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Report No. 37019301

TEST REPORT

This report contains:
3 pages of text
5 tables
5 graphs
8 sketches

Company

Sotralentz, F-67320 Drulingen

Client: KPE/A - F 206,
Herr Willing

Product

Lupolen® 5261 Z Black

Summary/Description of task

Testing of jetty floats under realistic conditions

This report describes the mechanical testing of blow-moulded floats made from Lupolen 5261 Z. The floats, which measure 690 mm x 690 mm x 400 mm, were subjected to various realistic compressive, shock and tensile loads.

The floats passed the test criteria in all respects.

Keywords/Distribution

PE-HD - Float, floating jetty - 1.14 -
2.2.1 - 4.3 - 5.2.1

KPE/A - F 206,
Herr Willing (5x)

KTE/WM - F 206

Note

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Task

The floats are made from blow-moulded Lupolen 5261 Z Black. Fastening "eyes" at the corners of each float are used to fasten them together to build floating jetties for mooring boats etc.

Single floats were subjected to various compressive, shock and tensile loads to investigate how they behave in practice.

The following were provided for the test:

- 12 floats made from Lupolen 5261 Z Black
- 1 float fastening pin made from Lupolen 5261 Z Black

Test procedure and results

Weight of float

The average weight of the 12 floats was found to be 11060 ± 90 gram.

Mechanical tests

- a) **Compressive loading in a test press at 23 °C**
(see figures 2 and 3)

In real life, the floating jetty is subjected to compressive loads when driven over. The floats were subjected to controlled compressive loading in a test press. Each was placed on its base, with the pressure plate of the press in contact with the float's upper surface. Two sizes of pressure plate were used, measuring 400 mm and 650 mm in diameter. The loading speed was 10 mm/min.

All the parts withstood the loads they were subjected to without suffering any damage. Tables 1 & 2 and diagrams 1 & 2 show the deformation that occurred for the different loads.

- b) **Shock loading at 23 °C**
(see figures 4 and 5)

The shock loads were applied using a falling weight. A single float was placed on its base on a level surface and a 150 kg mass dropped onto its upper surface from a height of 150 cm. The impact surface of the weight had a diameter of 180 mm. The weight was dropped onto the float 4 more times (total of 5 drops). A second float was tested in the same way. Both floats withstood this type of loading without suffering damage.

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c) **Tensile loads at the fastening eyes at 23 °C**
(see figures 6, 7 & 8)

The strength and deformation behaviour of the fastening eyes were investigated by applying tensile stresses separately in each of three directions:

- i) along a diagonal in the horizontal plane
- ii) along one side of the float in the horizontal plane
- iii) along a diagonal, inclined to the horizontal plane

Tensile loads were applied with a universal tensile testing machine. The speed of loading was 10 mm/min. It was only possible to test sections of the float as they were too large for testing machine.

The overall deformation (consisting of an elongation of the eye, change in the direction of the fastening tether, bulging of the corner surfaces) was recorded at each of the applied stresses and at 5 minutes thereafter. The results are given in tables 3-5 and diagrams 3-5. There was no evidence of damage to the floats as a result of these stresses.

In one case, in which the fastening eye was taken beyond its breaking point, maximum loads of 22.80-22.98 kN were recorded.


Romberg



Compressive loading

Speed of loading $V = 10 \text{ mm/min}$

a) load applied with 400 mm diameter plate

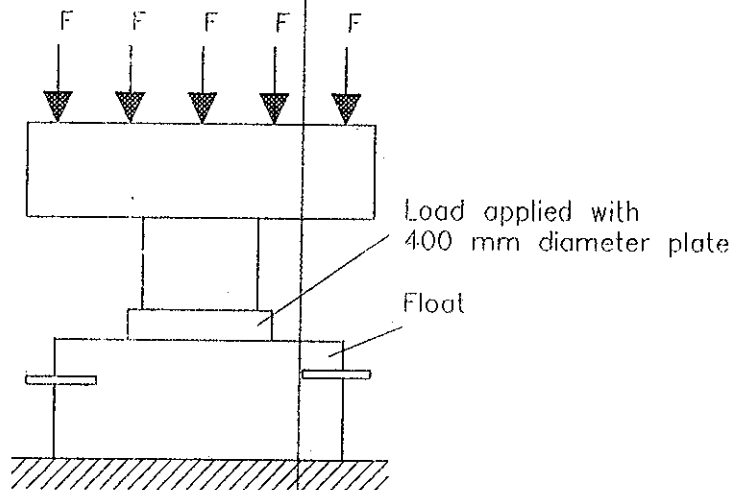
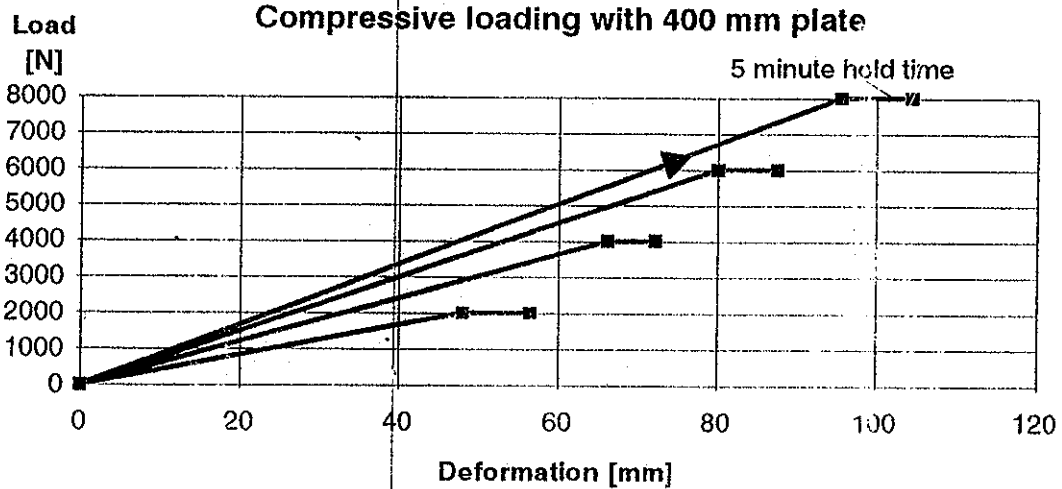


