



# Test Report

## THERMAL CONDUCTIVITY OF LIME MORTAR

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**FOR**

Eden Lime Mortar  
Edenholme  
Great Musgrave  
Kirkby Stephen  
Cumbria  
CA17 4DP

For the attention of Tim Wells.

**IDENTIFICATION**

Authorised NPL quotation 2010120038 signed and dated by T. Wells on 6 December 2010. NPL specimen number QM398 was assigned to the specimen.

**BASIS OF TEST**


NPL thermal conductivity measurement procedure conforming to ISO 8302:1991 and EN 12664:2001.

**UNCERTAINTY**

The overall measurement uncertainty is estimated to be within  $\pm 5.0\%$ , based on a standard uncertainty multiplied by a coverage factor  $k=2$ , providing a level of confidence of approximately 95 %.

**Reference:** 2010120038/1

**Date of issue:** 28 January 2011

**Checked by:**  CS

**Signed:**



**Name:** Jeremy Wormington

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(Authorised Signatory)

on behalf of NPLML

# NATIONAL PHYSICAL LABORATORY

Continuation Sheet

## OBJECTIVE

To determine the thermal conductivity of a lime mortar specimen, as prepared by NPL from material supplied by the customer, at a mean temperature of 10 °C.

## SPECIMEN PREPARATION

The specimens were conditioned in an environment of 23 °C and 50 %RH for 8 days before testing, achieving a mass equilibrium of better than 0.1 % per 24 hours. The specimens were then wrapped in polyethylene film of approximately 0.01 mm thickness, to prevent further loss or gain of moisture during the test.

## MEASUREMENTS

The thermal conductivity was measured using a precision single-sided 305 mm guarded hot-plate (NPL VGHP), in which the specimen is mounted horizontally with the heat flow upwards. In this apparatus thermocouples and a differential thermocouple are used to monitor the temperature balance between the guard and metering area of the heater plate. Linear temperature gradient edge guards are also used to further minimise lateral heat flow from the metering area. The plate surfaces have a total hemispherical emittance of 0.9 and all the temperature sensors and electrical instruments used are calibrated with traceability to national standards.

The specimen moisture content during the test was determined by heating the specimen in a ventilated oven at 105 °C until its change in mass per 24 hours was less than 0.01 % by volume.

## RESULTS

The results, including the specimen details, are shown on the following page.

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Sample description: Eden Lime Mortar


Information regarding the specimen and measurement is given below.

<b>Specimen and Test Details</b>	
NPL specimen number	QM398
Mean length × width /mm	306.1 × 303.2
Mean thickness during test /mm	46.31
Mass as received /kg	2.442
Mass before test /kg	2.215
Mass after test /kg	2.215
Density during test /(kg/m <sup>3</sup> )	515.3
Mean moisture content by mass during test /%	3.7
Mean temperature difference /K	19.86
Mean density of heat flow rate /(W/m <sup>2</sup> )	48.7
Laboratory temperature /°C	23
Laboratory relative humidity /%RH	41 to 42
Name of operator	A. Simpkin

<b>Thermal Conductivity Result for QM398</b>	
Date of measurement	15/01/11
<b>Mean test temperature /°C</b>	<b>10.1</b>
<b>Thermal conductivity /(W/m·K)</b>	<b>0.113</b>

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