James & Taylor Ltd.

Mechanically Fixed Brick Slip Systems

Evaluation Report

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Introduction

This evaluation report provides a review of mechanically fixed brick slip systems currently on the UK market. Although the report is not exhaustive in that it does not cover each and every system, all of the major systems and typologies are included.

For each product, a brief overview is presented, along with our understanding of their history, and how they have performed to date (where known).

The systems have been assessed on available online technical data, available in the public domain at the time of writing. The system build up has also been described, and test values to key performance criteria are also given.

An evaluation of thermal, acoustic, and fire performance issues are not included beyond a summary of certification provided, and any test or certification data that is not publicly available at the time of writing.

This report has been produced in conjunction with a non-project/product specific model performance specification, which describes the technical performance criteria Arup considers suitable for the specification and evaluation of brick slip cladding systems. The system comparison table at the end of the document evaluates the outlined systems against the clauses of the model performance specification, to provide a comparative assessment of the systems based on key performance factors. The model specification should be read in conjunction with this report to understand the detail of the referenced clauses.

Systems are presented in alphabetical order and suggest no order of preference or technical performance. The full system comparison table including qualitative information of the assessment is included.

James & Taylor have conducted additional studies to determine the possible range in brick slips heights when slips are manufactured to different tolerances/ranges, and to assess each system's ability to retain slips of the full range of the possible heights. A summary is provided in the body of the report and the full studies in Appendices A and B.

Contents

Barracuda

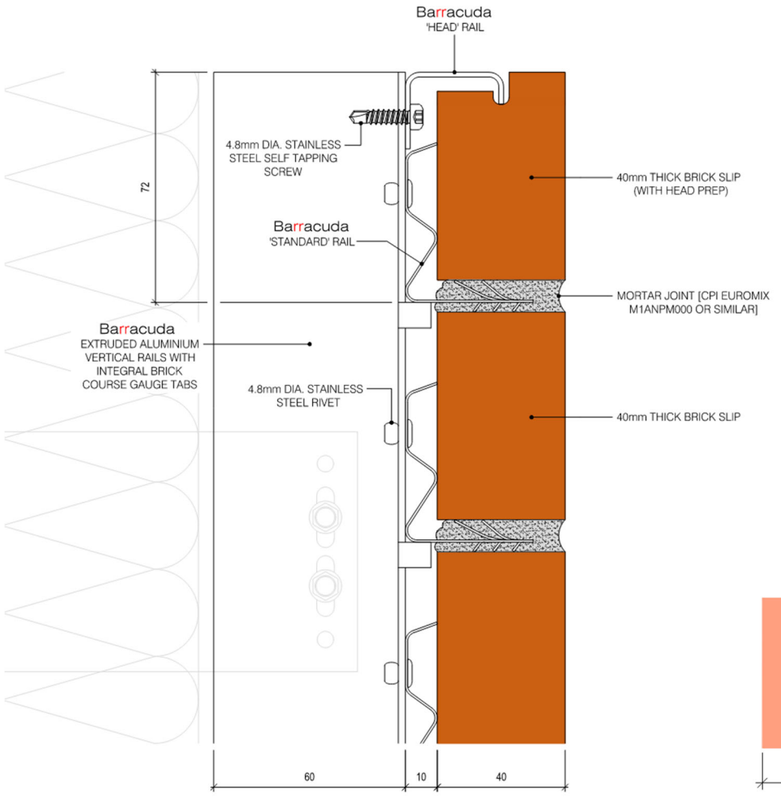
The Barracuda brick slip system produced by James & Taylor, is unique to other systems on the market in that it uses inward facing stainless steel sprung teeth to retain the brick slips.

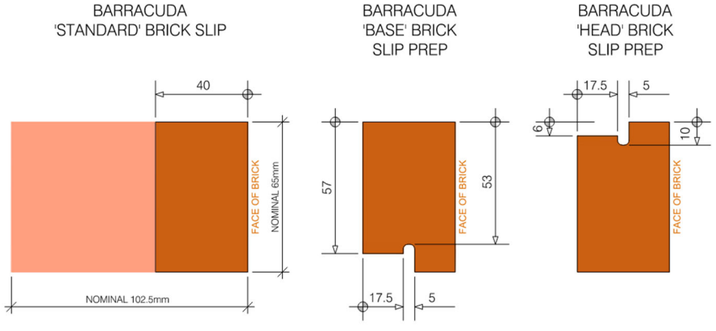
The sprung teeth differ in length along the horizontal stainless steel sections which allows them to accommodate the variation in size tolerances typical of clay bricks. The larger teeth at the base of the slip push the slips upwards, ensuring the top surface of the slips align with the horizontal cladding rail. The replicates the appearance of hand laid bricks, which are typically aligned with string lines across the top bed arris of each course, with any irregularity in height visible only along the base bed arris of each course.

Brick slips used on this system are required to be cut from whole bricks, creating slips with a thickness of 40 mm, without any grooves. This is intentionally thicker than other systems to improve the adhesion of the mortar to the sprung teeth and the slip. Systems which use brick slips cut from whole bricks present a disadvantage in terms of waste.

The brick slips are pushed into the horizontal stainless steel ‘Standard’ rails, which in turn are fixed to vertical aluminium cladding support rails. The top and bottom course of slips on a panel clip into the head and base rail, respectively, therefore requiring a machined groove on the head/base surface.

The system has been tested both in its final mortared and temporarily un-mortared state.



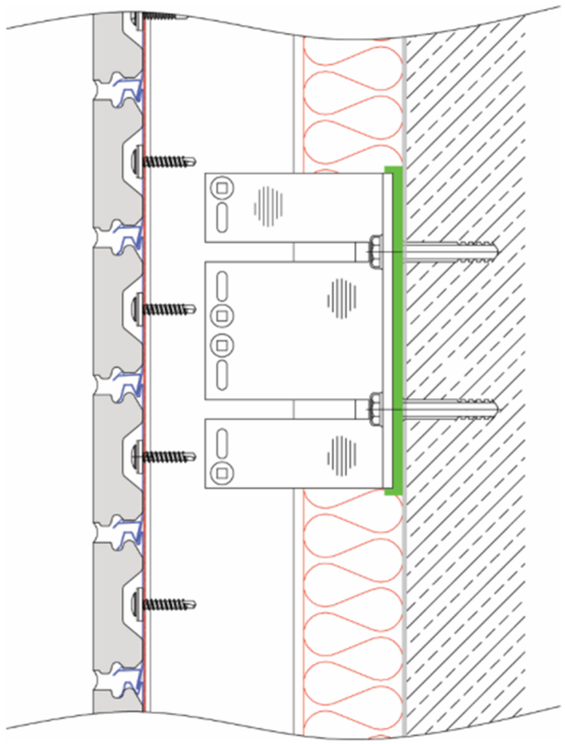


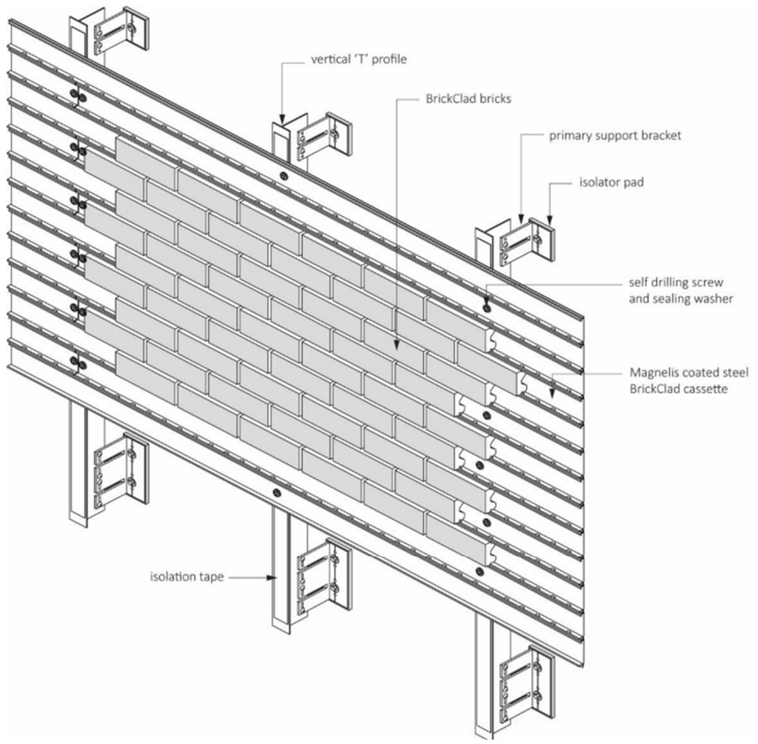
Design life	Design life of the building façade
Supplier	James & Taylor Ltd.
Brick type	Cut
Brick height (mm)	58-70
Brick length (mm)	215
Brick thickness (mm)	40
Brick finish	Any brick within tolerance and performance requirements of the system.
Mortar	Cement-based conventional bricklaying mortar.
Maximum mortar depth (mm)	40
Interlocking of mortar into mechanical key	Yes
Backing material	Stainless steel rail with sprung teeth.
Subframe options	Aluminium
Subframe spacing	‘L’ and ‘T’ rails spaced at a maximum of 600 mm centres (horizontally).
Substrate options	Masonry, concrete, timber-frame, steel-frame.
Brick slip height engagement	See Appendix B.
Reaction to fire classification	A1
Nominal weight of system	92 kg/m^2 (brick slips, rails, mortar)
Installation method	Refer to Barracuda Installation Guide.
Ability to support stretcher and header face of corner slip	Yes
Number of brick types and heights tested	9 types (including solid, deeply frogged, multi perforated, large hole perforated, wirecut, stock and handmade products); 58-70 mm
Wind load tests	Testing to CWCT standards, the system achieved a serviceability wind pressure of 2.4 kN/m^2 and a safety wind pressure of 3.6 kN/m^2. In a temporary un-mortared state, the system retained the slips when pull out tested to 85 N and 100 N, which equates to approximately 225 and 245 mph, respectively.
Impact resistance	In a final mortared state, the system achieved Category B Class 1 for serviceability, and Negligible Risk for safety, for hard and soft body impact testing to CWCT TN76. In a temporary un-mortared state, the system achieved Low Risk for hard body and Negligible Risk for soft body safety impact testing.
Freeze thaw resistance	Whole system tested to DD CEN/TS 772-22 - 100 freeze thaw cycles. No detectable deterioration of system.
Cyclic wind load resistance	Whole system tested to cyclic wind loads in accordance with BRE Digest 346 Part 7 Table 1. No detectable deterioration of the system.
Warranty	Design life of the building façade.
Movement joint requirements	Vertical expansion joints at maximum 6 m centres. Horizontal expansion joints at maximum 3.5 m centres.
Drainage requirements	Minimum 38 mm ventilated and drained clear cavity. Continuous 10 mm wide ventilation slot with insect/vermin mesh to prevent infestation of the cavity. Minimum ventilation area of 5000 mm^2 per metre run.
Soldier course	Vertical backing profile used to receive soldier course.
Ground level interface	Suitable for use above damp proof course (DPC) level.

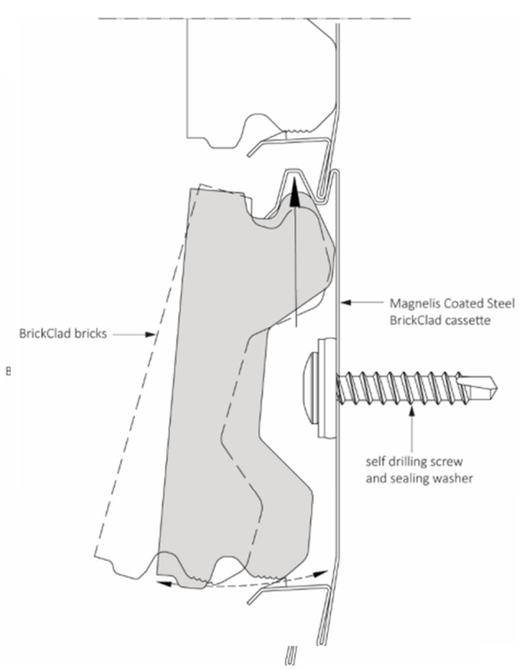
Barracuda

Available technical data for this product is provided in the table.

BrickClad







The BrickClad system is a relatively new addition to the market. This system is a partnership between the system manufacturer, Shackerley, and insulation and façade system manufacturer Kingspan.

The system consists of purpose extruded brick slips with grooves in the head and base surfaces, which clip into the continuous Magnelis coated (zinc-aluminium-magnesium)/ stainless steel cassette profile. The cassette profile is in turn fixed back to Shackerley's SureClad façade system—their primary support brackets and vertical rail T-profile backing system.

Kingspan sell this system with the same components but additionally with their QuadCore/K-Roc Slab insulation products incorporated.

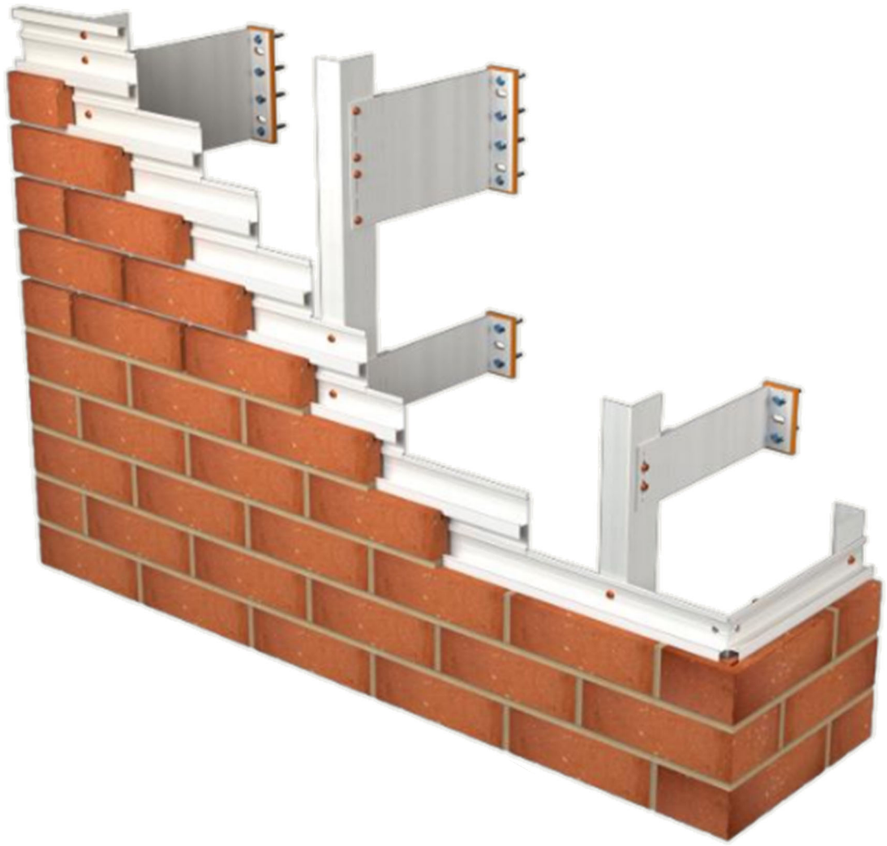
BrickClad have the 'Saxony' and 'Rustic' range of finishes which provide a limited variety of colours and textures.

