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BBA APPROVAL INSPECTION TESTING CERTIFICATION
TECHNICAL APPROVALS FOR CONSTRUCTION

Agrément Certificate
02/3883
Product Sheet 1

SIMPSON STRONG-TIE WALL EXTENSION PROFILES

CROCODILE C2K WALL EXTENSION PROFILES

This Agrément Certificatae Product Sheet(1) relates to Crocodile C2K Wall Extension Profiles, steel profiles for use for tying new masonry walls to existing masonry walls.

(1) Hereinafter referred to as 'Certificate'.

CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.

KEY FACTORS ASSESSED

Structural performance — the product can provide simple lateral support to masonry panels (see section 6).

Performance in relation to fire — the product is non-combustible (see section 8).

Durability — the profile and fixings will not be adversely affected by mortar (see section 10).

The BBA has awarded this Certificate to the company named above for the product described herein. This product has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of Second issue: 23 January 2013

Brian Chamberlain
Head of Approvals — Engineering

Greg Cooper
Chief Executive

The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk

Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

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Regulations

In the opinion of the BBA, Crocodile C2K Wall Extension Profiles, if installed, used and maintained in accordance with this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):

The Building Regulations 2010 (England and Wales) (as amended)

Requirement:	A1	Loading
Comment:		The product will contribute to the strength and stiffness of masonry walls provided the design of loads is in accordance with section 6.2 of this Certificate.
Requirement:	B3(1)	Internal fire spread (structure)
Comment:		The product will not adversely affect the fire resistance of the wall. See section 8.1 of this Certificate.
Requirement:	C2	Resistance to moisture
Comment:		Wall joints constructed using the product will resist the passage of moisture to the inside of the building provided the weatherproofing detail is in accordance with sections 7.1 and 7.2 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The product is acceptable. See sections 10.1 and 10.2 and the *Installation* part of this Certificate.

In addition to the contribution to which the product can make to meeting the relevant requirements, the following comment should be noted.

Requirement:	E1	Protection against sound from other parts of the building and adjoining buildings
Comment:		The affect of the product on sound transmission through walls has not been assessed. See section 4.4 of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Fitness and durability of materials and workmanship
Comment:		The use of the product satisfies the requirements of this Regulation. See sections 9, 10.1 and 10.2 and the *Installation* part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	1.1(a)(b)	Structure
Comment:		Wall joints made from this product will have satisfactory strength and stiffness provided the design loads are in accordance with section 6.2 of this Certificate.
Standard:	2.3	Structural protection
Comment:		The product can enable a wall to meet this Standard. See section 8.1 of this certificate
Standard:	2.6	Spread to neighbouring buildings
Comment:		The product, with reference to clause 2.6.1[(1)(2)], will not adversely affect the fire resistance of the wall. See section 8.1 of this Certificate.
Standard:	3.10	Precipitation
Comment:		Wall joints, with reference to clauses 3.10.1[(1)(2)], 3.10.2[(1)(2)], and 3.10.3[(1)(2)], constructed using the product will resist the passage of moisture to the inside of the building provided the weatherproofing detail is in accordance with sections 7.1 and 7.2 of this Certificate.
Standard:	3.15	Condensation
Comment:		The risk of damage due to interstitial condensation, with reference to clauses 3.15.1[(1)(2)] and 3.15.4[(1)(2)], will be minimal. See section 4.5 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The product can contribute to meeting the relevant requirements of Regulation 9, Standards 1 to 6 and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard.
Regulation:	12	Building standards applicable to conversions
Comment:		All comments given for these systems under Regulation 9, Standards 1 to 6 also apply to this Regulation, with reference to clause 0.12.1[(1)(2)] and Schedule 6[(1)(2)].

In addition to the contribution to which the product can make to meeting the relevant requirements, the following comment should be noted.

Standard:	5.1	Noise separation
Comment:		The affect of the product on sound transmission through walls has not been assessed. See section 4.4 of this Certificate.

(1) Technical Handbook (Domestic).
(2) Technical Handbook (Non-Domestic).

The Building Regulations (Northern Ireland) 2012

Regulation:	23(a)(i)(iii)(b)	Fitness of materials and workmanship
Comment:		The product is acceptable. See sections 10.1 and 10.2 and the *Installation* part of this Certificate.
Regulation:	28	Resistance to moisture and weather
Comment:		Wall joints constructed using the product will resist the passage of moisture to the inside of the building provided the weatherproofing detail is in accordance with sections 7.1 and 7.2 of this Certificate.

