

4th September 2007

Mr Ian Bennet
Greys Artstone Ltd
BurwellWorks New Mill Road
Brockholes
Holmfirth
Huddersfield
West Yorkshire
HD9 7AZ

CERAM
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E-mail: enquiries@ceram.com
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Dear Mr Bennet

Re: Fibre-cement slates

Please find enclosed the results for your fibre cement slates.

Accompanying this letter are the results for:

Density
Strength
Impermeability
Warm Water Soak
Soak dry cycling
Freeze thaw cycling

This completes the test programme for this material

If you have any questions please do not hesitate to contact me on 01782 764423.

Regards



Dr Martin O'Farrell

Materials Specialist
CBT



FOR IN PEOPLE

Mr Ian Bennet
Greys Artstone Ltd
Burdwell Works
New Mill Road
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E-mail: enquiries@ceram.com
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TEST REPORT

| | | |
|---------------------|---------------|---------|
| Clients Mark | Date Received | 14/3/07 |
| Your Reference | Date Tested | 17/5/07 |
| Lab Reference R2369 | Date Issued | 29/8/07 |

REPORT OF TESTS ON FIBRE CEMENT SLATES FOR IMPERMEABILITY IN ACCORDANCE WITH EN 492

1. Sample Mark

3 Fibre cement slates from Greys Artstone were supplied for analysis

2. Test Method

Testing of Impermeability has been undertaken in accordance with the test method specified in EN 492 Fibre Cement Slates and Fittings, Product Specification and Test Methods, in clause 7.3.3.

3. Results

After 24 hours of testing, the following results were recorded for the impermeability test for the concrete tiles submitted for testing.

It is a requirement of EN 492 that all tiles tested for impermeability should not have drops of water form on the underside of the tiles during the test period of 24 hours. Tiles that meet this requirement are deemed to have passed the impermeability test as specified in EN 492.

No drops were observed on the underside of the test samples after the 24 hour test period had elapsed.



3. Conclusion

It is a requirement in EN 492:2004 that all sample tiles conform to requirements for impermeability as specified in that standard.

The sample of tiles tested have met these criterion and can therefore be referred to as water impermeable.

(End of Test Report)

Authorised signatory:

A handwritten signature in black ink that reads "Martin O'Farrell". The signature is written in a cursive style with a large initial 'M'.

Dr Martin O'Farrell

Mr Ian Bennet
Greys Artstone Ltd
Burdwell Works
New Mill Road
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TEST REPORT

Clients Mark
Your Reference
Lab Reference R2369

Date Received 14/3/07
Date Tested 21/3/07 – 11/5/07
Date Issued 29/8/07

EN 492 DETERMINATION OF FREEZE/THAW RESISTANCE OF FIBRE CEMENT SLATES.

1. Samples.

Testing was undertaken on samples of fibre cement slates referred to as fibre cement slates.

2. Test Procedure.

The samples were tested in accordance with clause 7.4.1 of *BS EN 492 Fibre Cement Slates and Fittings, Product Specification and Test Methods*.

The test involves cutting 10 pairs of samples of suitable dimension from 10 slates, 20 pieces in total. Of each set of paired samples, half were used as a control lot, the other the test lot.

The control lot were then tested for "bend strength" in accordance with clause 7.3.2 of BS EN 492. The results of which are regarded as the "**Before**" set.

The test lot were conditioned by immersion in a water bath at ambient temperature (<5°C) for 48h. Following conditioning the test pieces were placed in a freezing cabinet and the temperature reduced to $(-20 \pm 4)^\circ\text{C}$ over a period of 1-2 hours and held at this temperature for a further 1 hour. The test pieces were then thawed in water, which reached a temperature of $20 \pm 4^\circ\text{C}$ over a period of 1-2 hours and held at this temperature for a further 1 hour.

After 100 cycles the test pieces are conditioned and tested for bend strength as described in clause 7.3.2. These are regarded as the "**After**" set.