Table 1

Float [Nr.]	Load [N]	Deformation [mm]	
		at maximum load	after 5 mins.
1	2000	48.0	56.5
2	4000	66.0	72.0
3	6000	80.0	87.5
4	8000	95.5	104.5

Float made from Lupolen 5261 Z Black Compressive loading with 400 mm plate



Compressive loading

Speed of loading $V = 10 \text{ mm/min}$

b) Load applied with 650 mm diameter plate

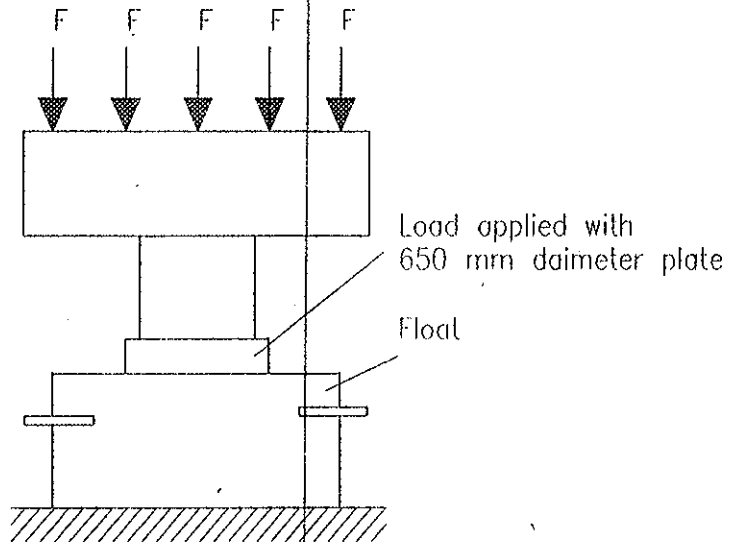


Table 2

Float [Nr.]	Load [N]	Deformation	
		at maximum load	after 5 mins.
1	2000	18.5	21.5
2	4000	32.0	34.0
3	6000	39.0	44.0
4	8000	44.0	49.5

