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## BRITISH BOARD OF AGRÉMENT TEST REPORT T163906

### FORTERRA BUILDING PRODUCTS LIMITED – SUREBRICK

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Date: 20 March 2019

On behalf of the British Board of Agrément

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**Requested by:** Gareth Rouse (Forterra)

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## 1 REPORT CONDITIONS

### 1.1 This Report:

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## 2 CORROSION ASSESSMENT

### 2.1 Method

In accordance with BS EN ISO 9227 : 2017 *Corrosion tests in artificial atmospheres – Salt spray tests*,

A neutral salt spray, as detailed in BS EN ISO 9227 Section 5 *Test solutions*, was used to generate a salt fog concentration of 1 - 2 cm<sup>3</sup> of fog collected over an area of 80 cm<sup>2</sup> per hour, as detailed in Table 3 *Operating conditions* of the same standard.

Deionised water purity was 0.2 µS·cm<sup>-1</sup> (Standard limit is ≤ 20 µS/cm). Salt purity complies with ASTM B117-11 & BS EN ISO 9227 : 2017 and is supplied with a Certificate of Conformity No SS/4250 from CW Specialist Salt Ltd. The pH of the collected spray = pH 6.9.

### 2.2 Samples

BBA Ref/Lot	Quantity	Description
T1/63906/1	3	Forterra Magnellis Surebrick cladding rails, 2.4m length d.o.m: 07/18
T1/63906/2	3	Forterra stainless steel Surebrick cladding rails, 2.4m length d.o.m: 07/18

### 2.3 Results

The rails were cut to 1m length for the test and were oriented horizontally in the salt spray cabinet.

After 1000 hours of salt fog exposure the specimens were removed and visually examined.

Lot	Conditioning	Observations
1	1000 hours	Blackening of the surface and salt stains but no evidence of red rust was found.
2	1000 hours	No evidence of corrosion or discolouration was found.

### 3 RESISTANCE OF CLADDING ELEMENT RETAINING TABS

#### 3.1 Method

In accordance with ETAG 034-1 Edition April 2012 : *guideline for European technical approval of kits for external wall claddings part i : ventilated cladding kits comprising cladding components and associated fixings*. Section 5.4.2.6.1 : *Resistance of metal clip*.

Except that, due to limitations of the tensile testing facility, the test was performed in two discreet phases. The first phase established the displacement required to achieve 1mm permanent deformation of the tab, by the application of a cyclic force. The second phase tested the tab to failure, by the application of a continuous linear force. The results have been combined into a single table in section 3.3 Results.

The testing speed for both phases of the test was 5mm·min<sup>-1</sup>.

#### 3.2 Samples

BBA Ref/Lot	Quantity	Description
T1/63906/1	3	Forterra Magnellis Surebrick cladding rails, 2.4m length d.o.m: 07/18
T1/63906/2	3	Forterra stainless steel Surebrick cladding rails, 2.4m length d.o.m: 07/18

#### 3.3 Results

Lot	Specimen	Displacement required to achieve 1mm deformation (mm)	Load at displacement required to achieve 1mm deformation (N)	Force at failure (kN)	Notes on failure
1	1	1.00	309.26	2.05	Clip straightened until it pulled out of grips.
	2	1.00	299.54	2.23	
	3	1.00	335.65	1.84	
	4	1.00	203.55	1.85	
	5	1.00	259.88	1.97	
	Mean	1.00	281.57	1.99	
	SD	0	51.41	0.16	
2	1	1.00	213.47	2.36	Clip straightened until it pulled out of grips.
	2	1.00	291.67	2.28	
	3	1.00	196.66	2.51	
	4	1.00	264.20	2.26	
	5	1.00	261.59	2.14	
	Mean	1.00	245.52	2.31	
	SD	0	39.22	0.14	

#### 4 PULL-THROUGH RESISTANCE OF FIXINGS FROM CLADDING ELEMENT RETAINING PROFILES

##### 4.1 Method

In accordance with ETAG 034-1 Edition April 2012 : *guideline for European technical approval of kits for external wall claddings part i : ventilated cladding kits comprising cladding components and associated fixings*. Section 5.4.2.3.4 : *Pull-through resistance of fixings from profiles*.

