

BRE Global Assessment Report

An assessment of the fire performance of a brickwork cladding system with Kingspan Kooltherm K15 insulation against the criteria of BR 135, Third Edition when evaluated in accordance with BS 9414:2019

Prepared for: Kingspan Insulation Limited

Date: 30 September 2020

Report Number: P116866-1001F Issue 1

BRE Global Ltd
Watford, Herts
WD25 9XX


Customer Services 0333 321 8811

From outside the UK:
T + 44 (0) 1923 664000
F + 44 (0) 1923 664010
E enquiries@bre.co.uk
www.bre.co.uk


Prepared for:
Kingspan Insulation Limited
Pembridge
Leominster
Herefordshire
HR6 9LA



Prepared by

Name	Andy Russell
Position	Principal Consultant
Date	30 September 2020
Signature	

Authorised by

Name	Tony Baker
Position	Laboratory Manager – Fire Resistance
Date	30 September 2020
Signature	

Date of this report	30 September 2020
Date of next review	30 September 2025

This report is made on behalf of BRE Global and may only be distributed in its entirety, without amendment, and with attribution to BRE Global Ltd to the extent permitted by the terms and conditions of the contract. Assessment results relate only to the specimens tested. BRE Global has no responsibility for the design, materials, workmanship or performance of the product or specimens assessed. This report does not constitute an approval, certification or endorsement of the product assessed and no such claims should be made on websites, marketing materials, etc. Any reference to the results contained in this report should be accompanied by a copy of the full report, or a link to a copy of the full report.

BRE Global's liability in respect of this report and reliance thereupon shall be as per the terms and conditions of contract with the client and BRE Global shall have no liability to third parties to the extent permitted in law.



Table of contents

1	Introduction	3
2	Scope	3
3	Supporting data	3
3.1	BRE Global test report no. P112065-1000 Issue 1	3
3.1.1	General	3
3.1.2	Details of test apparatus	3
3.1.3	Description of the system	3
3.2	BRE classification report no. P112065-1001 Issue: 1	7
3.3	Warringtonfire test report no. 414280	7
3.4	Warringtonfire test report no. 414281	7
4	Description of the proposed systems	8
5	Assessment	9
5.1	Applicable rule from BS 9414:2019	9
5.2	Applicable clause from BS 9414:2019 (Clause 5.4.10)	10
5.3	Evaluation	10
5.3.1	General	10
5.3.2	Adhesive	10
6	Conclusion	10
7	Figures	11
8	Validity of the assessment	16
8.1	Declaration by applicant	16
8.2	BRE Global declaration	16



1 Introduction

A fire test in accordance with 8414-2:2015+A1:2017 has been carried out on a brickwork cladding system with Kingspan Kooltherm K15 insulation. This assessment report considers the fire performance of this system where the facings on the Kingspan Kooltherm K15 insulation incorporate an alternative adhesive.

2 Scope

This assessment report considers the fire performance of a brickwork cladding system with Kingspan Kooltherm K15 insulation against the criteria of BR 135, Third Edition. The evaluation has been carried out in accordance with BS 9414:2019.

3 Supporting data

3.1 BRE Global test report no. P112065-1000 Issue 1

3.1.1 General

A fire test in accordance with BS 8414-2:2015+A1:2017 was carried out on an external wall system incorporating Kingspan Kooltherm K15 insulation with a brick façade. The test was carried out on 02 May 2018.

3.1.2 Details of test apparatus

The product was installed on to wall number 4 of the BRE Global test facility. This apparatus is representative of a structural steel framed building and consists of a structural steel test frame with a vertical main test wall and a vertical return wall at a 90° angle to and at one side of the main test wall (see figure 1). The main wall includes the combustion chamber.

3.1.3 Description of the system

3.1.3.1 Summary

Generic cladding type	Masonry
Relevant test method	BS 8414-2:2015+A1:2017
Substrate	Structural steel frame
Insulation	Kingspan Kooltherm K15 phenolic insulation (80mm thick & 100mm thick)



Cavity depth	50mm
Vertical cavity barriers	Siderise EW-CB30 stone wool cavity barrier (75mm wide x 155mm deep)
Horizontal cavity barriers	Siderise RH25G-090/030 stone wool open state cavity barrier with intumescent strip (75mm high x 125mm deep)
External finish	Wienerberger Waresley Red Stock bricks (219mm wide x 102mm deep x 63mm high)

Details of the tested systems are shown in figures 2 to 5.

