

BRE Test Report

Wind uplift resistance of Actis Boost'R Hybrid underlay to BS5534 Annex A

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Summary of test results

Summary of test results for wind uplift resistance of Actis Boost'R Hybrid roof underlay roof underlay to BS5534 Annex A		
Underlay type	Wind Uplift Pressure	
	345mm batten gauge	250mm batten gauge
Boost'R Hybrid with taped lap	3054Pa	Not tested
Boost'R Hybrid with taped lap and 38mm counter batten	5748Pa	Not tested



1 Introduction

This report details tests undertaken during June 2015 to test the wind uplift resistance of Actis Boost'R Hybrid multifoil roof underlay. The tests were carried out using the test method given in Annex A of BS5534 (2014). The tests were carried out at BRE, Bucknalls Lane, Watford, WD25 9XX, UK. The Client for these tests was Thomas Wiedmer, Technical Manager UK, Actis Insulation Limited, Unit 1 – Cornbrash Park, Bumpers Farm Industrial Estate, Chippenham, Wiltshire, SN14 6RA.

This testing is based on BRE Proposal No. 137-751, dated 2nd April 2015.

The roof underlay was tested at a batten gauge of 345mm with a taped lap and with a taped lap and a 38mm counter batten.

The test program was carried out as project B137751 under the BRE Terms and Conditions for Testing.

This report documents the work carried out at BRE and records the findings obtained.



2 Test Specimen

The following underlay and tape samples were supplied for testing.

Product	Roll size	Batch code
Boost'R Hybrid underlay	10m ² x 3 rolls	roll 1: FF4OE0D roll 2: FF4OE1P roll 3: FF5G24H
Actis Multidhesif tape	100mm x 20m	n/a



3 Test Apparatus

A test chamber was constructed to the specification given in the draft Annex A. Figure 1 shows the BRE test chamber and Figures 2 and 3 show sketches of the test chamber from Annex A.

The test chamber was constructed from 18m marine grade plywood with internal reinforcing members. It is nominally airtight and can withstand a pressure of up to 10kPa. The chamber has four rafters of nominal size 50mm x 100mm at 600mm centres mounted on its top face. The overall opening size of the test rig is 1850mm long x 1085mm wide. The depth of the chamber is 500mm. This test chamber fully complies with the requirements of BS5534 Annex A.

Air is supplied by a centrifugal fan with pressure and flow ratings of $\pm 10\text{kPa}$ and $1\text{m}^3/\text{s}$ respectively. Provision is included for a second similar fan to be connected if additional airflow is necessary.

Measurements of air pressure, underlay deflection, temperature and humidity were all made using calibrated instruments.



