

## **Case study: Durability of cellular glass in building applications – Testing of Foamglas® insulation**

### **Sampling: Premises of Belfius Bank & Insurance in Hasselt, Belgium (flat roof installed in 1978)**

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Responsibility for the content of the report lies with the authors.



# **FIW München**

**Report: E3.3-2017/04**



Notified body for testing, surveillance and certification of building materials and components  
Research and development in the field of heat and moisture protection

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This report includes

10 pages  
4 figures  
2 tables

Gräfelfing, 9 January 2017

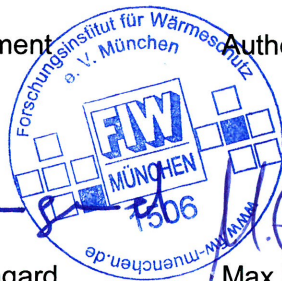
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# 1 Introduction

This summary gives a short review on one of many sampling and testing operations conducted in 2016 which is part of an ongoing study on durability of cellular glass for Pittsburgh Corning Europe. General aim of the study is to increase the knowledge about the long-term behaviour of cellular glass insulation in different types of building applications and determining factors influencing the stability and expected useful life. The project focuses on specific applications for building insulation materials e.g. external wall and flat roof insulation. The full study will be concluded in 2017.

The building site of the herein described sampling operation was selected by the applicant, and the sampling procedures are supervised by a third party commissioner.



Figure 1: View of the probed building / flat roof construction

# 2 Sampling operation

FOAMGLAS® insulation material was sampled by a third party commissioner from SECO/BCCA (Technical Control Bureau for Construction in Belgium and Belgian Construction Certification Association) from the flat roof of an administrative building in Hasselt on September 22<sup>nd</sup> 2016.



Figure 2: During the sampling operation on site

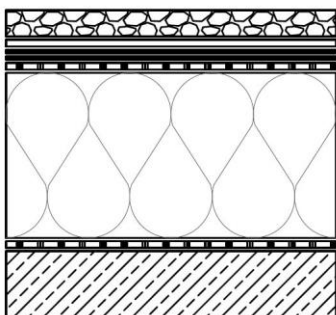
The sampling operation was conducted following a comprehensive sampling guideline issued by FIW. This guideline defines the standards of operation within the project for third parties, assigned by Pittsburgh Corning to supervise and document a sampling operation of cellular glass specimens. It includes instructions for the in-

specifications of buildings and FOAMGLAS® cellular glass products, the documentation, sampling, and shipping.

The guideline provides instructions and templates for the assigned sampling commissioners to meet the project's specifications and to harmonize the procedures for all inspections/samplings. Necessary data, which has to be gathered on site and manners of documentation for a proper evaluation within the framework of the ongoing durability study, is specified.

Important sampling documentation information on the building, the product, and construction gathered by the sampling commissioner is summarized below.

**Table 1: Sampling operation in Hasselt, Belgium (based on sampling protocol)**

Building	Administrative building of Belfius Bank & Insurance
Location	Paul Bellefroidlaan 3500 Hasselt Belgium
Year of construction	1978
Product	FOAMGLAS® T2 (50 mm) Cellular glass slabs 450 mm x 600 mm
Service Life	Since 1979 (37 years)
Sampling point	Flat roof of administration building (normal heating) A sampling point with rather low exposure to sunshine and near the rainwater evacuation point (drainage) was selected.
Construction build-up	<p>Compact roof build-up with gravel, bitumen cover layers and concrete sub-structure.</p>  <p>Roof has no slope.</p>
Condition	The inspection showed a uneven surface. Inspection showed humidity between membranes and between cellular glass and membranes. Waterproofing was in reasonable condition. The concrete substructure was uneven.

### 3 Measurements

The samples were delivered in water- and vapor proof packaging to FIW München on 24<sup>th</sup> October 2016 by the applicant. The laboratories at FIW performed several measurements on the specimens.



**Figure 3: Sample (1 out of 3) as arrived in the FIW laboratories**

The thermal performance was determined in “as-is” condition as well as oven-dry condition in a “heat flow meter apparatus” according to ISO 8301.

Additionally moisture content and dry density of the samples were measured.

### 4 Results

The specimens from the flat roof of the administrative building in Hasselt, Belgium show the following quality characteristics:

**Table 2: Results of measurement for FOAMGLAS® insulation installed 1978 in Hasselt**

<b>Thermal conductivity</b> (DIN EN 12667:2001-05)	<b>0.047 W/(m·K) (condition as sampled)</b> <b>0.047 W/(m·K) (dry condition)</b>
<b>Moisture content</b> (DIN EN ISO 12570:2013-09)	<b>1.3 % by mass / 0.2 % by volume</b>
<b>Density (oven-dry)</b> (EN 1602:2013-05)	<b>137 kg/m<sup>3</sup></b>



## 5 Conclusion

According to time and location of the product installation (1978 in Belgium), the sampled product was approved by the Belgian “Institute National Du Logement”, see technical approval N° 1074 of February 1971. It states a thermal conductivity for FOAMGLAS® T 2 of 0.040 kcal/m/K which equates to 0.047 W/(m·K).


<p>INSTITUT NATIONAL DU LOGEMENT</p>  <p>Bruxelles - Belgique</p>	<p>AGRÉMENT TECHNIQUE DES MATÉRIAUX, ÉQUIPEMENTS ET PROCÉDÉS DE CONSTRUCTION NON TRADITIONNELS</p> <hr/> <p>TOITURES ISOLANTES</p> <p>FOAMGLAS®</p>	<p>C.D.U. : 69.024.3</p> <p>TOITURES DAKEN ROOFS</p>
<p>MEMBRE DE L'UNION EUROPÉENNE POUR L'AGRÉMENT TECHNIQUE DANS LA CONSTRUCTION (UEAtc)</p>	<p>S.A. PITTSBURGH CORNING EUROPE avenue de Tervuren 32-38 1040 BRUXELLES (Tél. : 02/35.90.36, telex : 22277)</p>	<p>DÉCISION N° 1074</p>

Figure 4: Header of Belgian technical approval for FOAMGLAS T2 valid 1978

Considering the stated period of use (37 years) the tested samples of cellular glass showed good thermal performance with a thermal conductivity in sampled condition of 0.047 W/(m·K), still matching the requirements for the new material in 1978 .



## **6 Liability**

Measurements results are valid only for the described materials, properties and dimensions. The report is based on the current knowledge from research in thermal transport. Liability can only be accepted within the scope of this knowledge.

Warranty for analysis results and expert opinions of FIW München e.V. is limited to the limitations of claim in § 634a BGB for buildings.



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