##### 4.2 Samples

BBA Ref/Lot	Quantity	Description
T1/63906/1	3	Forterra Magnellis Surebrick cladding rails, 2.4m length d.o.m: 07/18
T1/63906/2	3	Forterra stainless steel Surebrick cladding rails, 2.4m length d.o.m: 07/18
T1/63906/7	1	Ejot fixings JA3-LT-4.9x3.8, Box of 100, 0088335956/10 29.06.2018

##### 4.3 Results

Lots	Specimen	Load at failure (N)	Mode of failure <sup>(1)</sup>
1+7	1	5614.32	A
	2	5435.79	A
	3	5546.81	A
	4	5599.90	A
	5	6078.13	A
	Mean	5654.99	
	SD	246.72	
2+7	1	7434.58	B
	2	7445.30	B
	3	7451.69	B
	4	5498.49	C
	5	7445.09	B
	Mean	7055.03	
	SD	870.15	

(1) Mode of failure key:

A = Fixing head tore through steel rail

B = Fixing broke at neck

C = Steel folded around fixing and pulled through apparatus

## 5 FIXING PULL-THROUGH UNDER SHEAR LOAD

### 5.1 Method

In accordance with ETAG 034-1 Edition April 2012 : *guideline for European technical approval of kits for external wall claddings part i : ventilated cladding kits comprising cladding components and associated fixings*. Section 5.4.2.1.2 : *Pull-through resistance under shear loads*.

Fixings were positioned centrally, 20mm from the bottom of the steel test piece and 40mm from the top of the timber substrate.

A test speed of 5mm·min<sup>-1</sup> was selected.

### 5.2 Samples

BBA Ref/Lot	Quantity	Description
T1/63906/1	3	Forterra Magnellis Surebrick cladding rails, 2.4m length d.o.m: 07/18
T1/63906/2	3	Forterra stainless steel Surebrick cladding rails, 2.4m length d.o.m: 07/18
T1/63906/7	1	Ejot fixings JA3-LT-4.9x3.8, Box of 100, 0088335956/10 29.06.2018

### 5.3 Results

Lots	Specimen	Maximum force (N)	Displacement at maximum force (mm)	Failure mode
1+7	1	3462.02	15.61	Fixing tore through metal rail
	2	2411.53	15.93	Fixing pulled out of timber
	3	2233.31	22.08	Fixing pulled out of timber
	4	2033.96	3.76	Fixing pulled out of timber
	5	2257.77	12.39	Fixing pulled out of timber
	Mean	2479.73	13.95	
	SD	565.32	6.69	
2+7	1	1927.63	6.10	Fixing pulled out of timber
	2	2568.57	14.55	Fixing pulled out of timber
	3	4745.22	27.25	Fixing pulled out of timber
	4	3231.62	22.37	Fixing pulled out of timber
	5	2784.54	18.41	Fixing pulled out of timber
	Mean	3051.52	17.74	
	SD	1056.97	8.03	

## 6 RESISTANCE OF GROOVED CLADDING ELEMENT

### 6.1 Method

In accordance with ETAG 034-1 Edition April 2012 : *guideline for European technical approval of kits for external wall claddings part i : ventilated cladding kits comprising cladding components and associated fixings*. Section 5.4.2.3.1 : *Resistance of grooved cladding element*.

A purpose-made bracket, 100mm in length, was used to engage the grooved element of the cladding brick slips. A test speed of 5mm·min<sup>-1</sup> was selected.

### 6.2 Samples

BBA Ref/Lot	Quantity	Description
T1/63906/3	50	Forterra hard brick slips
T1/63906/4	50	Forterra soft brick slips

### 6.3 Results

Lot	Specimen	Force at maximum load per 100mm groove length (N)	Mode of failure
3	1	1737.66	Lip above groove shattered
	2	1670.83	
	3	2193.93	
	4	1672.13	
	5	1414.36	
	Mean	1737.78	
	SD	283.49	
4	1	214.61	Lip above groove detached along entire length
	2	429.38	
	3	559.86	
	4	659.85	
	5	423.21	
	Mean	457.38	
	SD	167.62	