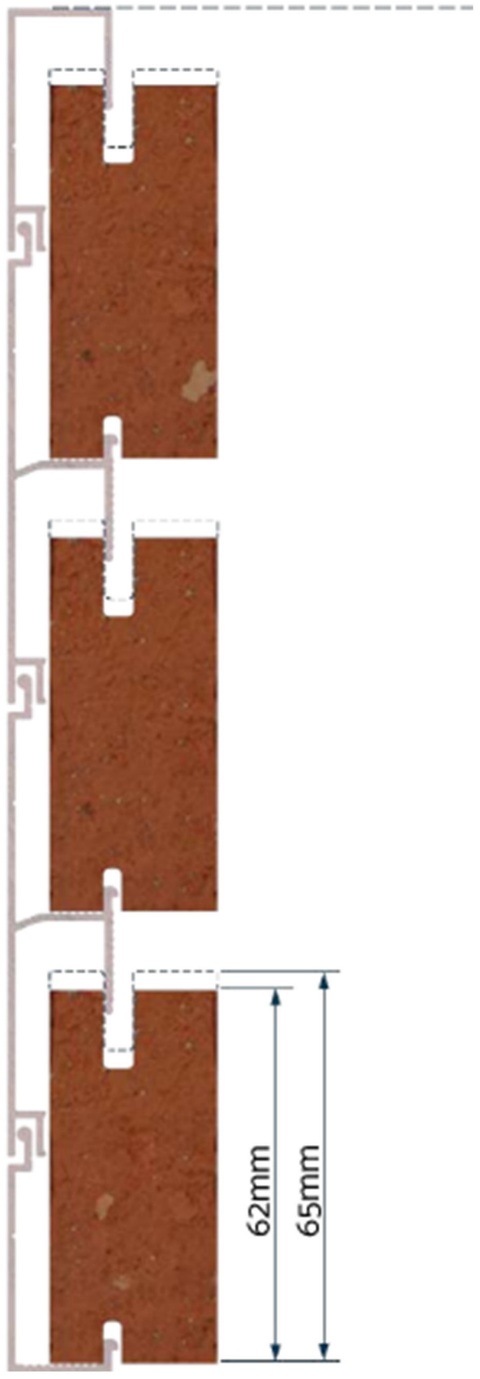
The system is tested to CWCT standards.

Design life	>35 years
Supplier	Shackerley Facades
Brick type	Extruded clay brick
Brick height (mm)	65 (nominal)
Brick length (mm)	215 (nominal)
Brick thickness (mm)	25, 30 (nominal)
Brick finish	Range of colours and textures within their Rustic and Saxony ranges.
Mortar	Mixture of hydrated lime, sand, and GGBS (cement-free).
Maximum mortar depth (mm)	22
Interlocking of mortar into mechanical key	Partial
Backing material	Magnelis coated steel BrickClad cassette.
Subframe options	Aluminium
Subframe spacing	Maximum spacing between vertical and horizontal subframe supports must not exceed 600 mm centres.
Substrate options	Masonry, concrete, timber-frame, steel-frame.
Brick slip height engagement	Not known.
Reaction to fire classification	A1
Nominal weight of system	47.62 kg/m^2 and 56.5 kg/m^2 (excluding pointing mortar) for the Saxony and Rustic range, respectively.
Installation method	Refer to Section 12 and 13 of BBA certificate 22/5998.
Ability to support stretcher and header face of corner slip	No
Number of brick types and heights tested	1; 65 mm
Wind load tests	Testing to CWCT standards, the system achieved a serviceability wind pressure of 2.4 kN/m^2 and a safety wind pressure of 3.6 kN/m^2.
Impact resistance	In a final mortared state, the system achieved Category B Class 1 and Negligible Risk for hard and soft body impact testing, as defined in CWCT TN76. (Suitable for most locations except vandalism prone location below 1.5m height).
Freeze thaw resistance	Brick slips tested to an unknown number of cycles.
Cyclic wind load resistance	Not stated.
Warranty	No warranty.
Movement joint requirements	Vertical and horizontal movement joints should be provided at 6 m centres and should coincide with movement joints in the substrate wall.
Drainage requirements	Minimum 38 mm ventilated and drained clear cavity.
Soldier course	Not stated.
Ground level interface	This system, when in accordance with BBA certificate, is stated as “satisfactory for use above damp-proof course (dpc) level, i.e. 150 mm above ground level”.

BrickClad

Available technical data for this product is provided in the table.





Briklok

Briklok is a system produced by RJ Facades which comprises cut brick slips with narrow grooves machined in the head and base surfaces. The slips clip into interlocking anodised aluminium profiles, which in turn, fix onto vertical aluminium/stainless steel rails.

Systems which use brick slips cut from whole bricks present a disadvantage in terms of embodied carbon and waste.

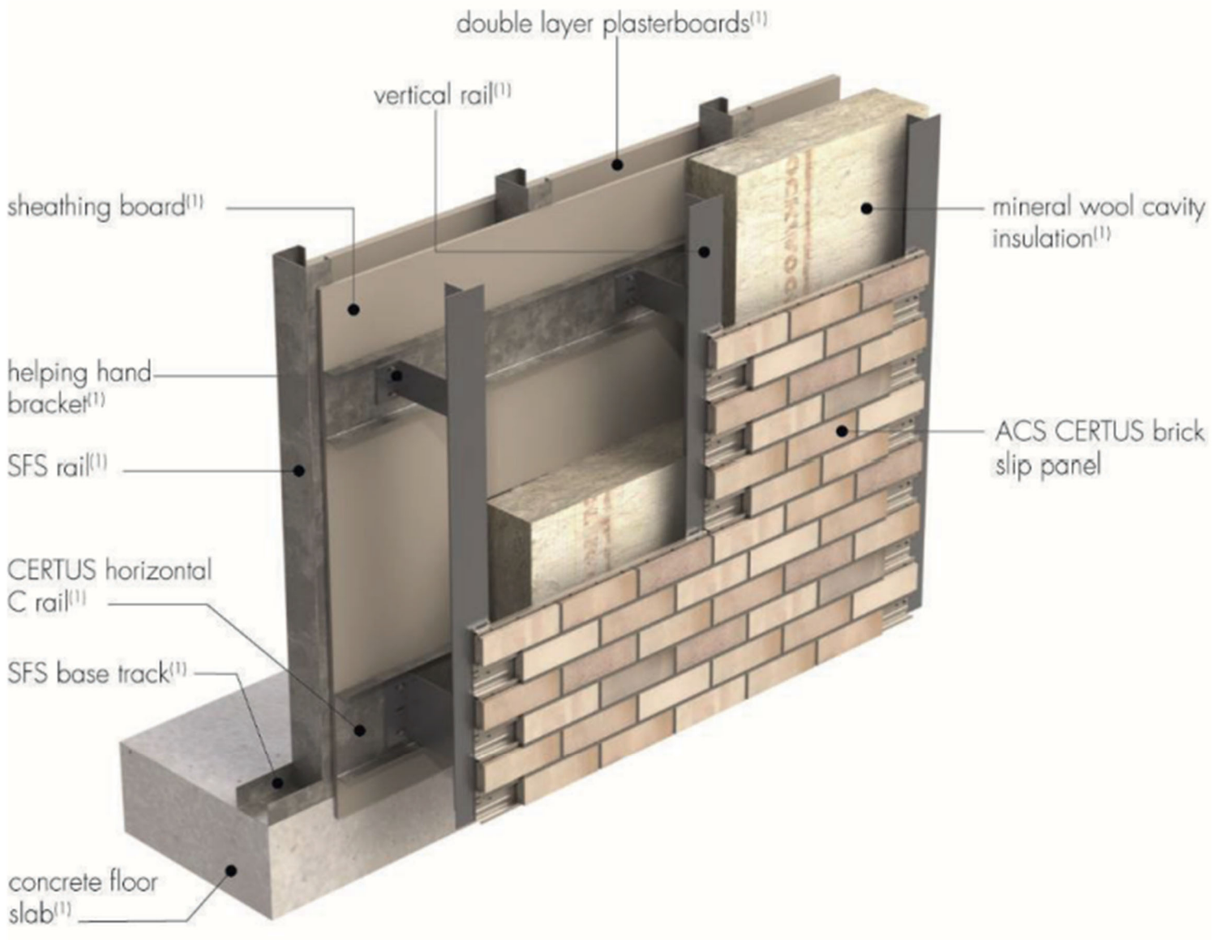
The profiles are manufactured with a lower carbon aluminium, known as REDUXA by Hydro, which claim to use 5% of the normal amount of energy required.

The system is UKAS accredited and tested by UL to CWCT standards, however; the system lacks published technical information.

Design life	>35 years
Supplier	RJ Facades
Brick type	Cut from standard facing bricks.
Brick height (mm)	62-67
Brick length (mm)	103, 215
Brick thickness (mm)	28
Brick finish	Range of colours and textures.
Mortar	Parex Historic Mortar KL— mixture of hydrated lime, sand, and GGBS.
Maximum mortar depth (mm)	17.5
Interlocking of mortar into mechanical key	No
Backing material	Continuous interlocking aluminium profile with horizontal and vertical supports.
Subframe options	Aluminium, stainless steel.
Subframe spacing	Not stated.
Substrate options	Masonry, concrete, aluminium-frame, steel-frame.
Brick slip height engagement	Not known.
Reaction to fire classification	A1
Nominal weight of system	Not stated.
Installation method	Not stated.
Ability to support stretcher and header face of corner slip	No.
Number of brick types and heights tested	Not stated; 62-67 mm.
Wind load tests	Testing to CWCT standards, the system achieved a serviceability wind pressure of 2.4 kN/m^2 and a safety wind pressure of 3.6 kN/m^2.
Impact resistance	In a final mortared state, the system achieved Category B Class 1 and Negligible Risk for hard and soft body impact testing, as defined in CWCT TN76. (Suitable for most locations except vandalism prone location below 1.5m height).
Freeze thaw resistance	Brick slips tested to an unknown number of cycles.
Cyclic wind load resistance	Not stated.
Warranty	Not stated.
Movement joint requirements	Not stated.
Drainage requirements	Ventilated with air and vapour barriers. Weep holes located at bottom of cavity for drainage.
Soldier course	Vertical backing profile used to receive soldier course.
Ground level interface	Not stated.

Briklok

Available technical data for this product is provided in the table.



CERTUS

Certus is a system produced by ACS, a Leeds based manufacturer who are diversifying from their core business of stainless steel masonry support systems which was established around 30 years ago.

Note: ACS should not be confused with the other ACS firm (Advanced Cladding Systems) who manufacture the adhesively fixed FastClad system which has suffered a number of failures.

The system differs from its competitors, in that it is modular, typically in preassembled 675 mm wide x 450 mm high panels which are fixed to vertical aluminium backing rails. The panels feature cut brick slips with vertical grooves in the head and base surfaces, similar to the other mechanically fixed systems. The backing tray is stainless steel and the brick slip connectors are springy, enabling ‘bridging slips’ to be clipped easily into place, which span between the modules every other course to maintain the stretcher bond (overlapping) appearance of conventional brickwork. The system is then pointed in-situ, in common with the other systems.

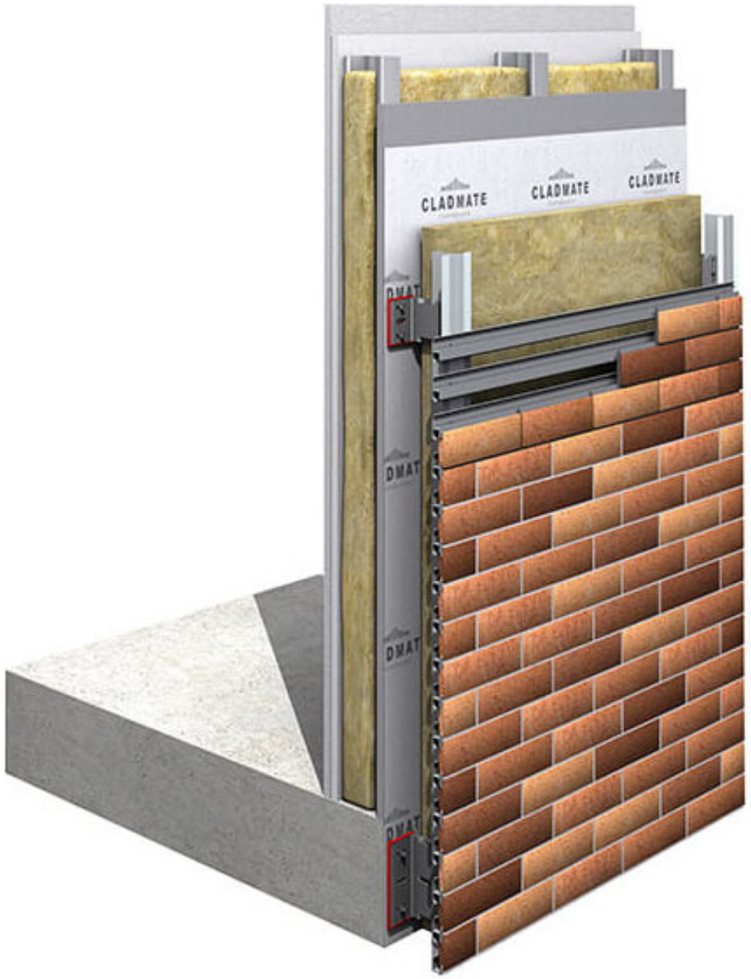
ACS are a well established system manufacturer and undertake rigorous design and engineering. The system has been fully tested to CWCT standards.

