Test Report

REPORT NUMBER:
0306/792934

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REQUISITIONER: Nordic Construction Solutions ApS
N P Danmarksvej 93
DK-8732 Hovedgård

SUBJECT: Two built-up walls, each measuring approx. 100 x 100 cm, have been supplied. A test specimen has been installed in each wall panel.

SAMPLING: The specimen was sent by the requisitioner and received by the Danish Technological Institute on 05.02.2018.

PERIOD: Testing was completed in the period 15.02.2017 to 27.02.2018.

METHOD: The method has been described and performed according to the requisitioner's requirements.

RESULT: There was subsequently no visible damage to the tested specimens. No destructive assessment has been performed.

STORAGE: The test materials will be destroyed after two months unless otherwise agreed in writing. As the test is destructive and non-reproducible, the test specimens were discarded immediately after completion of the test.

TERMS AND CONDITIONS: Tests were performed according to the Danish Technological Institute's General Terms and Conditions applicable on the date of the commencement of the agreement. Test results apply exclusively to the tested specimen. The test report may only be reproduced in extracts with the laboratory's prior written consent.

LOCATION: 28.02.2018, Danish Technological Institute, Building & Construction, Aarhus

SIGNATURE:

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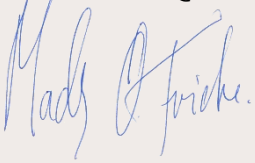

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Test specimens

Two built-up walls measuring approx. 100 x 100 cm have been supplied. A specimen for testing has been installed on the two test specimens.

Specimen 1	An LK Opus external power socket installed in the built-in outlet box. External dimensions are approx. 72 x 72 mm.
Specimen 2	A metal ventilation grille. External measurement is Ø 120 mm.

Test execution

The Danish Technological Institute, Building & Construction, has performed this project for Nordic Construction Solutions ApS regarding climate ageing tests and subsequent tensile tests on an external power socket built into a rendered wall, Specimen 1.

1. Climate-specific accelerated ageing has also been performed on a ventilation grille and onto the rendered wall, Specimen 2.

Photo 1 – Specimen 1

Photo 2 – Specimen 2

Structure of climate test

The test specimens are tested in a climate chamber in which they are exposed to a one-sided, repeated rain-frost-thaw cycle. The test specimens were built into a rendered construction of approx. 100 x 100 cm by the requisitioner.

Photo 3 – Specimens from exposed side

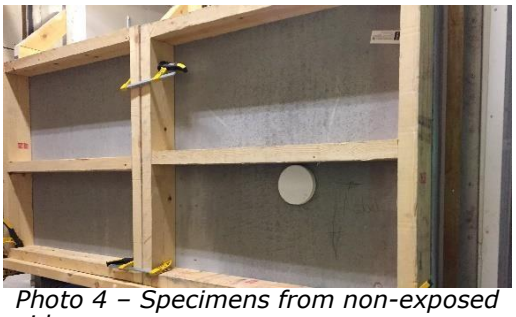

Photo 4 – Specimens from non-exposed side

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Photo 5 – Specimens during set-up for climate ageing test

The Danish Technological Institute has performed continuous inspections during the climate ageing process.

Climate chamber

The climate chamber used is capable of expose a surface alternately to water, frost, UV and warm air. The climate chamber can be used for accelerated ageing and effect on test specimens. Experience says that materials that are exposed to stress age significantly faster than under normal circumstances. There are no – or very few – standards available to determine how old the specimens will become, but approximate experience shows that one year's ageing can be achieved in just one week. Photo 5 shows the test set-up during construction in the climate chamber.

Method and cycle description

The test method is based on the following standard:

"DS 1127: Method for exposing building components and construction materials to accelerated climate effects in a vertical position"

The cycle programme is as follows:

Step 1	1 hour's light and heat radiation. Air temperature 40 degrees. Intensity: 1900W/m^2.
Step 2	30 minutes rain* at air temperature of 20 degrees. Supplied by six nozzles where the water provided by each nozzle is approx. 2 litres/minute.
Step 3	Frost for 1.5 hours at an air temperature of -20 degrees.
Step 4	Thawing for 1 hour.

This gives a cycle time of 4 hours. The Danish Technological Institute recommends a test period of 48 cycles which gives 192 hours or 8 days.

To the best of the Danish Technological Institute's belief, it has been estimated that an 8-day exposure provides a reasonable indication of the frost capabilities of the fitting of the specimen.

Modification has taken place according to DS1127 – precisely at 30 minutes moved from point B to C as it is estimated that sufficient water is supplied in 30 minutes. It is also estimated that a longer frost period is more important. This means that it is ensured that test specimens are exposed to critical frost exposure.

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Results of climate ageing effects

On completion of the climate ageing, visual inspection (non-destructive assessment) of the test specimens was performed from both sides. During this visual inspection, no damage was observed. The constructions were further examined by touching critical points around the test specimens to ascertain whether the surfaces were still intact. It was ascertained that the surfaces were intact.

On the basis of these observations, it is estimated that the construction has not been damaged by its exposure to frost.

Mechanical effects on Specimen 1 – electrical socket

As agreed with the requisitioner, the following was performed on Test Specimen 1 – after the climate ageing.

1. The test specimen is vertical. A screw was mounted in the 'middle thread' of the socket to allow the specimen to be pulled out.
2. Initially, a pull of 200 N at an angle of 45° from the plane and a rotation of 360° was performed. A 'conical' pull where the centre of the socket is aligned with the tip of the cone. The rotation was performed for 1 minute. This is to simulate twisting in the socket.
3. Then a horizontal pull of 200 N perpendicularly to the plane (horizontal pull) was performed. The pull was performed for 1 minute.

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Results of mechanical effect on Specimen 1 – electrical socket

Test 1

During the 'conical' pull, air cracks are seen between the socket liner and the wall. When the pull is complete, no cracks are seen, but the external part seems a little loose.

Test 2

During the horizontal pull, a small crack (estimated at 1-2 mm) formed on the lower part of the external part. See Photo 6.

The outlet box behind it shows no immediate damage after testing, and no damage is seen on the rendered area around the socket. See Photo 7.

Photo 6 – During horizontal pull

Photo 7 – Built-in socket and transition to wall – after test

It is believed that the twist of the external part (liner) is due to the transition between the screw in the liner and the thread in the outlet box.
It is believed that the fitting of the socket itself is OK and that the rendered part around the socket has not been damaged by the test.