3.1.3.2 Description of product

Table 1 List of component parts used in the construction of the system

Item	Description
1	British Gypsum Gyproc Wallboard (12.5mm-thick boards, double layer, fitted to internal face of partition).
2	Kingframe galvanised steel horizontal 'C'-shaped head channel (104mm deep x 67mm high x 1.8mm thick).
3	Kingframe galvanised steel horizontal 'C'-shaped base channel (104mm deep x 55mm high x 1.2mm thick).
4	Kingframe galvanised steel vertical 'C'-shaped stud (100mm deep x 50mm wide x 1.2mm thick).
5	Euroform Versapanel cement particle board (12mm thick).
6	Kingspan Nilvent breather membrane.
7	Galvanised steel profiled capping brackets (297mm deep x 35mm high x 3mm thick).
8	Aluminium 'U'-shaped capping (420mm deep x 40mm high x 3mm thick).
9	Galvanised steel skewers (320mm long x 25mm wide x 1mm thick).
10	Siderise EW-CB30 stone wool vertical cavity barrier (75mm wide x 155mm deep).
11	Galvanised steel skewers (355mm long x 25mm wide x 1mm thick).
12	Siderise RH25G-090/030 stone wool horizontal open state cavity barrier with intumescent strip (75mm high x 125mm deep).
13	Kingspan Kooltherm K15 phenolic insulation (80mm thick & 100mm thick).



Item	Description
14	Ancon 25/14 wall tie support channel (14mm deep x 25mm wide).
15	Aluminium combustion chamber surround side flashing (245mm deep x 65mm wide x 3mm thick).
16	Aluminium combustion chamber surround top flashing (245mm deep x 65mm high x 3mm thick).
17	Catnic LA/L10 galvanised steel external wall lintel (95mm deep x 158mm high x 2400mm wide x 2mm thick).
18	Ancon SD25/100 wall ties (105mm deep x 20mm wide x 2mm thick).
19	Wienerberger Waresley Red Stock bricks (102mm deep x 219mm wide x 63mm high).

3.1.3.3 Installation sequence

A Kingframe SFS (Steel Framing System) was constructed using items 2-4 in table 1. The partition was fitted flush with the front face of the floor slabs, fixed to the slabs and ground using 6 x 70mm countersunk Tapcon self-drilling screws at 100-400mm centres.

The vertical studs of the partition were set at 600mm centres and fixed to the horizontal channels using 4 x 25mm self-drilling screws. The stud spacing was reduced to 90mm at edge of framing.

A double layer of British Gypsum Gyproc Wallboard was fitted to the internal face of the partition (long edge horizontal) using Easydrive 3.5 x 50mm drywall screws at nominal 500mm vertical centres for the first layer, 230-600mm vertical centres for the second layer with horizontal centres in line with the studs of the partition.

A single layer of Euroform Versapanel cement particle board was fitted to the external face of the partition (long edge horizontal) and around the combustion chamber surround using 5.5 x 50mm self-drilling screws with horizontal centres in line with the studs of the partition and 100-300mm vertical centres (five fixings per column per board).

There was a 5-8mm gap between adjacent cement particle boards.

Euroform Versaseal-FS grey sealant was applied to gaps between adjacent cement particle boards.

Kingspan Nilvent breather membrane was fitted to the external face of the cement particle board using Arrow 14mm T50 staples.

Aluminium profiled brackets were fixed to the top of the partition using 5.5 x 50mm self-drilling screws (two per bracket), the brackets were fitted at 400-500mm centres.

Aluminium capping (item 8 in table 1) was fixed to the aluminium profiled brackets using 5.5 x 50mm self-drilling screws at 400-500mm centres in two rows 240mm apart.

Galvanised steel folded skewers (item 9 in table 1) were fixed to the cement particle board using 5.5 x 45mm self-drilling screws at 300mm centres in three columns located either side of the combustion chamber opening (290mm and 2320mm from the main-wing wall junction) and towards the outside edge of the wing wall (1615mm from the main-wing wall junction).

Siderise EW-CB30 stone wool vertical cavity barriers were pressed onto the skewers in columns.



Galvanised steel folded skewers (item 11 in table 1) were fixed to the cement particle board using 5.5 x 45mm self-drilling screws at 300mm centres in four rows located: 80mm, 365mm, 2940mm and 5450mm above the top of the combustion chamber.

Siderise RH25G-090/030 stone wool horizontal open state cavity barriers with intumescent strip were pressed onto the skewers in rows. A cut was made along the length of the skewers local to the tip and the ends were folded to opposite sides to secure the horizontal cavity barriers in place. Each row was interrupted by the vertical cavity barriers. All gaps between insulation boards and cavity barrier were sealed with aluminium tape.