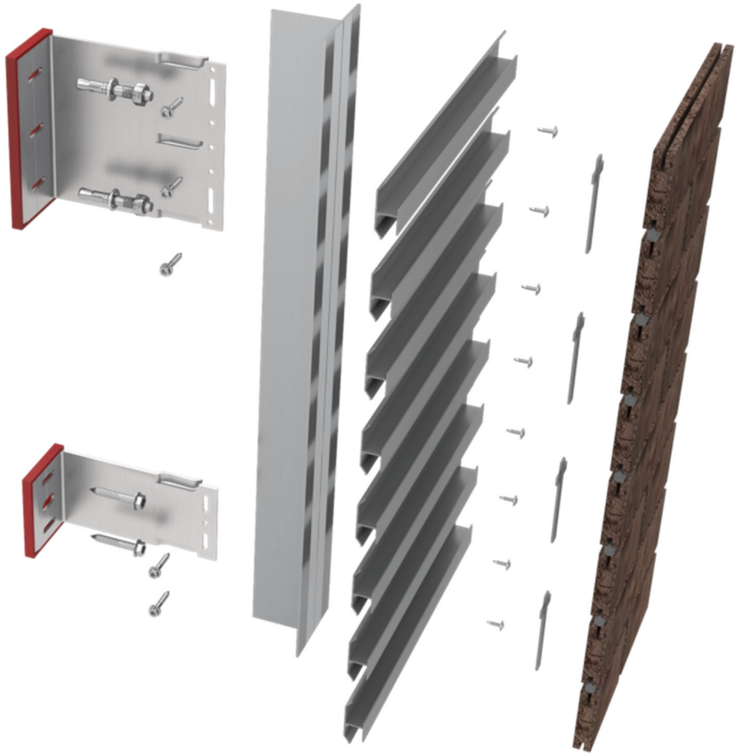
As ACS are not aligned to a brick manufacturer, the range of slips should theoretically be much broader, extended to all brick manufactures, and this may include purpose made slips although this is not currently known.

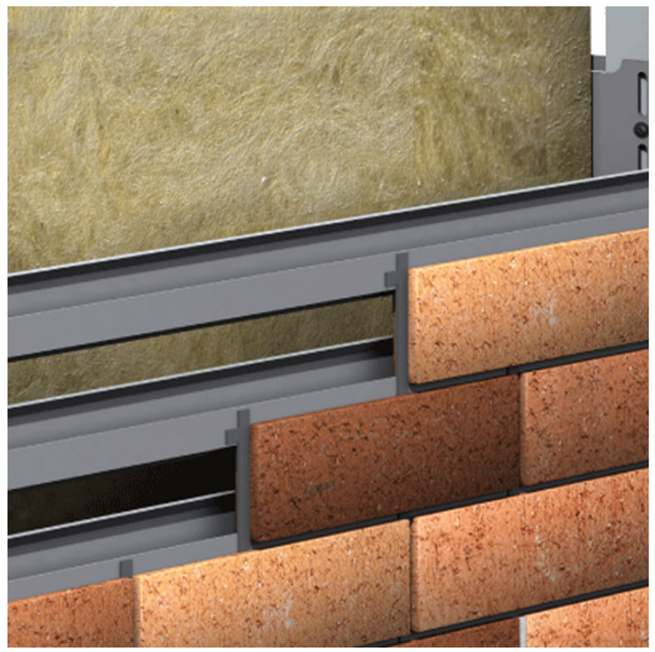
Design life	>60 years
Supplier	ACS Facades
Brick type	Cut from standard facing bricks.
Brick height (mm)	65
Brick length (mm)	215
Brick thickness (mm)	25, 35, 50, 75
Brick finish	Range of colours and textures.
Mortar	Parex Historic Mortar KL— mixture of hydrated lime, sand, and GGBS.
Maximum mortar depth (mm)	11
Interlocking of mortar into mechanical key	No
Backing material	Stainless steel carrier.
Subframe options	Stainless steel or aluminium.
Subframe spacing	Maximum spacing between vertical subframe supports must not exceed 675 mm centres (horizontally).
Substrate options	Masonry, concrete, timber-frame or steel-frame.
Brick slip height engagement	Not known.
Reaction to fire classification	A1
Nominal weight of system	55, 68, 92 and 132 kg/m^2 based on 25, 35, 50 and 75 mm thick brick slips respectively.
Installation method	Refer to Section 12 and 13 of BBA certificate 21/5870.
Ability to support stretcher and header face of corner slip	Yes.
Number of brick types and heights tested	3; 65 mm.
Wind load tests	Testing to CWCT standards, the system achieved a serviceability wind pressure of 2.4 kN/m^2 and a safety wind pressure of 3.6 kN/m^2.
Impact resistance	In a final mortared state, the system achieved Category B Class 3 and Low Risk for hard and soft body impact testing, as defined in CWCT TN76.
Freeze thaw resistance	Whole system tested to ETAG 017 - 30 freeze thaw cycles.
Cyclic wind load resistance	Not stated.
Warranty	No warranty provided.
Movement joint requirements	Vertical expansion joints at maximum 12 m centres. Horizontal expansion joints at maximum 6 m centres.
Drainage requirements	Minimum 38 mm ventilated and drained clear cavity.
Soldier course	Vertical framing used to receive soldier course.
Ground level interface	This system, when in accordance with BBA certificate, is described as “satisfactory for use above and below damp-proof course (dpc) level.”

CERTUS

Available technical data for this product is provided in the table.







CMS40

CMS40 is another newcomer to the market and is similar to MechSlip and others in the use of machined grooves in the head and base of cut brick slips, slotted into aluminium rails.

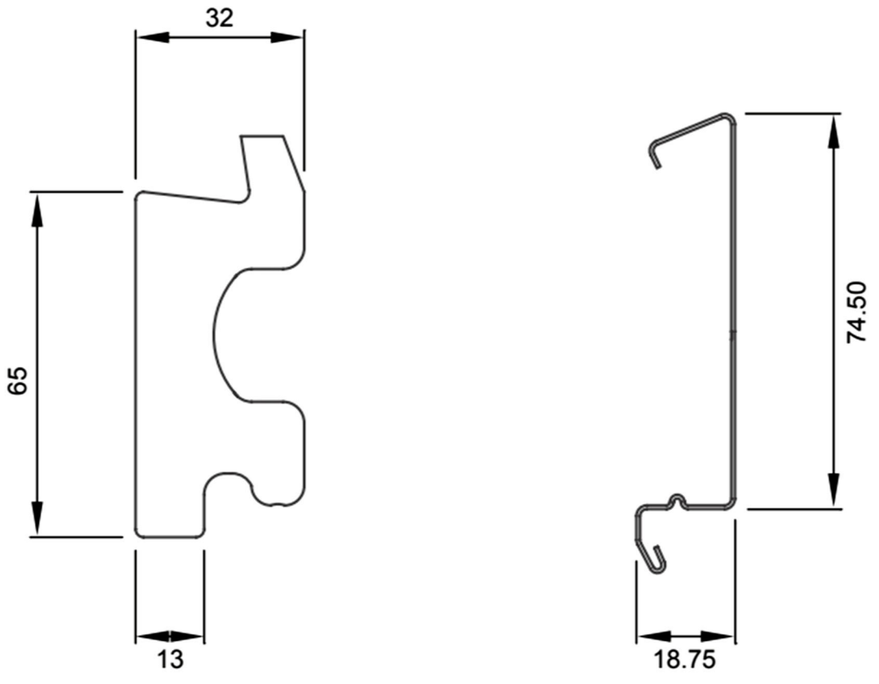
Its supplier, Cladmate Façade Systems produces rainscreen cladding brackets and rails, as well as a range of other non-mechanically fixed brick slip cladding systems, however; little is known about the firm's background.

CMS40 is distributed by Michelmersh, the UK's fourth largest brick producer, and cladding distributor Just Facades.

CMS40

Available technical data for this product is provided in the table.

Design life	>60 years
Supplier	Cladmate Façade Systems
Brick type	Cut or extruded
Brick height (mm)	62-68
Brick length (mm)	<510
Brick thickness (mm)	20-24
Brick finish	Range of colours and finishes.
Mortar	Parex Historic Mortar KL— mixture of hydrated lime, sand, and GGBS.
Maximum mortar depth (mm)	10
Interlocking of mortar into mechanical key	No
Backing material	Horizontal support rail.
Subframe options	Aluminium, stainless steel.
Subframe spacing	Maximum spacing between vertical subframe supports must not exceed 600 mm centres (horizontally).
Substrate options	Masonry, timber, steel, concrete, SFS.
Brick slip height engagement	See Appendix B.
Reaction to fire classification	A1
Nominal weight of system	53 $kg.m^{-2}$
Installation method	Refer to Cladmate CMS40 MFSlip Brochure.
Ability to support stretcher and header face of corner slip	No.
Number of brick types and heights tested	Not stated; 62-68 mm.
Wind load tests	Testing to CWCT standards, the system achieved a serviceability wind pressure of 2.4 kN/m^2 and a safety wind pressure of 3.6 kN/m^2.
Impact resistance	In a final mortared state, the system achieved Category B Class 1 and Negligible Risk for soft body impacts and Class 2 and Negligible Risk for hard body impacts, as defined in CWCT TN76. Note: the test panel was constructed with horizontal rails at 600 mm centres. At 1200 mm centres, the system achieved Class1 and Low Risk for soft body, and Class 3 and Low Risk for hard body.
Freeze thaw resistance	Brick slips tested to an unknown number of cycles.
Cyclic wind load resistance	Not stated
Warranty	No warranty provided.
Movement joint requirements	Not stated.
Drainage requirements	A minimum 50 mm ventilated and drained clear cavity with a minimum ventilation area of 5000 mm^2 per metre run.
Soldier course	Not stated.
Ground level interface	This system, when in accordance with BBA certificate, is satisfactory for use above damp-proof course (dpc) level.



Corium

Manufactured by Wienerberger, Corium consists of purpose extruded brick slips, which are clipped into longitudinally interlocking steel backing sections. The system is distributed in the UK by Taylor Maxwell, a brick and façade materials distributor.

The steel backing sections can be mounted vertically or horizontally and mechanically fixed to the supporting subframe. For lightweight steel frame and masonry substrates, a metal (generally aluminium) subframe is used. Timber battens are used for timber-frame structures.

The system was originally developed in the UK over two decades ago, as a joint venture between Corus (originally British Steel, now Tata) and Baggeridge Brick (later acquired by Wienerberger). The system is well established and has been used on many projects across the UK.

The backing system is a pressed metal tray with a Magnelis (zinc-aluminium-magnesium) coating. The coating provides adequate corrosion protection in most locations, although a stainless steel version is available for severe exposure (such as coastal zones) and for use below DPC level.

The brick slips are purpose-extruded in a longitudinal direction to create the connecting profile. This does limit the appearance and texture when compared to slips cut from standard bricks, as it is not possible to recreate the same appearance as say, a heavily textured moulded brick when using a longitudinal extrusion process. This can be an issue for visual acceptance, for example; on one Arup project the system was rejected by Westminster City Council's Planners because the slips could not sufficiently replicate the appearance of a traditional London yellow stock brick.

However; where a more regular shaped appearance is required, the Corium slips provide a crisp, contemporary appearance, such as on the Cambridge Mosque project which Arup provided consultancy on. The project went on to win an RIBA Regional Award and was shortlisted for the Sterling Prize (RIBA Building of the Year).

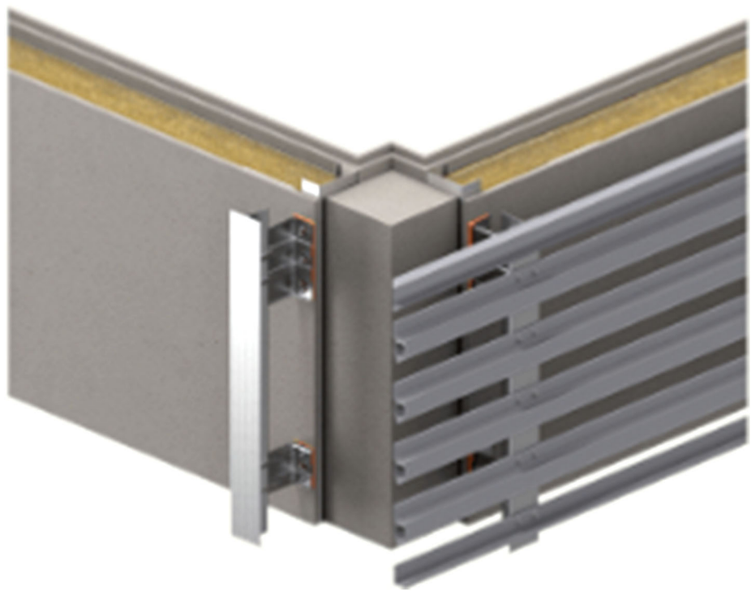
Careful consideration is needed at corners and reveals. The system currently has three corner details, two of which rely on an adhesive fixing for the return 'leg' of the brick slips. Arup do not advise the use of these due to the risk of failure following fatigue, and suggest using their mechanically fixed option.

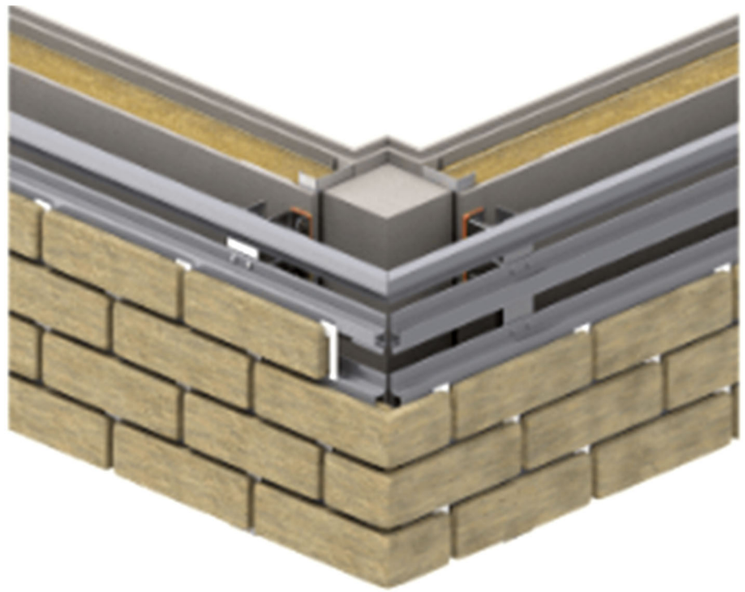
Design life	>35 years
Supplier	Wienerberger, distributed through Taylor Maxwell in the UK.
Brick type	Extruded clay, fired.
Brick height (mm)	50, 57.7, 65, 92, 140, 215
Brick length (mm)	215
Brick thickness (mm)	32
Brick finish	Various finishes available, limited by longitudinal extrusion process. Generally plain colours and textures, with some pressed-in textures and colour variation.
Mortar	Parex Historic Mortar KL— mixture of hydrated lime, sand, and GGBS.
Maximum mortar depth (mm)	13
Interlocking of mortar into mechanical key	Partial
Backing material	0.7 mm thick Magnelis coated steel (ZM 310 or ZM 430) - delivered in 2.4 m lengths. Option for 0.55 mm thick stainless steel (grades 304 or 316) for exposed locations and below DPC.
Subframe options	Aluminium
Subframe spacing	Maximum spacing between vertical subframe supports must not exceed 600 mm centres (horizontally).
Substrate options	Masonry, timber or steel-frame.
Brick slip height engagement	Not known.
Reaction to fire classification	A1
Nominal weight of system	68 kg/m^2 (brick slips, rails, mortar)
Installation method	Refer to Section 9 of BBA certificate 19/5693.
Ability to support stretcher and header face of brick slip	No.
Number of brick types and heights tested	1; Not stated.
Wind load tests	CWCT (vertical steel frame supports tested with stainless steel and Magnelis backing) achieved a serviceability wind pressure of 2.4 kN/m^2 and a safety wind pressure of 3.6 kN/m^2.
Impact resistance	In a final mortared state, the system achieved adequate impact resistance for use in the Impact Use Categories II, III and IV, as defined in EAD 090062-00-0404 : 2018, Table G.3. Use category I is not suitable for the system.
Freeze thaw resistance	Whole system tested to ETAG 017 - 30 freeze thaw cycles.
Cyclic wind load resistance	Not stated.
Warranty	Wienerberger warranty issued on a case-by-case basis.
Movement joint requirements	Vertical expansion joints at maximum 12 m centres. Horizontal expansion joints at maximum 9 m centres.
Drainage requirements	Clear cavity minimum 15 mm to achieve minimum ventilation area of 1000 mm^2 per metre run. Any ventilation openings to be protected with mesh.
Soldier course	Yes, 215 mm high x 65 mm wide spanning 3 rails (rails remain horizontal).
Ground level interface	This system, when in accordance with BBA certificate, is stated as “satisfactory for use above damp-proof course (dpc) level”.