Figure 1 The BRE test chamber for Annex A tests

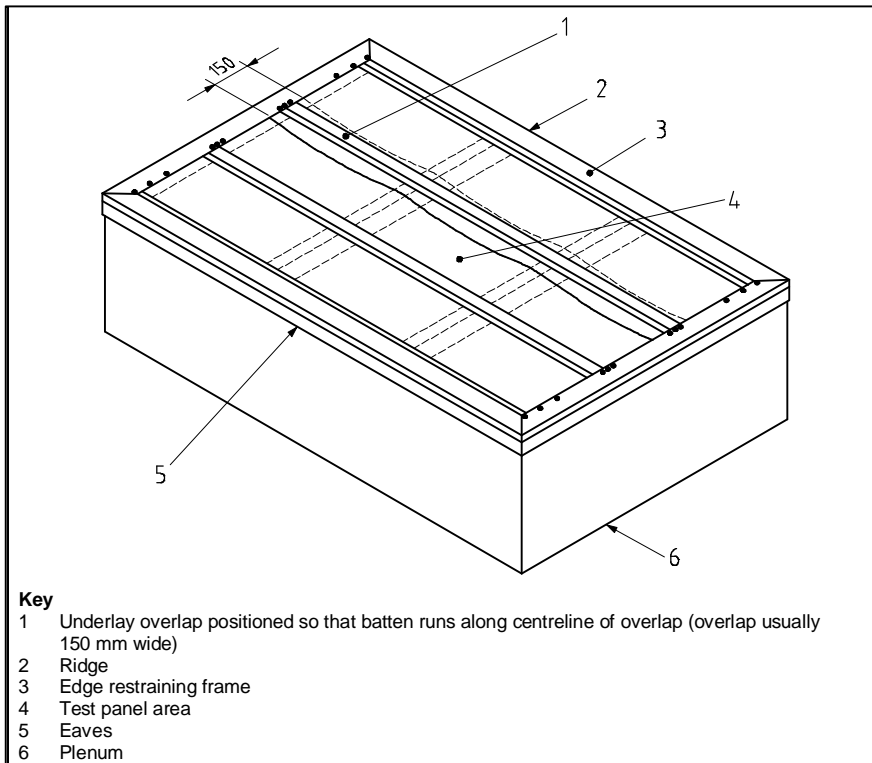


Figure 2 Schematic of the test rig from Annex A of BS5534

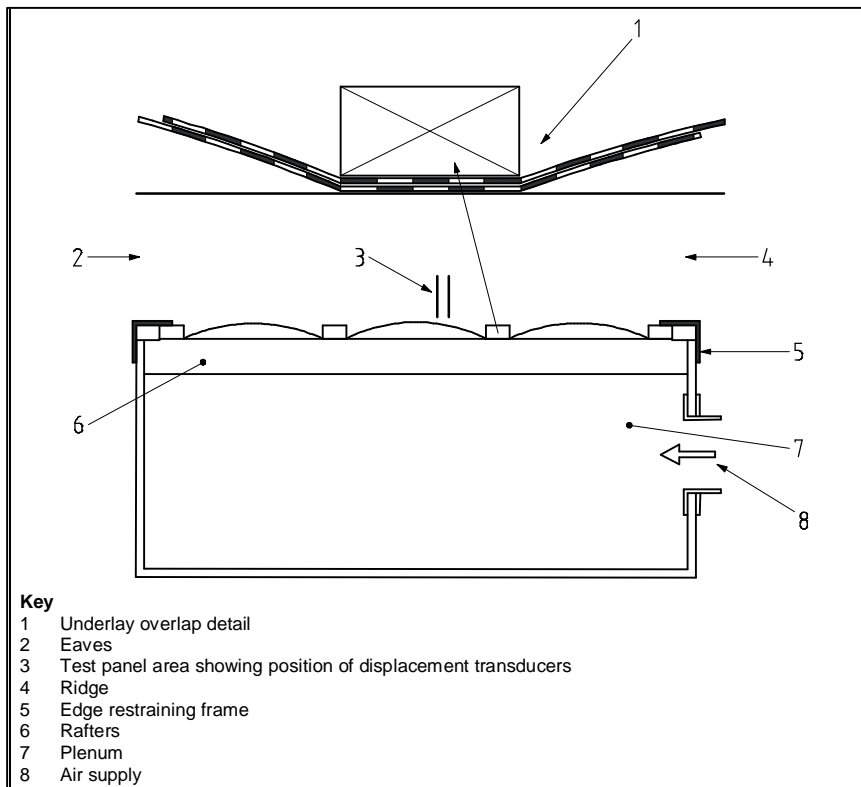


Figure 3 Cross-section of the test assembly (shown with uplift pressure applied)

4 Test Procedure

Six lengths of the underlay were cut for each test. Two lengths of underlay were laid across the rafters of the test chamber allowing for a 100mm overlap between each sheet. The laps were taped using Actis Multidhesif tape. The overlap was installed so that it was mid-span between battens. The underlay was fixed to the rafters using standard 20mm x 3mm galvanised clout nails spaced at 25mm from the free edge of both sheets and then at 300mm centres as shown in Figure 4 (taken from BS 5534).