A single layer of 100mm-thick Kingspan Kooltherm K15 insulation was fixed to the cement particle board using 4.8 x 100mm self-drilling screws with Ø75mm plastic insulation retaining discs and 5.5 x 150mm self-drilling screws with Fixfast SP-SS-50-F1 Ø50mm metal insulation retaining discs. Aluminium tape was applied over the heads of insulation fixings and gaps between insulation boards.

From the outside edge of the combustion chamber to the outside edge of the main wall up to a height of the second-row horizontal cavity barrier a single layer of 80mm-thick Kingspan Kooltherm K15 insulation was fitted.

Nine insulation fixings were used per full size board (three along both outer edges and three along the vertical centreline of the board). Smaller sections of insulation were secured using six fixings (two along both outer edges and two along the horizontal/vertical centreline of the board).

Aluminium flashing (items 15 and 16 in table 1) was fitted around the combustion chamber opening. The flashing was fixed to the external face of the cement particle board using 5.5 x 50mm self-drilling screws at 380mm centres. The flashing was fixed with 10mm-thick spacers and stone wool packed within the gap between the cement particle board and the flashing. Intumescent acrylic sealant was also used to seal the 10mm gap. Stone wool insulation was packed into the 20-30mm gap between the aluminium flashing and the cavity barriers surrounding the combustion chamber.

Ancon 25/14 wall tie support channels were fixed to the external face of the insulation, cement particle board and studs using 5.5 x 150mm self-drilling screws at 340-450mm vertical centres. The channels were fixed at 370-600mm centres on the main wall and 410-600mm on the wing wall.

A brick wall was constructed from Wienerberger Waresley Red Stock bricks and a standard sand/cement mortar mix 60-70mm from the external face of the insulation. At 450mm vertical centres and horizontal centres in line with wall tie support channels, Ancon SD25/100 wall ties were slotted into the support channels and embedded within the mortar.

A galvanised steel lintel spanned the combustion chamber opening to support the bricks as they were built above. Dowsil 719 Weather Proofing sealant was used to seal the perimeter of the combustion chamber surround flashing once the masonry wall was complete.

The cladding system measured:

Requirement	Actual measurement
≥6000mm above the top of the combustion chamber	6020mm
≥2400mm width across the main wall	2800mm
≥1200mm width across the wing wall	1683mm



Requirement	Actual measurement
260mm (±100mm) wing wall-combustion chamber opening	238mm
2000mm x 2000mm (±100mm) combustion chamber opening	1900mm wide x 1982mm high

3.2 BRE classification report no. P112065-1001 Issue: 1

This report presents the classification of an external wall system incorporating Kingspan Kooltherm K15 insulation with a brick façade. The classification is carried out in accordance with the procedures given in BR 135 – ‘Fire performance of external thermal insulation for walls of multi-storey buildings’, Third edition, Annex B 2013.

The system, as tested, satisfied the criteria as follows:

Test method & test number	Parameter	No. of tests	Results	
			Fire spread test result time, t_s (min)	Compliance with parameters in Annex B BR135:2013
BS 8414-2:2015+A1:2017/ P112065-1000 Issue 1	External fire spread	1	>15 minutes	Compliant
	Internal fire spread cavity		>15 minutes	Compliant
	System burn through		>15 minutes	Compliant

The system described in this classification report was deemed to meet the performance criteria set in Annex B of BR 135:2013.

3.3 Warringtonfire test report no. 414280

A test in accordance with EN ISO 1716:2018 was carried out on a sample of “Low Smoke Adhesive”, comprising synthetic rubber, to determine its heat of combustion on 21 May 2019.

For the product tested, the following results relating to the gross calorific potential were obtained.

Gross calorific value per unit mass (MJ/kg)	Gross calorific value per unit area (MJ/m ²)
24.1034	0.6990

3.4 Warringtonfire test report no. 414281

A test in accordance with EN ISO 1716:2018 was carried out on a sample of “FR Adhesive”, comprising synthetic rubber, to determine its heat of combustion on 21 May 2019.

For the product tested, the following results relating to the gross calorific potential were obtained.



Gross calorific value per unit mass (MJ/kg)	Gross calorific value per unit area (MJ/m ²)
13.4048	0.3887

4 Description of the proposed systems

The proposed external wall system has the same construction as that tested. The only difference is that facings on the Kingspan Kooltherm K15 insulation incorporates an alternative adhesive.



