

CERAM  
Queens Road, Penkhull  
Stoke-on-Trent  
ST4 7LQ England

Tel: +44 (0) 1782 764444

Fax: +44 (0) 1782 412331

E-mail: enquiries@ceram.com

www.ceram.com

H G MATTHEWS  
BELLINGDON BRICK WORKS  
BELLINGDON  
CHESHAM  
BUCKS.  
HP5 2UR  
FAO : J MATTHEWS

REPORT OF TESTS ON BRICKS

Your Reference LIGHT MULTI  
Ceram Sample(s) 604010969

Date Reported 10-Jun-04 Order/Job No NONE  
Date Received 21-May-04 Date(s) of Test(s) 25-May/04-Jun-04

**DETERMINATION OF COMPRESSIVE STRENGTH**

Tested in accordance with BS EN 772-1: 2000

No.	Brick		Frog		Load kN	Compressive Strength N/mm <sup>2</sup>
	Length mm	Width mm	Length mm	Width mm		
1	213.5	101.5	160	48	236.1	16.9
2	214.5	101.5	160	46	294.8	20.5
3	214.0	101.5	178	47	261.3	19.6
4	214.5	101.0	161	47	316.0	22.4
5	215.0	102.0	160	46	239.1	16.7
6	210.0	101.0	161	47	236.1	17.3
7	215.5	101.5	162	47	297.2	20.9
8	211.0	101.5	159	47	234.1	16.8
9	210.0	100.0	156	47	271.6	19.9
10	214.5	101.0	160	45	308.3	21.3
Mean	213	101	162	47	269.5	19.2

Name of organisation carrying out sampling = HG Matthews  
Method of sampling = Not supplied  
Method of conditioning = Dried at 105°C  
Method of preparation = Surface ground  
Orientation of loading = Bed face  
Coefficient of variation = 11.3%

End of Test Report



S Hall  
Authorised Signatory

CERAM  
Queens Road, Penkhull  
Stoke-on-Trent  
ST4 7LQ England

Tel: +44 (0) 1782 764444

Fax: +44 (0) 1782 412331

E-mail: enquiries@ceram.com

www.ceram.com

H G MATTHEWS  
BELLINGDON BRICK WORKS  
BELLINGDON  
CHESHAM  
BUCKS.  
HP5 2UR  
FAO : J MATTHEWS

REPORT OF TESTS ON BRICKS

Your Reference LIGHT MULTI  
Ceram Sample(s) 604010969

Date Reported 10-Jun-04 Order/Job No NONE  
Date Received 21-May-04 Date(s) of Test(s) 21/25-May-04

### DETERMINATION OF WATER ABSORPTION

Tested in accordance with BS EN 771-1: 2001 (Annex C)  
(Clay masonry units by submerging in water)

No.	Dry Weight (g)	Saturated Weight After 24 Hr Soak (g)	Water Absorption %
1	2198	2496	13.6
2	2177	2446	12.4
3	2156	2428	12.6
4	2171	2434	12.1
5	2211	2512	13.6
6	2099	2386	13.7
7	2214	2489	12.4
8	2149	2439	13.5
9	2102	2374	12.9
10	2153	2418	12.3
Mean	2163	2442	12.9

#### Notes

Name of organisation carrying out sampling: HG Matthews  
Method of sampling: Not supplied

End of Test Report



S Hall  
Authorised Signatory

Page No. 1 of 1

CERAM  
Queens Road, Penkhull  
Stoke-on-Trent  
ST4 7LQ England

Tel: +44 (0) 1782 764444  
Fax: +44 (0) 1782 412331  
E-mail: enquiries@ceram.com  
www.ceram.com

H G MATTHEWS  
BELLINGDON BRICK WORKS  
BELLINGDON  
CHESHAM  
BUCKS.  
HP5 2UR  
FAO : J MATTHEWS

REPORT OF TESTS ON BRICKS

Your Reference                      LIGHT MULTI  
Ceram Sample(s)                    604010969