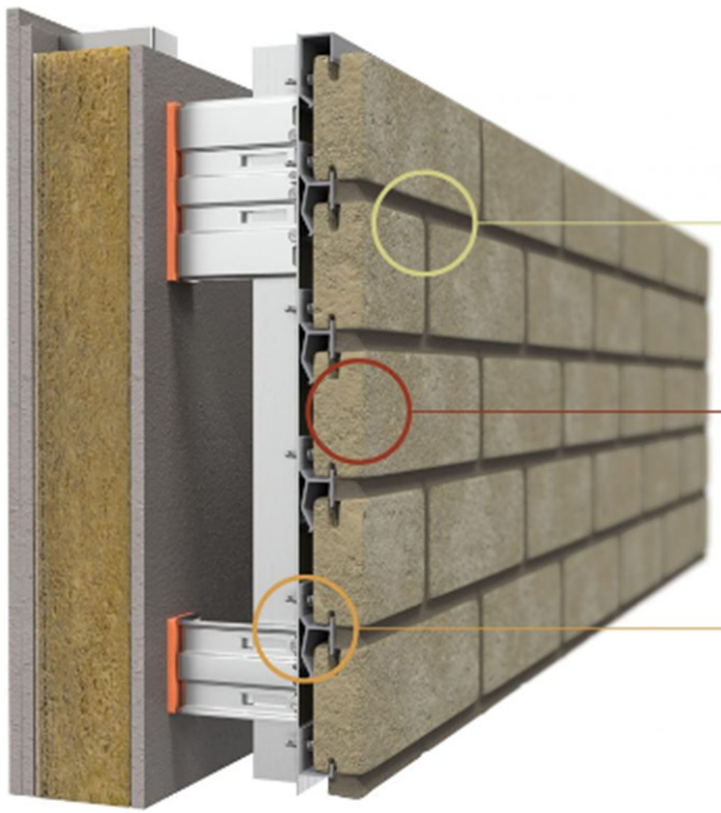
Corium

Available technical data for this product is provided in the table.

Below: Corium system used on RIBA award-winning Cambridge Mosque







MechSlip

MechSlip was developed around 2019 as a joint venture between Ibstock (the UK's largest brick producer) and Ash and Lacy (an aluminium cladding system producer). The system uses Ibstock brick slips that are cut from whole bricks, with machined grooves in the top and base to connect to the aluminium rails.

The brick slips are mechanically fixed onto a lightweight, anodised aluminium cladding support system. MechSlip has strong similarities with terracotta rainscreen cladding, and is compatible with common substrates such as steel frame, concrete frame, brickwork, dense concrete blockwork, light steel framing and existing masonry.

The product has been extensively tested, mainly to the CWCT suite of standards. The system has proven commercially successful since its launch.

A disadvantage is that the slips are cut from standard bricks and are limited to Ibstock products only. Ibstock do have the largest UK market share however, so the range of brick types will cover most, but not all needs.

Ibstock are currently in the process of commisioning the UK's first so-called 'net zero carbon' brick factory on the site of their Nostell works, which will include a line specifically for manufacturing slips. This would cut waste considerably. Currently it is only possible to cut a single slip from one whole wirecut/extruded brick meaning 80% of the material is wasted (along with its inherent cost and carbon). It is usually (but not always), possible to get two slips from a moulded/soft mud brick, meaning 60-80% waste.

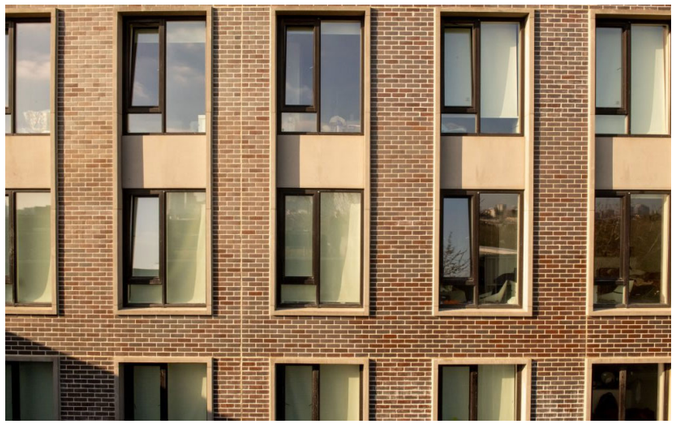
Purpose made slips will be a significant improvement to the system in terms of waste and embodied carbon, and Ibstock aim to make their slips look considerably less tile-like, and more like real bricks (see previous comments re: Corium). It is not yet known how the factory is likely to achieve net zero carbon, but based on current technology, the kilns are likely to be fired using natural gas, and the clay will always contain a quantity of organic material which will emit carbon dioxide whilst fired.

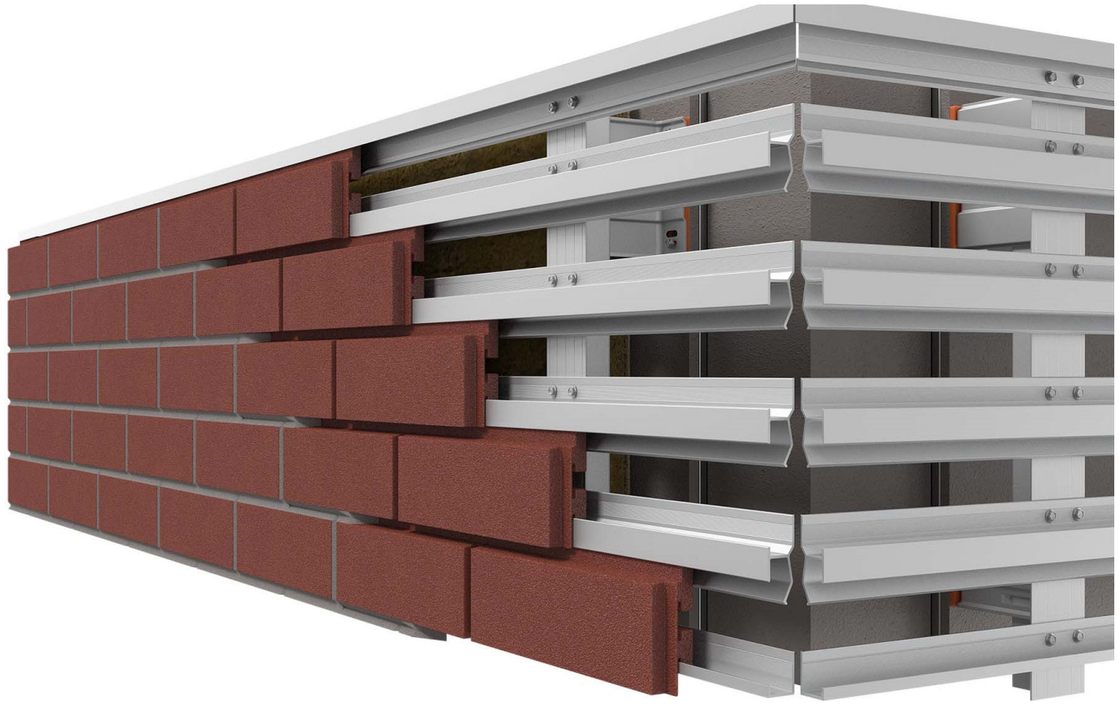
Design life	>35 years
Supplier	Direct from Ibstock or Ash & Lacy. Also distributed by Aquarian Cladding (factor).
Brick type	Ibstock brick slips, fired clay, cut & profiled (handmade, stock, wirecut).
Brick height (mm)	50, 65, 68, 73
Brick length (mm)	215, 290, 327, 440, 490
Brick thickness (mm)	28, 48
Brick finish	Smooth, creased, dragfaced, sanded, distressed, glazed (cut standard bricks).
Mortar	Parex Historic Mortar KL— mixture of hydrated lime, sand, and GGBS.
Maximum mortar depth (mm)	17.5
Interlocking of mortar into mechanical key	No
Backing material	Aluminium rails
Subframe options	AxiAL stainless steel or aluminium T/L mullions (L, T, Z, open, top hat) and brackets, aluminium starter / mid / top rail.
Subframe spacing	Maximum spacing between vertical and horizontal subframe supports must not exceed 600 mm centres.
Substrate options	Masonry, concrete, timber-frame or steel-frame.
Brick slip height engagement	See Appendix B.
Reaction to fire classification	A1
Nominal weight of system	51.5 kg/m^2
Installation method	Refer to Section 12 and 13 of BBA certificate 20/5839.
Ability to support stretcher and header face of corner slip	No.
Number of brick types and heights tested	1; 65 mm.
Wind load tests	MechSlip cladding fixed to AxiAL supporting system with aluminium brackets and rails at 600 mm spacing, achieved a serviceability wind pressure of 2.4 kN/m^2 and a safety wind pressure of 3.6 kN/m^2.
Impact resistance	In a final mortared state, the system achieved Category B Class 1 and Negligible Risk for soft body impacts, and Class 2 and Negligible Risk for hard body impacts, as defined in CWCT TN76. (Suitable for most locations except vandalism prone location below 1.5m height).
Freeze thaw resistance	Whole system tested to ETAG 017 - 30 freeze thaw cycles.
Cyclic wind load resistance	Not stated.
Warranty	25 years
Movement joint requirements	Vertical expansion joints at maximum 6 m centres. Horizontal expansion joints at maximum 6 m centres.
Drainage requirements	Minimum 38 mm ventilated and drained clear cavity.
Soldier course	Subframe system is typically installed vertically to receive soldier course.
Ground level interface	This system, when in accordance with BBA certificate, is stated as “satisfactory for use above damp-proof course (dpc) level”.

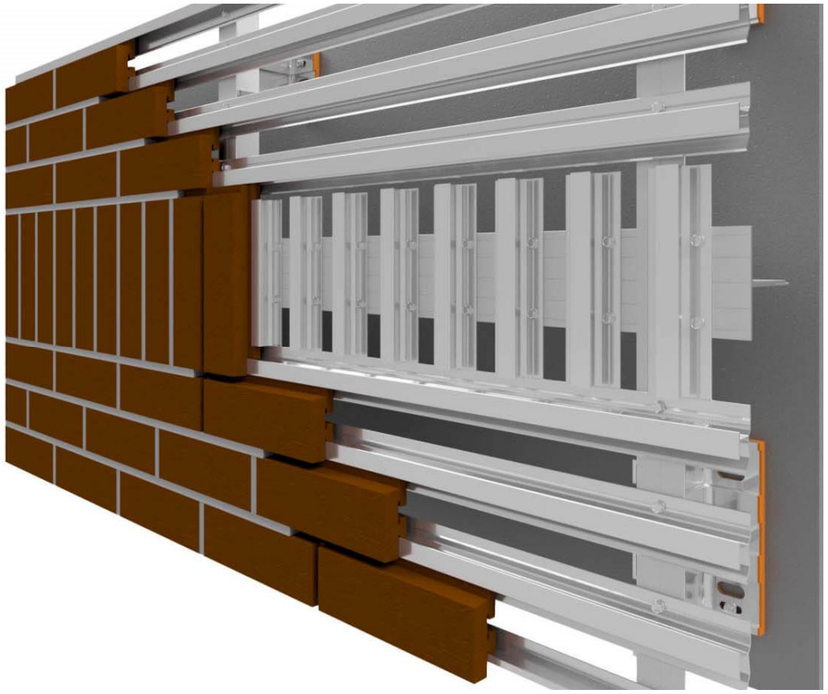
MechSlip

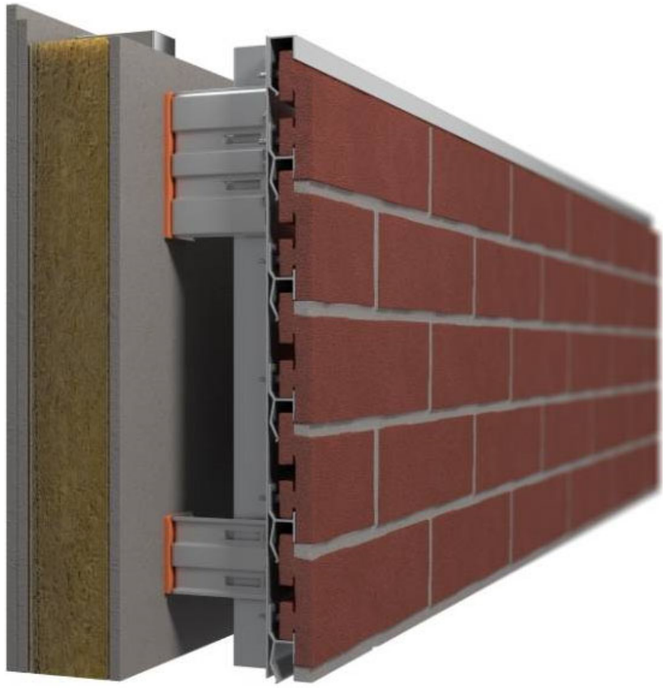
Available technical data for this product is provided in the table.

Below: MechSlip was used as a replacement brick slip cladding system after the FastClad adhesively fixed cladding system failed after under a decade in service. Arup undertook the failure investigation and advised the use of a mechanically fixed brick slip system such as MechSlip









NaturAL-X

NaturAL-X is a product from Ash & Lacy, and uses the same support system as the MechSlip system they co-developed with Ibstock.

