

The image features a dark blue background on the left side, which transitions into a white background on the right. A series of thin, yellow, curved lines sweep across the page from the top left towards the bottom right, creating a sense of motion and flow. The 'bre' logo is positioned on the blue background.

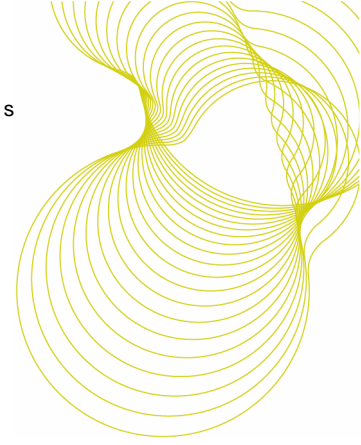
bre

**High speed wind and
rain tests on the
Manthorpe Dry Ridge
Tile System and the Roll-
out Tile Ridge system**

Prepared for: Mike Challinor
Manthorpe Building Products

14th May 2008

Test report number 245269



Prepared by

Name Dr P Blackmore
Position Associate Director, Building Technology Group
Date 4 June 2008

Signature 

Approved on behalf of BRE

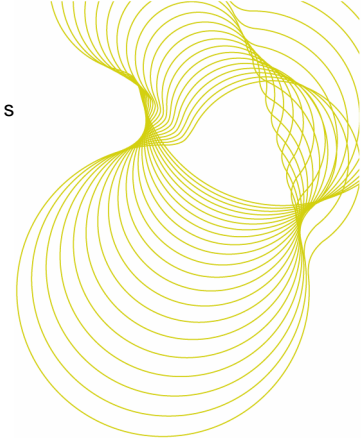
Name Mr D Richardson
Position Director, Building Technology Group
Date 4 June 2008

Signature 

BRE
Garston
WD25 9XX
T + 44 (0) 1923 664200
F + 44 (0) 1923 664096
E construction@bre.co.uk
www.bre.co.uk

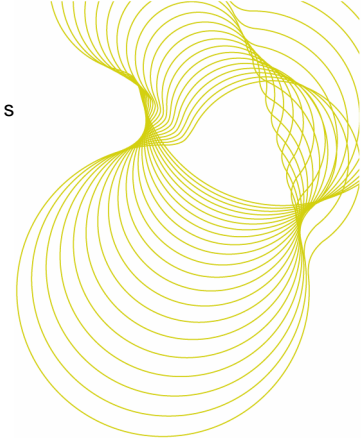
This report may only be distributed in its entirety and in accordance with the terms and conditions of the contract. Test results relate only to the items tested. BRE has no responsibility for the design, materials, workmanship or performance of the product or items tested. This report does not constitute an approval, certification or endorsement of the product tested.

This report is made on behalf of BRE. By receiving the report and action on it, the client – or any third party relying on it – accepts that no individual is personally liable in contract, tort or breach of statutory duty (including negligence).



Contents

1	Introduction	4
2	Details of tests carried out	5
3	Details of the test products	6
4	Test results	8
4.1	High Speed Testing	8
4.2	Driving rain testing	8
5	Summary	9

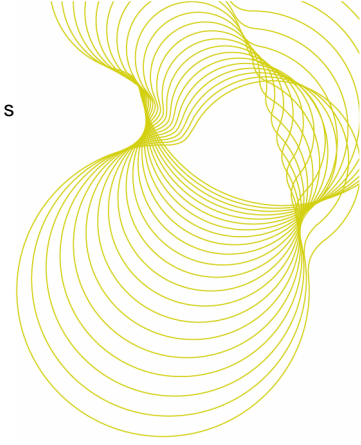


1 Introduction

This report details testing undertaken on 1st and 2nd April 2008 to assess the performance of the Manthorpe Dry Ridge Tile System and the Manthorpe Roll-out Tile Ridge system under high windspeed conditions and driving rain conditions. The testing was carried out at BRE, Bucknalls Lane, Watford, WD25 9XX, UK. The client for these tests was Manthorpe Building Products Ltd, Manthorpe House, Brittain Drive, Codnor Gate Business Park, Ripley, Derbyshire, DE5 3ND.

This testing is based on BRE Proposal No. 121729 dated 28th January 2007, which was accepted by Mr Mike Challinor of Manthorpe Building Products on 18th February 2008.

The testing was carried out at BRE as project CV1831 under the BRE Terms and Conditions for Testing. This report describes the work carried and the results obtained.



