

Test Preface

Test Report No. N950-24-18685

Brick Slip Pull Out Testing – Brick Slips in their Un-Mortared (Temporary) State

The following preface is intended to provide (in readily understood terms) some ‘background’ to this particular test, its purpose, relevance to ‘real world’ façade performance and an accurate interpretation of the results.

The Barracuda system (and other comparable brick slip systems) are mortared after the brick slips have first been ‘fitted’ into the system. Mortar is typically injected into the joints between the brick slips after a suitably large area of brick slips (viable for mortaring) have been installed. This means that the system might be left for a period of time, exposed to wind loads, in this ‘temporary’ un-mortared state.

We wanted to prove that the Barracuda system could ‘safely’ be left in this temporary un-mortared state, when subjected to any wind loads that the system might conceivably encounter.

Wind resistance testing (Test Report No. N950-22-18408) demonstrates the capability of the system’s rails, substructure and the connections between the two, to safely resist both positive and negative wind pressures up to 3600 pascals.

Positive wind pressure will push the brick slips into their retaining Barracuda rails, so, what we’re really interested in is; the negative wind pressure trying to pull the brick slips out of the system.

It’s relatively straightforward to configure test apparatus that enables application of a positive pressure. Typically, a polythene sheet (or similar) is applied to the face of the test panel and sealed around its perimeter. Either a chamber ‘outboard’ of the test panel face is positively pressurised or a chamber ‘inboard’ of the panel face is negatively pressurised. The polythene sheet is either ‘pushed’ against or ‘sucked’ against the face of the panel and hence the load is applied.

Configuring test apparatus to apply a negative pressure (so, pulling the brick slips away from the system) when the joints between the brick slips are un-mortared is more difficult. With a smooth surfaced rainscreen system, the joints between the system can be taped and an outboard chamber negatively pressurised or an inboard chamber positively pressurised. Successfully adhering tape to handmade bricks is not a viable proposition. Because of this we elected to apply a ‘pull out’ load to the individual brick slips.

How well could the Barracuda system ‘hang onto’ the bricks slips?

We wanted to really challenge the system, so we applied a sequence of 4 No. consecutive, exceptionally high loads, each load applied for a prolonged duration to mimic the system being subjected to 4 No. massive, prolonged duration wind gusts.

The loading sequence applied to each brick slip was;

Load 1. Minimum 85N applied for a minimum duration of 30 seconds

Load 2. Minimum 85N applied for a minimum duration of 30 seconds

Load 3. Minimum 85N applied for a minimum duration of 30 seconds

Load 4. Minimum 100N applied for a minimum duration of 30 seconds

In order to provide some perspective, if we convert these loads into windspeeds and allow for the fact that approximately 17% of the wind pressure will bleed through the open joints;

85N per brick slip is equivalent to a wind speed of 225 miles per hour

100 N per brick slip is equivalent to a wind speed of 245 miles per hour

You can't realistically stand up in wind speeds exceeding 75 miles per hour.

Current non-tornadic wind speed records are as follows;

The highest windspeed ever recorded is 253 miles per hour at Barrow Island Australia during tropical cyclone Olivia in 1996.

The highest windspeed ever recorded in the UK is 173 miles per hour on Cairngorm in the Scottish Highlands in 1986.

The highest windspeed ever recorded in England is 122 miles per hour at The Needles, Isle of White, during Storm Eunice in 2022

If we convert our test loads into a wind pressures;

85N per brick slip is equivalent to 6145 pascals

100N per brick slip is equivalent to 7230 pascals

The highest standard 'safety test' wind resistance test pressure stipulated by the CWCT is 3600 pascals.

So, we've doubled it!

The test loads we're applying are huge but we also wanted to ensure that we were applying these loads to brick heights that represented the extremes of those allowed by BS EN 771-1 (58mm to 70mm). Of particular interest were the smallest bricks allowable (58mm in height) as these should be the most difficult for the system to 'hold onto'.

In order to test brick slips that were 58mm high, brick slips were carefully fabricated (cut and bonded), ensuring that their original top and bottom surfaces were retained. In a similar fashion, brick slips 70mm high were also fabricated. In order to create a worse than 'worst case', brick slips 58mm high were incorporated into the test panel in greater relative theoretical quantity proportions than allowed by BS EN771-1.

Bricks, and the brick slips which are cut from them, also come in numerous shape types, bricks with large frogs, large core holes, numerous smaller core holes and of course 'solid' bricks etc. The bricks can be any clay material type, extruded, pressed or handmade.

In order to represent this range of brick shape types and brick manufacturing techniques, nine different brick types were selected and incorporated into the 'pull out' test panel.

These were;

- Brick Type 1. – Wienerberger Sandalwood Yellow Multi
- Brick Type 2. – Michelmersh Charnwood Light Victorian Red
- Brick Type 3. – Ibstock Leicester Red Stock
- Brick Type 4. – Ibstock Chesterton Multi Red Smooth
- Brick Type 5. – Blockley Windermere Grey Solid
- Brick Type 6. – Wienerberger Olde Ivory Stock
- Brick Type 7. – Wienerberger Smeed Dean London Stock
- Brick Type 8. – Ibstock Aldridge Anglian Red Multi Rustic
- Brick Type 9. – Michelmersh Haddley Brindle Wirecut

Please see test panel drawings appended to the test report for locations/distribution of the different brick types.

108 No. brick slips were tested, each subjected to the four consecutive pull out loads.

For 76 No. of the 108 No. brick slip tested, the residual displacements, after the application of the four consecutive pull out loads, was less than 0.1mm. So, they basically haven't moved.

The worst case residual displacement after the four consecutive pull out loads was 0.492mm (less than 0.5mm) at brick slip pull out location 30.

Not only did the Barracuda Brick Slip System successfully 'hang onto' all of the brick slips, the brick slips barely moved at all!