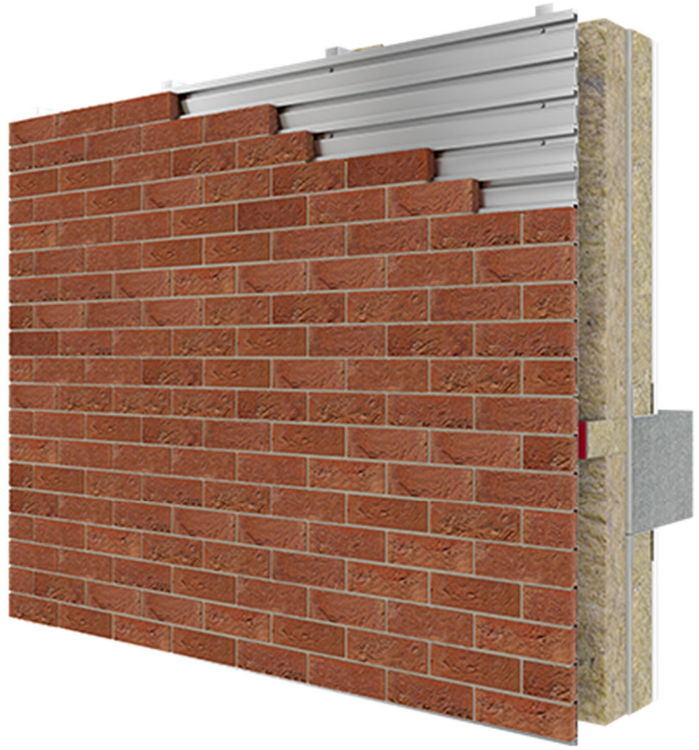
This system differs from MechSlip in that it uses purpose extruded bricks slip, rather than slips cut from whole bricks. This reduces cost and embodied carbon, however the built examples viewed by Arup to date look very ‘tile like’ i.e. too regular in appearance giving the suggestion that the products are slips rather than real bricks. Also, they appear to be struggling with size tolerances at the current time, especially bowing of the slips, which further emphasise the fact they are brick slips.

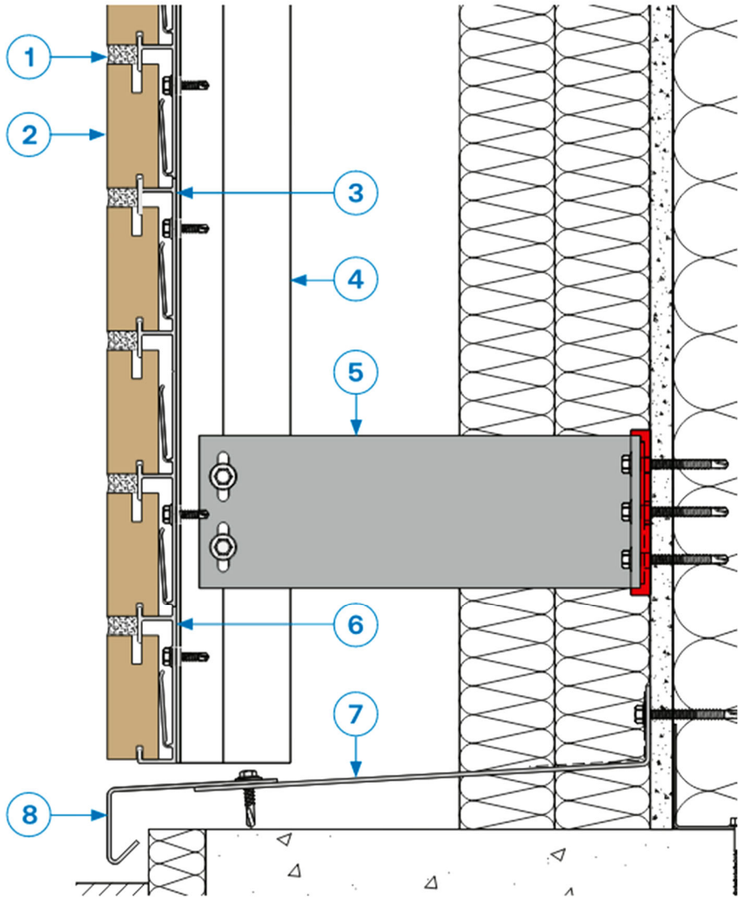
From a technical point of view the system shares most of the same performance characteristics as its sister product, MechSlip.

Design life	>35 years
Supplier	Ash & Lacy
Brick type	Extruded clay brick.
Brick height (mm)	80
Brick length (mm)	225
Brick thickness (mm)	28
Brick finish	Colours and textures available in Simplicity and Creativity ranges. Limited to purpose extruded slips with a rather ‘tile like’ appearance which is not always a convincing replacement for brick slips.
Mortar	Parex Historic Mortar KL— mixture of hydrated lime, sand, and GGBS.
Maximum mortar depth (mm)	17.5
Interlocking of mortar into mechanical key	No
Backing material	Aluminium
Subframe options	AxiAL stainless steel or aluminium T/L mullions (L, T, Z, open, top hat) and brackets, aluminium starter / mid / top rail.
Subframe spacing	Maximum spacing between vertical and horizontal subframe supports must not exceed 600 mm centres.
Substrate options	Masonry, concrete, timber-frame or steel-frame.
Brick slip height engagement	Not known.
Reaction to fire classification	A1
Nominal weight of system	57 kg/m^2
Installation method	Refer to Section 12 and 13 of BBA certificate 20/5773.
Ability to support stretcher and header face of corner slip	No.
Number of brick types and heights tested	1; 80 mm.
Wind load tests	NaturAL-X cladding fixed to AxiAL supporting system with aluminium brackets and rails at 600 mm spacing, achieved a serviceability wind pressure of 2.4 kN/m^2 and a safety wind pressure of 3.6 kN/m^2.
Impact resistance	In a final mortared state, the system achieved Class 2 and Negligible Risk, as defined in CWCT TN76. Therefore suitable for most applications except vandalism prone at low level.
Freeze thaw resistance	Whole system tested to ETAG 017 - 30 freeze thaw cycles.
Cyclic wind load resistance	Not stated.
Warranty	25 years
Movement joint requirements	Vertical expansion joints at maximum 6 m centres. Horizontal expansion joints at maximum 6 m centres.
Drainage requirements	Minimum 38 mm ventilated and drained clear cavity.
Soldier course	Subframe system is typically installed vertically to receive soldier course.
Ground level interface	This system, when in accordance with BBA certificate, is satisfactory for use above damp-proof course (dpc) level.

NaturAL-X

Available technical data for this product is provided in the table.





Occam

Proteus Façades have developed the Occam brick slip system and partnered with brick suppliers, EH Smith and Manchester Brick Specialists, who source a wide range of brick types to be used on the system.

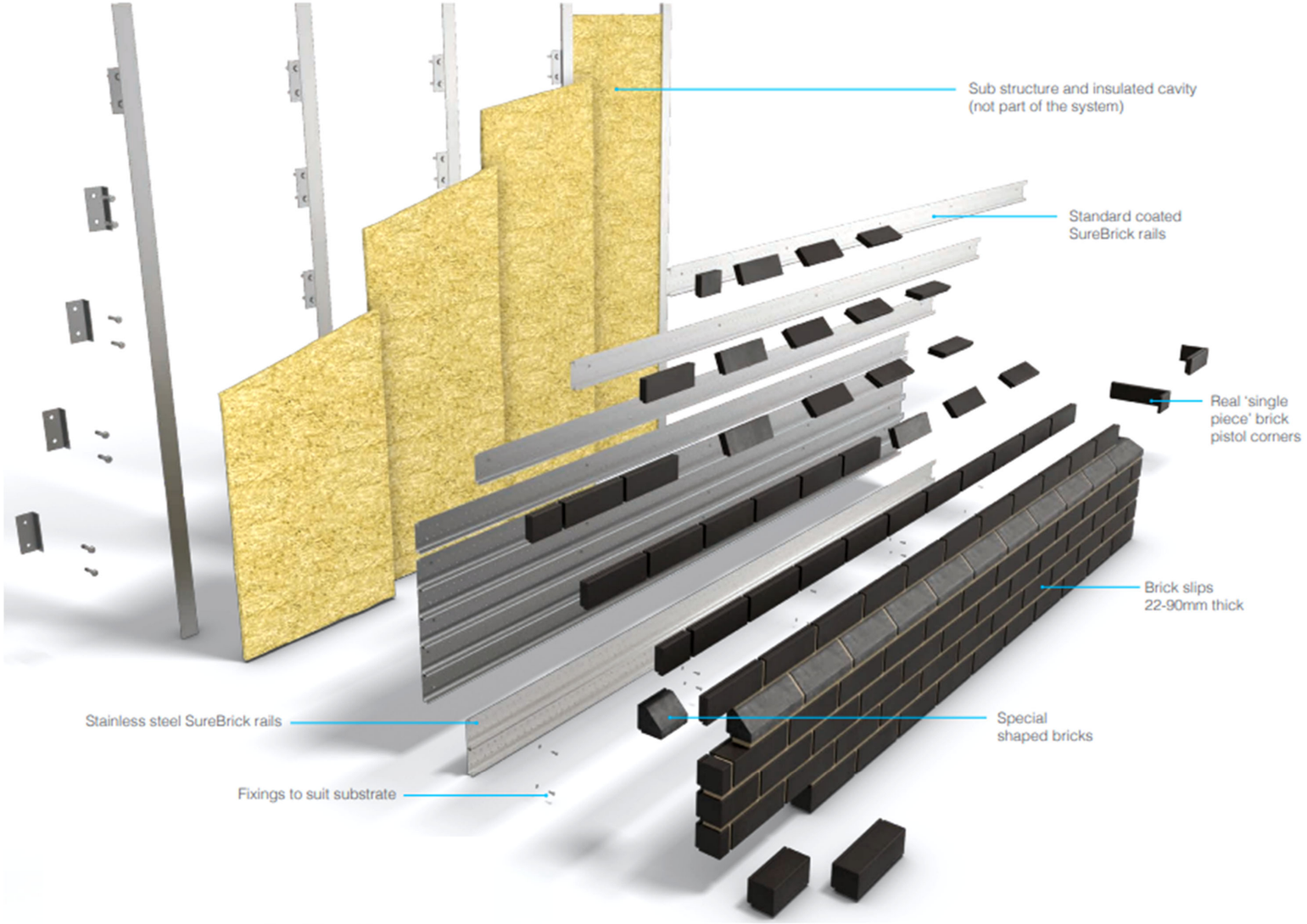
Brick slips used on the system can be purpose extruded or cut from whole bricks. They require narrow grooves machined in the head and base surfaces to allow them to clipped into an continuous horizontal aluminium backing profile. The profile has a horizontally spanning aluminium clip which pushes on the rear surface of the slip to keep it locked in position. The profile in turn is fixed onto aluminium T– or L-rail.

Minimal technical data is published online at the time of writing.

Design life	Not stated.
Supplier	Proteus Facades
Brick type	Cut or extruded.
Brick height (mm)	65, 140, 215
Brick length (mm)	Not stated.
Brick thickness (mm)	Not stated.
Brick finish	Range of colours and textures.
Mortar	Range of mortars including Instarmac Limepoint Plus, Instarmac Limepoint Regency & Sika Parex Historic KL.
Maximum mortar depth (mm)	16
Interlocking of mortar into mechanical key	No
Backing material	Aluminium carrier profile.
Subframe options	Aluminium
Subframe spacing	Not stated.
Substrate options	Not stated.
Brick slip height engagement	See Appendix B.
Reaction to fire classification	A1
Nominal weight of system	Not stated.
Installation method	Refer to Occam Brick Cladding Brochure.
Ability to support stretcher and header face of corner slip	No.
Number of brick types and heights tested	1; 65 mm.
Wind load tests	Testing to CWCT standards, the system achieved a serviceability wind pressure of 2.4 kN/m^2 and a safety wind pressure of 3.6 kN/m^2.
Impact resistance	In a final mortared state, the system achieved Class 2 and Negligible Risk for hard and soft body impact testing, as defined in CWCT TN76. (Suitable for most locations except vandalism prone location below 1.5m height).
Freeze thaw resistance	Not stated.
Cyclic wind load resistance	Not stated.
Warranty	Not stated.
Movement joint requirements	Not stated.
Drainage requirements	Not stated.
Soldier course	Vertical backing profile used to receive soldier course.
Ground level interface	Not stated.

Occam

Available technical data for this product is provided in the table.



SureBrick

Forterra's are one of the 'big three' UK brickmakers, alongside Wienerberger and Ibstock. SureBrick was developed to compete with Ibstock's MechSlip and Weinerberger's Corium systems, and to the growing demand for mechanically fixed brick slip systems. (Forterra were one of the pioneers of brick slip systems with their Wonderwall adhesively fixed system over two decades ago)

A version of the system has been in use in the US for a number of years, and it is understood that Forterra have the rights to produce their own version of the system in the UK.

The system has much in common with Wienerberger's Corium system, in that the slips interlock into continuous metal trays, but also with Ibstock/Ash & Lacy's MechSlip system in that the slips are cut from whole brick slips. In this case, the slips are limited to Forterra's brick product range, albeit extensive.

It is not known whether Forterra are planning to produce purpose-extruded brick slips for the system.

The system has also been tested to achieve CWCT and other key performance criteria.

Design life	>35 years
Supplier	Forterra
Brick type	Cut & profiled brick slips, F2.
Brick height (mm)	65
Brick length (mm)	215
Brick thickness (mm)	22 - 90
Brick finish	Range of colours and textures.
Mortar	SureBrick pointing mortar—mixture of hydrated lime, sand, and GGBS.
Maximum mortar depth (mm)	12
Interlocking of mortar into mechanical key	No
Backing material	SureBrick profiled rails 0.7 mm thick (coated metal or stainless steel).
Subframe options	Aluminium
Subframe spacing	Maximum spacing between vertical subframe supports must not exceed 600 mm centres (horizontally). Minimum facing width of rail is 40 mm.
Substrate options	Masonry, concrete, timber-frame or steel-frame.
Brick slip height engagement	Not known.
Reaction to fire classification	A1
Nominal weight of system	42 - 56 kg/m^2
Installation method	Refer to Section 12 and 13 of BBA certificate 20/5758.
Ability to support stretcher and header face of corner slip	No.
Number of brick types and heights tested	3; 65 mm.
Wind load tests	CWCT (vertical steel frame supports tested with SureBrick rails) - achieved a serviceability wind pressure of 2.4 kN/m^2 and a safety wind pressure of 3.6 kN/m^2.
Impact resistance	In a final mortared state, the system achieved Category B Class 1 and Negligible Risk for soft body impacts, and Class 3 and Low Risk for hard body impacts, as defined in CWCT TN76.
Freeze thaw resistance	Whole system tested to ETAG 017 - 30 freeze thaw cycles.
Cyclic wind load resistance	Not stated.
Warranty	35 years (available upon application).
Movement joint requirements	To be detailed by a qualified engineer in accordance with structural movement of building. Vertical expansion joints at maximum 12 m centres. Horizontal movement joints to suit building movements.
Drainage requirements	Minimum 38 mm ventilated and drained clear cavity. 500 mm^2 ventilation area per metre run = one perpend per 1.5 m. Timber battens to be made of appropriately treated timber, minimum 38 mm thick to ensure embedment of SureBrick fixings.
Soldier course	Install rails vertically (max 675 mm / 3 brick height).
Ground level interface	This system is satisfactory for use to provide a protective and decorative masonry façade above and below damp proof course (dpc) level.

