	C
1	A1	B1	C1
2	A2	B2	C2
3	A3	B3	C3
4	A4	B4	C4

5	A5	B5	C5
E _{xxxx}	A E _{xxxx}	B E _{xxxx}	C E _{xxxx}
E ₂₂₀₀	A E ₂₂₀₀	B E ₂₂₀₀	C E ₂₂₀₀
Note: In the resistance to wind load classification the number refers to the wind load class, see Table 2 and the letter to the relative frontal deflection, see Table 3			

Table 4 – Resistance to wind load - ClassificationEquipment setup diagram

LDT Number	Location
1 – 2 – 3	Mullion
4 – 5 – 6	Transom

8. TESTING EQUIPMENT

Equipment used for the test as enumerated below which requires calibration are all covered by valid calibration certificates.

- a. A 3-phase high pressure centrifugal blower with speed controller and damper to control the pressure within the chamber. This will be connected to the chamber via a transition piece and 5 meters of 15 cm diameter flexible duct. Speed is controlled by varying the frequency in steps of 0.1 Hz at the controller and by a remote knob control.
- b. Orifice plates for measurement of air flow.
- c. Data acquisition electronic equipment. Consists of 3 electronic manometers, 7 displacement transducers and software to read data, all are integrated into the excel sheet forms included herein.
- d. Others (as necessary for the test to be applied, to be filled-in in a particular testing project.)

	Name	Signature	Date
MS Prepared by	Swaminathan		06/July/2023
Reviewed and Authorized by	Reji Bhami		06/July/2023
Client's Approval			

9. ANNEX

(to be attached on final report)

-End of Method Statement-

GEALAN Private Limited, 10th Floor, RMZ Latitude Commercial,
Bellary Road, Hebbal, Bengaluru, KA-560024
contact@gealan.in | www.gealan.in
Toll Free: 1800 309 2526