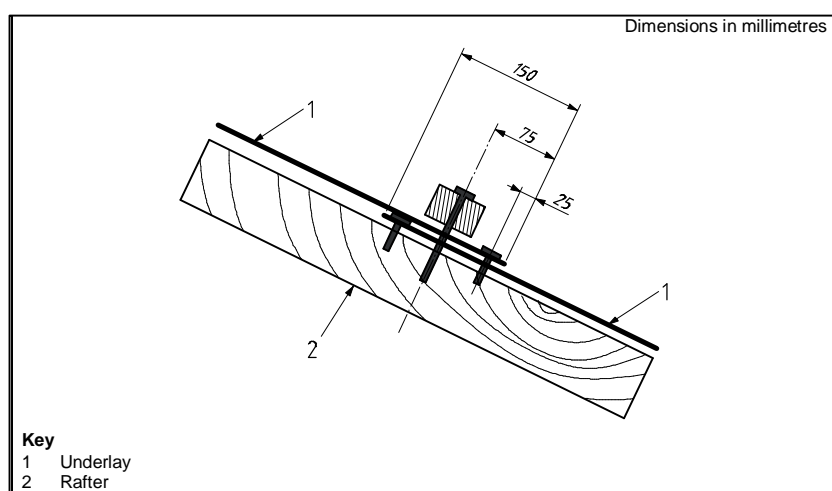


Figure 4 Details of the nailing at underlay overlap

An edge frame was then clamped over the underlay to restrain the free edges around the periphery. BS5534 certified battens 25mm x 50mm were then fixed to the rafters at 345mm gauge using 50mm No 8 screws.

Two linear displacement transducers (LVDT) were positioned on the underlay at the position where the maximum displacement was expected, Figure 5 shows the transducer locations. A trial test was carried out to fine-tune the transducer locations to ensure that the position of maximum deflection was identified. The pressure within the test chamber was measured using a digital pressure transducer. The outputs from the pressure transducer and displacement transducers were logged at a frequency of 10Hz.

The pressure was applied to the test chamber using an electronic controller set to give a pressure rise time of $150\text{Pa} \pm 10\text{Pa}$ per second. Because the characteristics (stretch and air permeability) of underlays can vary, a trial test was carried out for each product in order to determine the pressure controller ramp speed and throttle openings necessary to give the required pressure rise time. Figure 5 shows the underlay under test with a taped lap; Figure 6 shows the underlay during testing with a taped lap and 38mm counter battens.

The test was repeated three times for the two laying configurations using new lengths of underlay each time.