Float made from Lupolen 5261 Z Black Compressive loading with 650 mm plate

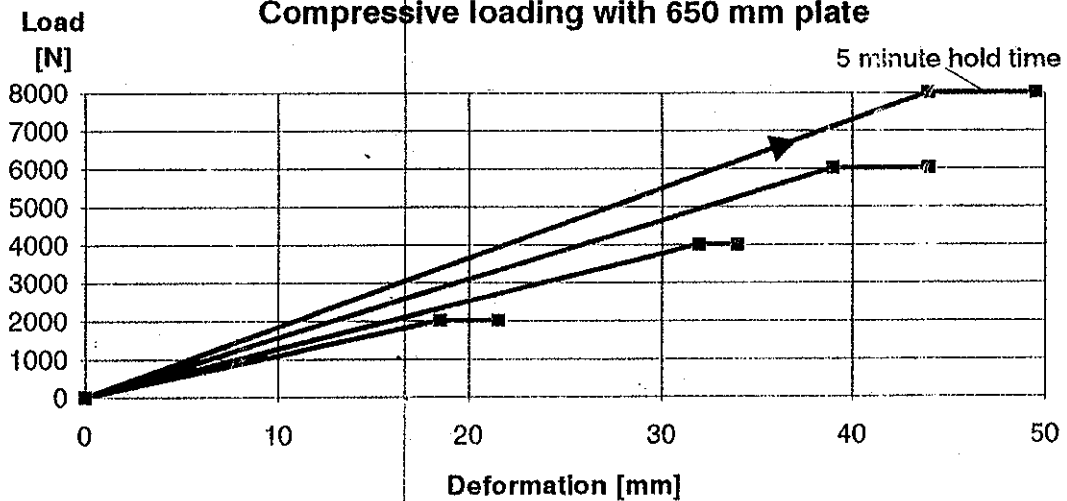


Diagram 2

Tensile test on the fastening eye

Speed of loading $V = 10 \text{ mm/min}$

b) Load directed along one side in the horizontal plane

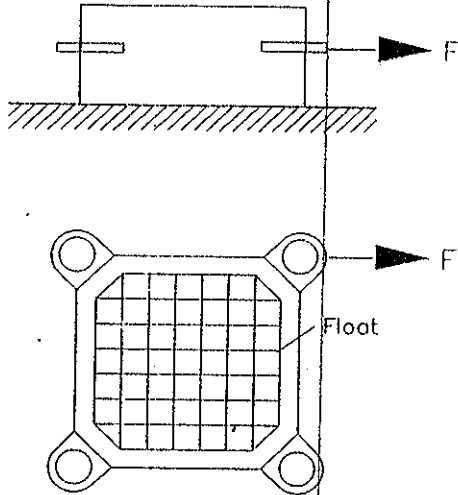
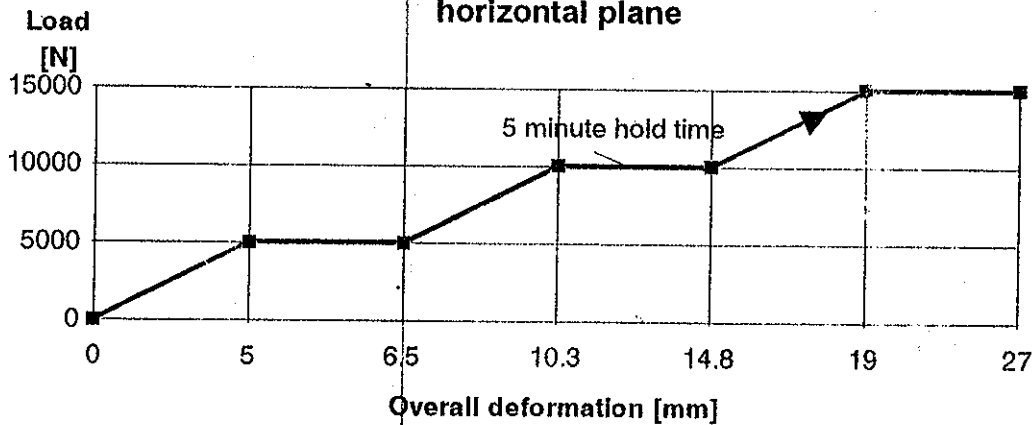


Table 4: Average overall deformation (three flats tested - see fig. 7)

Load step [Nr.]	Load [N]	Overall deformation [mm]	
		during loading	after 5 mins.
1	5000	5.0	6.5
2	10000	10.3	14.8
3	15000	19.0	27.0

Float made from Lupolen 5261 Z Black
Tensile load on eye directed along one side in
horizontal plane



Tensile test on the fastening eye

Speed of loading $V = 10 \text{ mm/min}$

a) Load directed along diagonal in horizontal plane (average deformation of three floats)

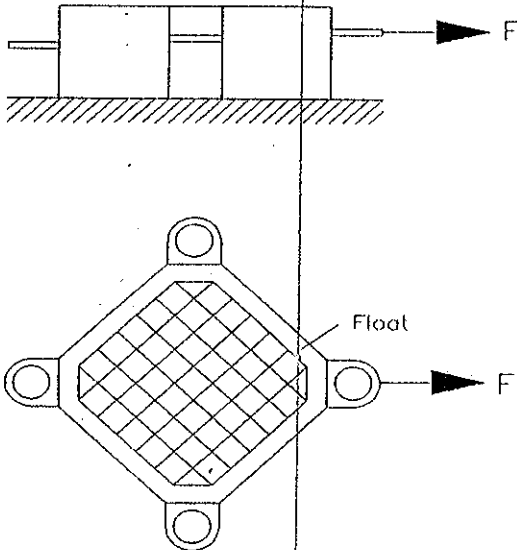
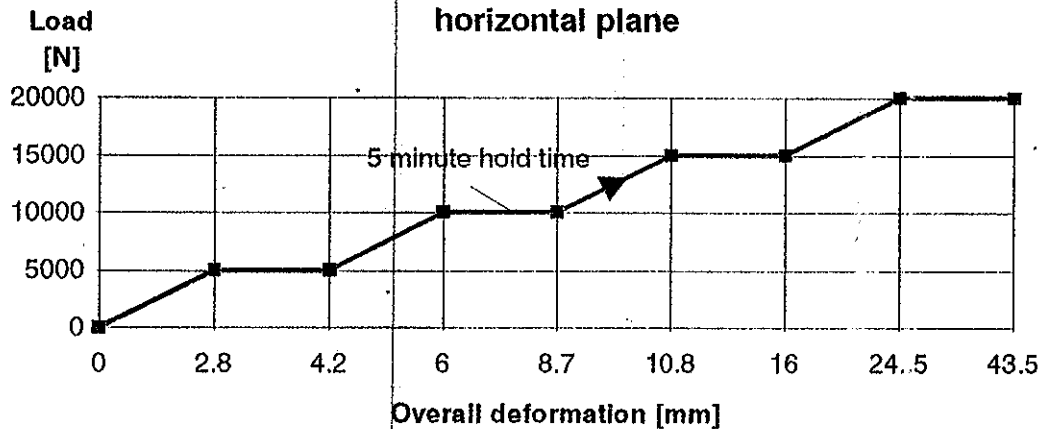


