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BRE Test Report

High Speed wind tests on the Manthorpe SmartVerge Ambidextrous & SmartVerge Polypropylene System

Prepared for: Mike Challinor

Date: 12th October 2017

Report Number: P110111-1000

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Date 12th October 2017

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1 Introduction

This report details testing undertaken on 5th October 2017 to assess the performance of the Manthorpe SmartVerge Ambidextrous (Ambi) and the SmartVerge Polypropylene Dry Verge Systems under high wind speed conditions. The testing was carried out at BRE, Bucknalls Lane, Watford, WD25 9XX. The testing was carried out for Manthorpe Building Products Ltd, Manthorpe House, Brittain Drive, Codnor Gate Business Park, Ripley, Derbyshire, DE5 3ND.

This testing is based on BRE Proposal No. P110111 dated 18th September 2017, which was accepted by Mr Mike Challinor of Manthorpe Building Products on 25th September 2017.

The testing was witnessed by Mike Challinor and Ben Hales of Manthorpe Building Products.

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2 Objective

The objective of the testing was to assess the performance of the Manthorpe SmartVerge Ambi and the SmartVerge Polypropylene Dry Verge Systems under high wind speed conditions. The Dry Verge Systems were installed on a 2m x 2m (plan dimensions) 22.5° pitch test roof which was mounted at the end of the BRE wind tunnel. The verges were installed as they would be in practice, this can be seen in the photos in Annex A. Two types of roof tile were used with the Dry Verge Systems; a flat concrete tile and a profile concrete tile.

There is currently no defined procedure for testing verge systems such as these under wind loading[1]. The advice given in BS5534:2015 Clause 4.15.8 is as follows '*Users should pay particular attention to the resistance to wind loads…*' but no guidance is given on how to do this.

In order to simulate the wind effects acting on the verge units as realistically as possible the verge units were subjected to high windspeeds to observe how they respond. This was done by mounting a test roof at the end of the BRE high speed wind tunnel. The roof, as described in the following Section, was placed on a turntable so that it could be rotated to subject it to winds from all directions. For each wind direction tested, the wind speed was increased in increments of 5m/s until the maximum speed of the wind tunnel was reached. The wind speed was held at a constant value for a period of at least 2 minutes at each step increment.

[1] There is a British Standard (BS8612) in preparation for dry fix roofing products which gives simplified loading tests for verge units but these do not completely replicate wind action on the verges

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3 Test Specimen

In order to maximise the amount of testing a single test rig fitted with both flat and profiled roof tiles was used to test both verge units. The SmartVerge Ambi Dry Verge system was tested first with the flat and profiled tiles, see Figure 1. The test roof was then stripped and the SmartVerge Polypropylene Dry Verge system was installed with the flat and profiled tiles as shown in Figure 2. The free tile edge in the middle of the test roof was sealed to prevent wind getting beneath the tiles. Details of the verge units and tiles are given in Table 1. Additional photos are included in Appendix A.

Verge	Details of Verge	Tile Details
SmartVerge Ambidextrous	Manthorpe SmartVerge Ambi Installed using 3.35 x 38mm annular shank nails, fixed through a batten end clip into the end grain.	Sandtoft Double Roman (Profile) Sandtoft Calderdale (Flat) 345mm Batten Gauge
SmartVerge Polypropylene	Manthorpe SmartVerge Polypropylene Installed using no.8 x 38mm pan head woodscrews through into the batten end grain.	Sandtoft Double Roman (Profile) Sandtoft Calderdale (Flat) 345mm Batten Gauge

Table 1 Details of verge units and tiles tested

The ridge tiles used were Sandtoft Segmental which were installed using the manufacturers fixings and fitting instructions. A Manthorpe round ridge end cap was fitted to the Gable end of the SmartVerge Ambi and SmartVerge Polypropylene.

Figure 1 Manthorpe SmartVerge Ambi installed with flat and profiles tiles.

Figure 2 Manthorpe SmartVerge Polypropylene installed with flat and profiled tiles.

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4 Results and Discussion

The verges were tested with wind approaching from a range of wind directions, the rig was mounted on a turntable to allow the rig to be easily manoeuvred into different positions. A total of 16 tests were carried out, eight tests on the Manthorpe SmartVerge Ambi and eight tests on the SmartVerge Polypropylene as shown in Appendix B. Log sheets describing the test results are also given in this Appendix.