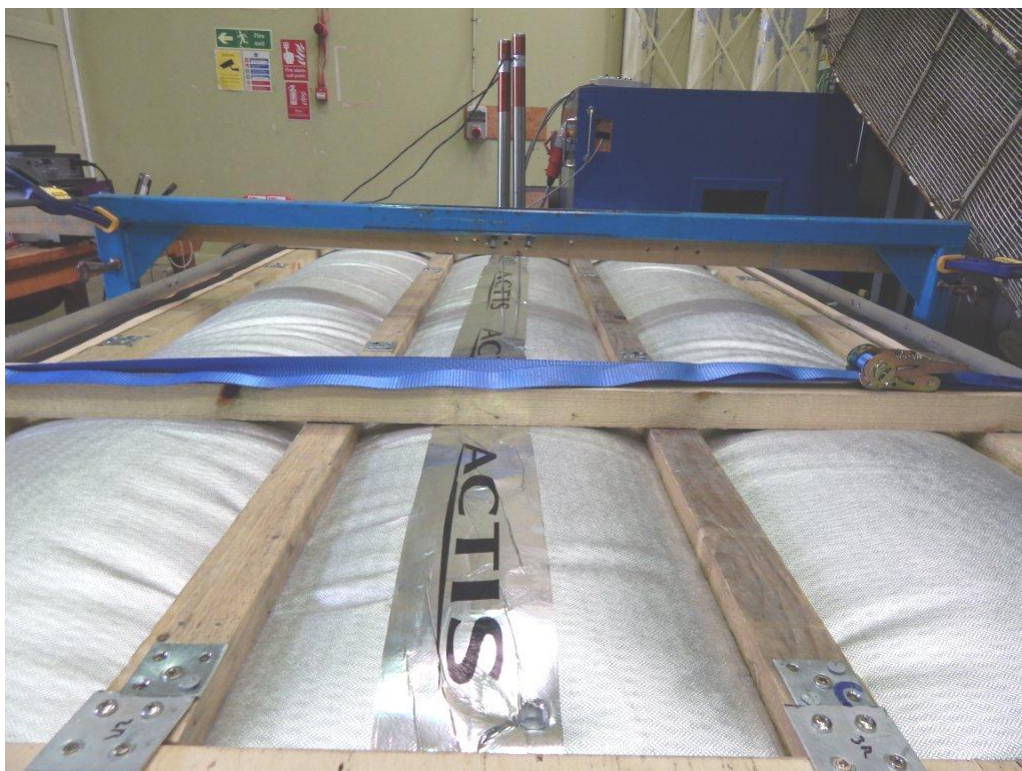


Figure 5 View of Boost'R Hybrid under test with taped laps at a batten at gauge of 345mm



Figure 6 View of Boost'R Hybrid under test with taped laps at a batten at gauge of 345mm with 38mm counter battens



5 Test Results

The test results are shown below. Plots of the pressure versus displacement curves are given in Annex A.

345mm batten gauge with taped lap

Test conditions: Test dates: 21/04/15 and 30/06/15
 Temperature: 21.3°C, and 25.1°C
 Relative Humidity: 32.2% and 26.5%

Test results:

Product	Test 1	Test 2	Test 3
Boost'R Hybrid	2979	3385	2799
Mean value	3054.4		
15% limits	2596.3	3512.6	

Test result: Wind uplift pressure = 3054Pa

The test measurements are within $\pm 15\%$ of the mean so this is a valid test result.



345mm batten gauge with taped lap and 38mm counter battens

Test conditions: Test dates: 30/06/15
 Temperature: 25.4°C
 Relative Humidity: 26.4%

Test results:

Product	Test 1	Test 2	Test 3
Boost'R Hybrid	5783	5980	5480
Mean value	5747.6		
15% limits	4885.4	6609.7	

Test result: Wind uplift pressure = 5748Pa

The test measurements are within ±15% of the mean so this is a valid test result.

Note: The allowable underlay deflection before it comes into contact with the roof tiles will be 35mm plus the counter batten depth; which is 38mm. This gives an allowable deflection of 73mm. In none of the tests with counter battens did the deflection reach 73mm. The maximum deflections in the three tests were 62.2mm, 54mm and 58.8mm.



6 Summary

Tests were conducted at BRE during June 2015 to determine the wind uplift resistance of Actis Boost'R Hybrid roof underlay with the laps taped and with the laps taped with a 38mm counter batten. The tests were carried out in accordance with the test method in Annex A of BS5534:2014. The underlay was tested at a batten gauge of 345mm.

For general use anywhere in the UK (i.e. anywhere in Zones 1 to 5, see Figure A.4 in BS5534) on a roof with a batten gauge of up to 345mm and a well-sealed ceiling, an underlay must achieve a wind uplift resistance of 1600Pa. If the roof has no ceiling or it is not well-sealed then the required uplift resistance increases to 1900Pa and if there is a permanent dominant opening and no ceiling or a not well-sealed ceiling then the required uplift resistance increases to 2350Pa. These values of uplift resistance are for a roof with a ridge height $\leq 15\text{m}$, a maximum batten gauge of 345mm, a roof pitch between 12.5° and 75° , a site altitude $\leq 100\text{m}$ and where topography is not significant. For roofs that do not meet these limitations then the required uplift resistance should be determined using BS5534:2014.

Tables 1 summarise the test results and Table 2 shows the zones of applicability of the underlays according to the classification given in Clause A.8 of BS5534:2014.



