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## ROOF TILE UNDERLAYS: WATERTIGHTNESS – TENT EFFECT

Key words: Roof tile underlays, sarking felt, watertightness, tent effect, test method

### 1 SCOPE

This NORDTEST METHOD specifies a test procedure for testing the watertightness of roof tile underlays resting on a substrate of wood or mineral wool.

### 2 FIELD OF APPLICATION

This method is used to ascertain the watertightness of materials intended for use as roof tile underlays. The method is applicable for all sorts of materials but is of special interest for products which are very open to moisture diffusion. The method is intended for use in the laboratory.

### 3 REFERENCES

NS 8140:1985 (DS 1127:1985), "Metode til at udsætte bygningskomponenter og byggematerialer for accelereret klimapåvirkning i vertikal stilling".

NT Build 118, "Steep roofs – Coverings: Tightness". Nordtest, Espoo, 1980.

### 4 DEFINITIONS

**Tent effect** of roof tile underlays is defined as the watertightness of materials placed in physical contact with a substrate like wood or mineral wool.

For watertightness of materials without contact with the substrate reference is made to NT Build 118.

### 5 SAMPLING

Unless otherwise agreed, the material to be tested is supplied by the client. The sample shall be sufficiently large to be representative of the material to be tested. Preferably test samples should be taken out from three different places in the roll or sheet.

### 6 METHOD OF TEST

#### 6.1 Principle

The test specimen is placed on a support of wood/mineral wool and is exposed to a water spray. Any water penetrating is collected and the amount is recorded.

For virgin materials the testing of tent effect is performed after an artificial ageing.

#### 6.2 Apparatus and materials

Apparatus for accelerated ageing in accordance with NS 8140.

A test set-up consisting of:

- an aluminium tray 900 x 600 x 49 mm placed on a rack to give it an inclination of 30° with the horizontal.
- a piece of plywood 150 x 600 mm and a piece of rock wool 450 x 600 mm to be placed inside the tray.
- a nozzle<sup>1</sup> with a scattering angle of 120°, giving 150 ± 10 litres of water per hour.
- a steel frame made from a hollow rectangular profile (app. 25 x 25 mm) with a thin wooden frame attached to the outside. (The steel frame is used to provide sufficient weight to press the roof tile underlay against the substrate). The dimensions of the inside of the steel frame shall be only slightly larger than the aluminium tray.

A balance capable of weighing up to 5 kg with an accuracy of ±0,001 kg.

<sup>1</sup> A suitable nozzle is for example: Spraying System CO, B.S.P.T. 1/8 GG, Fulljet SS 4.3 W (120 l/h at 0,2 MPa)

### 6.3 Preparation and conditioning of test specimens

Three representative samples each about 750 x 1050 mm are cut out. The material is fastened to the wooden frame with staples or nails. For materials supplied in roll form the material is bent around the edge of the frame and fastened to the side. For materials supplied in sheet form the material is fastened to the top of the frame and the edge is sealed with aluminium tape.

No conditioning is necessary before the test.

### 6.4 Procedure

For virgin materials an artificial ageing according to NS 8140:1985 is performed prior to testing the watertightness. If nothing else is agreed the artificial ageing should last 1344 hours (eight full weeks) in order to simulate what may happen during a normal construction period when the roof tile underlay is left exposed to UV-light, wind and precipitation.

The aluminium tray with the rock wool placed at the lower end and the plywood at the upper end is weighed (as supplement the plywood may also be weighed separately). The frame with the roof tile underlay is placed over the aluminium tray. The frame shall fit smoothly around the tray and a check shall be made that good physical contact is achieved between the supporting materials and the roof tile underlay. The tray is placed on the rack at an angle of 30° with the horizontal. The nozzle is placed 310 mm over the centre of the test specimen. Water is sprayed onto the surface for six hours. After finishing the exposure to water the frame is removed taking care that no water drops fall into the tray. The tray (and the plywood separately) is weighed again and the amount of water penetrating the roof tile underlay is calculated.

### 6.5 Expression of results

The result of the test is given as the amount of water in grams penetrating the roof tile underlay. The result of the test is given as the mean value of three separate tests.

### 6.6 Test Report

The test report shall include the following information:

- a) Name and address of the testing laboratory
- b) Identification number of the test report
- c) Name and address of the organisation or the person who ordered the test
- d) Purpose of the test
- e) Method of sampling
- f) Name and address of manufacturer or supplier of the tested object
- g) Name or other identification mark of the tested material
- h) Description of the tested material
- i) Date of supply of the material
- j) Date of the test
- k) Identification of the test equipment and instruments used
- l) Any deviation from the test methods
- m) Test results
- n) Date and signature.

