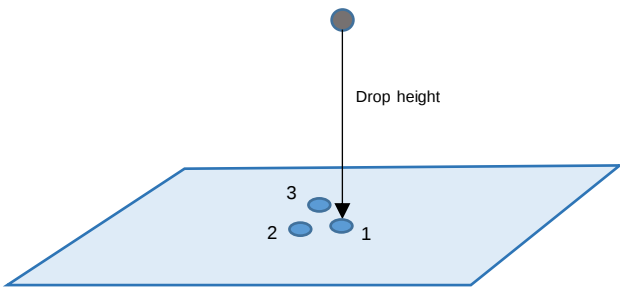


Test report no.: <i>Testrapport nr.:</i>	89224672-30	Order No.: <i>Opdracht nr.:</i>	89224672 24.A160	Page 1 of 6 Pagina 1 van 6
Client Reference No.: <i>Klantreferentie nr.:</i>	-	Order date: <i>Opdrachtdatum:</i>	2024-07-22	
Client: <i>Klant:</i>	Garware Hi Tech Films Limited Naigaon, P.O. Waluj, Aurangabad – 431 133, Maharashtra, India.			
Test item: <i>Testvoorwerp:</i>	4mm Glass+ 8mil Solar Safety Film			
Identification/ Type No.: <i>Benaming / Type nr.:</i>	4mm Glass+ 8mil Solar Safety Film			
Order content: <i>Inhoud opdracht:</i>	Classification testing hard body impact			
Test specification: <i>Testomschrijving:</i>	EN 356:1999 Glass in building - Security glazing ^a Testing and classification of resistance against manual attack <i>Resistance to hard body impact</i>			
Date of sample receipt: <i>Ontvangstdatum monster:</i>	2024-08-01			
Test sample No: <i>Testproefstuk nr.:</i>	4 pieces			
Testing period: <i>Testperiode:</i>	2024-11-26 - 2024-11-26			
Place of testing: <i>Testlocatie:</i>	Arnhem, the Netherlands			
Testing laboratory: <i>Testlaboratorium:</i>	TÜV Rheinland Nederland NoBo 0336			
Test result*: <i>Testresultaat*:</i>	Pass			
tested by: <i>getest door:</i>	X 	authorized by: <i>geautoriseerd door:</i>	X 	
Date: 2025-01-21 <i>Datum:</i>	Ondertekend door: Salah El Bardai	Issue Date: 2025-01-21 <i>Datum uitgave:</i>	Signed by: Sef Hovens	
Position / functie:	Expert	Position / functie:	Expert	
Others / <i>Andere:</i>	Category of resistance: P1A Code designation: EN 356 P1A			
Condition of the test item at delivery: <i>Toestand van het test voorwerp bij ontvangst:</i>	Test item complete and undamaged			
* Legend:	P(ass) = passed a.m. test specification(s)	F(ail) = failed a.m. test specification(s)	N/A = not applicable	N/T = not tested
* Legenda:	P(ass) = voldoet aan test omschrijving	F(ail) = voldoet niet aan test omschrijving	N/A = niet van toepassing	N/T = niet getest
This test report only 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 test mark. <i>Dit testrapport heeft alleen betrekking op het voorgenoemde test voorwerp. Zonder toestemming van het testcentrum mag dit testrapport niet in delen worden vermenigvuldigd. Dit keuringsrapport geeft geen recht op het dragen van enig keurmerk.</i>				