2 Details of tests carried out

The objective of the testing was to assess the performance of the Manthorpe Dry Ridge Tile System and the Manthorpe Roll-out Tile Ridge System under high wind speed conditions and under driving rain conditions. The test systems were installed on a 2m x 2m (plan dimensions) 35° pitch test roof which was mounted at the end of the BRE wind tunnel. The ridges were installed as they would be in practice, as detailed in the product information sheets and fixing instructions in Annex A. Marley Double Roman interlocking concrete tiles were used with both ridges.

2.1 High speed testing

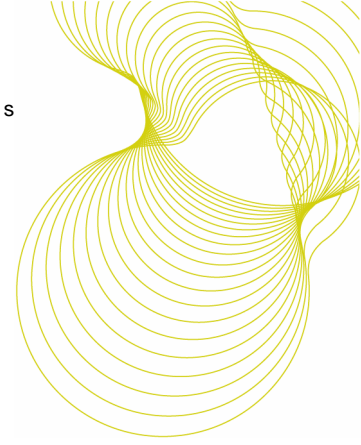
There is no defined procedure for testing of ridge systems such as these under wind loading. BS5534:2003 advises that dry roofing products such as verges, ridges, hips and valleys should not adversely affect the performance of a roof as laid. It is advised that for users to pay particular attention to the resistance to wind load of dry roofing products (Note 2 Clause 4.16.7).

It was decided in consultation with Manthorpe Building Products that the most appropriate approach would be to subject the ridges to high windspeeds to observe how they respond. This was done by mounting the test roof at the end of the BRE high speed wind tunnel. The roof was placed on a turntable so that it could be rotated to subject it to winds from a range of directions. For each wind direction tested, the wind speed was increased in increments until the maximum speed of the wind tunnel was reached. The wind speed was held at a constant value for a period of approximately 3 minutes at each step increment. A video of the testing was also produced.

2.2 Driving rain testing

Some indicative driving rain tests were carried out to determine the weathertightness performance of the two ridge systems. These tests were carried out on the duo-pitch roof specimens used for the high speed testing. There is no established driving rain test method for determining the performance of ridge tiles. There is a test method for determining the performance of tiles and slates in the main body of the roof [2], although this test method is not applicable to ridge tiles.

For these tests the wind and rain conditions were either representative of the wind-rain conditions used in the driving rain test method or more onerous.



3 Details of the test products

The ridges were installed by representatives from Manthorpe Building Products according to the manufacturers fixing specification (see Annex A). Each ridge was fixed to the test rig in turn as shown in Figures 1 and 2. The test roofs were laid with Marley Double Roman concrete tiles for both tests which were all head nailed and the verges were clipped. The Verges were sealed with polyurethane foam to provide a quick alternative to mortared verges.

Further photographs of the test specimens are included in Annex B.



Figure 1 Manthorpe Roll-out Tile Ridge System

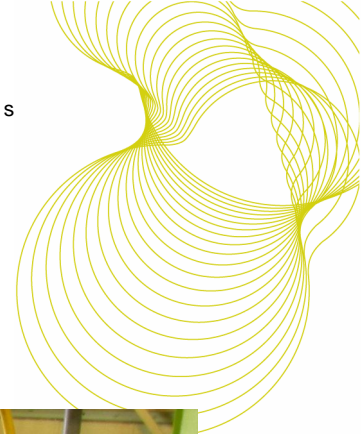
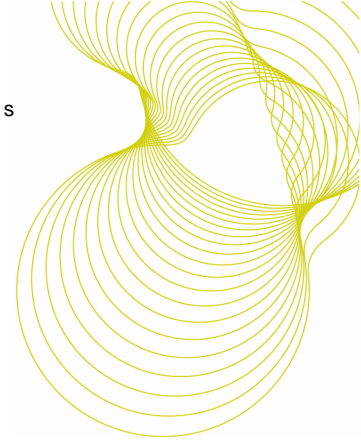


Figure 2 Manthorpe Dry Ridge Tile System



4 Test results

4.1 High Speed Testing

The ridges were tested with wind approaching from a range of wind direction. The two test specimens were tested with wind blowing on to the gable end (wind direction 0°), on to the corner at 45° and on to the eaves (wind direction 90°). Log sheets of the tests are given in Annex C. The testing was also filmed and the DVD chapter numbers for each of the tests are listed in Annex C for the appropriate test.