In all of the tests the Manthorpe SmartVerge Ambi and Manthorpe SmartVerge Polypropylene Dry Verge Systems resisted the wind tunnel's maximum wind speed of 45m/s (100.7mph) without showing any signs of distress or damage. At the higher wind speeds the verges showed no signs of movement, although some tiles vibrated slightly under winds from certain directions; however, none of the fixings worked loose. At the completion of the testing the verges 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 45m/s into context: from BS EN 1991-1-4 (the European Standard for actions on structures) the design wind speed to be expected on an isolated two-storey house in the London area in a fifty-year design life would be of the order of 32m/s. For a similar house in Aberdeen the design wind speed would be approximately 43m/s. The actual design wind speed would depend 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. Both these examples assume an isolated house, if there was shelter from surrounding buildings then the design wind speeds would be significantly lower. 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 BS EN 1991-1-4 and the UK National Annex.

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5 Summary

The results from these tests on the Manthorpe SmartVerge Ambi and the SmartVerge Polypropylene Dry Verge Systems show that the verges, when fixed according to the manufacturer's instructions, will resist wind speeds of at least 45m/s without failing or demonstrating any other visible signs of distress. It is very likely that these verge systems will be able to withstand significantly 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.

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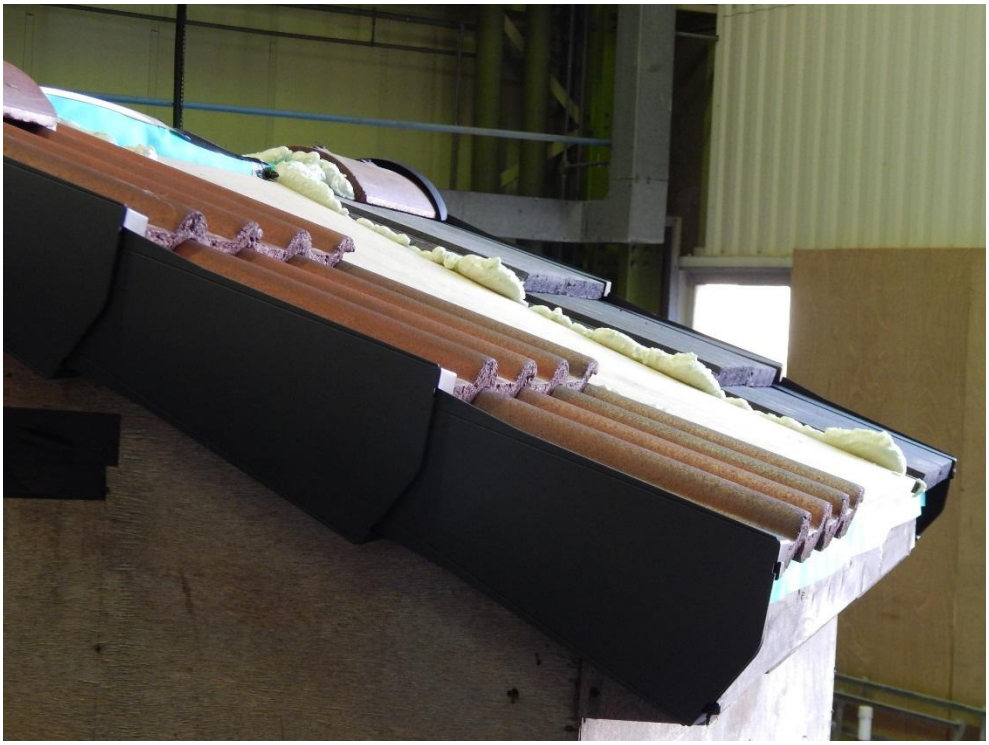
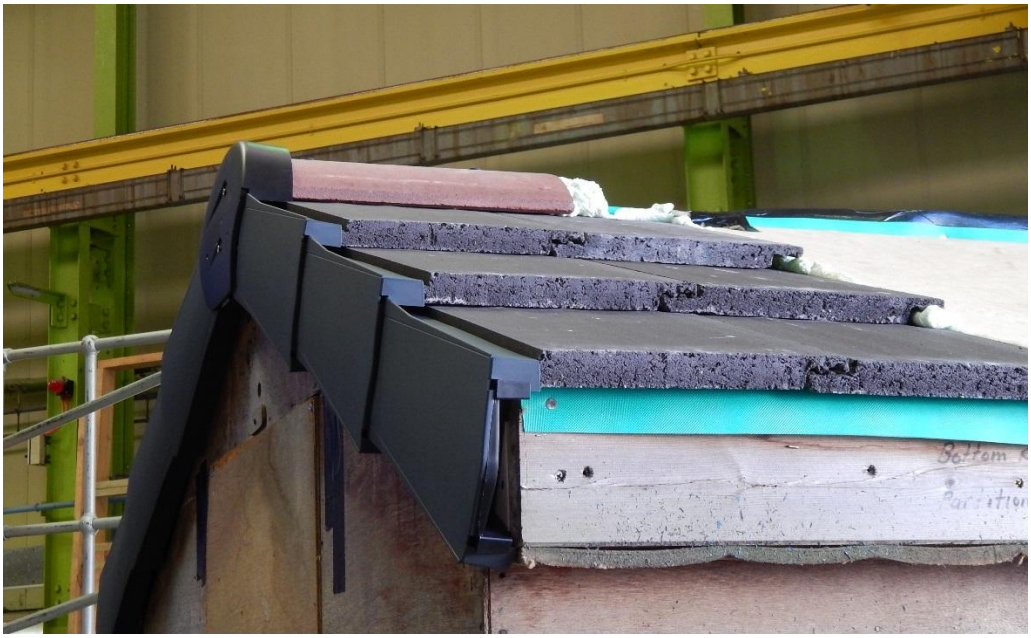
Appendix A – Additional Photographs

