TEST REPORT
HINGE SCREWED TO WINDOW FRAME
TENSILE AND SHEAR STRENGTH

PETITIONER *Applicant*	**INDRESMAT, SL** **Ctra. Del Mig 75.** **08907- Hospitalet de Llobregat. Barcelona.**
MANUFACTURER(1) *Manufacturer*	**INDRESMAT, SL**
PRODUCT *Product*	**Hinge screwed to window frame**
MODEL(1) *Model*	**Frame profile: KLIMA-PUR**
DIMENSIONS(1) *Dimensions*	**70 x 65 x 1200 mm (profile section)**
REHEARSAL DATE *Date of tests*	**August 31, 2023**
ISSUE DATE *Date of issue*	**01.09.2023**

Test Standard:
Ensatec's internal procedure

Section and/or photographic:

RESULTS
Results

Tensile strength

No.	***1***	***2***	***3***	***4***	***5***	***6***	***Average value***
Load, kg	491.7	484.6	540.7	487.2	495.2	521.5	503.5

Shear strength

No.	***1***	***2***	***3***	***4***	***5***	***6***	***Average value***
Load, kg	1042.2	1197.3	1066.2	1193.0	1048.7	1177.6	1120.8

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1 BACKGROUND AND PURPOSE.

This report has been prepared at the request of**INDRESMAT, SL**at the ENSATEC facilities, located at Avda. Lentiscares, 4-6 in Navarrete (La Rioja), in order to determine the mechanical characteristics of traction and shear of the following construction element:

- **Hinge screwed to polyurethane window frame**
  Frame profile model:**KLIMA-PUR**

2 EQUIPMENT AND MEDIA USED.

The following equipment was used to carry out the tests.

- Press with 20 kN load cell and tooling
- Environmental conditions conditioning room
- Tape measure
- Thermohygrometer

3 DEVELOPMENT

The client supplies the laboratory with two samples of polyurethane window frames, each with six hinges screwed onto it. One sample is used in the tensile strength test, and the other in the shear strength test. The hinges are secured to the profile using four countersunk lag screws measuring 4 x 45 mm in diameter.

The base profile is made of polyurethane foam (PUR).

The purpose of the test is to determine the tensile and shear characteristics of the hinges with respect to the polyurethane frame profile.

The samples are placed in the press using the appropriate tooling, in order to simulate the stresses produced by the weight of the window leaves on the frame.*(see photographic documentation).*

For the tensile test, the sample is fixed horizontally to the press and the pull-off load is applied by means of a pin inserted in the hinge.

For the shear strength test, the sample is fixed vertically to the press and a direct and constant load is applied to the hinge until it moves relative to the profile.

4 SAMPLE CHARACTERISTICS.

Definition of the test sample	
Description	Hinge screwed to polyurethane window profile
Laboratory reference	MV75857
Data provided by the client	
Manufacturer	Profile: INDRESMAT, SL Hinge: ROTO FRANK SA
Model (profile)	KLIMA-PUR
Material	Frame profile: Polyurethane foam. Hinge: Zamak
Delivery date	July 21, 2023
Analysis date	01.09.2023
Dimensions, width x height (mm)	Frame profile (section): 70 x 65 mm. Hinge: 88 x 17 x 17 mm
Fixation	Countersunk lag screw Ø 4 x 45 mm (4 units per hinge)

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5 RESULTS

Test parameters	
Speed increase	5 (kg/s)
Environmental conditions	22.6 °C / 47 %
Laboratory reference	MV75857
Rehearsal date	August 31, 2023

TENSILE STRENGTH			
No.	Max strength kg	Deformation maximum, mm	Fracture form(1)
1	491.7	6.81	Hinge breakage at screw hole
2	484.6	6.41	Hinge coming off the profile
3	540.7	6.31	Hinge breakage at screw hole
4	487.2	6.10	Hinge breakage at screw hole
5	495.2	6.70	Hinge coming off the profile
6	521.5	6.17	Hinge breakage at screw hole
Average value	503.5	6.42	-

Remarks: The table reflects the maximum load values and deformation reached during the Test. Given the structure of the polyurethane profile, failure due to collapse does not occur, so the values shown in the graph must be observed to assess the results.