3. Results.

The results of the flexural strength tests before and after freeze/thaw testing are given in Table 1 below.

| Before (M_{fci}) | | After (M_{fi}) | | $R_i (=M_{fi}/M_{fci})$ | |
|----------------------|------------|--------------------|------------|-------------------------|-------|
| Sample | MOR (MPa)* | Sample | MOR (MPa)* | Sample | R_i |
| 1 | 65 | 1 | 37 | 1 | 0.57 |
| 2 | 41 | 2 | 66 | 2 | 1.61 |
| 3 | 69 | 3 | 63 | 3 | 0.91 |
| 4 | 70 | 4 | 43 | 4 | 0.61 |
| 5 | 36 | 5 | 81 | 5 | 2.25 |
| 6 | 52 | 6 | 73 | 6 | 1.40 |
| 7 | 66 | 7 | 36 | 7 | 0.55 |
| 8 | 46 | 8 | 77 | 8 | 1.67 |
| 9 | 60 | 9 | 44 | 9 | 0.73 |
| 10 | 45 | 10 | 52 | 10 | 1.16 |
| | | | | Mean | 1.15 |
| | | | | SD | 0.58 |

R_L

0.81311096

Result:
Pass

*Test certificates are included at the end of this report

Table 1.

4. Conclusion.

BS EN 492 states that R_L should not be less than 0.75 in order for the product to satisfy the requirements of the freeze thaw test.

From the tests carried out it has been determined that the fibre cement slate tested has **passed** the requirements of the freeze thaw test in accordance with BS EN 492.

(End of Test Report)

Authorised Signature



Dr Martin O'Farrell

Authorised Signature

Mr Ian Bennet
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www.ceram.com/building

TEST REPORT

| | | |
|---------------------|---------------|-------------------|
| Clients Mark | Date Received | 14/3/07 |
| Your Reference | Date Tested | 21/3/07 – 05/6/07 |
| Lab Reference R2369 | Date Issued | 29/8/07 |

EN 492 DETERMINATION OF WARM WATER RESISTANCE OF FIBRE CEMENT SLATES.

1. Samples.

Testing was undertaken on samples of fibre cement slates referred to as fibre cement slates.

2. Test Procedure.

The samples were tested in accordance with clause 7.3.4 of *BS EN 492 Fibre Cement Slates and Fittings, Product Specification and Test Methods*.

The test involves cutting 10 pairs of samples of suitable dimension from 10 slates, 20 pieces in total. Of each set of paired samples, half were used as a control lot, the other the test lot.

The control lot were then tested for "bend strength" in accordance with clause 7.3.2 of BS EN 492. The results of which are regarded as the "**Before**" set.

The test lot were conditioned by immersion in a warm water bath at $(60\pm 2)^{\circ}\text{C}$ for (56 ± 2) days. The test pieces were then conditioned and tested for bend strength as described in clause 7.3.2. These are regarded as the "**After**" set.



3. Results.

The results of the flexural strength tests before and after warm water testing are given in Table 1 below.

| Before (M_{fci}) | | After (M_{fi}) | | $R_i (=M_{fi}/M_{fci})$ | |
|----------------------|------------|--------------------|------------|-------------------------|-------|
| Sample | MOR (MPa)* | Sample | MOR (MPa)* | Sample | R_i |
| 1 | 80 | 1 | 113 | 1 | 1.41 |
| 2 | 103 | 2 | 189 | 2 | 1.83 |
| 3 | 81 | 3 | 151 | 3 | 1.86 |
| 4 | 91 | 4 | 118 | 4 | 1.30 |
| 5 | 97 | 5 | 120 | 5 | 1.24 |
| 6 | 130 | 6 | 97 | 6 | 0.75 |
| 7 | 75 | 7 | 107 | 7 | 1.43 |
| 8 | 95 | 8 | 80 | 8 | 0.84 |
| 9 | 94 | 9 | 122 | 9 | 1.30 |
| 10 | 64 | 10 | 83 | 10 | 1.30 |
| | | | | Mean | 1.33 |
| | | | | SD | 0.36 |

R_L 1.11845072

Result:
Pass

*Test certificates are included at the end of this report

Table 1.

4. Conclusion.

BS EN 492 states that R_L should not be less than 0.75 in order for the product to satisfy the requirements of the warm water test.

From the tests carried out it has been determined that the fibre cement slate tested has **passed** the requirements of the warm water test in accordance with *BS EN 492*.

(End of Test Report)

Authorised Signature



Dr Martin O'Farrell

Authorised Signature

Results.