Summary of test results for wind uplift resistance of Actis Boost'R Hybrid roof underlay roof underlay to BS5534 Annex A		
Underlay type	Wind Uplift Pressure	
	345mm batten gauge	250mm batten gauge
Boost'R Hybrid with taped lap	3054Pa	Not tested
Boost'R Hybrid with taped lap and 38mm counter batten	5748Pa	Not tested

Table 1 Test results for Actis Boost'R Hybrid underlay

Summary of test results for wind uplift resistance of Actis Boost'R Hybrid roof underlay roof underlay to BS5534 Annex A		
Underlay type	Geographical wind zone	
	345mm batten gauge	250mm batten gauge
Boost'R Hybrid with taped lap	Zones 1 to 5	Zones 1 to 5
Boost'R Hybrid with taped lap and 38mm counter batten	Zones 1 to 5	Zones 1 to 5

Table 2 Zones of applicability of Actis Boost'R Hybrid underlay according to BS5534:2014 clause A.8



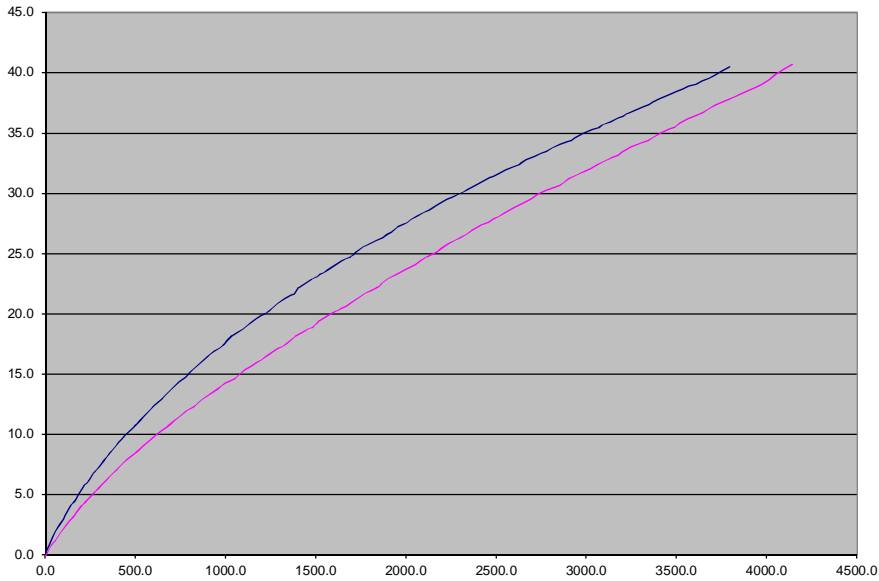
7 References

1. BS 5534: 2014: Slating and tiling for pitched roofs and vertical cladding – Code of Practice: Annex A – Method of test and classification of roof underlays for wind uplift resistance.