Table 3: Average overall deformation (three floats tested - see fig. 6)

Load step [Nr.]	Load [N]	Overall deformation [mm]	
		during loading	after 5 mins.
1	5000	2.8	4.2
2	10000	6.0	8.7
3	15000	10.8	16.0
4	20000	24.5	43.5

Float made from Lupolen 5261 Z Black
Tensile load on eye directed along diagonal in
horizontal plane



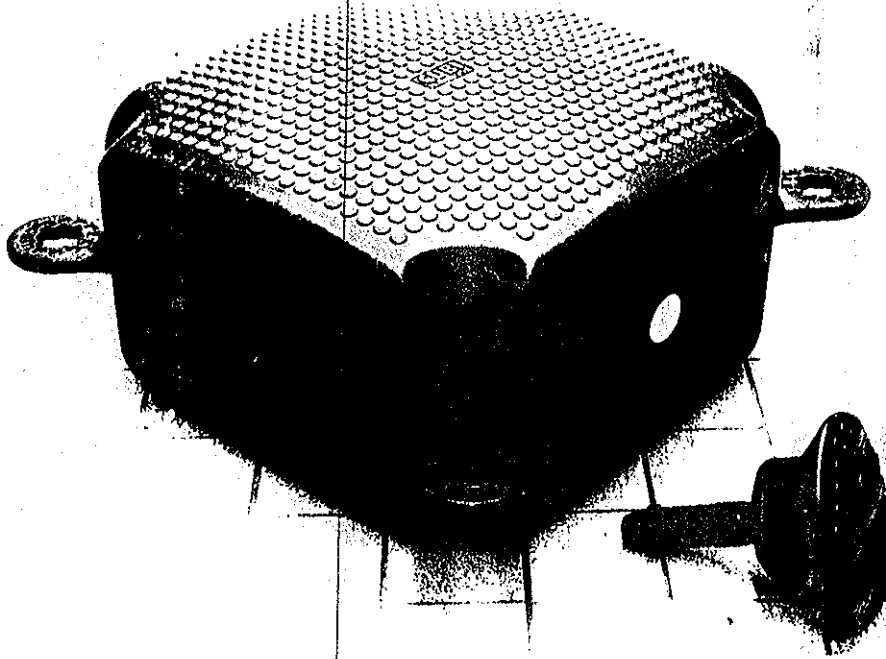


Fig. 1: Float made from Lupolen 5261 Z Black

Tensile test on the fastening eye

Speed of loading $V = 10 \text{ mm/min}$

c) Load directed along diagonal inclined to the horizontal plane
(average deformation of three floats)