SureBrick

Available technical data for this product is provided in the table.

System Comparison Summary Tables

The following tables provides a ‘red, amber, green’ summary of each system’s conformance with the requirements of the Arup Model Performance Specification. This is based on publicly available information on the systems published online at the time of writing.

An expanded version of the table showing further details of each criteria is provided from page 26 onwards.

Key

Red	Satisfies no requirements of the Arup model specification clause or information not provided.
Amber	Satisfies some but not all of the requirements of the Arup model specification clause or some information is not provided.
Green	Sufficient information provided to determine all requirements of the Arup model specification clause are satisfied.

Model performance specification clause	System									
	Barracuda	BrickClad	Briklok	CERTUS	CMS-40	Corium	MechSlip	NaturAl-X	Occam	SureBrick
2. Performance: general requirements										
2.1 Design and service life										
2.2 Accommodation of movements										
2.3.1 Wind loads										
2.4 Impact										
2.5 Fire										
2.6 Corrosion										
2.7 Visual quality										
3. Components, products & assemblies										
3.1 Brick slip cladding systems										
3.1.1 Testing authority										
3.1.2 Testing generally										
3.1.2 (a) Deflection limits	***TBC***									
3.1.2 (b) Wind resistance										
3.1.2 (c) Thermal transmittance										
3.1.2 (d) Fire	See clause 2.5									
3.1.2 (e) Impact resistance										
3.1.2 (f) Heat/rain resistance										
3.1.2 (g) Freeze/thaw resistance										
3.1.2 (h) Cyclic wind resistance										
3.1.3 Drainage and ventilation										
3.1.4 Cavity barriers										

Model performance specification clause	System									
	Barracuda	**BrickClad**	**Briklok**	**CERTUS**	**CMS-40**	**Corium**	**MechSlip**	**NaturAl-X**	**Occam**	**SureBrick**
3.3 Brackets, fixings and support rails										
4. Materials										
4.1 Aluminium										
4.2 Stainless steel										
4.3 Clay brick slip										
4.4 Brick slip cladding system carrier frame	See clause 4.1 and 4.2									
4.5 Mortar for grouting brick slip cladding system										
4.7 Sealant (non-structural)										
5. Accuracy of erection										
5.1 Aluminium cladding support structure										
5.2 Stainless steel cladding support structure										
5.3 Fixings										
5.4 Membranes										
5.5 Brick slip cladding										
6. Minimum prescriptive requirements										
6.1 Generally										

Full system comparison

The following tables provides a ‘red, amber, green’ summary of each system’s conformance with the requirements of the Arup Model Performance Specification. This is based on publicly available information on the systems published online at the time of writing.

This is an expanded version of the summary tables provided on pages 24 and 25 of this document.

Key

Red	Satisfies no requirements of the model specification clause or information not provided.
Amber	Satisfies some but not all of the requirements of the model specification clause or some information is not provided.
Green	Sufficient information provided to determine all requirements of the model specification clause are satisfied.

Model performance specification clause	System				
	Barracuda	**BrickClad**	**Briklok**	**CERTUS**	**CMS40**
2. Performance: general requirements					
2.1 Design and service life	Design life of the building façade	>35 years	>35 years	>60 years	>60 years
2.2 Accommodation of movements	Able to withstand deflections from applied loads. Movement joint requirements specified, demonstrating the systems ability to accommodate movement.	Able to withstand deflections from applied loads. Movement joint requirements specified, demonstrating the systems ability to accommodate movement.	Able to withstand deflections from applied loads. Movement joint drawing details provided but no further information, such as distance to centres, to demonstrate the systems ability accommodate movement.	Able to withstand deflections from applied loads. Movement joint requirements specified, demonstrating the systems ability to accommodate movement.	Able to withstand deflections from applied loads. No information on ability to accommodate movement.
2.3.1 Wind loads	Tested to serviceability pressure 2400 Pa and safety pressure 3600 Pa.	Tested to serviceability pressure 2400 Pa and safety pressure 3600 Pa.	Tested to serviceability pressure 2400 Pa and safety pressure 3600 Pa.	Tested to serviceability pressure 2400 Pa and safety pressure 3600 Pa.	Tested to serviceability pressure 2400 Pa and safety pressure 3600 Pa.
2.4 Impact	Tested to the serviceability and safety impact loads for hard and soft body testing relevant to Category B.	Tested to the serviceability and safety impact loads for hard and soft body testing relevant to Category B.	Tested to the serviceability and safety impact loads for hard and soft body testing relevant to Category B.	Tested to the serviceability and safety impact loads for hard and soft body testing relevant to Category B.	Tested to the serviceability and safety impact loads for hard and soft body testing relevant to Category B.
2.5 Fire	A1 reaction to fire classification	A1 reaction to fire classification.	A1 reaction to fire classification.	A1 reaction to fire classification.	A1 reaction to fire classification.
2.6 Corrosion	System designed not to trap water. No aluminium components in direct contact with curing cementitious surfaces.	System designed not to trap water. No aluminium components in direct contact with curing cementitious surfaces.	System designed not to trap water. Horizontal anodised aluminium profiles used, however, corrosion risk is mitigated by use of lime-based (cement-free) mortar.	System designed not to trap water. No aluminium components in direct contact with curing cementitious surfaces.	System designed not to trap water. Horizontal anodised aluminium profiles used, however, corrosion risk is mitigated by use of lime-based (cement-free) mortar.
2.7 Visual quality	System appears to provide a reasonably uniform appearance from supplier's images.	System appears to provide a reasonably uniform appearance from supplier's images.	System appears to provide a reasonably uniform appearance from supplier's images.	System appears to provide a reasonably uniform appearance from supplier's images.	System appears to provide a reasonably uniform appearance from supplier's images.
3. Components, products & assemblies					
3.1 Brick slip cladding systems	Proprietary system tested to CWCT and other relevant standards. 3 x 3.5 m test panel of all system components and a backing wall construction that exhibits mid span deflections representative of those in service.	Proprietary system tested to CWCT and other relevant standards. No information on test panel size. Test panel constituted all system components, however, no information on backing wall.	Proprietary system tested to CWCT and other relevant standards. 5 x 8 m test panel of all system components and an SFS backing wall, representative of in service.	Proprietary system tested to CWCT and other relevant standards. 5.39 x 8.10 m test panel of all system components. No information provided on backing wall.	Proprietary system tested to CWCT and other relevant standards. System tested with all components. No information on test panel size and backing wall.
3.1.1 Testing authority	Tested by a UKAS accredited Independent Testing Authority.	Tested by a UKAS accredited Independent Testing Authority.	Tested by a UKAS accredited Independent Testing Authority.	Tested by a UKAS accredited Independent Testing Authority.	Tested by a UKAS accredited Independent Testing Authority.
3.1.2 Testing generally	Tested in a temporary un-mortared and final mortared state whilst incorporating samples with a range of manufacturing tolerances.	Testing conducted only in a final mortared state. Brick slips of 65 mm height only tested. No other information on brick slip tolerances tested.	Testing conducted only in a final mortared state. Brick slips of 63 mm height only tested. No other information on brick slip tolerances tested.	Testing conducted only in a final mortared state. No information on height/tolerances of brick slips tested.	Testing conducted only in a final mortared state. No information on height/ tolerances of brick slips tested.

Model performance specification clause	System				
	Barracuda	BrickClad	Briklok	CERTUS	CMS-40
3.1.2 (b) Wind resistance	Achieved a serviceability wind pressure of 2.4 kN/m^2 and a safety wind pressure of 3.6 kN/m^2 in a final mortared state. In a temporary un-mortared state, the system retained the slips when pull out tested to 85 N and 100 N, which equates to approximately 225 and 245 mph, respectively.	Achieved a serviceability wind pressure of 2.4 kN/m^2 and a safety wind pressure of 3.6 kN/m^2 in a final mortared state. No information on testing in a temporary un-mortared state.	Achieved a serviceability wind pressure of 2.4 kN/m^2 and a safety wind pressure of 3.6 kN/m^2 in a final mortared state. No information on testing in a temporary un-mortared state.	Achieved a serviceability wind pressure of 2.4 kN/m^2 and a safety wind pressure of 3.6 kN/m^2 in a final mortared state. No information on testing in a temporary un-mortared state.	Achieved a serviceability wind pressure of 2.4 kN/m^2 and a safety wind pressure of 3.6 kN/m^2 in a final mortared state. No information on testing in a temporary un-mortared state.
3.1.2 (c) Thermal transmittance	Thermal breaks on brackets are specified.	Thermal breaks on brackets are specified.	Thermal breaks appear to be on system drawings but are not explicitly labelled.	Thermal breaks on brackets are specified.	Thermal breaks on brackets are specified.
3.1.2 (d) Fire	As per clause 2.5	As per clause 2.5	As per clause 2.5	As per clause 2.5	As per clause 2.5
3.1.2 (e) Impact resistance	In a final mortared state, the system achieved Category B Class 1 and Negligible Risk for hard and soft body impact testing, as defined in CWCT TN76. In a temporary un-mortared state, the system achieved Low and Negligible Risk for hard and soft body safety impact testing. Achieved Class 1 and Negligible Risk for hard and soft body impact testing following durability test sequence f), g), and h).	In a final mortared state, the system achieved Class 1 and Negligible Risk for exposure Category B. No information provided on impact testing in a temporary un-mortared state or after durability test sequence.	In a final mortared state, the system achieved Class 1 and Negligible Risk for exposure Category B. No information provided on impact testing in a temporary un-mortared state or after durability test sequence.	In a final mortared state, the system achieved Class 3 and Low Risk for exposure Category B. No information provided on impact testing in a temporary un-mortared state or after durability test sequence.	In a final mortared state, the system achieved Category B Class 1 and Negligible Risk for soft body impacts and Class 2 and Negligible Risk for hard body impacts, as defined in CWCT TN76. Note: the test panel was constructed with horizontal rails at 600 mm centres. At 1200 mm centres, the system achieved Class1 and Low Risk for soft body, and Class 3 and Low Risk for hard body. No information provided on impact testing in a temporary un-mortared state or after durability test sequence.
3.1.2 (f) Heat/rain resistance	No detectable deterioration to the brick slips. Only fine cracking in mortar.	No information provided.	No information provided.	No information provided.	No detectable deterioration to the brick slips.
3.1.2 (g) Freeze/thaw resistance	Whole system tested to DD CEN/TS 772-22 - 100 freeze thaw cycles.	Brick slips tested to an unknown number of freeze thaw cycles.	Brick slips tested to an unknown number of freeze thaw cycles.	Whole system tested to ETAG 017 - 30 freeze thaw cycles. (Note: ETAG 017 now superseded by EAD 040914-00-0404, but the test method is the same).	Brick slips tested to an unknown number of freeze thaw cycles.

Model performance specification clause	System				
	Barracuda	**BrickClad**	**Briklok**	**CERTUS**	**CMS-40**
3.1.2 (h) Cyclic wind resistance	No loss of integrity.	No information provided.	No information provided.	No information provided.	No information provided.
3.1.3 Drainage and ventilation	System has a minimum 38 mm wide unobstructed, ventilated, and drained cavity. Drainage routes have been detailed in drawings.	System specifies a minimum 38 mm wide unobstructed, ventilated, and drained cavity. Openings and drainage routes have not been detailed in drawings.	System specifies a minimum 38 mm wide unobstructed, ventilated, and drained cavity. Weep holes specified at bottom of cavity 215 x 10 mm.	System specifies a minimum 38 mm wide unobstructed, ventilated, and drained cavity, with a minimum ventilation area of 5000 mm^2 per metre run. Drainage routes detailed in drawings.	System specifies a minimum 50 mm ventilated and drained clear cavity with a minimum ventilation area of 5000 mm^2 per metre run.
3.1.4 Cavity barriers	System clearly demonstrates how continuous cavity barriers are incorporated.	Cavity permits the use of continuous cavity barriers. However, system drawings do not clearly show this.	System clearly demonstrates how continuous cavity barriers are incorporated.	Cavity permits the use of continuous cavity barriers. However, system drawings do not clearly show this.	Cavity permits the use of continuous cavity barriers. However, system drawings do not clearly show this.
3.3 Brackets, fixings and support rails	Horizontal ‘Standard’ rails are cold rolled stainless steel grade 1.4310. Vertical rail subframe is aluminium grade 6063 T6. All fixings are stainless steel.	The horizontal cassette profiles are roll-formed steel sheets with a ZM310 Magnelis coating or in stainless steel grade 1.4301. The vertical rail subframe and wall brackets are aluminium grade 6063/T6. All fixings are stainless steel grade A2.	Horizontal backing profile are extruded anodised aluminium grade 6063/T6. Vertical rail subframe has aluminium or stainless steel options. ‘Helping hand’ brackets have aluminium or stainless steel options. Stainless steel grade includes 1.4301 and 1.4401. All fixings are stainless steel grade A2 or A4.	Horizontal carrier system are stainless steel grade 1.4301 or 1.4401 depending on the environment requirements. Vertical rail subframe is aluminium or stainless steel. ‘Helping hand’ bracket material not specified. All fixings are stainless steel grade A2 or A4.	Horizontal support rails are anodised aluminium grade 6063/T6. Vertical rail subframe and ‘helping hand’ brackets are aluminium grade 6063/T6 or stainless steel grade 1.4301. All fixings are stainless steel grade A2.
4. Materials					
4.1 Aluminium	Aluminium extrusions are grade 6063/T6.	Aluminium extrusions are grade 6063/T6.	Aluminium extrusions are grade 6063/T6.	No information on aluminium grade provided.	Aluminium extrusions are grade 6063/T6.
4.2 Stainless steel	Stainless steel grade 1.4301 used for non-visible components. Stainless steel grade A2 used for all non-visible fixings.	Stainless steel grade 1.4301 used for non-visible components. Stainless steel grade A2 used for all non-visible fixings.	Stainless steel grade 1.4301 and **1.4401** used for non-visible components. Stainless steel grade A2 and **A4** used for non-visible fixings.	Stainless steel grade 1.4301 can be used for non-visible components. Stainless steel grade A2 can be used for non-visible fixings.	Stainless steel grade 1.4301 used for non-visible components. Stainless steel grade A2 used for all non-visible fixings.

