

**WATER ABSORPTION OF PERIMETER INSULATION MADE OF EPS  
COMPARISON OF THE TEST METHODS ACCORDING TO THE  
APPROVALS UP TO 2003 AND EN 13163**

- Summary -

**Institut:** **Forschungsinstitut für Wärmeschutz e.V. München**  
Lochhamer Schlag 4  
82166 Gräfelfing  
GERMANY

**Managing director:** Dr. rer. nat. Roland Gellert

**Project manager:** Dipl.-Ing. (FH) Claus Karrer

**Reference number:** ZP 52-5-5.77-1193/05

The research project was promoted from Deutschen Institut für Bautechnik, Berlin /  
Germany

Gräfelfing, 11 June 2007

This summary contains 3 pages

## SUMMARY

At the time of the European Standards concerning insulation material becoming binding on the 31 December, 2003, the general approvals for the building inspection in the field of perimeter insulation made of expanded polystyrene (EPS), had been composed or adjusted. The testing methods in view of the water absorption of the insulation material differed sometimes considerably from the regulations of the approvals. The research project was to examine the differences of these testing methods and the consequences for the insulation materials.

As regards the "determination of the water absorbance by a long-term, total immersion according to EN 12087-2A", the testing results had always been identical or smaller in comparison to the immersion with change of temperatures according to the test 1/2 of former approvals showing sometimes a visible difference. As regards material produced by automatic machines, smaller nominal thicknesses and lower apparent densities generally led to better results including however a bigger scatter. There was, on average, a slightly higher absorption of humidity as regards block material. In many specimens an extensively homogeneous distribution of humidity was determined while using both methods, especially when there was a high absorption of humidity.

The DIN EN 12008 concerning the "determination of water absorption by diffusion" corresponds to a great extent to the test 1/3 of the former approval. Products of a higher apparent density tended to absorb less humidity. However, also products having a lower apparent density were able to fulfil the levels of the DIN EN 13163.

The water absorption during the frost-thaw alternating stress according to EN 12091 together with a long-term, total immersion as a preliminary test (according to the demands of DIN EN 13163) was in most of the comparable tests less than during the frost-thaw alternating stress after the diffusion test (test 1/4 of the former approvals). However, it was not possible to establish a direct connection to the testing methods. As regards the frost-thaw stress after total immersion, one tends to expect an increasing absorption of humidity if there are an increased thickness, an increased apparent density and an increased quantity of moisture while testing (EN 12087-2A). The test results diverge considerably though.

In most of the cases, the change in the compressive strain at a 10 % compression by the frost-thaw alternating stress resulted after the total immersion according to EN 12087-2A in better test results than after the diffusion test. This applies particularly to smaller nominal thicknesses and lower apparent densities. The limiting value of DIN EN 13163 of 10 % concerning the decrease of the compressive strain after a compression of 10 % after the frost-thaw alternating stress with a total immersion according to EN 12087-2A as a preliminary test had always been maintained apart from one exception. Here, bigger nominal thicknesses tend to give better results.

As regards the water absorption, the regulations in the approvals for the building inspection for perimeter insulation material issued since 2004, basically seem to make sense and are accomplishable and, as regards thermal insulation material, don't require higher demands compared to those existing before 31 December 2003.