Regulation:	29	Condensation
Comment:		The risk of damage due to interstitial condensation will be minimal. See section 4.5 of this Certificate.
Regulation:	30	Stability
Comment:		Wall joints constructed with the product will have satisfactory strength and stiffness provided the design loads are in accordance with section 6.2 of this Certificate.
Regulation:	35	Internal fire spread — Structure
Comment:		The product will not adversely affect the fire resistance of the wall. See section 8.1 of this Certificate.

In addition to the contribution to which the product can make to meeting the relevant requirements, the following comment should be noted.

Regulation:	49	Protection against sound from other parts of the building and from adjoining buildings
Regulation:	50 (a)(b)	Protection against sound within a dwelling or room for residential purposes
Regulation:	51	Reverberation in the common internal parts of buildings containing flats or rooms for residential purposes
Comment:		The affect of the product on sound transmission through walls has not been assessed. See section 4.4 of this Certificate.

Construction (Design and Management) Regulations 2007

Construction (Design and Management) Regulations (Northern Ireland) 2007

In the opinion of the BBA, there is no information in this Certificate which relates to the obligations of the client, CDM co-ordinator, designer and contractors under these Regulations.

Additional Information

NHBC Standards 2013

NHBC accepts the use of Crocodile C2K Wall Extension Profiles, provided it is installed, used and maintained in accordance with this Certificate, in relation to *NHBC Standards*, Chapter 6.1 *External masonry*.

Technical Specification

1 Description

1.1 The Crocodile C2K Wall Extension Profiles are 33 mm wide by 2236 mm long, and available in stainless steel (C2KS) and epoxy-coated galvanized steel (C2KG).

1.2 Coach screws M6 by 50 mm; washers 1.6 mm thick by 18 mm outer diameter; and masonry plugs 10 mm by 45 mm are bought-in; and are subject to incoming control checks.

1.3 The wall extension profiles and fixing components are manufactured to the specification of materials defined in Table 1.

Table 1 Material specification

Model number	Component	Pack quantity	Material	Additional protection	Material standard	Size (mm)
C2KG	Profile	2	Galvanized mild steel	Epoxy powder coating	Grade DX51D+Z275 to BS EN 10346	0.6
	Tie[1]	10	Galvanized mild steel	Epoxy powder coating	Grade DX51D+Z275 to BS EN 10346	0.6
	Coach screws	6	Mild steel Austenitic stainless steel	Zinc-enriched phenolic coating	BS EN ISO 10683 Grade A2 to BS EN ISO 3506-1	M6 x 50
	Washers	6	Mild steel	Zinc-enriched phenolic Coating	BS EN ISO 10683 Grade A2 to BS EN ISO 3506-1	1.6 x 18 OD
	Masonry plug	6	High density polyethylene			10 x 45
C2KS	Profile	2	Austenitic stainless steel		Grade 1.4301 to BS EN 10088-2	0.6
	Tie [1]	10	Austenitic stainless steel		Grade 1.4301 to BS EN 10088-2	0.6
	Coach screws	6	Austenitic stainless steel		Grade A2 to BS EN ISO 3506-1	M6 x 50
	Washers	6	Austenitic stainless steel		Grade A2 to BS EN ISO 3506-1	1.6 x 18 OD
	Masonry plug	6	High density polyethylene			10 x 45

(1) The tie is incorporated within the profile.

2 Manufacture

2.1 The wall extension profiles, incorporating integral ties, are formed from slit stainless steel or galvanized coil which is checked before manufacture for dimensional tolerance, chemical composition and mechanical properties. Visual, dimensional and epoxy coating quality are checked on the finished product.

2.2 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

2.3 The management system of Simpson Strong-Tie has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by BSI Management System (Certificate FM14704).

3 Delivery and site handling

The wall extension profiles and fixings are supplied in packs, containing two profiles and one packet of fixings. Each pack carries the product identification code, fixing instructions and the BBA identification mark incorporating the number of this Certificate.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Crocodile C2K Wall Extension Profiles.

Design Considerations

4 General

4.1 Crocodile C2K Wall Extension Profiles are suitable to tie new masonry walls of up to three storeys, maximum height 8 metres, to existing masonry walls to provide simple lateral support. When used in two- or three-storey construction, the new wall must be effectively tied at the roof and intermediate floor level in accordance with the recommendations of BS EN 1996-3 : 2006.

