

Certificate of Test

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Title:

PLYSOLENE LIMITED

Payload GR

Determination of Methane Permeability


Certificate of Test No: 10170


Client's Name & Address:

**Mr Steve Ratcliffe
Plysolene Limited
21 Star Industrial Estate
Partridge Green
West Sussex
RH13 8RA**

Our Ref: 1.287.1/DJT
TW Job No: T556 - 3JS4
Your Ref: PO 1545
Date: 30 May 2008
Date Sample(s) Received: 21 April 2008
Sample(s) Received From: Plysolene

Sample No: 144649

Tested By:  D J Thompson

Authorised By:  S R Moxon

Job Title: **Manager, Testing & Contracting**

For

Taylor Woodrow Technology

Stanbridge Road, Leighton Buzzard, Bedfordshire,
LU7 4QH
Tel No. 01525 859111 Fax No. 01525 85911

Registered Office Watford
England

Registered No.1090601

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Taylor Woodrow

1. SAMPLE DESCRIPTION & ANALYSIS REQUIRED

Taylor Woodrow Technology received one sheet of Plyload GR (TW Ref. 144649). No Certificate of sampling was received. The sample was given a unique sample number for reference purposes only.

The Materials Testing Laboratories were requested to determine the membrane for methane permeability in general accordance with "Rilem Report 12, Performance Criteria for Concrete Durability, E & FN Spon, London, UK pp 226-231".

2. METHOD

2.1 Coating Details

The product was described by the client as follows: Plyload GR is a Gas Resistant Polymeric High Performance DPC.

2.2 Methane Permeability

Methane (100%) at 0.2 bar (15 cm mercury) above atmospheric was pressurised on the coated surface of the test specimen. The gas flow rate through the sample was determined at atmospheric pressure approximately 24 hours after initial pressurisation.

3. RESULTS

METHANE GAS PERMEABILITY

Table 1

CLIENT IDENTIFICATION	TW SAMPLE NUMBER	COATING THICKNESS (cm)	SAMPLE AREA (cm ²)	TIME ELAPSED AFTER START OF TEST (Hours)	METHANE GAS PERMEABILITY (k) (m ² /s)
Plyload GR	144649/1	0.0902	50.64	24	1.16 x 10 ⁻¹⁴

Date of test: 17 April 2008.

Note: Gas flow was less than 0.01ml in one hour, which is lower than our detection limit.

Although there is no recognised specification for Methane Gas Permeability, the figure quoted above, based upon the method quoted above, indicates that Plyload GR acts as an impermeable barrier to methane, due to the amount of gas detected being lower than the detection limit of the equipment used.

For this test method, the results gained for Methane gas can be also used for Radon gas, therefore Plyload GR acts as an impermeable barrier to Radon gas.

END OF CERTIFICATE

Certificate of Test

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Title:

PLYSOLENE LIMITED

Payload GR

Determination of Carbon Dioxide Diffusion Coefficient

Certificate of Test No: 10169

Client's Name & Address:

**Mr Steve Ratcliffe
Plysolene Limited
21 Star Industrial Estate
Partridge Green
West Sussex
RH13 8RA**

Our Ref:	1.287.1/DJT
Job No:	T556-3JS4
Your Ref:	PO 1545
Date:	9 May 2008
Date Sample(s) Received:	21 April 2008
Sample(s) Received From:	Plysolene Ltd

Sample No(s): 144649

Tested By:  D J Thompson

Authorised By:  S R Moxon

Job Title: **Manager, Testing & Contracting**

For

Taylor Woodrow Technology

Stanbridge Road, Leighton Buzzard, Bedfordshire,
LU7 4QH
Tel No. 01525 859111 Fax No. 01525 859112

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1. SAMPLE DESCRIPTION AND ANALYSIS REQUIRED

Taylor Woodrow Technology received one sheet of Plyload GR (TW ref. 144649). The specimen was given a unique sample number for reference purposes only. No certificate of sampling was received.

The Materials Testing Laboratories were requested to determine the carbon dioxide diffusion coefficient in accordance with In-House Test Procedure TP950/05/13569 Issue 1, which is in general accordance with EN 1062-6:2002.

2. METHOD

2.1 Coating Details

The product was described by the client as follows: Plyload GR is a Gas Resistant Polymeric High Performance DPC.

2.2 Determination of Carbon Dioxide Diffusion Resistance*

One specimen, cut from the sheet of Plyload GR, (specimen no. 144649/2) was sealed in a circular steel rig such that both faces were exposed. Carbon dioxide (15% in oxygen) at a known pressure and flow rate was passed over one face of the membrane 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.

* In-House Test Procedure TP950/05/13569 Issue 1.

3. RESULTS

The results of the analyses are tabulated below.

CARBON DIOXIDE DIFFUSION RESISTANCE

Coating System Name	Plyload GR
TW Specimen No.	144649/2
D_{CO_2} (cm^2s^{-1})	3.24×10^{-7}
μ -value	4.60×10^5
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_p value (R) greater than 50 metres.

The figures quoted above, indicate that Plyload GR 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