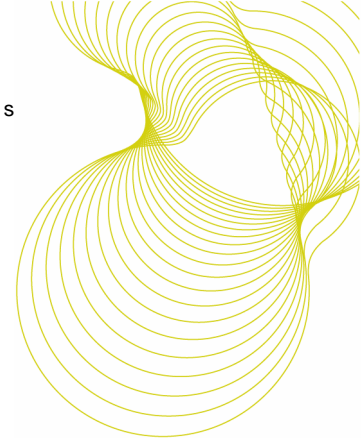
In all of the tests both the Manthorpe Dry Ridge Tile System and the Manthorpe Roll-out Tile Ridge System resisted the wind tunnel's maximum wind speed of 48.5m/s (108mph) without showing any signs of distress or damage. At the higher windspeeds the courses of tiles below the ridges were 'chattering' for winds from certain directions but there was no sign of movement of the ridges. At the completion of the testing the ridges and their fixings were visually inspected and all components and fixings were found to be in good order and completely undamaged.

To put a wind speed of 48.5m/s into context, from BS6399: Part 2 (the British Standard for wind loading on buildings) the design wind speed to be expected on a two-storey house in the London area in a fifty year design life would be of the order of 25m/s to 35m/s (depending on factors such as the roof height, distance to sea and distance from the edge of the town and the heights and spacing of surrounding buildings). For a similar house in a town in Scotland the design wind speed would vary from about 35m/s to 45m/s. These examples exclude the effects of topography and ground altitude. If the building is on the top of a steep hill then the wind speeds can be increased by up to 36%, wind speeds also increase by about 10% for every 100m increase in ground level. To determine the actual design wind speed at any particular site it is necessary to follow the procedures given in BS6399-2.

4.2 Driving rain testing

The test results from the driving rain test are given in Annex C. During the testing the wind was blowing on to the gable. The test conditions used are representative of actual wind- rain conditions and are shown in Annex C.

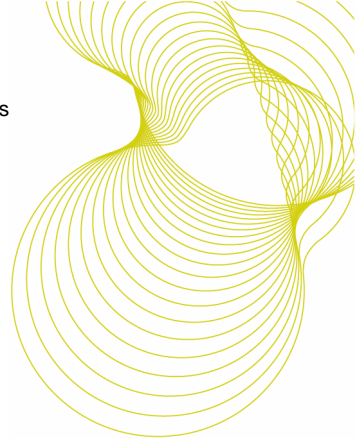
The roofs were tested with both driving rain and deluge conditions (heavy rain with no wind). During these tests neither the Dry Ridge Tile System or the Roll-out Tile Ridge System leaked. These tests are representative of actual wind-rain conditions expected on a real roof and show that under the wind-rain and deluge conditions applied neither of the two ridge systems would be expected to leak.



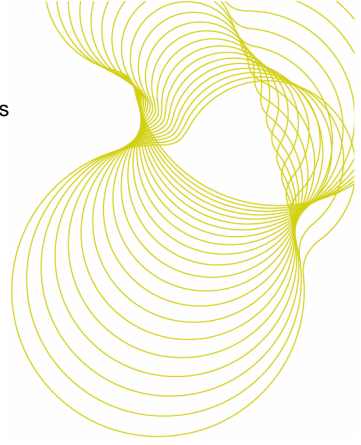
5 Summary

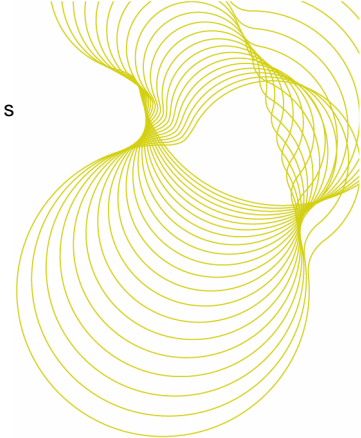
The results from these tests on the Manthorpe Dry Ridge Tile System and the Manthorpe Roll-out Tile Ridge System show that the ridges when fixed according to the manufacturers instructions will resist wind speeds of at least 48.5m/s without failing or demonstrating any other visible signs of distress. It is very likely that these ridge systems will be able to withstand higher wind speeds than the maximum applied during the testing, although this was not demonstrated in the testing because the maximum speed of the wind tunnel was reached.

The driving rain testing indicated that under the representative wind-rain conditions used for these tests, neither the Manthorpe Dry Ridge Tile System or the Manthorpe Roll-out Tile Ridge System leaked.