4.2 The product may be used for internal and external walls; the one size being suitable for new walls ranging from 60 mm to 250 mm thick.

4.3 Use of the system obviates the need for conventional toothing or bonding.

4.4 The product has not been assessed for use where particular sound insulation properties are required; therefore separating walls incorporating the wall extension profiles should be tested to show compliance with the relevant Building Regulations. It should be recognised that where any differential movement has to be accommodated (as referred to in section 6.7) this will have a significant effect on the acoustic performance of the wall construction.

4.5 The construction of a new external wall, whether jointed by traditional toothing and bonding or by the use of a metal profile, will create a thermal bridge through the original wall. The use of any metal profile used at this junction will not significantly affect the U value of the wall. Extensions should always be designed in accordance with BS 5250 : 2011 and, where necessary, appropriate insulation included in the construction to minimise the risk of local condensation, particularly if the new wall is of solid construction.

5 Practicability of installation

The product is designed to be installed by a competent general builder, or a contractor, experienced with this type of product.

6 Structural performance

6.1 Crocodile C2K Wall Extension Profiles are for use in providing simple lateral support to masonry panels, as defined in, and in the context of BS EN 1996-1-1 :2005.

6.2 The design shear strength of extension profiles, when fixed to existing masonry in accordance with section 6.1 and the *Installation* part of this Certificate, may be taken as 3.5 kN over the height of two wall extension profiles, ie 2236 mm using three fixings per profile.

6.3 Fixings for the extension profiles must be made into bricks or blocks and not into mortar joints.

6.4 The design shear strength given in section 6.2 relates to existing masonry of solid clay bricks, solid dense and lightweight aggregate concrete blocks and solid aerated concrete blocks of minimum crushing strength 3.5 $N{\cdot}mm^{-2}$.

6.5 In accordance with BS EN 1996-1-1 :2005, the reaction along the edge of the wall may normally be assumed to be uniformly distributed.

6.6 As with conventional toothing and bonding, the designer must ensure that the existing wall has adequate strength, stability and integrity to accommodate the new wall. The effect of any proposed modification to the existing wall, such as cutting a vertical damp-proof course (see section 6.2), must also be checked.

6.7 The system is capable of accommodating up to 10 mm of vertical movement, due for example to differential foundation movement, without a significant loss of strength. Brittle finishes, eg plaster and rendering, may be cracked where such movement occurs and may require repair.

6.8 The system has not been assessed for use where the masonry fixings will be subject to direct tensile load.

6.9 In addition to the requirements directly referred to in this Certificate, structures of brickwork or blockwork, in which the system is incorporated, must be designed and constructed to comply with one of the following technical specifications:

BS EN 1996-1-1 : 2005 and BS EN 1996-3 :2006 or PD 6697 : 2010

England and Wales — Approved Document A1/2, Section 1, Part C

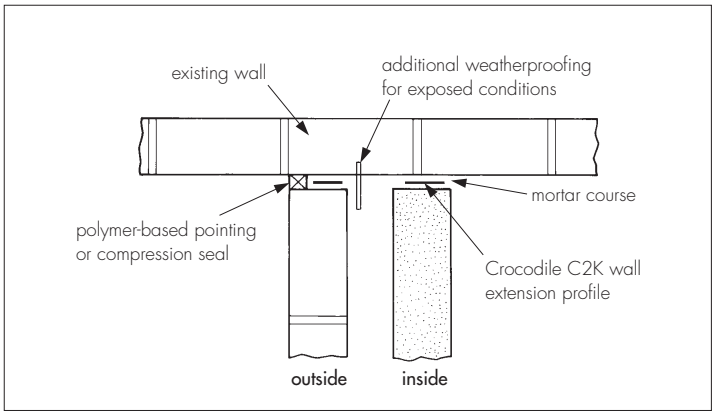
Scotland — Mandatory Standards, Part C *Small Buildings Guide*

Northern Ireland — Technical Booklet D *Structure*.

7 Weathertightness

7.1 To prevent water penetration at the joint between the existing wall outer leaf and the new wall, either wax or bitumen impregnated foam-type sealing strip or polymer-based sealant should be positioned either behind the wall extension profile or in the junction perpend as shown in Figure 1).