Model performance specification clause	System				
	Barracuda	**BrickClad**	**Briklok**	**CERTUS**	**CMS-40**
4.3 Clay brick slip	Brick slips are required to comply with BS EN 771-1. System is able to accommodate and sufficiently restrain brick slips with a range of size tolerances. Demonstrated by testing with brick slips of 58-70 mm height.	No information on system's ability to accommodate and sufficiently restrain brick slips with a range of size tolerances.	Brick slips are required to comply with BS EN 771-1. No information on systems ability to accommodate and sufficiently restrain brick slips with a range of size tolerances.	Brick slips are required to comply with the requirements of BS EN 771-1 and to the specification criteria. No information on systems ability to accommodate and sufficiently restrain brick slips with a range of size tolerances.	Brick slips are required to comply with the requirements of BS EN 771-1 and to the specification criteria. No information on systems ability to accommodate and sufficiently restrain brick slips with a range of size tolerances.
4.4 Brick slip cladding system carrier frame	See clause 4.1 and 4.2				
4.5 Mortar for grouting brick slip cladding system	System uses a gun-applied cementitious mortar with a class iii option.	Shackerley offer a gun-applied lime-based mortar with M5 compressive strength class.	System used gun-applied Parex Historic Mortar KL (lime-based) with M5 compressive strength class.	System uses gun-applied Parex Historic Mortar KL (lime-based) with M5 compressive strength class.	System uses gun-applied Parex Historic Mortar KL (lime-based) with M5 compressive strength class.
4.7 Sealant (non-structural)	Low modulus silicone sealant used with polyethylene backing rod.	No information provided.	No information provided.	No information provided.	No information provided.
5. Accuracy of erection					
5.1 Aluminium cladding support structure	Clear guidance given for setting out and installing support structure.	Clear guidance given for setting out and installing support structure.	No information provided.	Clear guidance given for setting out and installing support structure.	Basic guidance given for setting out and installing support structure.
5.2 Stainless steel cladding support structure	Clear guidance given for setting out and installing support structure.	Clear guidance given for setting out and installing support structure.	No information provided.	Clear guidance given for setting out and installing support structure.	Basic guidance given for setting out and installing support structure.
5.3 Fixings	Clear fixing installation guidance provided.	Clear fixing installation guidance provided.	No fixing installation guidance provided.	Clear fixing installation guidance provided.	Basic fixing installation guidance provided.

Model performance specification clause	System				
	Barracuda	**BrickClad**	**Briklok**	**CERTUS**	**CMS-40**
5.4 Membranes	Vapour control and/or waterproofing membranes are continuously mechanically and adhesively fixed. Membranes are completely sealed at all joints and fixing penetrations.	No information provided.	No information provided.	No information provided.	No information provided.
5.5 Brick slip cladding	Clear installation guidance for installing brick slips and aligning brick slips. Aluminium 'L' and 'T' rails have integral brick course 'gauge tabs' for the 'Standard' rails to be placed into to promote accurate installation. System designed to push slips upwards so that top of bricks are level. Projecting integral stops and the ability to move slips horizontally after installing them allows for accurate erection.	Basic installation guidance for installing and aligning brick slips. Horizontal cassette profile positions predetermined using architectural layout drawings.	Minimal/no installation guidance provided.	Clear installation guidance for installing brick slips and aligning brick slips. . To promote accurate installation panels are fixed to aluminium rails by pre-pierced horizontal slots at the ends of each panel, they can be adjusted to ensure correct line/ level. Brick slip and carrier profile prefabricated to ensure accurate construction.	Basic installation guidance for installing brick slips and aligning brick slips.
6. Minimum prescriptive requirements					
6.1 Generally	Fixings outside or through the vapour control line are stainless steel. All brick slips individually mechanically fixed.	Fixings outside or through the vapour control line are stainless steel. Brackets outside the vapour control line are stainless steel. All brick slips individually mechanically fixed. Minimum air gap as per CWCT guidance is specified.	Fixings outside or through the vapour control line are stainless steel. Brackets outside the vapour control line are stainless steel or aluminium. All brick slips individually mechanically fixed. Opening in rainscreen are sufficient to ventilate and drain cavity. Minimum air gap as per CWCT guidance is specified.	Fixings outside or through the vapour control line are stainless steel. All brick slips individually mechanically fixed. Opening in rainscreen are sufficient to ventilate and drain cavity. Minimum air gap as per CWCT guidance is specified.	Fixings outside or through the vapour control line are stainless steel. Brackets outside the vapour control line are stainless steel or aluminium. All brick slips individually mechanically fixed. Opening in rainscreen are sufficient to ventilate and drain cavity. Minimum air gap as per CWCT guidance is specified.

Model performance specification clause	System				
	Corium	**MechSlip**	**NaturAl-X**	**Occam**	**SureBrick**
2. Performance: general requirements					
2.1 Design and service life	>35 years	>35 years	>35 years	No information provided.	>35 years
2.2 Accommodation of movements	Able to withstand deflections from applied loads. Movement joint requirements specified, demonstrating the systems ability to accommodate movement.	Able to withstand deflections from applied loads. Movement joint requirements specified, demonstrating the systems ability to accommodate movement.	Able to withstand deflections from applied loads. Movement joint requirements specified, demonstrating the systems ability to accommodate movement.	Able to withstand deflections from applied loads. No further information on ability to accommodate movement.	Able to withstand deflections from applied loads. Movement joint requirements specified, demonstrating the systems ability to accommodate movement.
2.3.1 Wind loads	Tested to serviceability pressure 2400 Pa and safety pressure 3600 Pa.	Tested to serviceability pressure 2400 Pa and safety pressure 3600 Pa.	Tested to serviceability pressure 2400 Pa and safety pressure 3600 Pa.	Tested to serviceability pressure 2400 Pa and safety pressure 3600 Pa.	Tested to serviceability pressure 2400 Pa and safety pressure 3600 Pa.
2.4 Impact	Tested to the serviceability and safety impact loads for hard and soft body testing relevant to Category B.	Tested to the serviceability and safety impact loads for hard and soft body testing relevant to Category B.	Tested to the serviceability and safety impact loads for hard and soft body testing relevant to Category B.	No information on impact loads.	Tested to the serviceability and safety impact loads for hard and soft body testing relevant to Category B.
2.5 Fire	A1 reaction to fire classification.	A1 reaction to fire classification.	A1 reaction to fire classification.	A1 reaction to fire classification.	A1 reaction to fire classification.
2.6 Corrosion	System designed not to trap water. No aluminium components in direct contact with curing cementitious surfaces.	System designed not to trap water. Horizontal anodised aluminium profiles used, however, corrosion risk is mitigated by use of lime-based (cement-free) mortar.	System designed not to trap water. Horizontal anodised aluminium profiles used, however, corrosion risk is mitigated by use of lime-based (cement-free) mortar.	System designed not to trap water. Horizontal anodised aluminium profiles used, however, corrosion risk is mitigated by use of lime-based (cement-free) mortar.	System designed not to trap water. No aluminium components in direct contact with curing cementitious surfaces.
2.7 Visual quality	System appears to provide a reasonably uniform appearance from supplier's images.	System appears to provide a reasonably uniform appearance from supplier's images.	System appears to provide a reasonably uniform appearance from supplier's images.	System appears to provide a reasonably uniform appearance from supplier's images.	System appears to provide a reasonably uniform appearance from supplier's images.
3. Components, products & assemblies					
3.1 Brick slip cladding systems	Proprietary system tested to CWCT and other relevant standards. 6 x 6 m test panel of all system components and a backing wall construction that exhibits mid span deflections representative of those in service.	Proprietary system tested to CWCT and other relevant standards. 5 x 5 m test panel of all system components, mounted on a backing wall supplied by the test centre, comprising of RCM boards.	Proprietary system tested to CWCT and other relevant standards. 5 x 5 m test panel of all system components, mounted on a backing wall supplied by the test centre, comprising of RCM boards.	Proprietary system tested to CWCT and other relevant standards. No further information provided.	Proprietary system tested to CWCT and other relevant standards. 5.4 x 6.6 m test panel of all system components and a backing wall construction that exhibits mid span deflections representative of those in service.
3.1.1 Testing authority	Tested by a UKAS accredited Independent Testing Authority.	Tested by a UKAS accredited Independent Testing Authority.	Tested by a UKAS accredited Independent Testing Authority.	Tested by a UKAS accredited Independent Testing Authority.	Tested by a UKAS accredited Independent Testing Authority.
3.1.2 Testing generally	Testing conducted only in a final mortared state. Brick slips of 65 mm height only tested. No other information on brick slip tolerances tested.	Testing conducted only in a final mortared state. Brick slips of 65 mm height only tested. No other information on brick slip tolerances tested.	Testing conducted only in a final mortared state. Brick slips of 65 mm height only tested. No other information on brick slip tolerances tested.	Testing conducted only in a final mortared state. No further information provided.	Testing conducted only in a final mortared state. Brick slips of 65 mm height only tested. No other information on brick slip tolerances tested.

Model performance specification clause	System				
	Corium	MechSlip	NaturAl-X	Occam	SureBrick
3.1.2 (b) Wind resistance	Achieved a serviceability wind pressure of 2.4 kN/m^2 and a safety wind pressure of 3.6 kN/m^2 in a final mortared state. No information on testing in a temporary un-mortared state.	Achieved a serviceability wind pressure of 2.4 kN/m^2 and a safety wind pressure of 3.6 kN/m^2 in a final mortared state. No information on testing in a temporary un-mortared state.	Achieved a serviceability wind pressure of 2.4 kN/m^2 and a safety wind pressure of 3.6 kN/m^2 in a final mortared state. No information on testing in a temporary un-mortared state.	Achieved a serviceability wind pressure of 2.4 kN/m^2 and a safety wind pressure of 3.6 kN/m^2 in a final mortared state. No information on testing in a temporary un-mortared state.	Achieved a serviceability wind pressure of 2.4 kN/m^2 and a safety wind pressure of 3.6 kN/m^2 in a final mortared state. No information on testing in a temporary un-mortared state.
3.1.2 (c) Thermal transmittance	Thermal breaks on brackets are specified.	Thermal breaks on brackets are specified.	Thermal breaks on brackets are specified.	Thermal breaks on brackets are specified.	No information provided.
3.1.2 (d) Fire	As per clause 2.5	As per clause 2.5	As per clause 2.5	As per clause 2.5	As per clause 2.5
3.1.2 (e) Impact resistance	In a final mortared state, the system achieved adequate impact resistance for use in the Impact Use Categories II, III and IV, as defined in EAD 090062-00-0404 : 2018, Table G.3. Use category I is not suitable for the system. No information provided on impact testing in a temporary un-mortared state or after durability test sequence.	In a final mortared state, the system achieved Category B Class 1 and Negligible Risk for soft body impacts, and Class 2 and Negligible Risk for hard body impacts. No information provided on impact testing in a temporary un-mortared state or after durability test sequence.	In a final mortared state, the system achieved Class 1 and Negligible Risk for exposure Category B. No information provided on impact testing in a temporary un-mortared state or after durability test sequence.	In a final mortared state, the system achieves up to Class 2 and Negligible Risk. No information provided on the impact loads/exposure category.	In a final mortared state, the system achieved Category B Class 1 and Negligible Risk for soft body impacts, and Class 3 and Low Risk for hard body impacts. No information provided on impact testing in a temporary un-mortared state or after durability test sequence.
3.1.2 (f) Heat/rain resistance	No detectable deterioration to the brick slips.	No detectable deterioration to the brick slips.	No detectable deterioration to the brick slips.	Testing undertaken but no details of the results.	No detectable deterioration to the brick slips.
3.1.2 (g) Freeze/thaw resistance	Whole system tested to ETAG 017 - 30 freeze thaw cycles. (Note: ETAG 017 now superseded by EAD 040914-00-0404, but the test method is the same).	Whole system tested to ETAG 017 - 30 freeze thaw cycles. (Note: ETAG 017 now superseded by EAD 040914-00-0404, but the test method is the same).	Whole system tested to ETAG 017 - 30 freeze thaw cycles. (Note: ETAG 017 now superseded by EAD 040914-00-0404, but the test method is the same).	Tested to EAD 090062-01-0404. No information provided on test sample and number of cycles.	Whole system tested to ETAG 017 - 30 freeze thaw cycles. (Note: ETAG 017 now superseded by EAD 040914-00-0404, but the test method is the same).
3.1.2 (h) Cyclic wind resistance	No information provided.	No information provided.	No information provided.	No information provided.	No information provided.
3.1.3 Drainage and ventilation	Specifies a clear cavity minimum 15 mm to achieve minimum ventilation area of 1000 mm^2 per metre run. Drainage routes detailed in drawings.	System specifies a minimum 38 mm wide unobstructed, ventilated, and drained cavity, with a minimum ventilation area of 5000 mm^2 per metre run. Drainage routes detailed in drawings.	System specifies a minimum 38 mm wide unobstructed, ventilated, and drained cavity, with a minimum ventilation area of 5000 mm^2 per metre run. Drainage routes detailed in drawings.	No information provided.	System specifies a minimum 38 mm wide unobstructed, ventilated, and drained cavity, with a minimum ventilation area of 5000 mm^2 per metre run. Drainage routes detailed in drawings.