5 Assessment

5.1 Applicable rule from BS 9414:2019

Parameter 1: INSULATION LAYER(S)

Tested component/product	Variation proposed	Sub-groups	Option for change	Additional evidence required (of tested and alternative/modified products)	For rule, see clause reference
Facing layer (if applicable), including any adhesive	Alternative facing layer and/or adhesive	All insulation products	Permissible – see note to rule	Reaction-to-fire test data	5.4.10



5.2 Applicable clause from BS 9414:2019 (Clause 5.4.10)

The test result shall be deemed to be valid if the tested facing is replaced with an alternative facing (including the adhesive) with a gross heat of combustion in MJ/m² equal to or less than the tested product.

NOTE If the membrane is used for the purpose of protecting the insulation from the effects of fire, either as a separate membrane or encapsulation of the insulation product, it is not permitted to remove it or replace it with an alternative product.

5.3 Evaluation

5.3.1 General

In this instance, the membrane is not considered to be for the purpose of protecting the insulation from the effects of the fire, so it is permitted to replace it with an alternative product.

5.3.2 Adhesive

The gross heat of combustion for the “Low Smoke Adhesive”, which was used in BRE Global report no. P112065-1000 Issue 1, was found to be 0.6990MJ/m² (see Warringtonfire report no. 414280) and that for the alternative “FR Adhesive” was found to be 0.3887MJ/m² (see Warringtonfire report no. 414281). The latter is therefore considered a suitable alternative.

6 Conclusion

Therefore, it is our opinion that the brickwork cladding system with Kingspan Kooltherm K15 insulation, where the facings on the Kingspan Kooltherm K15 insulation incorporate an alternative adhesive, as described in section 4, will satisfy the criteria of BR 135, Third Edition, if tested to BS 8414-2:2015+A1:2017.

This evaluation has been carried out in accordance with BS 9414:2019.