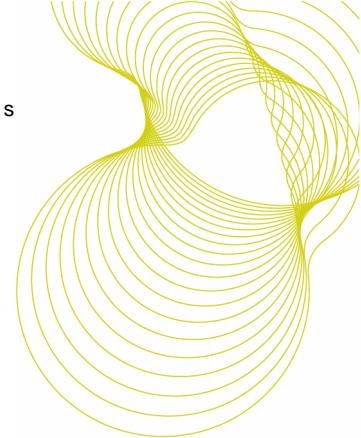
Annex A - Details of the Manthorpe Dry Verge System

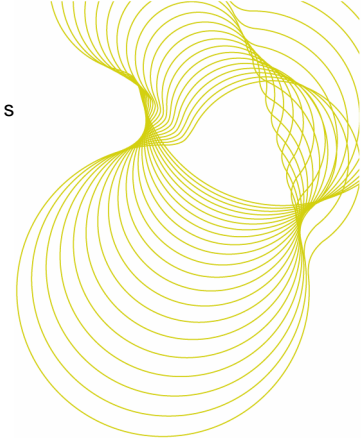


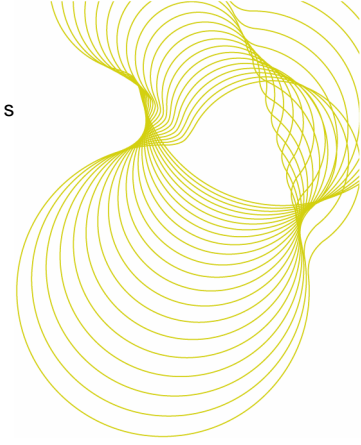


Annex B - Additional photographs of the test specimens







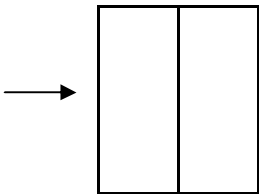


Annex C - Test Results

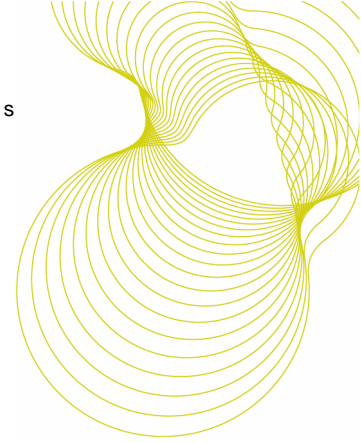
Annex C1 – High Speed Tests

Test 1 Manthorpe Dry Ridge Tile System

Head on. Arrow indicates wind direction.

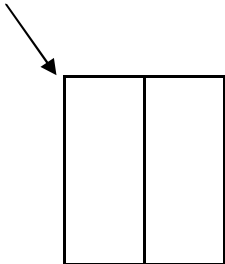


Chapter	Speed (m/s)	Time (min)	Comments
C1	10	3	No movement of ridge or tiles
C2	20	3	No movement of ridge or tiles
C3	30	3	No movement of ridge or tiles
C4	35	3	No movement of ridge or tiles
C5	40	5	Tiles second row from top in middle chattering slightly
C6	45-48	5	Tiles second row from top in middle chattering slightly



Test 2 Manthorpe Dry Ridge Tile System

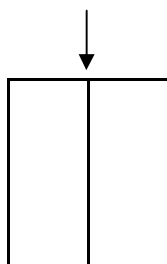
Wind direction 45°. Arrow indicates wind direction.



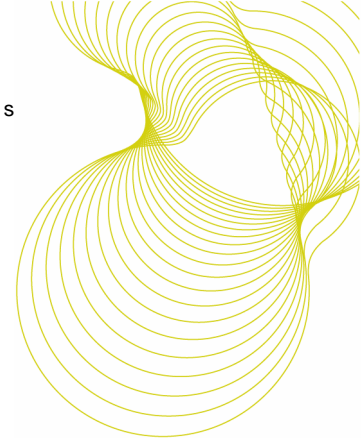
Chapter	Speed (m/s)	Time (min)	Comments
C7	10	30 SEC	No movement of ridge or tiles
C8	20	3	No movement of ridge or tiles
C9	30	3	No movement of ridge or tiles
C10	35	3	No movement of ridge or tiles
C11	40	5	No movement of ridge or tiles
C12	45	5	No movement of ridge or tiles
C13	48	5	Tiles second row from top in middle chattering slightly