The results of the flexural strength tests before and after soak dry testing are given in Table 1 below.

| Before (M_{fci}) | | After (M_{fi}) | | $R_i (=M_{fi}/M_{fci})$ | |
|----------------------|------------|--------------------|------------|-------------------------|-------|
| Sample | MOR (MPa)* | Sample | MOR (MPa)* | Sample | R_i |
| 1 | 41.0 | 1 | 67.0 | 1 | 1.63 |
| 2 | 30.0 | 2 | 64.0 | 2 | 2.13 |
| 3 | 47.0 | 3 | 60.0 | 3 | 1.28 |
| 4 | 34.0 | 4 | 99.0 | 4 | 2.91 |
| 5 | 43.0 | 5 | 54.0 | 5 | 1.26 |
| 6 | 39.0 | 6 | 54.0 | 6 | 1.38 |
| 7 | 33.0 | 7 | 81.0 | 7 | 2.45 |
| 8 | 34.0 | 8 | 103.0 | 8 | 3.03 |
| 9 | 31.0 | 9 | 107.0 | 9 | 3.45 |
| 10 | 59.0 | 10 | 54.0 | 10 | 0.92 |
| | | | | Mean | 2.04 |
| | | | | SD | 0.88 |

R_L 1.53433389

Result:
Pass

*Test certificates are included at the end of this report

Table 1.

3. Conclusion.

BS EN 492 states that R_L should not be less than 0.75 in order for the product to satisfy the requirements of the soak dry test.

From the tests carried out it has been determined that the fibre cement slate tested has passed the requirements of the soak dry test in accordance with BS EN 492.

(End of Test Report)

Authorised Signature



Dr Martin O'Farrell

Authorised Signature

3. Conclusion

The results indicate that the samples supplied for test satisfy the requirements for a Class B product.

(End of Test Report)

Authorised signatory:

A handwritten signature in black ink, appearing to read "Martin O'Farrell". The signature is written in a cursive style with a large initial 'M'.

Dr Martin O'Farrell

Authorised Signature

Freeze Thaw

YOUR PARTNER IN MATERIALS AND TECHNOLOGY

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PHYSICAL TESTING REPORT

Greys Artstone Ltd
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Brockholes
Holmfirth
Huddersfield
West Yorkshire
HD9 7AZ
FAO: I Bennet

REPORT OF TESTS ON: Fibre Cement Slates

Your Reference: Freeze Thaw Before

CERAM Reference: (071579)-7665

Date Reported 16-May-2007

Order Number: BT07089TLO

Date Logged 21-Mar-2007

Date(s) of Test(s): 21-Mar-2007 to 11-May-2007

Determination of Bending Moment of Rupture

BSEN 492: 2004

| No. | Mean of Two Directions | Weaker Direction |
|------|------------------------|------------------|
| | Nm/m | Nm/m |
| 1 | 65 | 63 |
| 2 | 41 | 29 |
| 3 | 69 | 61 |
| 4 | 70 | 58 |
| 5 | 36 | 28 |
| 6 | 52 | 35 |
| 7 | 66 | 51 |
| 8 | 46 | 25 |
| 9 | 60 | 36 |
| 10 | 45 | 29 |
| Mean | 55 | 42 |

Span: 200 mm

Class: Class B

Sample Compliance: The sample COMPLIES with Class B as given in Table 1 of the above standard

End of Test Report


S Hall
Authorised Signatory



PHYSICAL TESTING REPORT

Greys Artstone Ltd
Burdwell Works New Mill Road
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Holmfirth
Huddersfield
West Yorkshire
HD9 7AZ
FAO: I Bennet

REPORT OF TESTS ON: Fibre Cement Slates

Your Reference: Freeze Thaw After

CERAM Reference: (071579)-7666

Date Reported 16-May-2007

Order Number: BT07089TLO

Date Logged 21-Mar-2007

Date(s) of Test(s): 21-Mar-2007 to 11-May-2007

Determination of Bending Moment of Rupture

BSEN 492: 2004

| No. | Mean of Two Directions Nm/m | Weaker Direction Nm/m |
|------|--------------------------------|--------------------------|
| 1 | 37 | 23 |
| 2 | 66 | 64 |
| 3 | 63 | 42 |
| 4 | 43 | 30 |
| 5 | 81 | 76 |
| 6 | 73 | 72 |
| 7 | 36 | 23 |
| 8 | 77 | 69 |
| 9 | 44 | 24 |
| 10 | 52 | 44 |
| Mean | 57 | 47 |

Span: 200 mm

Class: Class B

Sample Compliance: The sample COMPLIES with Class B as given in Table 1 of the above standard

End of Test Report



PHYSICAL TESTING REPORT

Greys Artstone Ltd
Burdwell Works New Mill Road
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HD9 7AZ
FAO: I Bennet

REPORT OF TESTS ON: Fibre Cement Slates

Your Reference: Tile Only

CERAM Reference: (071579)-7660

Date Reported 04-Sep-2007

Order Number:

BT07089TLO

Date Logged 21-Mar-2007

Date(s) of Test(s):

21-Mar-2007 to 05-Jun-2007

Determination of Bending Moment of Rupture

BSEN 492: 2004

| No. | Mean of Two Directions | Weaker Direction |
|------|------------------------|------------------|
| | Nm/m | Nm/m |
| 1 | 94 | 42 |
| 2 | 77 | 33 |
| Mean | 86 | 38 |

Span: 200 mm

End of Test Report



S Hall
Authorised Signatory



INVESTOR IN PEOPLE

PHYSICAL TESTING REPORT

Greys Artstone Ltd
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FAO: I Bennet

REPORT OF TESTS ON: Fibre Cement Slates**Your Reference:** Warm Water Soak Before**CERAM Reference:** (071579)-7661**Date Reported** 04-Sep-2007**Order Number:** BT07089TLO**Date Logged** 21-Mar-2007**Date(s) of Test(s):** 21-Mar-2007 to 05-Jun-2007**Determination of Bending Moment of Rupture**

BSEN 492: 2004

| No. | Mean of Two Directions | Weaker Direction |
|------|------------------------|------------------|
| | Nm/m | Nm/m |
| 1 | 80 | 37 |
| 2 | 103 | 46 |
| 3 | 81 | 27 |
| 4 | 91 | 41 |
| 5 | 97 | 46 |
| 6 | 130 | 60 |
| 7 | 75 | 25 |
| 8 | 95 | 45 |
| 9 | 94 | 39 |
| 10 | 64 | 20 |
| Mean | 91 | 39 |

Span: 200 mm

End of Test Report


S Hall
Authorised Signatory

PHYSICAL TESTING REPORT

Greys Artstone Ltd
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Brockholes
Holmfirth
Huddersfield
West Yorkshire
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FAO: I Bennet

REPORT OF TESTS ON: Fibre Cement Slates

Your Reference: Warm Water Soak After

CERAM Reference: (071579)-7662

Date Reported: 04-Sep-2007

Order Number:

BT07089TLO

Date Logged: 21-Mar-2007

Date(s) of Test(s):

21-Mar-2007 to 05-Jun-2007

Determination of Bending Moment of Rupture

BSEN 492: 2004

| No. | Mean of Two Directions Nm/m | Weaker Direction Nm/m |
|------|--------------------------------|--------------------------|
| 1 | 113 | 44 |
| 2 | 189 | 83 |
| 3 | 151 | 66 |
| 4 | 118 | 56 |
| 5 | 120 | 52 |
| 6 | 97 | 32 |
| 7 | 107 | 53 |
| 8 | 80 | 36 |
| 9 | 122 | 55 |
| 10 | 83 | 36 |
| Mean | 118 | 51 |

Span: 200 mm

End of Test Report


S Hall
Authorised Signatory



PHYSICAL TESTING REPORT

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HD9 7AZ
FAO: I Bennet

REPORT OF TESTS ON: Fibre Cement Slates

Your Reference: Soak Dry Before

CERAM Reference: (071579)-7663

Date Reported 08-Aug-2007

Order Number:

BT07089TLO

Date Logged 21-Mar-2007

Date(s) of Test(s):

21-Mar-2007 to 23-Jul-2007

Determination of Bending Moment of Rupture

BSEN 492: 2004

| No. | Mean of Two Directions Nm/m | Weaker Direction Nm/m |
|------|--------------------------------|--------------------------|
| 1 | 41 | 28 |
| 2 | 30 | 24 |
| 3 | 47 | 44 |
| 4 | 34 | 30 |
| 5 | 43 | 32 |
| 6 | 39 | 33 |
| 7 | 33 | 26 |
| 8 | 34 | 33 |
| 9 | 31 | 29 |
| 10 | 59 | 55 |
| Mean | 39 | 33 |

Span: 200 mm

End of Test Report


S Hall
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PHYSICAL TESTING REPORT

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Holmfirth
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West Yorkshire
HD9 7AZ
FAO: I Bennet

REPORT OF TESTS ON: Fibre Cement Slates

Your Reference: Soak Dry After

CERAM Reference: (071579)-7664

Date Reported 08-Aug-2007

Order Number:

BT07089TLO

Date Logged 21-Mar-2007

Date(s) of Test(s):