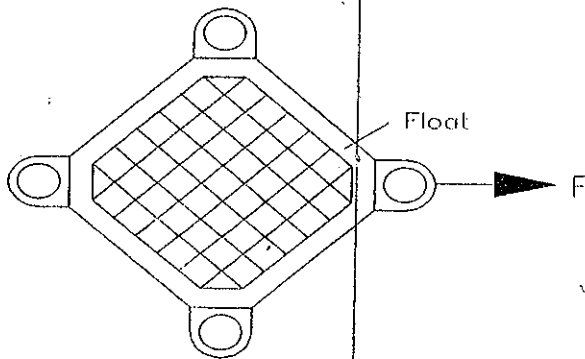
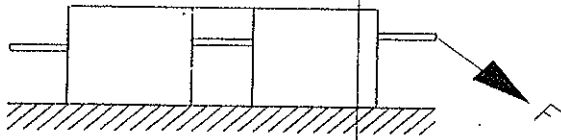
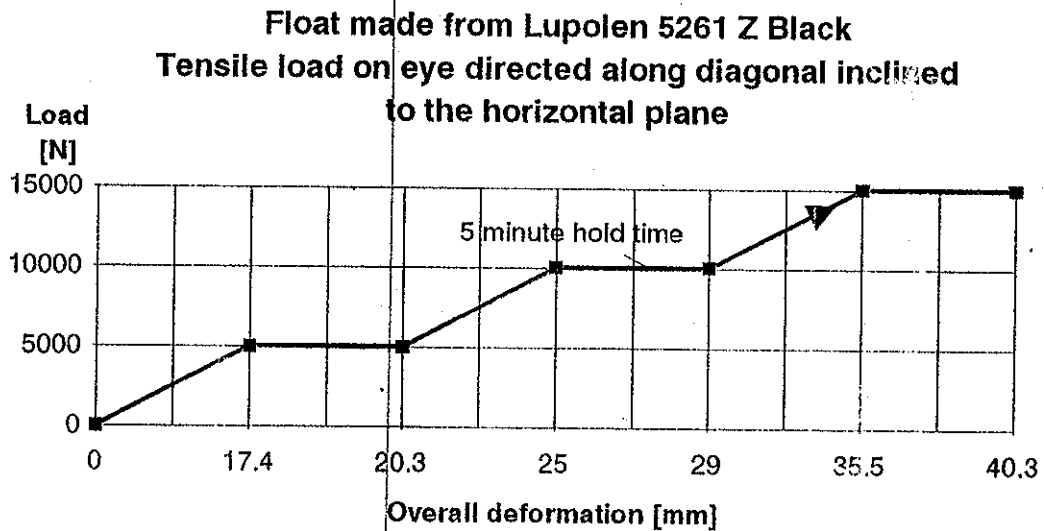


Table 5: Average overall deformation (three floats tested - see fig. 8)

Load step [Nr.]	Load [N]	Overall deformation [mm]	
		during loading	after 5 mins.
1	5000	17.4	20.3
2	10000	25.0	29.0
3	15000	35.5	40.3



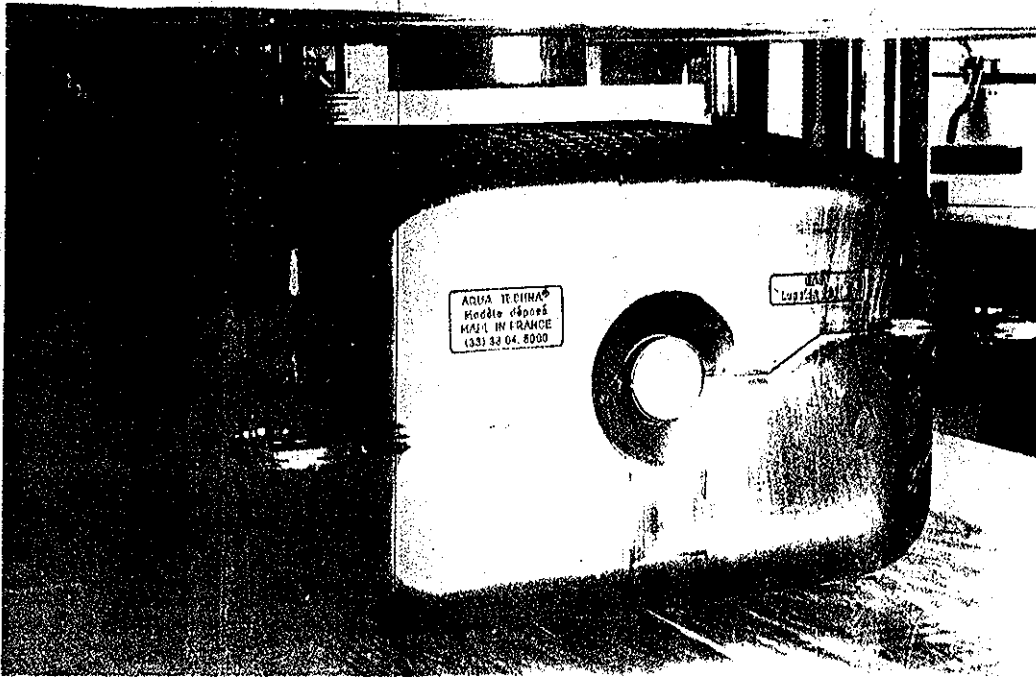


Fig. 2: Float made from Lupolen 5261 Z Black
Compressive loading with 400 mm plate