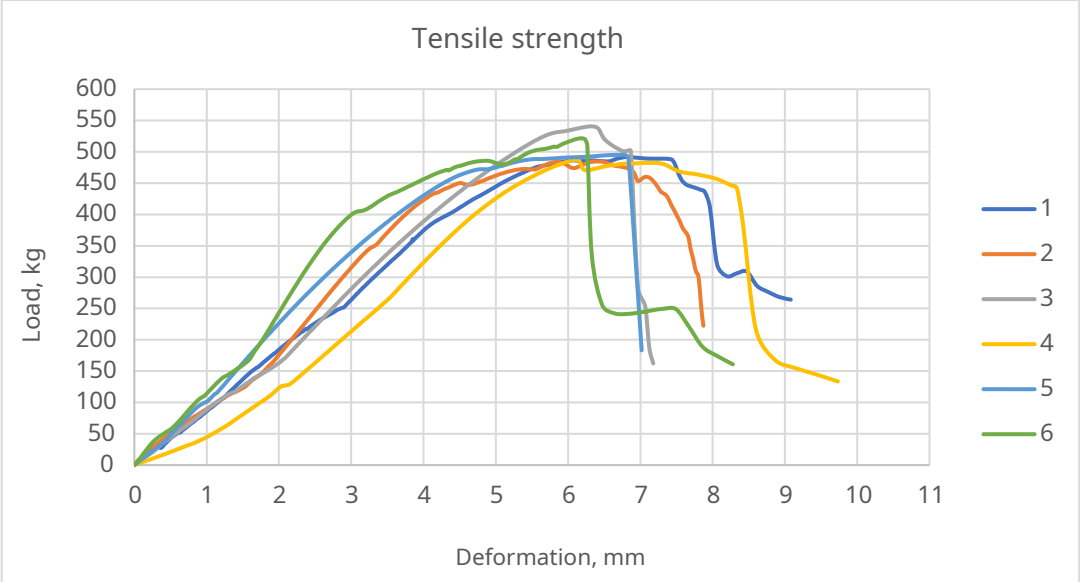

Fig. 1 Load/deformation graph

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SHEAR STRENGTH			
No.	Max strength kg	Deformation maximum, mm	Fracture form(1)
1	1042.2	9.25	Tear in the polyurethane structure
2	1197.3	9.45	Tear in the polyurethane structure
3	1066.2	8.14	Tear in the polyurethane structure
4	1193.0	9.18	Tear in the polyurethane structure
5	1048.7	8.75	Tear in the polyurethane structure
6	1177.6	8.55	Tear in the polyurethane structure
Average value	1120.8	8.89	-

Observations: In samples 2, 3, 4, 5 and 6, the upper guide bolt of the hinge breaks.
The table shows the maximum load and deformation values reached during the test. Given the structure of the polyurethane foam profile, failure due to collapse does not occur, so the values shown in the graph must be observed to evaluate the results.