Figure 1 Juction perpend sealing



7.2 Where exposure conditions can be classified as being equal to or in excess of moderate/severe (see BS EN 1996-3 :2006), in common with other wall extension systems and conventional toothing or bonding methods, additional protection from moisture penetrating to the inside of the building should be considered. This can take the form of an extended vertical damp-proof course, as shown in Figure 1, which will prevent moisture from being transmitted through the existing masonry wall and also shed any moisture that may penetrate the perpend joint to the bottom of the new wall cavity.

7.3 The weathertightness of the joint will not be affected by normal building movement.

8 Performance in relation to fire

8.1 Use of the system will not have a significantly adverse effect on the fire resistance of the existing or new wall.

8.2 It is important to ensure that any gaps between the existing wall and each leaf include a continuous seal of either mortar or a proprietary intumescent sealant (not covered by this Certificate) to retard the spread of fire or smoke.

9 Maintenance

During routine maintenance, the sealant joint should be checked. If necessary the joint must be raked out and remade (see section 7.1).

10 Durability

10.1 The profiles and fixings will not be adversely affected by mortar (including those incorporating conventional mortar admixtures).

10.2 With reference to section 7.1, if joint movement is low and the sealants are used in accordance with the Certificate holder's recommendations, sealants remain effective for up to 20 years (see section 9).

11 Reuse and recyclability

The product comprises of steel that can be readily recycled.

Installation

12 General

12.1 Crocodile C2K Wall Extension Profiles must be installed according to the Certificate holder's instructions.

12.2 The existing masonry must be structurally sound with a flat, vertical surface.

12.3 For cavity wall construction a wall extension profiles must be used with each leaf.

12.4 For external walls the bottom edge of the lower wall connector must be above the damp-proof course.

12.5 For external walls the vertical joint between the existing wall and the outer leaf of the wall must be weathersealed as detailed in section 7.

12.6 The wall extension profiles must be positioned so that they are on the centre line of the new masonry wall. For cavity walls, the required cavity width and the thickness of each masonry leaf will need to be taken into account.

13 Preparation

Any rendered or pebble-dash finish should be removed to ensure that wall connector profiles are fixed directly to the existing masonry.

14 Procedure

14.1 A plumb line is marked on the existing wall to aid the alignment of the profile.

14.2 If required a vertical cut is made into the existing wall in readiness for a vertical damp-proof course (see section 7.2 and Figure 1).

14.3 The wall extension profiles are installed starting with the lowest profile at the bottom of the proposed joint and working upwards to the highest profile.

14.4 The first profile is placed over the marked centre-line and the fixing positions marked as shown in Figure 2; this ensures that the profile is positioned above the damp-proof course and that all fixing positions avoid mortar joints. If necessary, the alternative positions are used, ie 450 mm and 600 mm.

14.5 The holes are drilled and plugged using a 10 mm diameter masonry drill.

14.6 The first profile is lightly attached to the masonry, with the coach screws and washers provided, at the two lower fixing positions only.

14.7 The second profile is positioned directly above the lower profile so that both ends are flush. If necessary the second profile is reduced in length to accommodate the height of the new wall by cutting at one end only.