Date Reported            07-Jun-04                      Order/Job No                      NONE  
Date Received            21-May-04                      Date(s) of Test(s)                28-May/03-Jun-04

DETERMINATION OF THE ACTIVE SOLUBLE SALTS  
CONTENT OF CLAY MASONRY UNITS


BS EN 772-5: 2001 with ICP Finish

		%
Active Magnesium Mg <sup>2+</sup>	=	<0.005
Active Sodium Na <sup>+</sup>	=	<0.005
Active Potassium K <sup>+</sup>	=	<0.005
Sodium + Potassium (Na <sup>+</sup> + K <sup>+</sup> )	=	<0.01
Magnesium Mg <sup>2+</sup>	=	<0.01

The sample classification is S2.

The above results are the mean of duplicate determinations.

End of Test Report

  
Dr K M Johnson  
Authorised Signatory

Page No. 1 of 1



CERAM  
Queens Road, Penkhull  
Stoke-on-Trent  
ST4 7LQ England

Tel: +44 (0) 1782 764444

Fax: +44 (0) 1782 412331

E-mail: enquiries@ceram.com

www.ceram.com

H G MATTHEWS  
BELLINGDON BRICK WORKS  
BELLINGDON  
CHESHAM  
BUCKS.  
HP5 2UR  
FAO : J MATTHEWS

REPORT OF TESTS ON BRICKS

Your Reference LIGHT MULTI  
Ceram Sample(s) 604010969

Date Reported 10-Jun-04 Order/Job No NONE  
Date Received 21-May-04 Date(s) of Test(s) 21/24-May-04

**DETERMINATION OF INITIAL RATE OF WATER ABSORPTION**

Tested in accordance with BS EN 772-11: 2000 (Clay Masonry Units)

No.	Initial Rate of Water Absorption kg/(m <sup>2</sup> x min)
1	4.7
2	4.5
3	4.2
4	4.6
5	4.7
6	4.5
7	4.2
8	4.6
9	4.7
10	4.3
Mean	4.5

**Notes**

Name of organisation carrying out sampling: HG Matthews  
Method of sampling: Not supplied

End of Test Report



S Hall  
Authorised Signatory

Page No. 1 of 1

CERAM  
Queens Road, Penkhull  
Stoke-on-Trent  
ST4 7LQ England

Tel: +44 (0) 1782 764444

Fax: +44 (0) 1782 412331

E-mail: enquiries@ceram.com

www.ceram.com

H G MATTHEWS  
BELLINGDON BRICK WORKS  
BELLINGDON  
CHESHAM  
BUCKS.  
HP5 2UR  
FAO : J MATTHEWS

REPORT OF TESTS ON BRICKS

Your Reference LIGHT MULTI  
Ceram Sample(s) 604010969

Date Reported 10-Jun-04 Order/Job No NONE  
Date Received 21-May-04 Date(s) of Test(s) 21-May-04

**DETERMINATION OF DIMENSIONS**

Tested in accordance with BS EN 772-16: 2000

No.	Length mm	Width mm	Height mm
1	213.5	101.5	68.5
2	214.5	101.5	67.5
3	214.0	101.5	66.5
4	214.5	101.0	67.0
5	215.0	102.0	68.0
6	210.0	101.0	67.0
7	215.0	101.5	68.5
8	211.0	101.5	68.0
9	210.0	100.0	67.0
10	214.5	101.0	67.5
Mean	213	101	68

**Notes**

Name of organisation carrying out sampling: HG Matthews  
Method of sampling: Not supplied  
Method of measurement: B  
Measuring device: Digital calipers  
Precision of measuring device: Two decimal places