Model performance specification clause	System				
	Corium	**MechSlip**	**NaturAl-X**	**Occam**	**SureBrick**
3.1.4 Cavity barriers	Cavity permits the use of continuous cavity barriers. However, system drawings do not clearly show this.	System clearly demonstrates how continuous cavity barriers are incorporated.	System clearly demonstrates how continuous cavity barriers are incorporated.	No information provided.	Cavity permits the use of continuous cavity barriers. However, system drawings do not clearly show this.
3.3 Brackets, fixings and support rails	The horizontal cassette profiles are roll-formed steel sheets with a ZM310 Magnelis coating or in stainless steel grade 1.4301/1.4401. The vertical rails and wall brackets are aluminium. All fixings are stainless steel.	Horizontal support rails and 'helping hand' brackets are anodised aluminium grade 6063/T6. Vertical rail subframe is stainless steel grade 1.4401 or aluminium grade 6063/T6. All fixings are stainless steel A2/A4.	Horizontal support rails and 'helping hand' brackets are anodised aluminium grade 6063/T6. Vertical rail subframe is stainless steel grade 1.4401 or aluminium grade 6063/T6. All fixings are stainless steel A2/A4.	Horizontal support rails are aluminium. Vertical rail subframe is aluminium. No information on fixings or grade of aluminium used.	Horizontal support rails comprising of either structural steel coated with hot dip zinc-magnesium coating or stainless steel grade 1.4301/1.4401. Vertical rail subframe and 'helping hand' brackets are aluminium. All fixings are stainless steel A2.
4. Materials					
4.1 Aluminium	Aluminium grade not specified.	Aluminium extrusions are grade 6063/T6.	Aluminium extrusions are grade 6063/T6.	Aluminium grade not specified.	Aluminium grade not specified.
4.2 Stainless steel	Stainless steel grade 1.4301 used for non-visible components. Stainless steel grade for fixings is not specified.	Stainless steel grade **1.4401** used for non-visible components. Stainless steel grade A2 available as an option to use for non-visible fixings.	Stainless steel grade **1.4401** used for non-visible components. Stainless steel grade A2 available as an option to use for non-visible fixings.	No information provided.	Stainless steel grade 1.4301 available as an option to use for non-visible components. Stainless steel grade A2 used for all non-visible fixings.
4.3 Clay brick slip	Corium's purpose extruded brick slips comply with the requirements of BS EN 771-1 and to the specification criteria. No information on systems ability to accommodate and sufficiently restrain brick slips with a range of size tolerances.	Brick slips are required to comply with BS EN 771-1. No information on systems ability to accommodate and sufficiently restrain brick slips with a range of size tolerances.	Brick slips are required to comply with BS EN 771-1. No information on systems ability to accommodate and sufficiently restrain brick slips with a range of size tolerances.	No information provided.	Brick slips are required to comply with the requirements of BS EN 771-1 and to the specification criteria. No information on systems ability to accommodate and sufficiently restrain brick slips with a range of size tolerances.
4.5 Mortar for grouting brick slip cladding system	System uses gun-applied Parex Historic Mortar KL (lime-based) with M5 compressive strength class.	System uses gun-applied Parex Historic Mortar KL (lime-based) with M5 compressive strength class.	System uses gun-applied Parex Historic Mortar KL (lime-based) with M5 compressive strength class.	System uses gun-applied lime-based mortars with appropriate compressive strengths.	System uses SureBrick Pointing Mortar (lime-based). No information provided on mortar compressive strength.
4.6 Cavity trays, stop ends, cloaks etc.	Cavity tray specified in drawings but no further details provided.	Cavity tray specified in drawings but no further details provided.	Cavity tray specified in drawings but no further details provided.	Cavity tray specified in drawings but no further details provided.	Cavity tray specified in drawings but no further details provided.
4.7 Sealant (non-structural)	Low modulus silicone sealant used with polyethylene backing rod.	Low modulus silicone sealant used with closed cell polyethylene backing rod.	Low modulus silicone sealant used with closed cell polyethylene backing rod.	No information provided.	No information provided.

Model performance specification clause	System				
	Corium	**MechSlip**	**NaturAl-X**	**Occam**	**SureBrick**
5. Accuracy of erection					
5.1 Aluminium cladding support structure	Clear guidance given for setting out and installing support structure.	Clear guidance given for setting out and installing support structure.	Basic guidance given for setting out and installing support structure.	No information provided.	Clear guidance given for setting out and installing support structure.
5.2 Stainless steel cladding support structure	Clear guidance given for setting out and installing support structure.	Clear guidance given for setting out and installing support structure.	Basic guidance given for setting out and installing support structure.	No information provided.	Clear guidance given for setting out and installing support structure.
5.3 Fixings	Clear fixing installation guidance provided.	Clear fixing installation guidance provided.	Basic fixing installation guidance provided.	No information provided.	Clear fixing installation guidance provided.
5.4 Membranes	Continuous breather membrane specified ensuring overlaps and connections are carried out to manufacturers instructions. No information on method of fixing.	No information provided.	No information provided.	No information provided.	No information provided.
5.5 Brick slip cladding	Clear installation guidance for installing brick slips and aligning brick slips.	Clear installation guidance provided for installing brick slips and aligning brick slips. Guidance emphasises importance of cladding being plumb and true,	Basic installation guidance for installing brick slips and aligning brick slips.	Basic installation guidance for installing brick slips and aligning brick slips.	Basic installation guidance for installing brick slips and aligning brick slips.
6. Minimum prescriptive requirements					
6.1 Generally	Fixings outside or through the vapour control line are stainless steel. Brackets outside the vapour control line are aluminium. All brick slips individually mechanically fixed. Opening in rainscreen are sufficient to ventilate and drain cavity.	Fixings outside or through the vapour control line are stainless steel. Brackets outside the vapour control line are aluminium. All brick slips individually mechanically fixed. Opening in rainscreen are sufficient to ventilate and drain cavity. Minimum air gap as per CWCT guidance is specified.	Fixings outside or through the vapour control line are stainless steel. Brackets outside the vapour control line are aluminium. All brick slips individually mechanically fixed. Opening in rainscreen are sufficient to ventilate and drain cavity. Minimum air gap as per CWCT guidance is specified.	All brick slips individually mechanically fixed. No further information provided.	Fixings outside or through the vapour control line are stainless steel. Brackets outside the vapour control line are aluminium. All brick slips individually mechanically fixed. Opening in rainscreen are sufficient to ventilate and drain cavity. Minimum air gap as per CWCT guidance is specified.

James & Taylor Studies

James & Taylor have conducted studies to determine the possible range in brick slip heights when slips are manufactured to T1/R1, T2/R1, and T2/R2 tolerance/range categories define in BS EN 771-1 and National Annexes.

Their findings conclude that it is possible for a brick slip manufactured to a nominal height of 65 mm with a declared T1/R1 tolerance/range to potentially vary in height between 58 and 72 mm. This raises potential safety concerns around disengagement of slips from support rails, where such broad variation of slip sizes may not have been anticipated during the system design. For example, the fixed positioning of horizontal rails may mean that slips which are considerably smaller than the nominal 65 mm height might not engage sufficiently.

James & Taylor performed an additional study to assess each system's ability to retain brick slips of 58-72 mm height, factoring in a theoretical installation tolerance range of the horizontal support rails. An example of the study is shown in Figure 2. Their study could not be performed for BrickClad, Briklok, Certus, Corium, NaturAl-X, and Surebrick due to insufficient online data.

They concluded that the majority of systems could have limited capacity to fully engage the full range of brick slip heights. This could mean that the mechanical fixings are not sufficiently engaged into the brick slips, potentially leading to brick slips falling from the system.

According to their study, their own system, Barracuda, performs the best by fully engaging brick slips up to a height of 70 mm, at which point they are too large for the system.

Note that the findings present a possible scenario, the likelihood of which occurring is unknown without undertaking an extensive study of different manufacturers bricks in service.

All of the reviewed systems require a selection of suitable sized bricks within the specified tolerance/range according to the scope of the system. The range of sizes that can be fully engaged and safely secured will vary between systems.

The full findings of James& Taylor's studies are detailed in Appendix A and B of this document.

Appendix A: James & Taylor’s explanation of ’T’ and ’R’ brick tolerances

BS EN 771-1 BRICK HEIGHT TOLERANCES EXPLAINED

Most brick slip systems rely, for their satisfactory performance, on the engagement of cut or purpose made brick slips into a rail system. This means that the height of the bricks becomes critical to their safe retention by the system.

Typically, brick manufacturers declare the height of the bricks they produce and state the maximum potential deviation from that height, using the three "Categories" stated within BS EN 771-1.

These three Categories are:

T1 / R1
T2 / R2
T2 / R2

BS EN 772-16 is the Standard that prescribes the methods of measurement. 10no bricks are selected at random from the consignment and each individual brick measured. The 10 measurements are added together and the total divided by 10 to determine the average/ mean of those measurements.

"T" is the maximum permissible deviation of the average/mean of those 10 measurements from the declared height value (65mm). "R" is the maximum permissible deviation between the largest and the smallest of the 10 individual height measurements.

TABLE 1 – Shows the maximum permissible deviations applicable to each category.

TABLE 1

CATEGORY	MAXIMUM PERMISSIBLE DEVIATION
T1	± 3mm
T2	± 2mm
R1	5mm
R2	2mm

TABLE 2 – Shows the individual brick height measurements that result in the extremes of brick height variation allowed by BS EN 771 for each T and R category combination.

TABLE 2

T1/R1									
QUANTITY OF BRICKS	INDIVIDUAL BRICK HEIGHT MEASUREMENT	ADDITION OF BRICK HEIGHTS	MEAN AVERAGE HEIGHT	COMPLIANCE		SMALLEST BRICK MEASURES	LARGEST BRICK MEASURES	COMPLIANCE	
				DEVIATION	CATEGORY			DEVIATION	CATEGORY
2	58mm	116mm	62mm	-3mm	T1	58mm	63mm	5mm	R1
8	63mm	504mm							
10		**620mm**							
2	72mm	144mm	68mm	+3mm	T1	72mm	67mm	5mm	R1
8	67mm	536mm							
10		**680mm**							

T2/R1									
2	59mm	118mm	63mm	-2mm	T2	59mm	64mm	5mm	R1
8	64mm	512mm							
10		**630mm**							
2	71mm	142mm	67mm	+2mm	T2	71mm	66mm	5mm	R1
8	66mm	528mm							
10		**670mm**							

T2/R2									
5	62mm	310mm	63mm	-2mm	T2	62mm	64mm	2mm	R2
5	64mm	320mm							
10		**630mm**							
5	68mm	340mm	67mm	+2mm	T2	68mm	66mm	2mm	R2
5	66mm	330mm							
10		**670mm**							

TABLE 3 - Summarises by Category, the smallest and largest brick that can be provided.

TABLE 3

CATEGORY	SMALLEST	LARGEST
T1 – R1	58mm	72mm
T2 – R1	59mm	71mm
T2 – R2	62mm	68mm

CONCLUSIONS

Any brick slip system supplier, incorporating a brick slip/cut brick that is designated by the brick manufacturer as being in one of the three above T & R Categories, must demonstrate by test that the extremes of brick height variation stated in Table 3 can be safely accommodated by their system, with adequate and sufficient engagement achieved at all times.

The following brick slip system testing must be carried out, incorporating brick slips exhibiting the extremes of height variation stated in Table 3.

Impact Testing Mortared
Impact Testing Un-mortared
Dynamic Water Penetration
Wind Resistance
Durability - Heat Rain, Freeze Thaw, Cyclic Wind Loading, Impact Testing
Pull Out Testing Un-mortared

Any assessment of adequate/sufficient brick slip engagement for any brick slip system must include representative site installation tolerances.

Appendix B: James & Taylor's Brick Slip Height Engagement Study

BARRACUDA

	POTENTIAL INSTALLATION ERROR - 75mm HORIZONTAL RAIL SETTING OUT DIMENSION						
BRICK HEIGHT	**SETTING OUT AT 75mm**	**+1mm**	**+2mm**	**+3mm**	**-1mm**	**-2mm**	**-3mm**
58mm		Barracuda horizontal rails are positioned/fixed by placing the Barracuda horizontal rail projecting leg onto a setting out 'guide tab'. These guide tabs are accurately, factory pre-formed, into the front flange of Barracuda vertical substructure rails at 75mm vertical centes.					
59mm							
60mm							
61mm							
62mm							
63mm							
64mm							
65mm							
66mm							
67mm							
68mm							
69mm							
70mm							
71mm							
72mm							

	brick fully engaged in rails
	brick to large to fit
	not applicable for the system

Brick Slips used in Brick Slip Systems will typically be designated by the brick manufacturer, in accordance with BS EN771-1 as T1/R1 (58mm to 72mm), T2/R1 (59mm to 71mm) & T2/R2 (62mm to 68mm)

Information, readily available on the internet has been used to establish brick slip to horizontal rail engagement (to the nearest whole millimetre).

MECHSLIP							
	POTENTIAL INSTALLATION ERROR - 75mm HORIZONTAL RAIL SETTING OUT DIMENSION						
BRICK HEIGHT	SETTING OUT AT 75mm	+1mm	+2mm	+3mm	-1mm	-2mm	-3mm
58mm							
59mm							
60mm							
61mm							
62mm							
63mm							
64mm							
65mm							
66mm							
67mm							
68mm							
69mm							
70mm							
71mm							
72mm							

	negative or zero rail to brick engagement
	1mm rail to to brick engagement
	2mm brick to rail engagement
	3mm+ brick to rail engagement
	brick to large to fit
	not applicable for the system

Brick Slips used in Brick Slip Systems will typically be designated by the brick manufacturer, in accordance with BS EN771-1 as T1/R1 (58mm to 72mm), T2/R1 (59mm to 71mm) & T2/R2 (62mm to 68mm)

Information, readily available on the internet has been used to establish brick slip to horizontal rail engagement (to the nearest whole millimetre).

CMS40

CMS40 [CLADMATE]							
	POTENTIAL INSTALLATION ERROR - 75mm HORIZONTAL RAIL SETTING OUT DIMENSION						
BRICK HEIGHT	SETTING OUT AT 75mm	+1mm	+2mm	+3mm	-1mm	-2mm	-3mm
58mm							
59mm							
60mm							
61mm							
62mm							
63mm							
64mm							
65mm							
66mm							
67mm							
68mm							
69mm							
70mm							
71mm							
72mm							

	negative or zero rail to brick engagement
	1mm rail to to brick engagement
	2mm brick to rail engagement
	3mm+ brick to rail engagement
	brick to large to fit
	not applicable for the system

Brick Slips used in Brick Slip Systems will typically be designated by the brick manufacturer, in accordance with BS EN771-1 as T1/R1 (58mm to 72mm), T2/R1 (59mm to 71mm) & T2/R2 (62mm to 68mm)

Information, readily available on the internet has been used to establish brick slip to horizontal rail engagement (to the nearest whole millimetre).

Occam

OCCAM							
	POTENTIAL INSTALLATION ERROR - 75mm HORIZONTAL RAIL SETTING OUT DIMENSION						
BRICK HEIGHT	SETTING OUT AT 75mm	+1mm	+2mm	+3mm	-1mm	-2mm	-3mm
58mm					It is very unlikely that OCCAM horizontal rails could be installed with a negative installation error to the 75mm horizontal rail setting out dimension, due to the configuration of the system.		
59mm							
60mm							
61mm							
62mm							
63mm							
64mm							
65mm							
66mm							
67mm							
68mm							
69mm							
70mm							
71mm							
72mm							

	negative or zero rail to brick engagement
	1mm rail to to brick engagement
	2mm brick to rail engagement
	3mm+ brick to rail engagement
	brick to large to fit
	not applicable for the system

Brick Slips used in Brick Slip Systems will typically be designated by the brick manufacturer, in accordance with BS EN771-1 as T1/R1 (58mm to 72mm), T2/R1 (59mm to 71mm) & T2/R2 (62mm to 68mm)

Information, readily available on the internet has been used to establish brick slip to horizontal rail engagement (to the nearest whole millimetre).