



Dipl.-Ing. (FH)  
Udo Bergfeld

ANGEWANDTE  
BAUPHYSIK &  
OBJEKTBEGLEITUNG

ROSENHEIM

TEST REPORT: K 01 08 16.21-23

TEST: Alternating climate test on coated glass

SUBJECT: Coated single sheets of glass using the “SIGNAPUR”  
nanotechnology glass-sealing system

APPLICANT: Rangger Handels OEG  
Niederau 315  
A -6314 Wildschönau

EXTENT: 3 pages including this title page

TEST:	Alternating climate test on coated glass										
SUBJECT:	Coated single sheets of glass using the "SIGNAPUR" nanotechnology glass-sealing system										
APPLICANT:	Rangger Handels OEG Niederau 315 A -6314 Wildschönau										
THE TASK:	Using the test samples handed over, an evaluation was to be produced regarding the extent to which the coating on the glass maintains its "self-cleaning effect" if used for a relatively long period and exposed to weather conditions and normal use.										
PERFORMANCE OF THE TEST:	<p>The test samples were installed in identical structural conditions between two climate chambers to test the effects of weather and use. One of these chambers functioned as an "interior zone" the other took on the function of the "exterior zone".</p> <p>The changes in climate caused by the time of year were simulated quickly via rapid climate changes. During this, the following "test program" was undertaken cyclically on the outside surfaces:</p> <p>During the test cycles the air in the "outside zone" was provided with various contaminants</p> <table><tr><td>a) beautiful summer day</td><td>25°C/40% rel. humidity</td></tr><tr><td>b) sultry weather</td><td>25°C/85% rel. humidity</td></tr><tr><td>c) thundery rain</td><td>10°C/100% rel. humidity</td></tr><tr><td>d) frost</td><td>-10°C</td></tr><tr><td>e) radiant heat with a surface temperature of 75°C</td><td></td></tr></table> <p>This test cycle reproduces the most disadvantageous conditions to which coatings would be exposed.</p>	a) beautiful summer day	25°C/40% rel. humidity	b) sultry weather	25°C/85% rel. humidity	c) thundery rain	10°C/100% rel. humidity	d) frost	-10°C	e) radiant heat with a surface temperature of 75°C	
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This cycle was maintained for a period which in nature would correspond to “exposure to the weather” for approximately 7 years. During this the windows were cleaned on a total of 14 occasions with standard commercial products so that cleaning is also taken into account in the investigation.

The tests were undertaken with 2 coated panes of glass and one uncoated pane as a comparison element. In this way a comparison could be undertaken between panes with and without coating at any time during the test.

RESULTS:

The “lotus effect” was present during the entire test cycle. There was no change in the effect on the coated panes during the entire test cycle. This referred to both the hygrothermic (climate change) and mechanical (cleaning) stresses on the panes.

“LOTUS EFFECT”

Investigations of the lotus plant have established that as a consequence of the nature of the surface of the plant, any water present behaves differently. Investigations revealed that if these characteristics are transferred to glass surfaces, a so-called self-cleaning characteristic is set up if the coating on the glass is formed by analogy with the nature of the surface of this lotus plant.

EXTENT

3 pages: only valid in its entirety

Brannenburg bei Rosenheim, 29.09.2001

(stamp illegible)

(signed)

Dipl.-Ing. (FH) Udo Bergfeld  
Head of Institute



Dipl.-Ing. (FH)  
Udo Bergfeld

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ROSENHEIM

A.B.O. ROSENHEIM GmbH ♦ Bahnhofstraße 67 ♦ D-83098 Brannenburg

Messrs. Ranger Handels OEG  
- Herr Rangger –  
Niederau 315

A-6314 Wildschönau

Your ref.

Your letter dated:

Our ref.  
Br/Be

Date  
31.08.2002

**Further information about the alternating climate tests  
K 01 08 16. 21-23 at our company premises**

Dear Herr Rangger,

We are pleased to be able to give you further information about the behaviour of the coating over time during the tests.

You can see the general test cycle from the test report. During this an extremely wide range of weather conditions were simulated as in a “time-lapse film”.

The simulation period would correspond approximately to a period under stress of 7 years.

The coating gave no indication of any reduction in the “lotus effect” during this period.

A slight improvement in comparison with the “new” pane of glass became apparent after a simulated period of approx. six months, which remained constant over the entire test cycle.

We hope we have answered your further questions regarding behaviour over time during the test cycle and are of course pleased to be available for if you have any further questions or require any elaboration on the subject.

Yours sincerely,  
Dipl.-Ing (FH) Udo Bergfeld  
(Head of Institute, A.B.O. Rosenheim GmbH)



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Messrs. Ranger Handels OEG  
- Herr Rangger –  
Niederau 315

A-6314 Wildschönau

Your ref.

Your letter dated:

Our ref.  
Br/Be

Date  
29.01.2004

**Further information about the alternating climate tests  
K 01 08 16.21-23 at our company premises**

Dear Herr Rangger,

We are pleased to be able to give you further information concerning the irradiation device during the tests.

You can see the general test cycle from the test report. During this an extremely wide range of weather conditions were simulated as in a “time-lapse film”.

Irradiation was simulated with a device which corresponds DIN EN ISO 12543 Part 4. The spectral distribution of the irradiation device approximately results in the following:

3%	UVB
8%	UVA
18%	visible range
24%	IRA
27%	IRB
20%	IRC

We hope to have answered your further questions concerning irradiation during the test cycle and are of course pleased to be available for if you have any further questions or require any elaboration on the subject.

Yours sincerely,  
Dipl.-Ing. (FH) Udo Bergfeld  
(Head of Institute, A.B.O. Rosenheim GmbH)