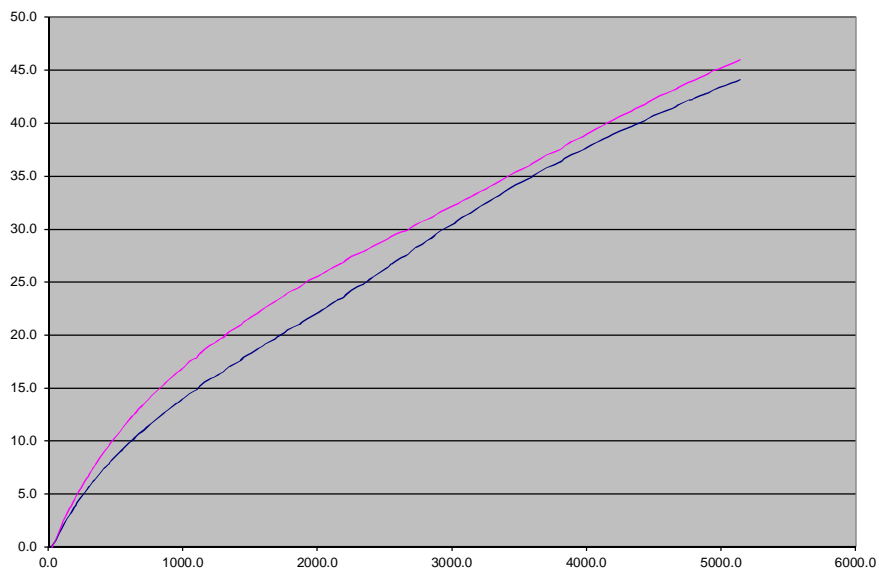


Annex A Pressure versus displacement plots for Boost'R Hybrid underlay

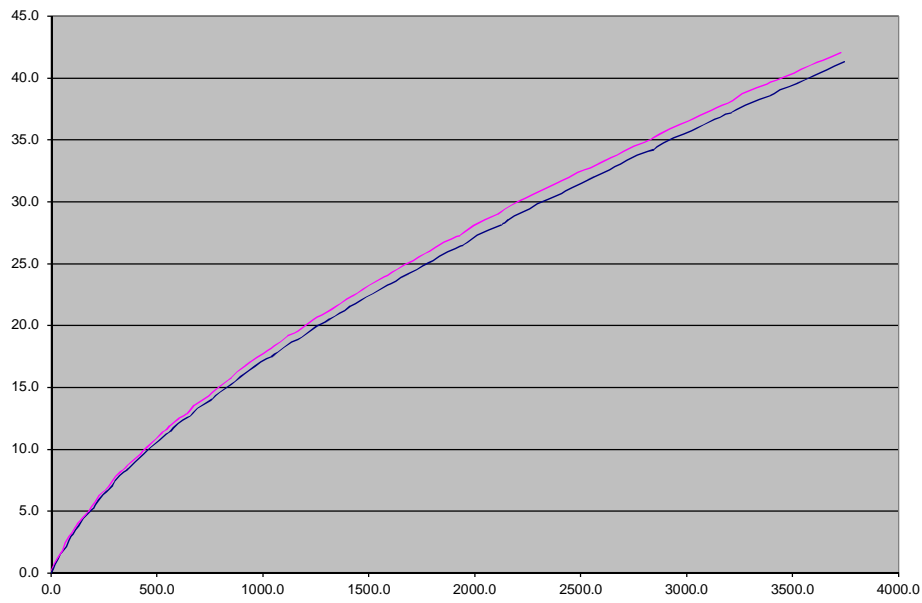
Tests with a taped lap



Test 1