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Remarks
Opmerkingen

1	The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. The decision rule for statements of conformity in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance to and ILAC-G8:09/2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account. <i>De apparatuur die tijdens de gespecificeerde testperiode is gebruikt, is gekalibreerd volgens ons testlaboratoriumkalibratieprogramma. De apparatuur voldoet aan de eisen die zijn opgenomen in de relevante normen. De traceerbaarheid van de gebruikte testapparatuur wordt gewaarborgd door naleving van de voorschriften van ons managementsysteem. De beslissing voor conformiteitsverklaringen in dit testrapport is gebaseerd op de "Zero Guard Band Rule" en "Simple Acceptance" in overeenstemming met en ILAC -G8:09/2019 en IEC Guide 115:2021, tenzij anders aangegeven in de toegepaste norm vermeld op pagina 1 van dit rapport of aangevraagd door de klant. Dit betekent dat er geen rekening wordt gehouden met de meetonzekerheid.</i>
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3	Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report. Tests clauses marked with ^a are performed under ISO 17025 accreditation. Deviations of testing specification(s), test locations or customer requirements are listed in specific test clause in the report. This report is only to be read as a whole. No opinions or interpretation are included in this report. This test report consists of multiple pages and is only to be read as a whole. The number of pages can be seen in the header on the top right of each page, the report ends when the last page is reached. TÜV Rheinland Nederland B.V. is solely responsible for the content. <i>Test onderdelen welke met * zijn gemarkeerd zijn uitbesteed aan gekwalificeerde onderaannemers en zijn beschreven in het respectievelijke test onderdeel van dit rapport. Test onderdelen welke met ^a zijn gemarkeerd zijn onder ISO 17025 accreditatie uitgevoerd. Afwijkingen van testspecificatie(s), testlocaties of klant eisen zijn vermeld in het van toepassing zijnde onderdeel in het rapport. Het rapport dient als geheel te worden gelezen. Er zijn geen opinies en interpretaties opgenomen binnen het rapport. Dit rapport bestaat uit meerdere pagina's en dient al geheel gelezen te worden. Het aantal pagina's is rechtsboven in de koptekst van dit rapport vermeld en eindigt wanneer de laatste pagina is bereikt. TÜV Rheinland Nederland is als enige verantwoordelijk voor de inhoud van het rapport.</i>
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Clause Deel	Product description Productomschrijving
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1	Product details: <i>Product details:</i>	Name of the manufacturer : Garware Hi Tech Films Limited Address of the manufacturer : Naigaon, P.O. Waluj, Aurangabad – 431 133, Maharashtra, India. Production plant of the samples : - Line ID where the samples are made : - Production date : - Sampling date : - The product was marked as : 4 mm Glass + 8mil Solar Safety Film Kind of glass : Clear float glass Nominal thickness : 4.1 mm Composition : 4 mm float + 8mil Solar Safety Film
2	Other: <i>Andere:</i>	Test sample(s), as well sample information, description, product details and intended usage was provided by customer.
3	Test sample obtaining: <i>Selectie van het proefstuk:</i>	☒ Sending by customer ☐ Sampling by TÜV Rheinland Group ☐ Others:
4	Number of test items Aantal proefstukken	4
5	Picture of sample	

Picture 1.



Picture 2.



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Clause Deel	Requirements – Tests Vereisten - Tests				
6	Scope	EN 356 specifies requirements and test methods for security glazing designed to resist actions of force by delaying access of objects and/or persons to a protected space for a short period of time. The standard classifies security glazing products into categories of resistance to actions of force.			
7	Requirement	Resistance to hard body impact The security glazing product shall be classified in that particular category of resistance if all three test pieces prevent penetration by the impacting body when tested by the method described in clause 8 of the standard.			
8	Classification	Category of resistance	Drop height (mm)	Total number of strikes	Code designation for category of resistance
		P1A	1500 ± 50	3 in a triangle	EN 356 P1A
		P2A	3000 ± 50	3 in a triangle	EN 356 P2A
		P3A	6000 ± 50	3 in a triangle	EN 356 P3A
		P4A	9000 ± 50	3 in a triangle	EN 356 P4A
		P5A	9000 ± 50	3 times 3 in a triangle	EN 356 P5A
9	Test method	Clause 8 EN356. Test method for drop test: The test piece shall be placed horizontally into the clamping frame of the test piece support apparatus and fixed in accordance with the requirements of clause 6.1.3. of this standard. The drop height (measured from the bottom of the impactor to the surface of the test piece) shall be adjusted according to table 1 for the category of resistance tested. For categories P1A, P2A, P3A and P4A, the impactor (a steel ball of 4,11 ± 0,06 kg) shall be dropped on to each test piece three times from the same height, in such a way that the impacted positions form the pattern of an equilateral triangle with a side length of (130 ± 20) mm around the geometric centre of the test piece, with one side of the triangle parallel to a short side of the specimen. The impact position opposite to this side of the triangle shall be hit first. For category P5A, the above procedure shall be repeated a total of three times on each test piece, giving nine impacts, three on each point of the triangle. Loose fragments shall be removed from the test piece after each impact. The test temperature shall be (23 ± 2) °C.			
10	Measurement uncertainty	Caused by the destructive nature of the test and pass/fail result no measurement uncertainty can be determined. Based on the validation of the test procedure, measurement set-up and the associated parts (steel ball / drop height, etc.) there is a presumption of conformity established which is approved with ISO 17025 accreditation.			