Manthorpe SmartVerge Ambidextrous



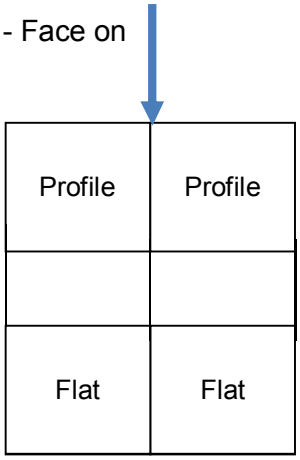


Manthorpe SmartVerge Polypropylene

Appendix B – Test Results

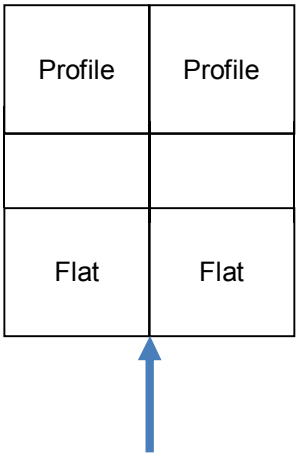
Manthorpe SmartVerge Ambidextrous

T1- Face on



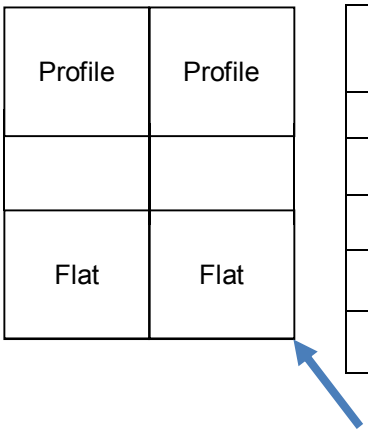
Tunnel Speed (m/s)	Time (mins)	Details
25	2	No Movement
30	2	No Movement
35	2	No Movement
40	2	No Movement
45	5	No Movement

T2 – Face On



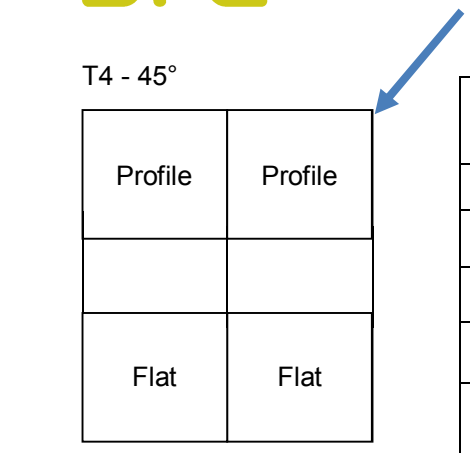
Tunnel Speed (m/s)	Time (mins)	Details
25	2	No Movement
30	2	No Movement
35	2	No Movement
40	2	No Movement
45	5	No Movement