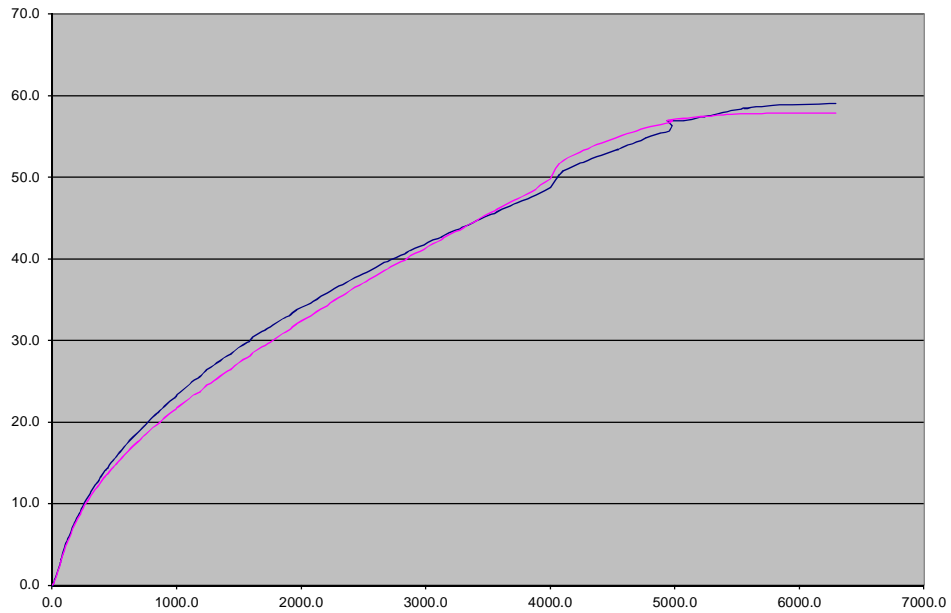
Test 2



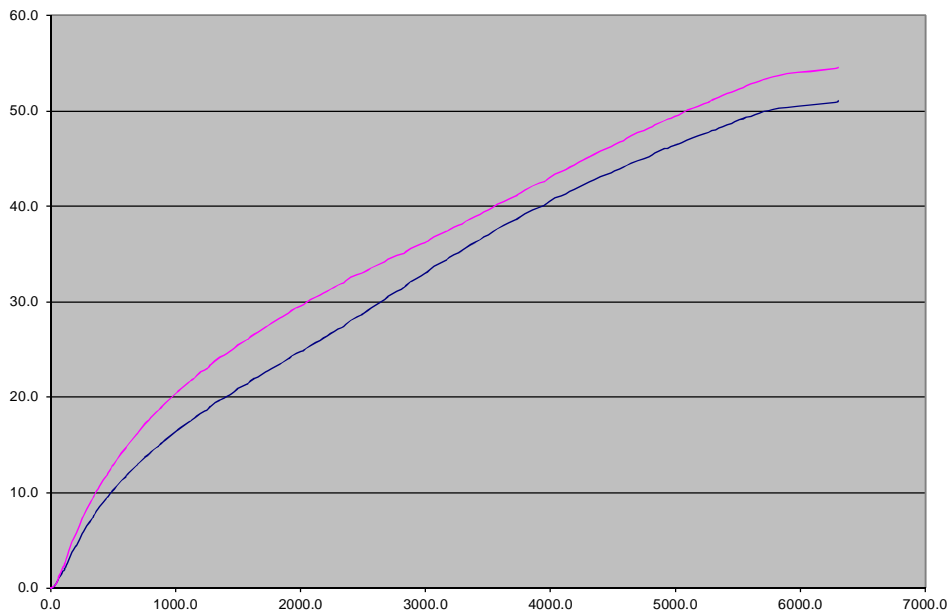
Test 3



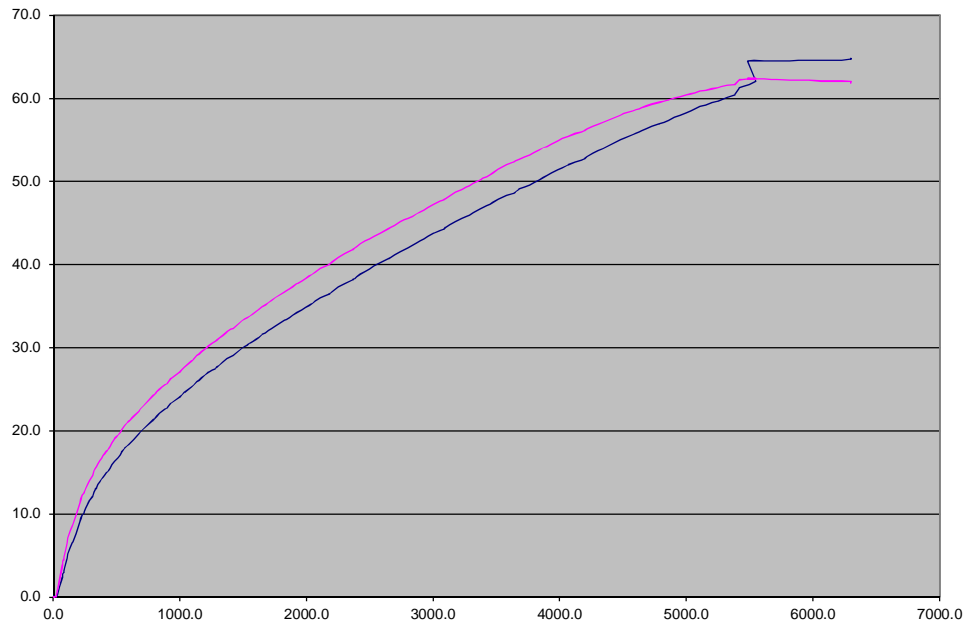
Tests with a taped lap and 38mm counter battens



Test 1



Test 2



Test 3