End of Test Report



S Hall  
Authorised Signatory

Page No. 1 of 1

CERAM  
Queens Road, Penkhull  
Stoke-on-Trent  
ST4 7LQ England

Tel: +44 (0) 1782 764444

Fax: +44 (0) 1782 412331

E-mail: enquiries@ceram.com

www.ceram.com

H G MATTHEWS  
BELLINGDON BRICK WORKS  
BELLINGDON  
CHESHAM  
BUCKS.  
HP5 2UR  
FAO : J MATTHEWS

REPORT OF TESTS ON BRICKS

Your Reference LIGHT MULTI  
Ceram Sample(s) 604010969

Date Reported 10-Jun-04 Order/Job No NONE  
Date Received 21-May-04 Date(s) of Test(s) 21/25-May-04

DETERMINATION OF NET VOLUME AND PERCENTAGE OF VOIDS OF  
CLAY MASONRY UNITS BY HYDROSTATIC WEIGHING

Tested in accordance with BS EN 772-3: 1998

No.	Net Volume 10 <sup>4</sup> mm <sup>3</sup>	Voids %
1	128	14
2	126	14
3	125	13
4	126	13
5	129	13
6	122	14
7	129	13
8	125	14
9	122	13
10	125	14
Mean	126	14

Notes

Name of organisation carrying out sampling: HG Matthews  
Method of sampling: Not supplied.

End of Test Report



S Hall  
Authorised Signatory

Page No. 1 of 1



CERAM  
Queens Road, Penkhull  
Stoke-on-Trent  
ST4 7LQ England

Tel: +44 (0) 1782 764444  
Fax: +44 (0) 1782 412331  
E-mail: enquiries@ceram.com  
www.ceram.com

H G MATTHEWS  
BELLINGDON BRICK WORKS  
BELLINGDON  
CHESHAM  
BUCKS.  
HP5 2UR  
FAO : J MATTHEWS

REPORT OF TESTS ON BRICKS

Your Reference LIGHT MULTI  
Ceram Sample(s) 604010969

Date Reported 10-Jun-04 Order/Job No NONE  
Date Received 21-May-04 Date(s) of Test(s) 21/25-May-04

**DETERMINATION OF NET AND GROSS DRY DENSITY OF  
MASONRY UNITS (EXCEPT FOR NATURAL STONE)**

Tested in accordance with BS EN 772-13 : 2000

No.	Net Dry Density Kg/m <sup>3</sup>	Gross Dry Density Kg/m <sup>3</sup>
1	1710	1480
2	1720	1480
3	1720	1490
4	1720	1500
5	1710	1480
6	1710	1480
7	1720	1480
8	1710	1480
9	1720	1490
10	1720	1470
Mean	1720	1480

Note:

Name of organisation carrying out sampling: HG Matthews  
Method of sampling: Not supplied

End of Test Report



S Hall  
Authorised Signatory

Page No. 1 of 1

CERAM  
Queens Road, Penkhull  
Stoke-on-Trent  
ST4 7LQ England

Tel: +44 (0) 1782 764444

Fax: +44 (0) 1782 412331

E-mail: enquiries@ceram.com

www.ceram.com

H G MATTHEWS  
BELLINGDON BRICK WORKS  
BELLINGDON  
CHESHAM  
BUCKS.  
HP5 2UR  
FAO : J MATTHEWS

REPORT OF TESTS ON BRICKS

Your Reference LIGHT MULTI  
Ceram Sample(s) 604010969

Date Reported 10-Jun-04 Order/Job No NONE  
Date Received 21-May-04 Date(s) of Test(s) 24-May/07-Jun-04

DETERMINATION OF THERMAL CONDUCTIVITY AND  
WATER VAPOUR PERMEABILITY

(EN 1745: Annex A, Masonry and Masonry Products -  
Methods for Determining Design and Thermal Values)

$\lambda_{10, \text{Dry}}$ (W/mk)		Water Vapour Diffusion Coefficient
P = 50%	P = 90%	$\mu$
0.45	0.51	5/10

Taken from the tabulated values based on values determined from EN772-13: 2000.

