



0013

## PHYSICAL TESTING ANALYSIS REPORT

**Description:** Determination of Frost Resistance

**Test Method:** In House Method based on prEN772-22

**Lucideon Reference:** (174717)-35110

**Client:** Norfolk Antique & Reclamation Centre Ltd  
Woolseys Farm  
Salhouse Road  
Panxworth  
NR13 6JH

**For the Attention of:** Mr. Frank Sykes

**Date Logged:** 12-Oct-2017

**Date of Tests:** 17-Oct-2017 to 15-Nov-2017

**Report Date:** 16-Nov-2017

**Purchase Order No.:** BACS

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.

**Miss Zoe Kinally**  
**Manager**

Lucideon Reference: (174717)-35110  
Customer Reference: BR2.5  
Description: Handmade Britannia Red Brick



## **DETERMINATION OF FREEZE/THAW RESISTANCE OF CLAY MASONRY UNITS (Tested in Accordance with DD/CEN/TS 772:22: 2006)**

### **1 SAMPLES RECEIVED**

35 x regular shaped, textured single frog clay bricks, as sampled by the client with dimensions of 215 x 102.5 x 65 mm.

### **2 TEST PROCEDURE**

#### **2.1 Introduction**

The test has been carried out in accordance with the European method DD CEN/TS EN 772-22: 2006, 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:

#### **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 to give a panel of approximate dimensions 740 x 660mm 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°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 cycle consists of 120 minutes ( $\pm 5$  mins) of freezing to -15°C ( $\pm 3^\circ\text{C}$ ) air temperature, heating with re-circulated warm air to 20°C ( $\pm 3^\circ\text{C}$ ) for 20 minutes, 2 minute flood coat spray at a water temperature of 18-25°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

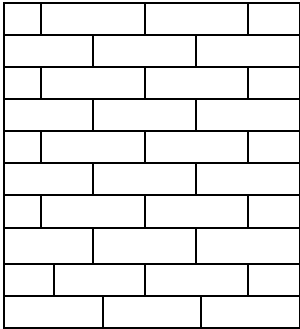
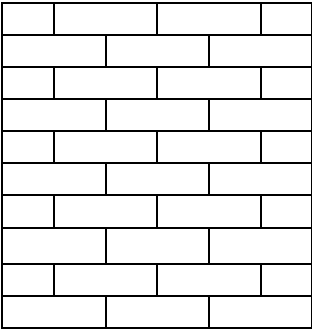
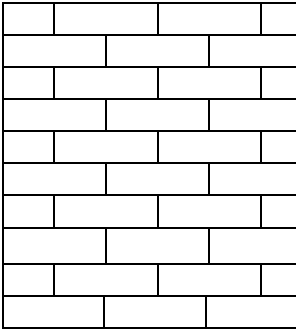
The panel was examined after 10 and 50 cycles. After 100 cycles the panel was allowed to thaw completely, removed from the apparatus and photographed. The panel was then dismantled and individual bricks examined for frost damage as categorised in Table 1.

**Table 1**

Categories/Types of Damage	Type
None	0
Crater (e.g. lime-burst)	1
Hair Crack $\leq 0.2\text{mm}$	2
Minor Crack	3
Surface Crack $> 0.2\text{mm}$	4
Through Crack	5
Chipping, Peeling, Scaling	6
Fracture	7
Spalling, Delamination	8

## 2.6 Results

### Incidence of Damage

After 10 Cycles	After 50 Cycles	After 100 Cycles
		
Total No. of Damaged Bricks = 0	Total No. of Damaged Bricks = 0	Total No. of Damaged Bricks = 0

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.

## 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 units 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 "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**