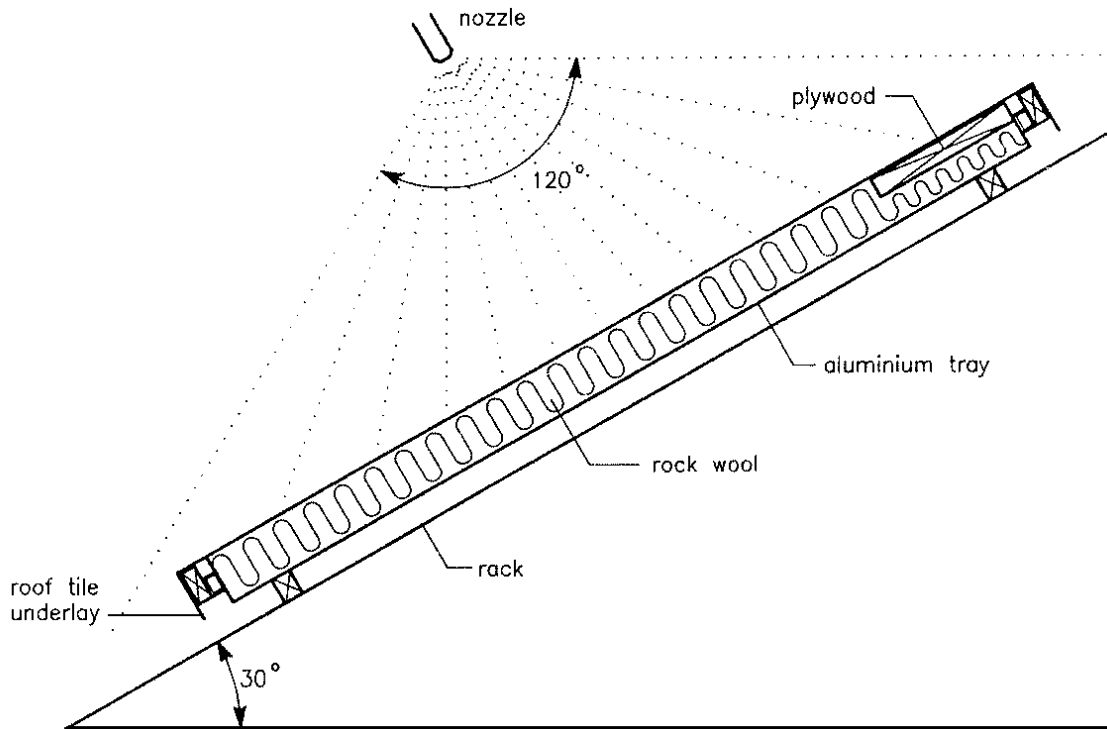


Figure 1. Cross section of test set up.

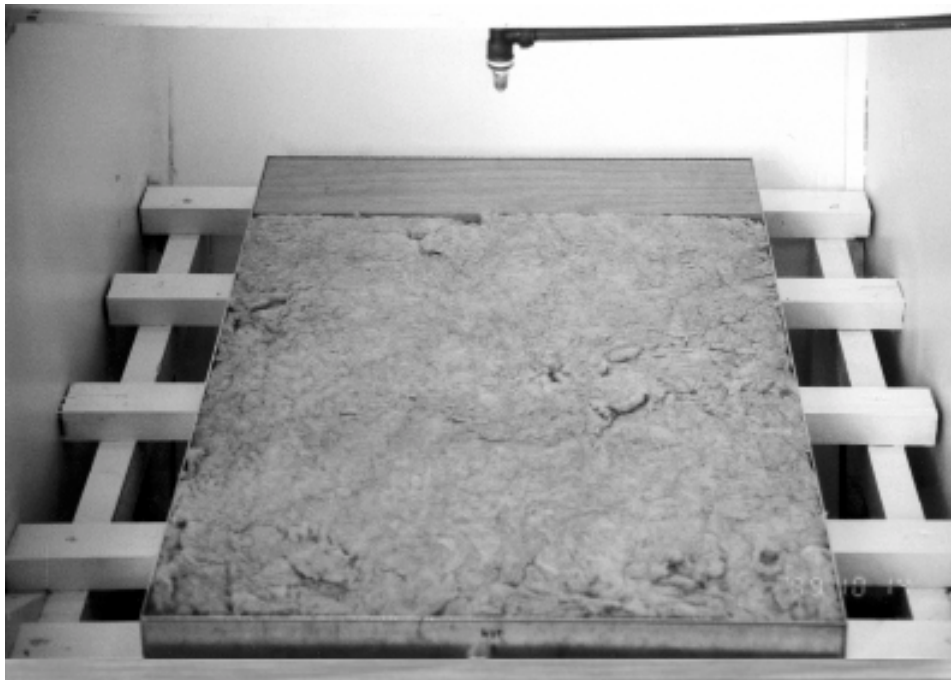


Figure 2. Test set up for testing of watertightness/tent effect without the roof tile underlay. The roof tile underlay is placed on top of the rock wool and the plywood. Water is sprayed onto the roof tile underlay from a nozzle placed on the rack above the test specimen.

## INFORMATIVE ANNEX

When testing watertightness/tent effect it is normally presupposed that no water should penetrate the roof tile underlay during the test. However, the exposure to water in the test is more severe than the conditions which can normally be expected in practice, and for that reason it may be considered acceptable that small amounts of water penetrate during the test. Further it is difficult to avoid that small amounts of water are spilled when handling the soaked roof tile underlay.

It has been found that a maximum of 15 g water accumulated in the substrate materials, i.e. the plywood and the rockwool, during the test may be considered an acceptable requirement.