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## PRØVNINGSRAPPORT

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I5-848  
ID 970041

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*For:* ISOLAMIN AB  
S- 956 32 Överkalix  
Sverige

*testing of sandwich elements* comprising a core of mineral wool with a metal plate on each side has been performed on the terms mentioned overleaf. The elements are used for acoustic protection outdoors and the purpose of the test was to assess the influence of wethering on the performance of the elements as regards cohesion.

The testing has been performed as an accelerated ageing test followed by a tensile test. The ageing cycles were as agreed upon with the client comprising up to 1800 cycles of 1. high temperature, 2. spraying with water and 3 frost.

*the result of the tests were that* a rather moderate decrease of the tensile strenght as a function of the number of ageing cycles was found.

04.FEB.1997

Dato

Sagsansvarlig/Forskningschef

<u>Request:</u>	SBI has by ISOLAMIN AB been requested to perform an accelerated ageing test and a tensile test on sandwich panels intended for use as acoustic protection outdoors.
<u>Testing laboratory:</u>	Danish Building Research Institute Materials and Structures Division
<u>Responsible investigator</u>	Senior researcher, M.Sc. Erik Brandt
<u>Report identification</u>	I5-848 ID970041
<u>Client:</u>	ISOLAMIN AB S-956 32 Överkalix Sverige
<u>Purpose of the test:</u>	The purpose of the test was to investigate whether the gluing of the metal plates to the mineral wool was affected by the combined action of high temperatures, moisture and frost.
<u>Identification of test specimens</u>	The tested elements are made from a core of mineral-wool which has a metal plate glued on to both sides. There are two types of elements one with steel plates and one with aluminium plates. One of the metal plates on each element was perforated.
<u>Test specimens</u>	There were 21 specimens with steel plate and 17 with aluminium plate each measuring approximately 300 x 245 mm (glued area).
<u>Sampling:</u>	The test specimens were delivered ready to test from the client.

Test method:

Testing has been performed as an accelerated ageing comprising 1. high temperatures/UV-light, 2. spraying with water and 3. frost as agreed upon with the client. The time for each cycle was chosen to 4 hours. The cycles include:

Heating:	110 minutes	(75°C; 45 W/m <sup>2</sup> UVA, 4 W/m <sup>2</sup> UVB)
no heating	10 minutes	
Water spray	24 minutes	(52 l/m <sup>2</sup> h)
dripping off	6 minutes	
Frost:	89 minutes	(- 20 ± 5°)
thawing	1 minute	

The specimens were subjected to different numbers of exposure cycles ranging from 0 up to 1800. The perforated plate faced the "climate" during the test. Tensile testing was carried out on the specimens after the accelerated ageing.

Test equipment:

A) SBI's new weathering simulator, SBI # 3857, for accelerated ageing with control of temperature/UV-light, water spraying and frost. The control was set to the above weathering cycle.

B) MST Universal testing machine, SBI # 3978.

Description of testprocedure

The elements are exposed to a number of ageing cycles as described below. 7 test-specimens are used as references i.e. they are not exposed to ageing cycles. 7 specimens are exposed for 600 cycles, 2 for 900 cycles, 7 for 1200 cycles, 2 for 1500 cycles and the remaining 7 for 1800 cycles. After the ageing test the specimens are tensile tested to find the adhesion of the metalplates to the mineral wool. 6 specimen were not tensile tested but sent back to the client for his own examination.

Delivery:

The test specimens were delivered to SBI in november 1995.

Test period:

The testing has taken place in the period january 1996 - january 1997.

Deviation from normal procedure

In 4 cases the bond between the tensile head of the testing machine and the metal plate of the specimen failed before the internal bond in the specimen. The true tensile strength of the specimen was therefore not obtained. However these results are included in the tables, where they are marked with a t after the tensile force, and curves below as the results obtained are close to the values of the other similar specimens tested at the same time. The deviation from the "true" values are therefore believed to be small.

Results:

The results of the tests are shown in the scheme on the following page. The Figure below is showing the max. tensile force for each individual test specimen and the regression line for the tensile strength as a function of the number of ageing cycles. There is not distinguished between values for steel and values for aluminium, as they are very similar. The actual plate material is indicated with an s and an a respectively in the column "cycles".

The mean tensile strength for unexposed specimens is 8,26 kN. This value decreases according to the regression line with  $1.3 \pm .6$  N per ageing cycle ( $0.0013 \text{ kN} \pm .0006 \text{ kN}$ ). The test results for the individual specimens are shown on the curves in appendix 1.