7 Figures

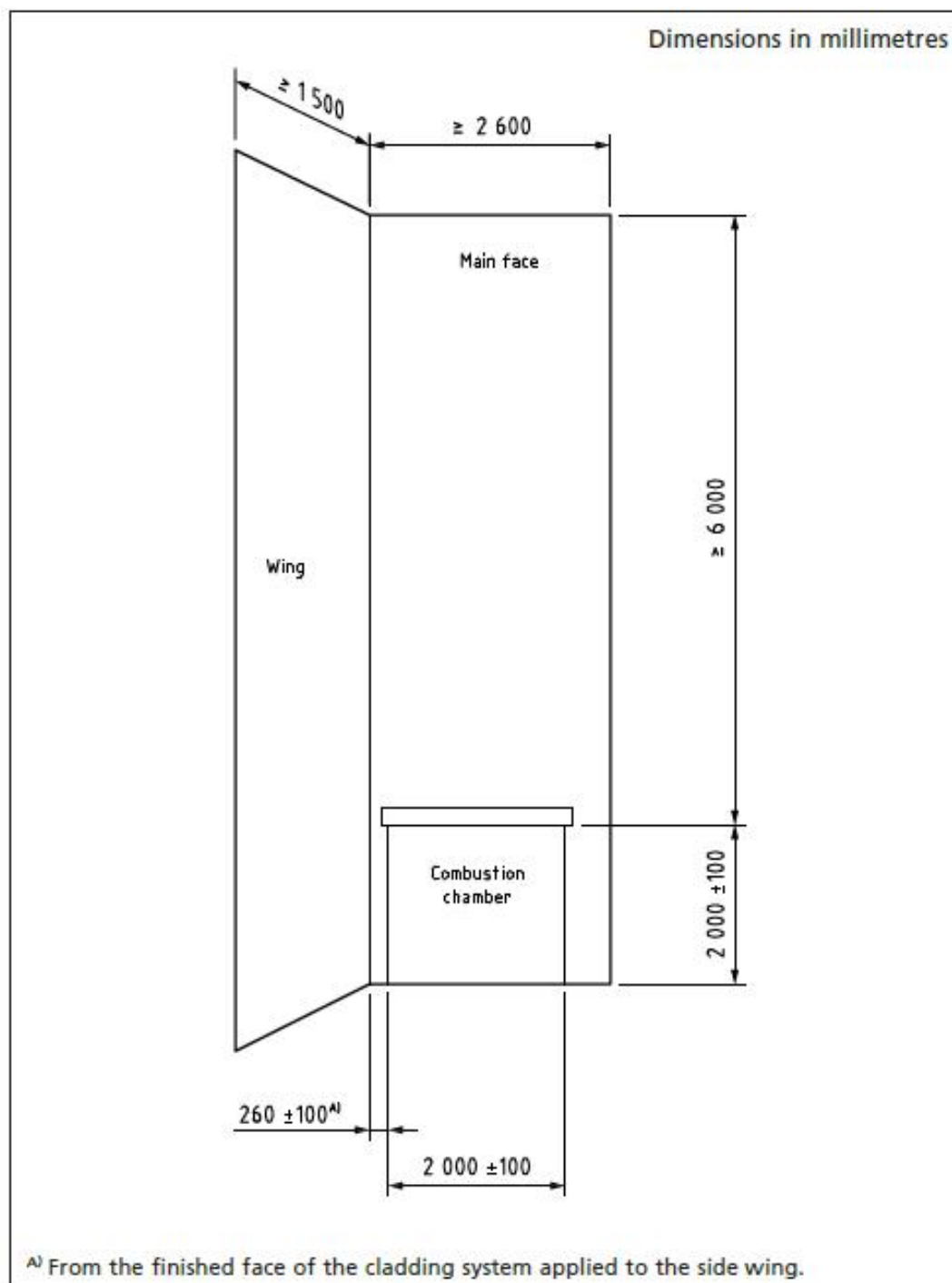


Figure 1 Test apparatus dimensions as specified by test standard

Note: The test apparatus may be constructed left- or right-handed.