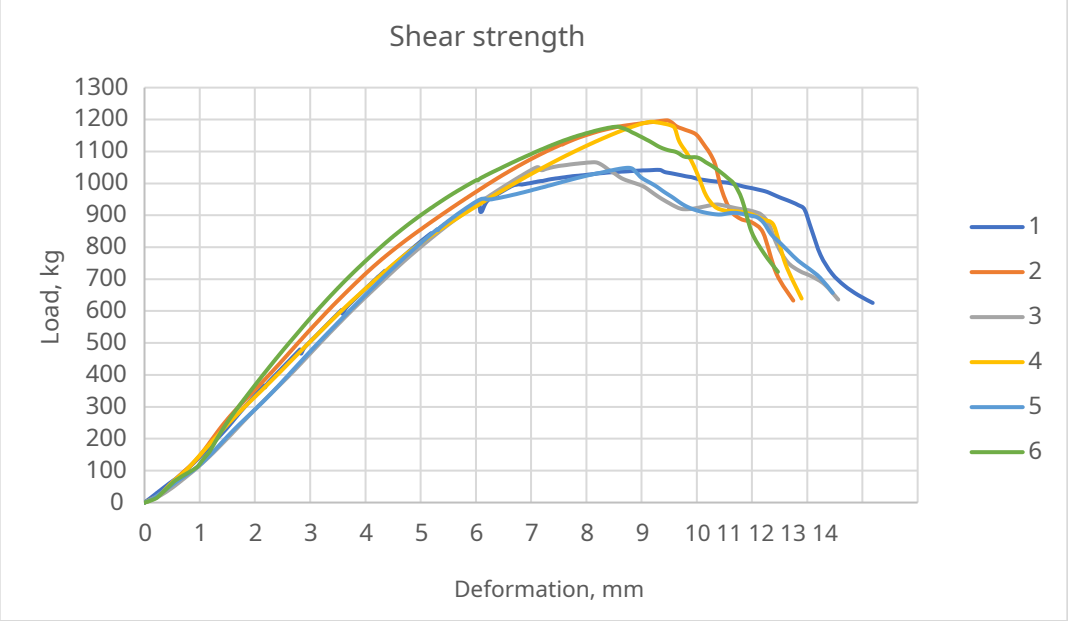

Fig. 2 Load/deformation graph

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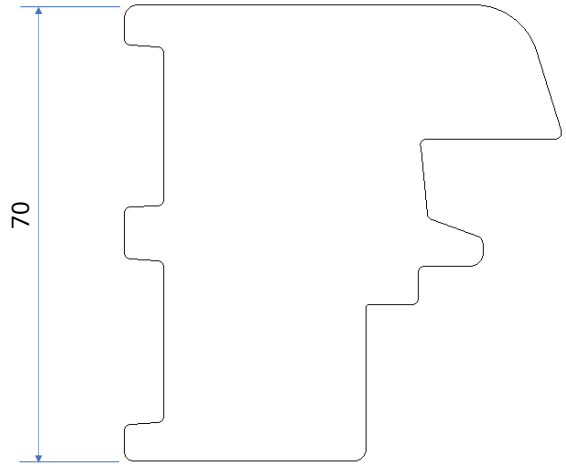
6 DOCUMENTATION PROVIDED BY THE CLIENT

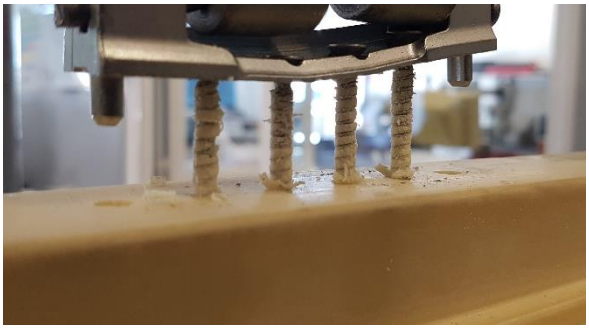


Frame profile

7 PHOTOGRAPHIC DOCUMENTATION

Detail of the sample supplied

Lag screw Ø 4 x 45 mm



Pull-off tensile test

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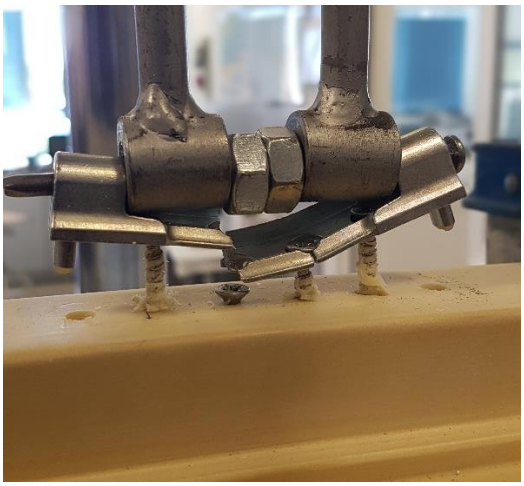





Shear test with tearing and breakage of the guide pin

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