End of Test Report



S Hall  
Authorised Signatory

Page No. 1 of 1



CERAM  
Queens Road, Penkhull  
Stoke-on-Trent  
ST4 7LQ England

**Tel:** +44 (0) 1782 746476

**Fax:** +44 (0) 1782 412331

**E-mail:** enquiries@ceram.com

**www.ceram.com/building**

## Test Report

H G Matthews  
The Brickworks  
Bellingdon  
Chesham  
Bucks  
HP5 2UR

**Clients Mark** Light Multi  
**Your Reference** Order Number -  
Jim Matthews  
**Date Received** 20 May 2004  
**Laboratory No.** SW172a/04;W4002  
**Date Tested** 27 May to 16 June 2004  
**Date Issued** 16 June 2004  
**Our Reference** H://SW172a/04;W4002

**F.A.O. Mr J Matthews**

### DETERMINATION OF FREEZE/THAW RESISTANCE OF CLAY MASONRY UNITS

#### 1. SAMPLES RECEIVED

<b>Name</b>	Light Multi	<b>Definitions</b>	
<b>Code</b>	.	<b>Material</b>	Clay
<b>Colour</b>	Red Multi	<b>Size</b>	215x102.5x65mm (Nominal)
<b>Finish</b>	Sanded Face	<b>Shape</b>	Regular
<b>Making</b>	.	<b>Features</b>	Single Frog
<b>No. Rec'd.</b>	40		

#### 2. TEST PROCEDURE

##### 2.1 Introduction

The test has been carried out in accordance with the draft European method prEn772-22 (April 2002) which involves subjecting a panel of brickwork to repeated freeze-thaw cycles designed to simulate naturally occurring conditions. From the test the bricks are given a freeze-thaw resistance classification which categorises the bricks as being suitable to withstand the following conditions:

- F2 – Severe Exposure
- F1 – Moderate Exposure
- F0 – Passive Exposure

The test method is summarised as follows:

Page 1 of 4 pages

## 2.2 Sample Preparation

Each unit was numbered and any existing defects on individual bricks noted before testing.

## 2.3 Construction of Test Panel

A panel of brickwork consisting of 10 courses of 3 bricks in half bond was built using a 1:4 by volume High Alumina Cement: Sand mortar with bucket handle tooled finish to the joint was constructed. The panel was then left to cure in ambient laboratory conditions for a minimum of 3 days before testing.

## 2.4 Freeze/Thaw Cycles

The panel was immersed in water at room temperature for 7 days before installation in a freeze-thaw apparatus which subjects the main face of the panel to repeated cycles of freezing and thawing following an initial freeze at an air temperature of  $-15^{\circ}\text{C}$  for 6 hours. The rear of the panel was insulated with a 50mm thick extruded polystyrene foam board and the sides insulated with a 25mm thick polystyrene board.

A freeze-thaw cycles consists of 120 minutes ( $\pm 5$  mins) of freezing to  $-15^{\circ}\text{C}$  ( $\pm 3^{\circ}\text{C}$ ) air temperature, heating with re-circulated warm air to  $20^{\circ}\text{C}$  ( $\pm 3^{\circ}\text{C}$ ) for 20 minutes, 2 minute flood coat spray at a water temperature of  $18-25^{\circ}\text{C}$  followed by a two minute drain period. This gives 10 cycles every 24 hours and a standard test will continue for 100 cycles.