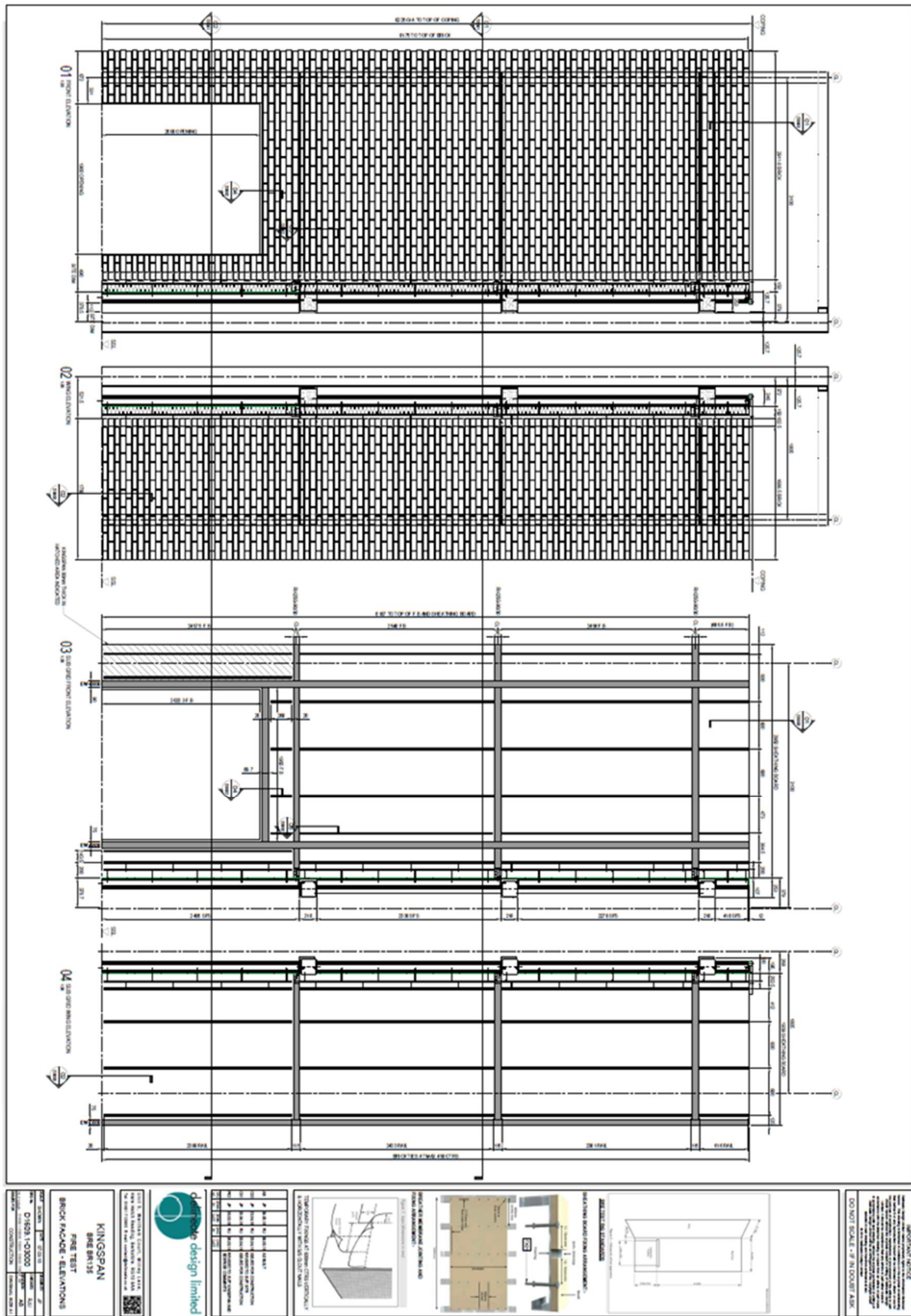


Figure 2 Brick façade and locations of barriers

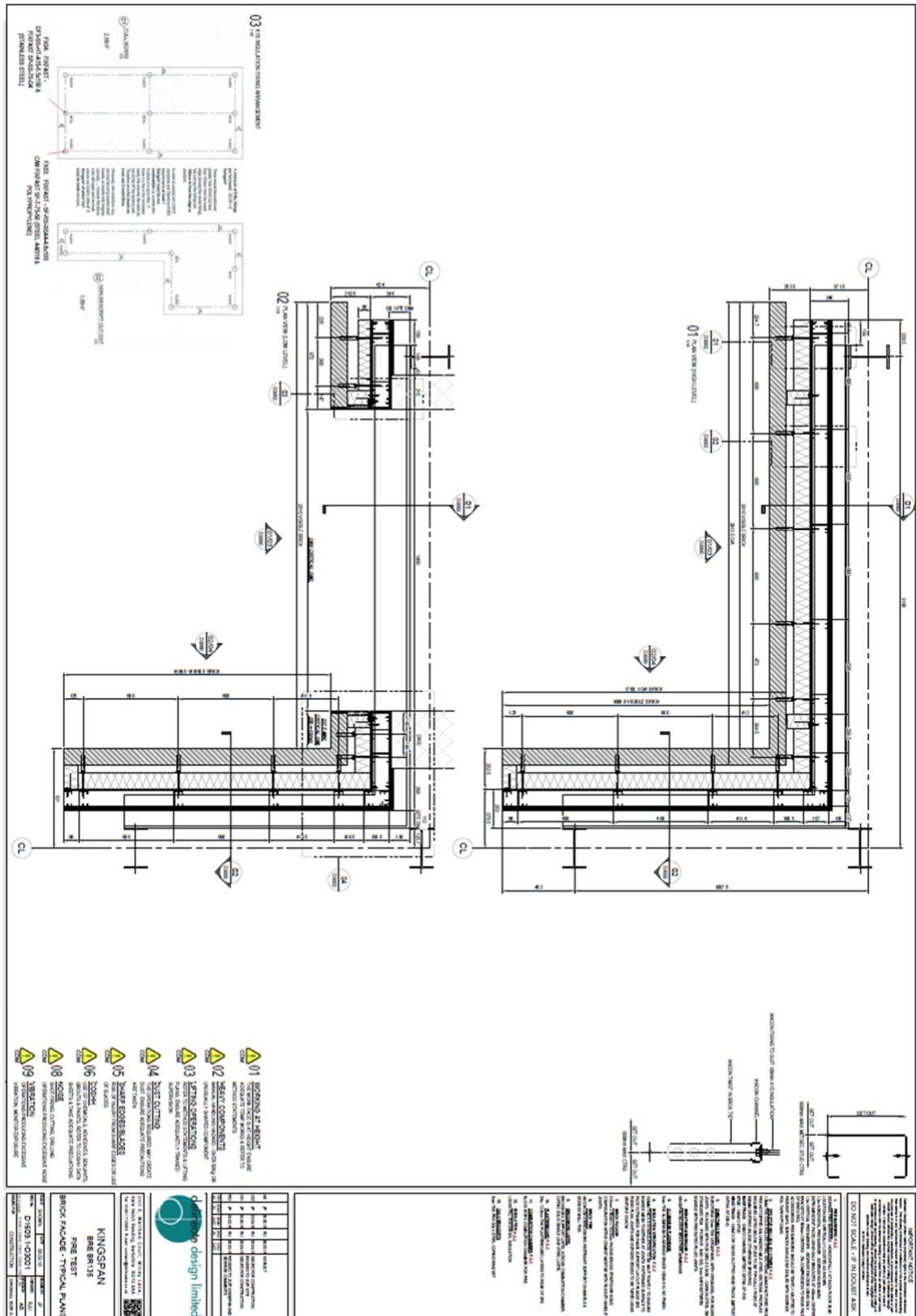


Figure 3 Plan view cross sections

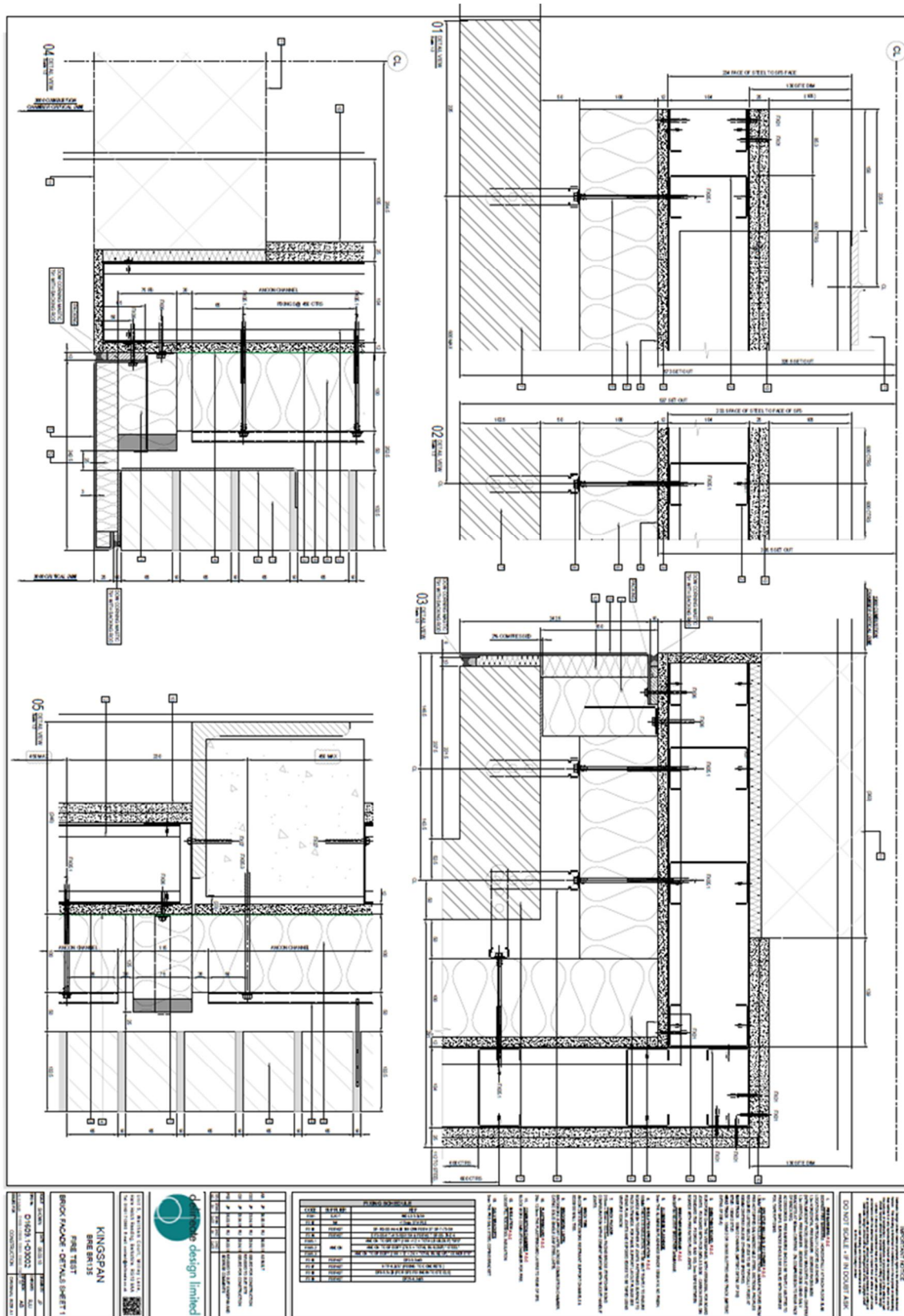


Figure 4 Cross sections

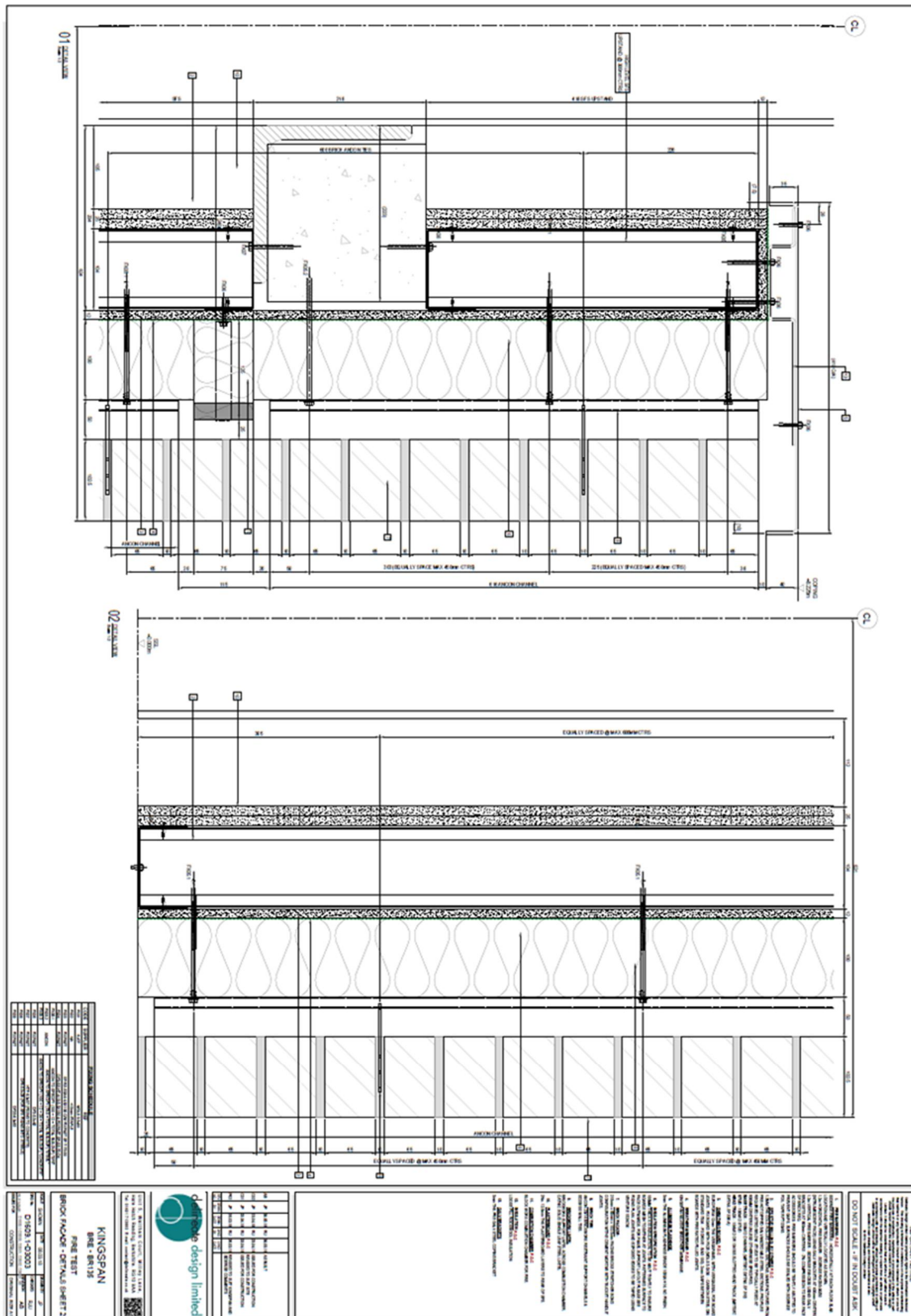


Figure 5 Cross sections



8 Validity of the assessment

8.1 Declaration by applicant

We the undersigned confirm that we have read and complied with the obligations placed on us by the PFPF Guide to Undertaking Assessments in Lieu of Fire Tests.

We confirm that the component or element of structure, which is the subject of this assessment, has not to our knowledge been subjected to a fire test to the Standard against which this assessment is being made.

We agree to withdraw this assessment from circulation should the component or element of structure be the subject of a fire test to the Standard against which this assessment is being made.

We are not aware of any information that could adversely affect the conclusions of this assessment.

If we subsequently become aware of any such information, we agree to cease using the assessment and ask BRE Global to withdraw the assessment.

Signed:

For and on behalf of:

8.2 BRE Global declaration

This assessment is issued on the basis of test data and information to hand at the time of issue. If contradictory evidence becomes available to BRE Global the assessment will be unconditionally withdrawn and the applicant will be notified in writing. Similarly, the assessment is invalidated if the assessed construction is subsequently tested since actual test data is deemed to take precedence over an expressed opinion. The assessment is valid for a period of five years after which it should be returned for review to consider any additional data which has become available or any changes in the fire test procedures. Any changes in the specification of the product will invalidate this assessment.

This assessment has been carried out in accordance with Fire Test Study Group Resolution No. 82. It relates to the fire performance of the product and does not cover aspects of quality, durability, maintenance nor service requirements. This assessment relates only to the specimen(s) assessed and does not by itself imply that the product is approved under any Loss Prevention Certification Board approval or certification scheme or any other endorsements, approval or certification scheme.

Next review date: 30 September 2025