14.8 The procedures outlined in sections 14.4 and 14.5 are repeated for the second profile.

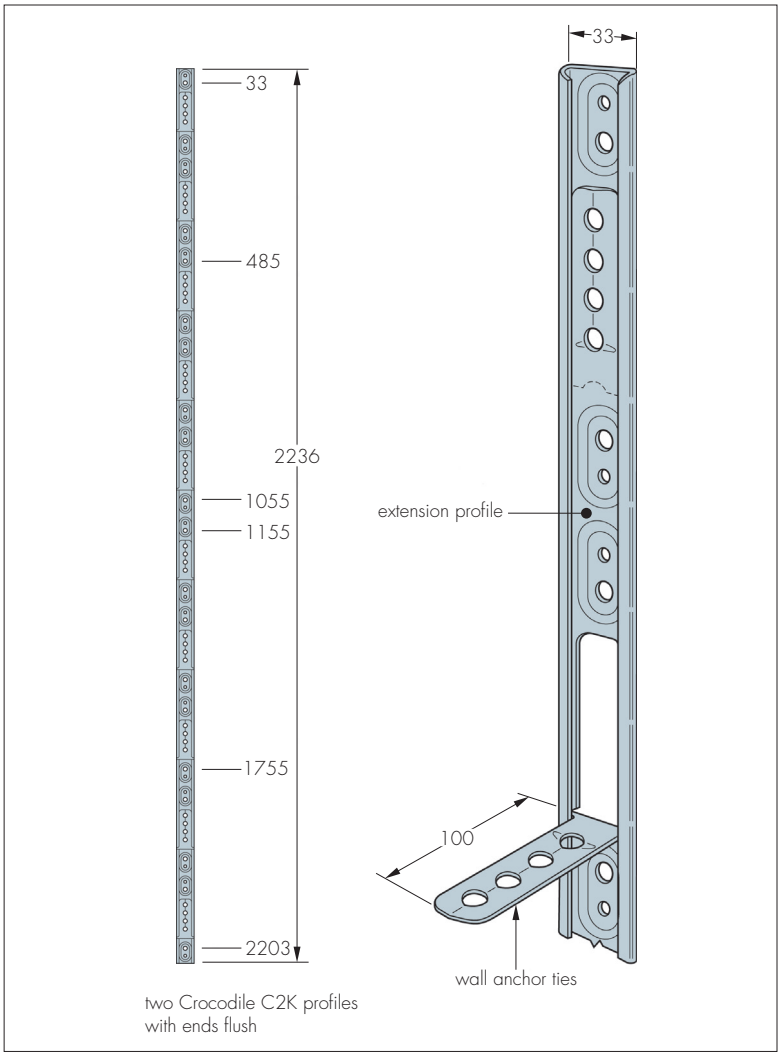
14.9 For any additional profiles required to complete the joint, the procedures outlined in sections 14.6 and 14.7 are repeated.

14.10 When specified, the impregnated foam sealing strip or polymer-based sealant is positioned behind the wall extension profile (see section 7.1 and Figure 1).

14.11 The wall extension profiles are aligned and all coach screws tightened.

14.12 Brickwork or blockwork for the new wall is laid in the conventional way, with a full mortar joint between the existing and the new walls. As the bricks are laid, ties are snapped off from the extension profiles and adjusted in position in the profile channel to sit on a mortar course of the new wall (see Figure 2). Further mortar is applied over the top so that the ties are completely surrounded by mortar.

Figure 2 Dimensions and fixings positions



14.13 Ties are inserted into the new wall at maximum 300 mm centres.

14.14 When specified, at the completion stage of the new wall, the impregnated foam sealing strip or polymer-based sealant is inserted at the junction perpend (see section 7.1 and Figure 1).

14.15 If required, the extended vertical damp-proof course is inserted into the aperture cut as described in section 14.2.

Technical Investigations

15 Tests

Tests were carried out to establish:

- load deflection characteristics of the component parts
- load deflection characteristics of laterally loaded wallettes.

16 Investigations

16.1 Calculations were made and examined in conjunction with the results of the load deflection tests referred to above, to establish structural performance.

16.2 Existing information relating to the suitability of the corrosion protection and compatibility of materials in contact was examined.

16.3 Data relating to the effects of the product on the weathertightness of cavity walls were examined.

16.4 An assessment was made of the behaviour of the system in fire.

16.5 The manufacturing process was examined, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

Bibliography

BS 5250 : 2011 *Code of practice for control of condensation in buildings*

BS EN 1996-1-1 : 2005 *Eurocode 6 : Design of masonry structures — General rules for reinforced and unreinforced masonry structures*

BS EN 1996-3 : 2006 *Eurocode 6 : Design of masonry structures : Simplified calculation methods for unreinforced masonry structures*

BS EN 10088-2 : 2005 *Stainless steels — Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes*

BS EN 10346 : 2009 *Continuously hot-dip coated strip and sheet of low carbon steels for cold forming — Technical delivery conditions*

BS EN 10683 : 2000 Fasteners — *Non-electrolytically applied zinc flake coatings*

BS EN ISO 3506-1 : 2009 *Mechanical properties of corrosion-resistant stainless steel fasteners — Bolts, screws and studs*

BS EN ISO 9001 : 2008 *Quality management systems — Requirements*

PD 6697 : 2010 *Recommendations for the design of masonry structures to BS EN 1996-1-1 and BS EN 1996-2*

Conditions of Certification

17 Conditions

17.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page — no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

17.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

17.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

17.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

17.5 In issuing this Certificate, the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

17.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.

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