## 2.5 Assessment of Freeze/Thaw Resistance

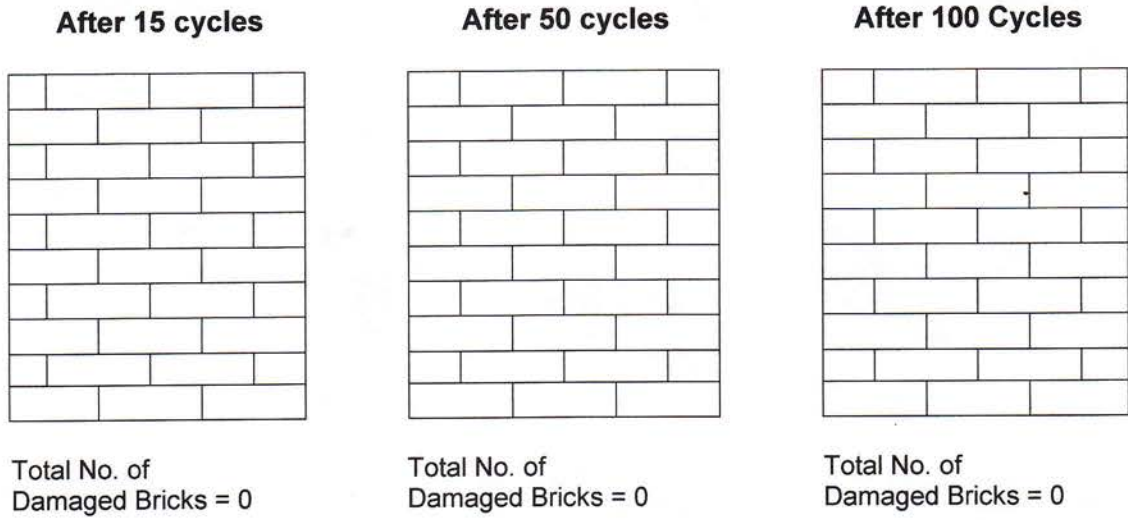
The panel was examined after 15 and 50 cycles. After 100 cycles the panel was allowed to thaw completely, removed from the apparatus and photographed (fig 1). The panel was then dismantled and individual bricks examined for frost damage as categorised in Table 1.

**TABLE 1.**

<b>Categories/Types of Damage</b>	<b>Type</b>
None	0
Crater (e.g. lime-burst)	1
Hair Crack $<0.15\text{mm}$	2
Minor crack	3
Surface crack	4
Through crack	5
Chipping, peeling, scaling	6
Fracture	7
Delamination	8

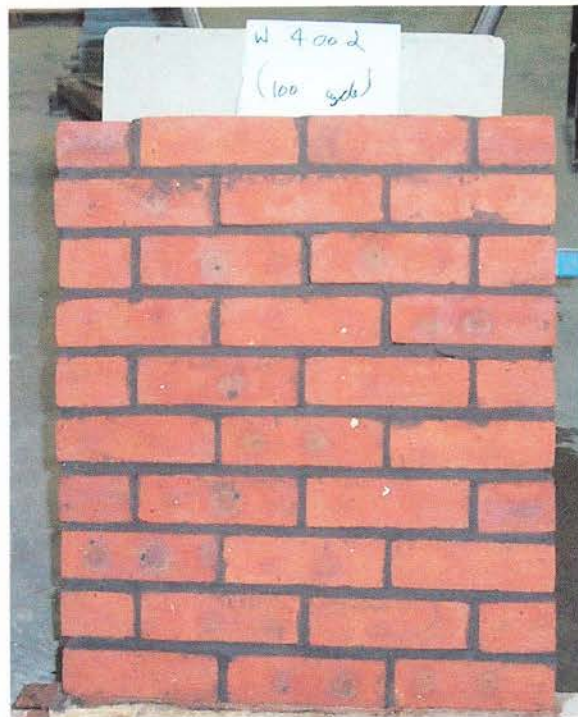
2.6 Results.

INCIDENCE OF DAMAGE



Incipient delamination detected by tapping the face of the panel with a metal rod is reported as **C** at 10 and 50 cycles if delamination is confirmed at 100 cycles

Figure 1



100



**3. CONCLUSIONS**

From the test carried out no damage greater than type 3 (see table1) was observed after 100 freeze-thaw cycles and therefore the bricks are classified as being F2 i.e. suitable for use in conditions of severe exposure.

Guidance on the type of masonry subject to severe exposure conditions is given In Appendix B3.2 of BS EN 771-1:2003 "Specifications for Clay Masonry Units"

Additional guidance may be offered by the manufacturer and the use of these bricks in specific situations.

**(End of Test Report).**

Authorised signatory:

  
Mrs L C Owen