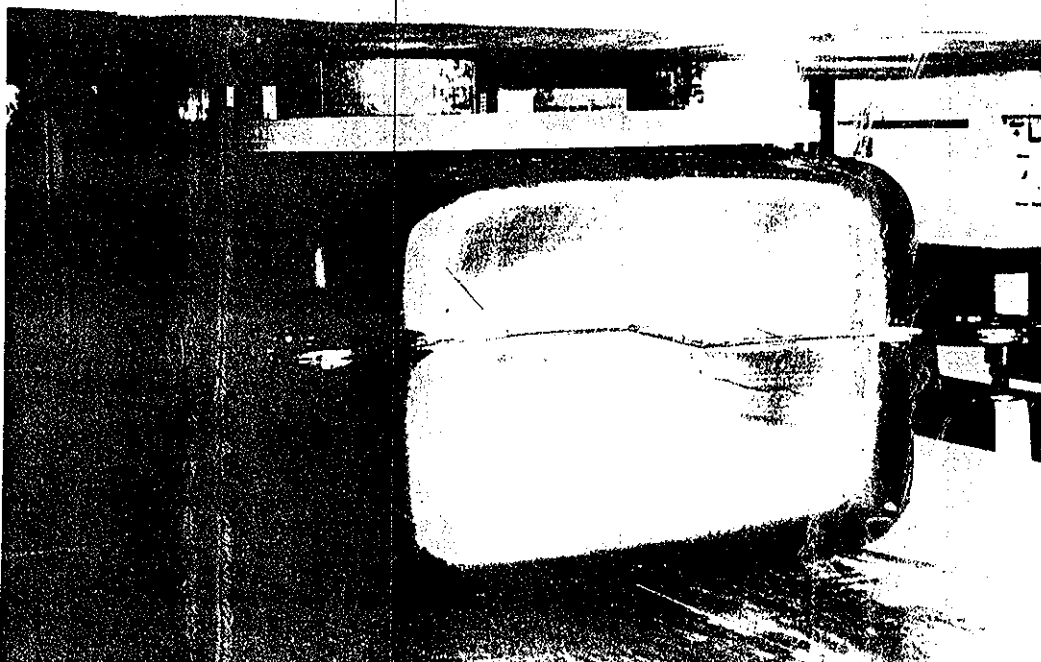


Fig. 3: Float made from Lupolen 5261 Z Black
Compressive loading with 650 mm plate