Test 3 Manthorpe Dry Ridge Tile System

Wind direction 90°. Arrow indicates wind direction

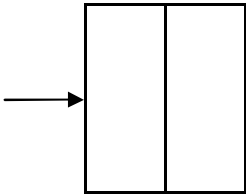


Chapter	Speed (m/s)	Time (min)	Comments
C14	10	1	No movement of ridge or tiles
C15	20	1	No movement of ridge or tiles
C16	30	2	No movement of ridge or tiles
C17	35	2	No movement of ridge or tiles
C18	40	2	No movement of ridge or tiles
C19	45	2	No movement of ridge or tiles
C20	48	2	No movement of ridge or tiles



Test 3 Manthorpe Roll-out Tile Ridge System

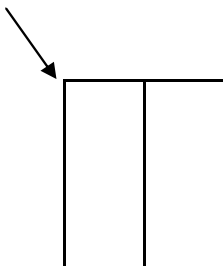
Wind direction 0°. Arrow indicates wind direction.



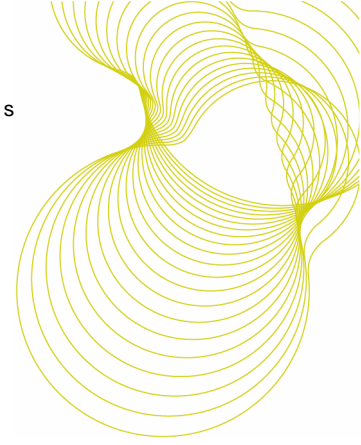
Chapter	Speed (m/s)	Time (min)	Comments
C26	30	3	No movement of ridge or tiles
C27	35	3	No movement of ridge or tiles
C28	30	5	Top row tiles chattering slightly
C29	48	5	All tiles chattering slightly - no movement of ridge

Test 5 Manthorpe Roll-out Tile Ridge System

Wind direction 45°. Arrow indicates wind direction.

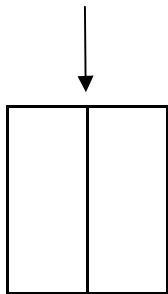


Chapter	Speed (m/s)	Time (min)	Comments
C30	30	3	No movement of ridge or tiles
C31	35	3	No movement of ridge or tiles
C32	30	3	No movement of ridge or tiles
C33	48	5	Top three rows tiles chattering

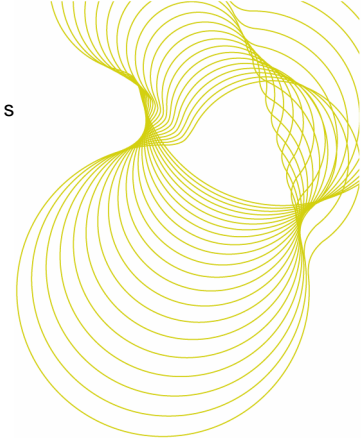


Test 6 Manthorpe Roll-out Tile Ridge System

Wind direction 90°. Arrow indicates wind direction.



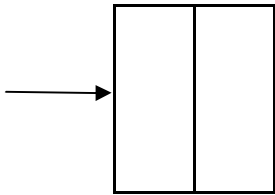
Chapter	Speed (m/s)	Time (min)	Comments
C34	30	3	No movement of ridge or tiles
C35	35	3	No movement of ridge or tiles
C36	30	3	No movement of ridge or tiles
C37	48	3	No movement of ridge or tiles



Annex C2 Driving Rain Testing

Test 7 Manthorpe Roll-out Tile Ridge System

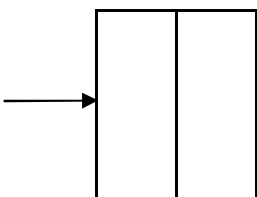
Wind direction 0°. Arrow indicates wind direction.



Chapter	Speed (m/s)	Time (min)	Comments
C22	N/A	10	Deluge only, set to 9.3L/min - No water penetration Spray bars set to 5.2L/min - No water penetration
C23	12	15	

Test 8 Manthorpe Dry Ridge Tile System

Wind direction 0°. Arrow indicates wind direction.



Chapter	Speed (m/s)	Time (min)	Comments
C24	12	15	Spray bars set to 5.2L/min - No water penetration
C25	N/A	10	Deluge only, set to 9.3L/min - No water penetration

=====REPORT ENDS=====