21-Mar-2007 to 23-Jul-2007

Determination of Bending Moment of Rupture

BSEN 492: 2004

| No. | Mean of Two Directions | Weaker Direction |
|------|------------------------|------------------|
| | Nm/m | Nm/m |
| 1 | 67 | 57 |
| 2 | 64 | 58 |
| 3 | 60 | 56 |
| 4 | 99 | 91 |
| 5 | 54 | 40 |
| 6 | 54 | 40 |
| 7 | 81 | 64 |
| 8 | 103 | 99 |
| 9 | 107 | 107 |
| 10 | 54 | 37 |
| Mean | 74 | 65 |

Span: 200 mm

End of Test Report



S Hall
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INVESTOR IN PEOPLE

PHYSICAL TESTING REPORT

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Burdwell Works New Mill Road
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FAO: I Bennet

REPORT OF TESTS ON: Fibre Cement Slates

Your Reference: Freeze Thaw Before

CERAM Reference: (071579)-7665

Date Reported 16-May-2007

Order Number: BT07089TLO

Date Logged 21-Mar-2007

Date(s) of Test(s): 21-Mar-2007 to 11-May-2007

Determination of Bending Moment of Rupture

BSEN 492: 2004

| No. | Mean of Two Directions | Weaker Direction |
|------|------------------------|------------------|
| | Nm/m | Nm/m |
| 1 | 65 | 63 |
| 2 | 41 | 29 |
| 3 | 69 | 61 |
| 4 | 70 | 58 |
| 5 | 36 | 28 |
| 6 | 52 | 35 |
| 7 | 66 | 51 |
| 8 | 46 | 25 |
| 9 | 60 | 36 |
| 10 | 45 | 29 |
| Mean | 55 | 42 |

Span: 200 mm

Class: Class B

Sample Compliance: The sample COMPLIES with Class B as given in Table 1 of the above standard

End of Test Report



S Hall
Authorised Signatory



PHYSICAL TESTING REPORT

Greys Artstone Ltd
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HD9 7AZ
FAO: I Bennet

REPORT OF TESTS ON: Fibre Cement Slates

Your Reference: Freeze Thaw After

CERAM Reference: (071579)-7666

Date Reported 16-May-2007

Order Number: BT07089TLO

Date Logged 21-Mar-2007

Date(s) of Test(s): 21-Mar-2007 to 11-May-2007

Determination of Bending Moment of Rupture

BSEN 492: 2004

| No. | Mean of Two Directions | Weaker Direction |
|------|------------------------|------------------|
| | Nm/m | Nm/m |
| 1 | 37 | 23 |
| 2 | 66 | 64 |
| 3 | 63 | 42 |
| 4 | 43 | 30 |
| 5 | 81 | 76 |
| 6 | 73 | 72 |
| 7 | 36 | 23 |
| 8 | 77 | 69 |
| 9 | 44 | 24 |
| 10 | 52 | 44 |
| Mean | 57 | 47 |

Span: 200 mm

Class: Class B

Sample Compliance: The sample COMPLIES with Class B as given in Table 1 of the above standard

End of Test Report



S Hall
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YOUR PARTNER IN MATERIALS AND TECHNOLOGY

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PHYSICAL TESTING REPORT

Determination of Bulk Density

REPORT OF TESTS ON: Fibre Cement Slate

Your Reference:

CERAM Reference: (072762)-14440

Date Reported 11-Jun-2007

Order Number: BT07089TLO

Date Logged 18-May-2007

Date(s) of Test(s): 31-May-2007 to 04-Jun-2007

Please find attached the results for the sample(s) recently submitted for analysis.

Opinions and interpretations expressed herein are outside the scope of UKAS Accreditation.

S Hall
Authorised Signatory



CERAM TEST RESULTS

Your Reference: Fibre Cement Slate
CERAM Reference: (072762) – 14440

Determination of Apparent Density BSEN 492 : 2004 (E)

Results

| Sample | Apparent density (g/cm ³) | Bulk density (g/cm ³) |
|--------|---------------------------------------|-----------------------------------|
| 1 | 2.53 | 1.90 |
| 2 | 2.52 | 1.89 |
| 3 | 2.52 | 1.89 |
| Mean | 2.52 | 1.89 |

End of Test Report

Page 2 of 2



S Hall
Authorised Signatory

MANUFACTURERS GUARANTEE

Greys Artstone Ltd provides a 25 year guarantee on all its roofing products for all materials supplied after the 1st June 2004, when all Greys Artstone products achieved the British Standard for durability and strength. These Standards can be viewed on our website.
All materials supplied before this date were subject to a 10 years manufacturers guarantee.
Guarantee evidence is required of purchase invoice or written guarantee that would have been provided on request.