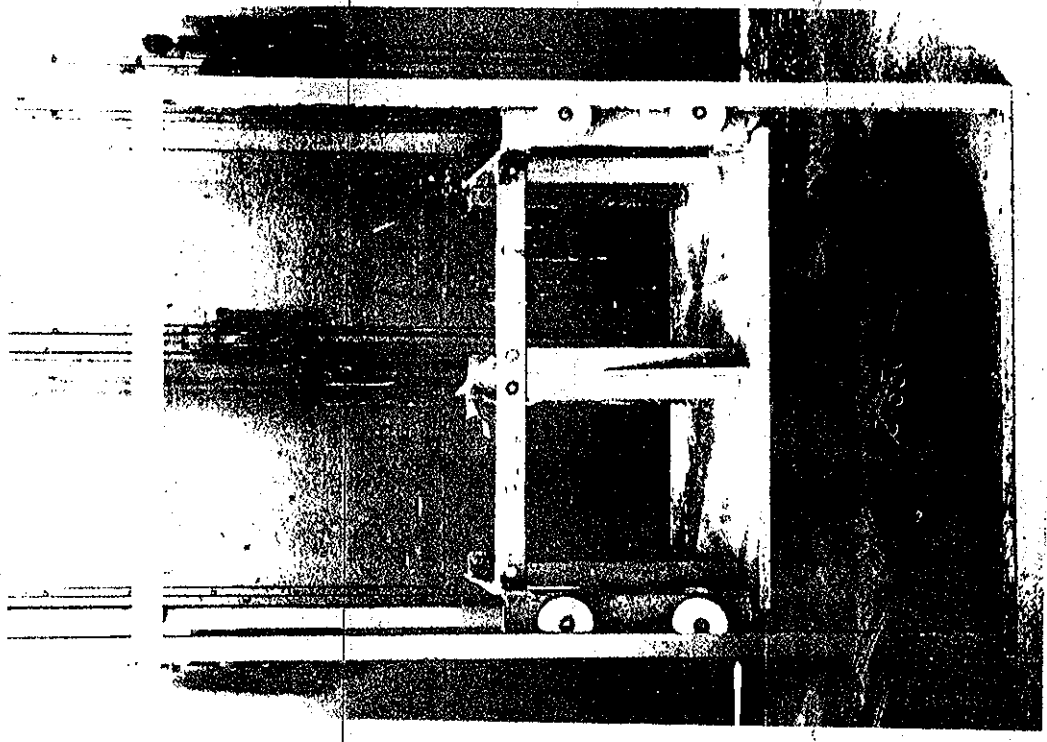


Fig. 5: Shock loading at 23 °C

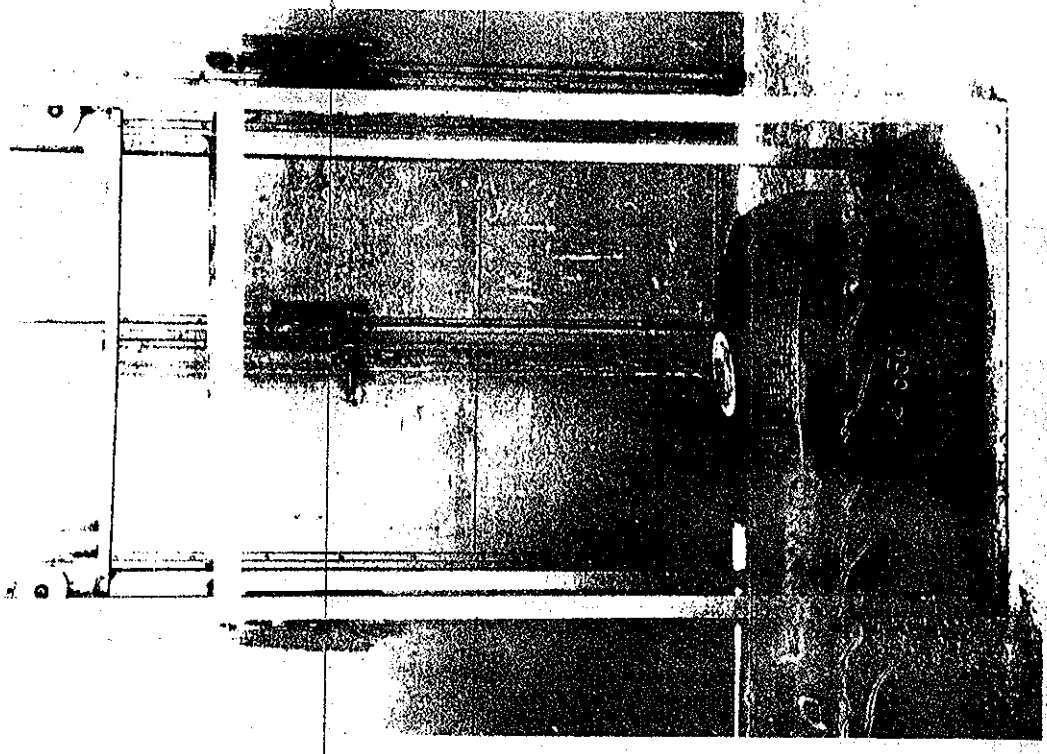


Fig. 4: Shock loading at 23 °C

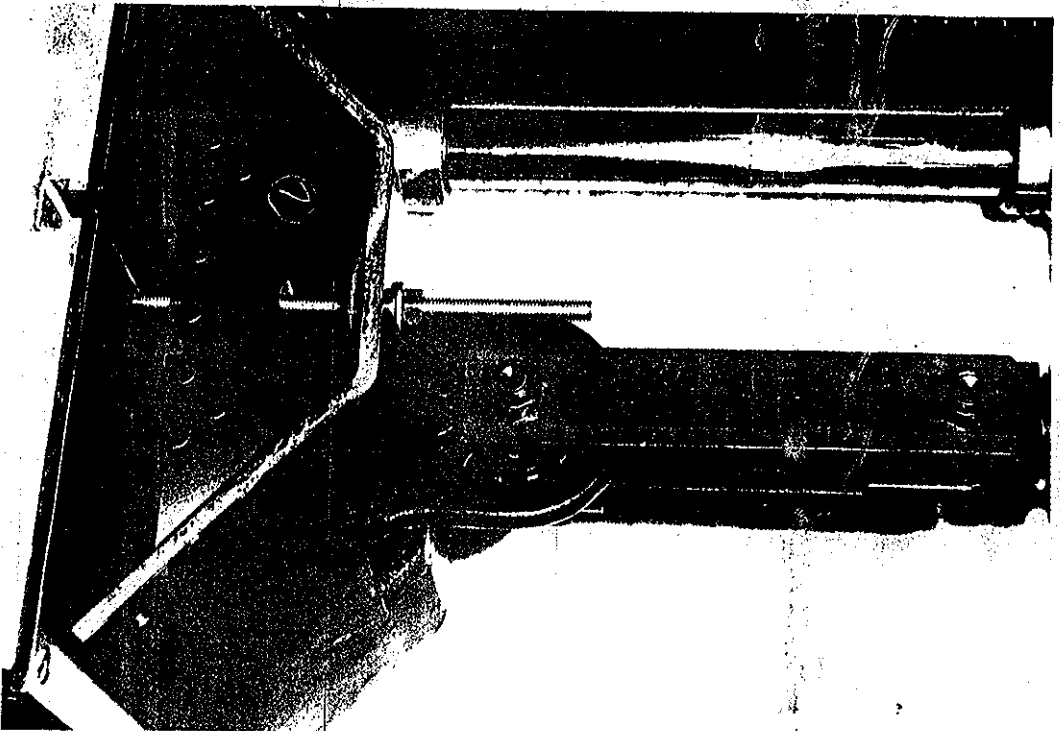


