

**Title: Determination of Carbon Dioxide
Diffusion Coefficient of Solcourse
Gas Resistant DPC**

Certificate of Test Number: 15098

Client's Name & Address:

Solco
Unit 51, Portmanmoor Road Ind. Est.
Ocean Park
Cardiff
CF24 5HB

Our Ref: N950/TMV056

TC Job No: 3PK7 – 1.287.02

Your Ref: PO 1879

Date: 17 November 2011

Date sample received: 21 April 2008

Sample received from: Solco

Sample No: 144649/2

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1. INTRODUCTION

This certificate of test describes the carbon dioxide diffusion testing carried out at the request of Solco on 24 April 2008 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 sheet of Solcourse Gas Resistant DPC (TC Ref 144649), described by the client as a Gas Resistant Polymeric High Performance DPC. The sheet was given unique TC sample numbers for reference purposes only.

3. DETERMINATION OF CARBON DIOXIDE DIFFUSION RESISTANCE

One specimen, cut from the sheet of Solcourse Gas Resistant DPC (TC Ref. 144649/2) 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_{CO_2}) is calculated using Fick's Law of Diffusion and Crank's equation.

4. TEST RESULTS

CARBON DIOXIDE DIFFUSION RESISTANCE

Table 1

Membrane Name	Solcourse Gas Resistant DPC
TC Specimen No.	144649/2
D_{CO_2} (cm^2s^{-1})	3.24×10^{-7}
μ -value	4.60×10^5
S_D -value, R (m)	415
Mean Dry Film Thickness (μm)	902
Date of Test	24 April 2008

Notes:

- i) D_{CO_2} and the diffusion resistance coefficient (μ -value) are calculated using the mean DFT measured on a spare unused specimen.
- ii) Klopfer criterion for effective anti-carbonation coating is R greater than 50 metres.
- iii) EN 1062-6 Classification C₁ for Carbon Dioxide Permeability requires the S_D value (R) greater than 50 metres.

The figures quoted above, indicate that Solcourse Gas Resistant DPC attains the specification for the higher EN 1062-6 Classification C₁ for coatings/membranes, and acts as a barrier to Carbon Dioxide gas.

END OF CERTIFICATE