Certificate of Test

Title:
JOTUN UAE LIMITED

Determination of Carbon Dioxide Diffusion Coefficient of Jotashield Tex Ultra After 2500 Hours Accelerated Weathering

Certificate of Test No: **7176**

Client's Name & Address:

Mr S Mathew
Jotun UAE Limited
PO Box 3671
Dubai
United Arab Emirates

Our Ref:	**1.164.10/SPJ/1446**
Job No:	**6DH9**
Your Ref:	**-**
Date:	**30 September 2003**
Date Sample(s) Received:	**5 November 2002**
Sample(s) Received From:	**Jotun UAE Ltd**

Sample No(s): **129543**

Tested By: ..... **S P Jull**

Authorised By: ..... **A T Blake**

Job Title: **Manager, Materials Test Laboratories**

For

Taylor Woodrow Technology

Stanbridge Road, Leighton Buzzard, Bedfordshire, LU7 4QH

Tel No. 01525 859111 Fax No. 01525 859112
Registered Office Watford England Registered No.1090601

Taylor Woodrow

1. SAMPLE DESCRIPTION AND ANALYSIS REQUESTED

One litre of Jotun Siloxane Acrylic primer and one litre of Jotashield Tex Ultra were received in the Laboratories. When received, the samples were designated with unique sample reference numbers, which were use for our own identification purposes. No certificates of sampling were received.

The carbon dioxide diffusion coefficient of the coating system after 2500 hours accelerated weathering was to be determined.

2. METHOD

2.1 Preparation

The coating system was brush applied to previously characterised unglazed ceramic tiles using a weighing procedure to achieve the coverage rate required. A flood coat of Jotun Siloxane Acrylic Primer was applied and allowed to dry for a minimum period of 6 hours. Two coats of Jotashield Tex Ultra were then applied at a rate of 300g/m^2/coat with a minimum drying period of 24 hours between coats. The second coat was applied at 90° to the first. The samples were allowed to dry in the laboratory for three days and were then conditioned for a minimum of 28 days at 23±2°C and 60±5% relative humidity.

2.2 Accelerated Weathering

The samples were placed in a QUV weathering device under an exposure regime (QUV-A) designed to simulate UK conditions, 4 hours UV at 50°C followed by 4 hours condensation at 40°C.

2.2 Determination of Carbon Dioxide Diffusion Coefficient*

One coated tile (specimen no. 129543) was sealed in a circular steel rig such that the coated and uncoated faces were exposed. Carbon dioxide (15% in oxygen) at a known pressure and flow rate was passed over the coated face of the plate and helium gas was passed over the opposite face at the same pressure and flow rate. The helium gas stream was continuously monitored by gas chromatography to analyse the carbon dioxide. Equilibrium conditions were achieved after approximately 24 hours and the steady sate flux of carbon dioxide was then calculated from the percentage of carbon dioxide in the helium stream and the flow rate of this gas.

The diffusion coefficient for carbon dioxide (Dco_2) is calculated using Fick's Law of Diffusion and Crank's equation.

* In-House Test Procedure TP1303/90/4671 Issue 1.

3. RESULTS

Coating	Jotashield Tex Ultra
QUV Weathered for (hours)	2500
TW Specimen No.	129543/M
Dco_2 (cm^2s^{-1})	6.03E-08
μ-value	2.47E+06
R (m)	467
Sc(cm)	117
Mean Dry Film Thickness (μm)	189
Date of Test	19-Mar-03

Notes:

i) R (equivalent air layer thickness) and Sc (equivalent thickness of concrete) are dependent on the film thickness and are calculated here for the dry film thickness (DFT) present on test specimens.

ii) Dco_2 and the diffusion resistance coefficient (μ-value) are calculated using the mean DFT measured on a spare specimen.

iii) Dco_2 for an uncoated plate is 1.0×10^{-3} cm^2s^{-1}.

iv) S_C is calculated assuming an average grade concrete where the μ-value has been estimated as 400. The value is dependent on the film thickness.

(v) Klopfer criterion for effective anti-carbonation coating is R greater than 50 meters.

END OF CERTIFICATE