Fig. 6: Tensile loads at the fastening eyes at 23 °C

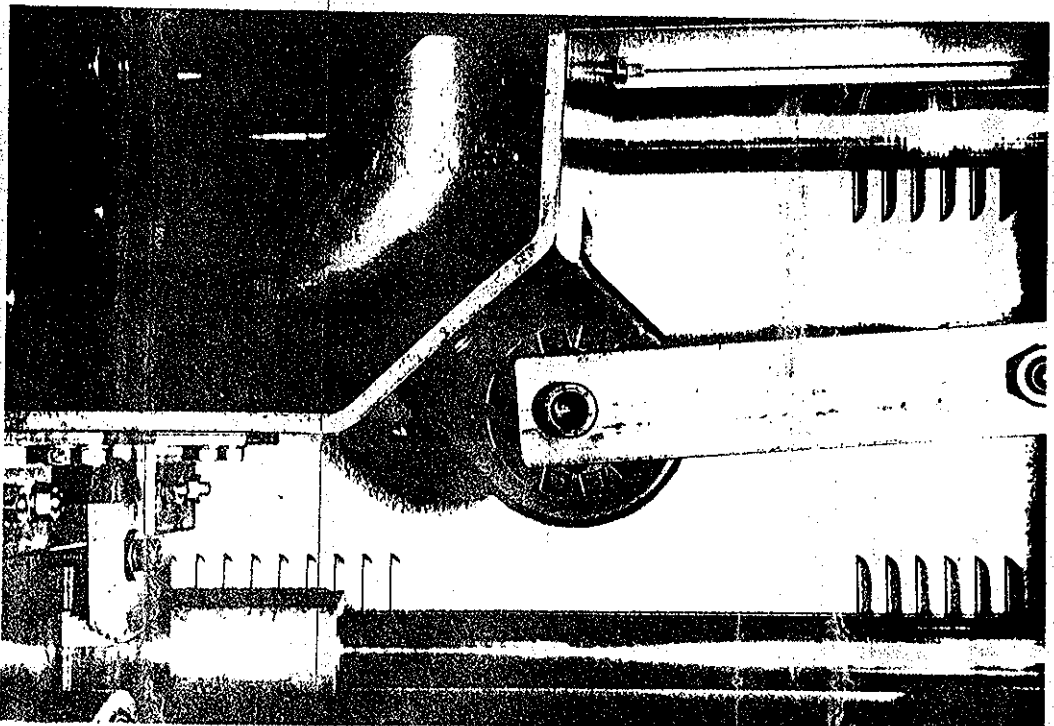


Fig. 7: Tensile loads at the fastening eyes at 23 °C

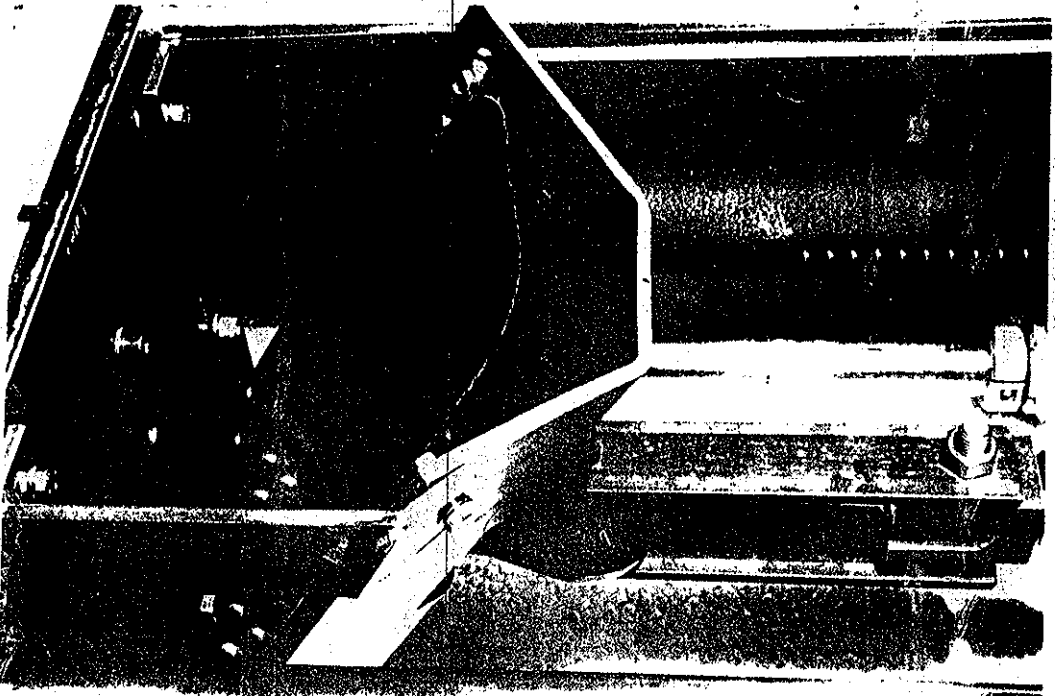


Fig. 8: Tensile loads at the fastening eyes at 23 °C