

# Certificate of Test

Supplement to Certificate of Test number 7910 issued by Taylor Woodrow Technology on 05 January 2006, Certificate of Test number 9697 issued by Taylor Woodrow Technology on 28 January 2008 & Certificate of Test number 12077 on 9 July 2009.

Since the original Certificates were issued, the product known as 'Jotashield Tex Ultra' has had no formulation change.

Since the original Certificate was issued, Taylor Woodrow Technology has rebranded as VINCI Construction UK Ltd. Technology Centre.

**Title: Determination of Carbon Dioxide Diffusion Coefficient of Jotashield Tex Ultra**

**Certificate of Test Number: 13533**

**Client's Name & Address:**

Jotun UAE LLC  
Al Quoz Industrial Area  
PO Box 3671  
Dubai  
United Arab Emirates

Our Ref: N950/V018

TC Job No: 3NF3 – 1.064.27

Your Ref: PO 54798

Date: 06 October 2010

Date sample(s) received: 24 October 2005


Sample(s) received from: Jotun UAE Ltd LLC


Sample No: 143005

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This Certificate and the results shown are based upon the information drawings samples and tests referred to herein

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Tested by:   
D J Thompson (position: Engineer)

Authorised by:   
S R Moxon (position: Manager)

**Technology Centre**

Stanbridge Road, Leighton Buzzard, Bedfordshire, LU7 4QH

**Tel No. 01525 859000**  
Registered Office, Watford

**Fax No. 01525 859001**  
Registered No. 2295904 England



**TECHNOLOGY CENTRE** 

## 1. INTRODUCTION

This certificate of test describes the carbon dioxide diffusion testing carried out at the request of Jotun UAE Ltd LLC on 22 December 2005 at Technology Centre (TC), Leighton Buzzard.

The test was carried out in accordance with In-House Test Procedure TP950/05/13569 Issue 1, which is in general accordance with EN 1062-6:2002.

## 2. SAMPLE DESCRIPTION

Technology Centre received one litre of Jotashield Siloxane Acrylic Primer (TC Ref 143004) and one litre of Jotashield Tex Ultra (TC Ref 143005). The coatings were given unique TC sample numbers for reference purposes only.

## 3. TEST PROCEDURE

### 3.1 Coating Application

The coating system was brush applied to previously characterised porous plates using a weighing procedure to achieve the coverage rate required. One coat of Jotun Siloxane Acrylic Primer was applied as a horizontal flood coat and allowed to dry for a minimum of 8 hours. Two coats of Jotashield Tex Ultra were then applied, each at a rate of  $465\text{g/m}^2$ , with a minimum drying period of 24 hours between coats. Each coat was applied at  $90^\circ$  to the previous. The coated sample was allowed to cure for 2-3 days in the laboratory, and then conditioned at  $23\pm 2^\circ\text{C}$  and  $60\pm 5\%$  relative humidity for a minimum period of four weeks prior to testing.

### 3.2 Determination of Carbon Dioxide Diffusion Resistance

One coated tile (TC Ref. 143005) 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 for carbon dioxide. Equilibrium conditions were achieved after approximately 24 hours and the steady state 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 ( $D_{\text{CO}_2}$ ) is calculated using Fick's Law of Diffusion and Crank's equation.

#### 4. TEST RESULTS

##### CARBON DIOXIDE DIFFUSION RESISTANCE

Table 1

Coating System Name	Jotashield Tex Ultra
TC Specimen No.	143005/4
$D_{CO_2}$ ( $cm^2s^{-1}$ )	$4.26 \times 10^{-08}$
$\mu$ -value	$3.50 \times 10^{+06}$
R (m)	1130
Sc (cm)	282
Mean Dry Film Thickness ( $\mu m$ )	323
Date of Test	22 December 2005

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 the test specimens.
- ii)  $D_{CO_2}$  and the diffusion resistance coefficient ( $\mu$ -value) are calculated using the mean DFT measured on a spare unused specimen.
- iii)  $D_{CO_2}$  for an uncoated plate is  $1.0 \times 10^{-3} cm^2s^{-1}$ .
- iv) Sc is calculated assuming an average grade concrete where the  $\mu$ -value has been estimated as 400.
- v) Klopfer criterion for effective anti-carbonation coating is R greater than 50 metres.
- vi) EN 1062-6 Classification C<sub>1</sub> for Carbon Dioxide Permeability requires the SD value (R) greater than 50 metres.

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END OF CERTIFICATE