T3 - 45°



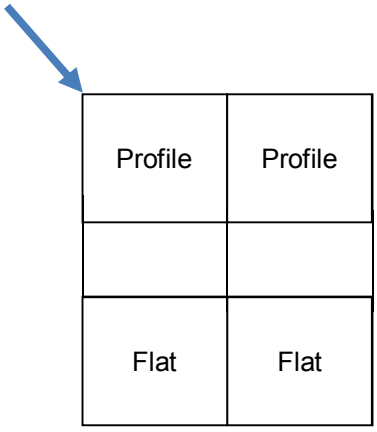
Tunnel Speed (m/s)	Time (mins)	Details
25	2	No Movement
30	2	No Movement
35	2	No Movement
40	2	No Movement
45	5	No Movement

T4 - 45°



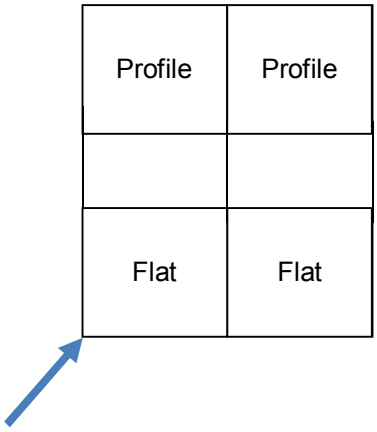
Tunnel Speed (m/s)	Time (mins)	Details
25	2	No Movement
30	2	No Movement
35	2	No Movement
40	2	No Movement
45	5	Profile tiles along edge on 1st and 2nd course lifting slightly on side furthest from tunnel, lifting by around 3mm-5mm

T5 - 45°



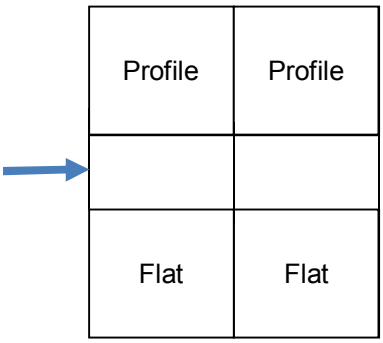
Tunnel Speed (m/s)	Time (mins)	Details
25	2	No Movement
30	2	No Movement
35	2	No Movement
40	2	No Movement
45	5	No Movement

T6 - 45°



Tunnel Speed (m/s)	Time (mins)	Details
25	2	No Movement
30	2	No Movement
35	2	No Movement
40	2	No Movement
45	5	Flat tile top course opposite side has some movement, lifting very slightly

T7 – Side On



Tunnel Speed (m/s)	Time (mins)	Details
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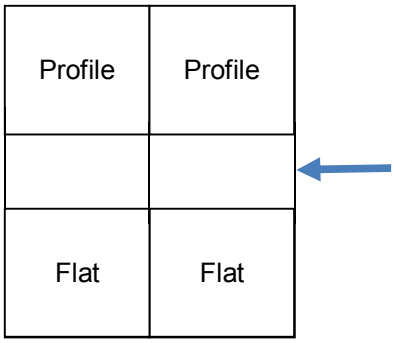
30	2	No Movement
35	2	No Movement
40	2	No Movement
45	5	No Movement

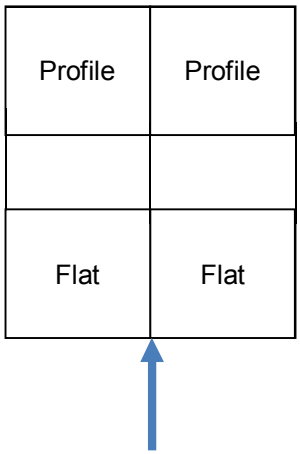
T8 – Side On



Tunnel Speed (m/s)	Time (mins)	Details
25	2	No Movement
30	2	No Movement
35	2	No Movement
40	2	No Movement
45	5	No Movement

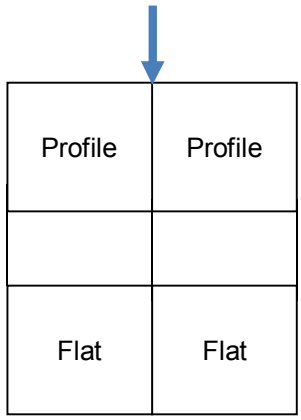
Manthorpe SmartVerge Polypropylene

T1 – Face On



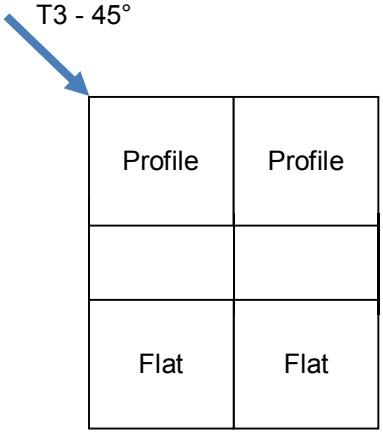
Tunnel Speed (m/s)	Time (mins)	Details
25	2	No Movement
30	2	No Movement
35	2	No Movement
40	2	No Movement
45	5	No Movement