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Clause Deel	Requirements – Tests <i>Vereisten - Tests</i>
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11	Resistance to Hard Body Impact				
	Composition (from the attack side)		4 mm Glass + 8mil Solar Safety Film		
	Asymmetrical yes/no		Yes		
	Attack face?		As marked by the manufacturer - Glass side		
	Dimensions [mm]		900 x 1100		
	Nominal thickness [mm]		4.1		
	Clamping < (140 ± 20) N/mm² ? yes/no		Yes		
	Drop height [mm]		1500		
	Number of strikes		3 in a triangle		
	Test piece	Position	1	2	3
	Repetition 1	1	No Breakage	Breakage, no penetration	No Breakage
		2	Breakage, no penetration	Breakage, no penetration	No Breakage
		3	Breakage, no penetration	Breakage, no penetration	Breakage, no penetration
	Test result		Pass	Pass	Pass
	Penetration within 5 seconds since the time of impact ? yes/no		No	No	No
Slippage of test piece > 5mm ? yes/no		No	No	No	

12	Classification based on test results EN 356:1999, Clause 10.1 Drop test	
	The security glazing product is classified in that category of resistance corresponding to the applied drop height and number of impacts, provided that all three test pieces have resisted penetration by the impactor.	
	Security glazing product with (trade)name: 4 mm Glass + 8mil Solar Safety Film Composition: 4 mm Glass + 8mil Solar Safety Film Category of resistance: P1A Code of designation: P1A	Pass ☒ Fail ☐ Not applicable ☐
13	Remarks	
	<i>When and if changes are made in production method and/or equipment, assessment according to this standard shall be reconsidered and re-tests shall be performed when the changes can lead to different specifications of the glass. The decision and responsibility lies at the manufacturer.</i> <i>If no reference of the product description was supplied by the manufacturer, than that document shall be added to this test report by the manufacturer. It was to the manufacturer's responsibility that the samples delivered for initial type test are representative to the production and deviations from perfection were included in the delivered test samples.</i>	

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Photo documentation
Foto documentatie

Picture sample 1 after drop 2



Picture sample 1 after drop 3



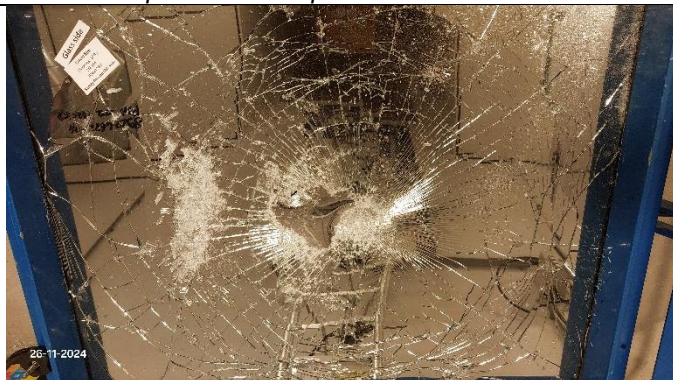
Picture sample 2 after drop 1



Picture sample 2 after drop 2



Picture sample 2 after drop 3



Picture sample 3 after drop 3