T2 – Face On



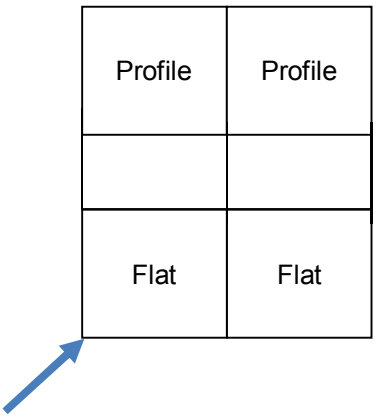
Tunnel Speed (m/s)	Time (mins)	Details
25	2	No Movement
30	2	No Movement
35	2	No Movement
40	2	No Movement
45	5	No Movement

T3 - 45°



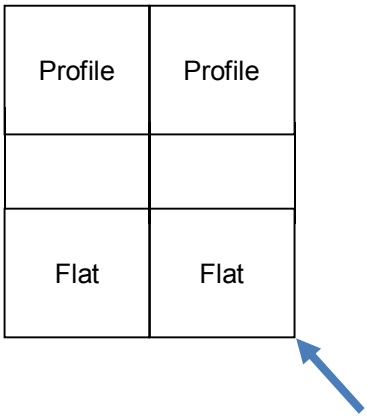
Tunnel Speed (m/s)	Time (mins)	Details
25	2	No Movement
30	2	No Movement
35	2	No Movement
40	2	No Movement
45	5	No Movement

T4 - 45°



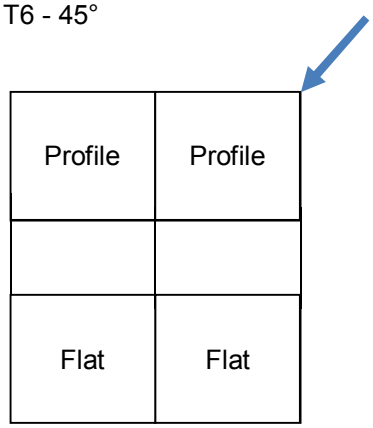
Tunnel Speed (m/s)	Time (mins)	Details
25	2	No Movement
30	2	No Movement
35	2	No Movement
40	2	No Movement
45	5	No Movement

T5 - 45°



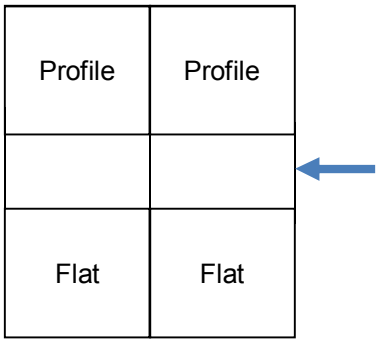
Tunnel Speed (m/s)	Time (mins)	Details
25	2	No Movement
30	2	No Movement
35	2	No Movement
40	2	No Movement
45	5	No Movement

T6 - 45°



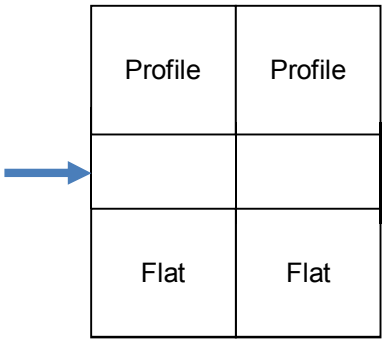
Tunnel Speed (m/s)	Time (mins)	Details
25	2	No Movement
30	2	No Movement
35	2	No Movement
40	2	Some vibration and movement of edge profile tile top course on opposite side to wind.
45	5	Top and 2nd course vibrating as mentioned above, lifting by 3-5mm.

T7 – Side On



Tunnel Speed (m/s)	Time (mins)	Details
25	2	No Movement
30	2	No Movement
35	2	No Movement
40	2	No Movement
45	5	No Movement

T8 – Side On



Tunnel Speed (m/s)	Time (mins)	Details
25	2	No Movement
30	2	No Movement
35	2	No Movement
40	2	No Movement
45	5	No Movement

Report Ends