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Agrément Certificate
12/4956
Product Sheet 3

XTRATHERM XTROLINER (XO)

XTROLINER SOFFIT PLUS

This Agrément Certificate Product Sheet[1] relates to the Xtroliner Soffit Plus, comprising rigid polyisocyanurate foam board with a composite foil-facing on both sides, adhesively bonded to magnesium silicate board, for use in new and existing buildings as soffit insulation in exposed concrete floor decks in car parks, storage areas, loading bays and similar areas beneath habitable buildings.

(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

Thermal performance — when installed at the maximum thickness, the product can enable exposed floors to achieve minimum U values of 0.20 $W \cdot m^{-2} \cdot K^{-1}$ (see section 6).

Properties in relation to fire — the product achieved the fire rating B-s1, d0 when classified to BS EN 13501-1 : 2007 (see section 7).

Mechanical resistance and stability — the product has sufficient strength to resist the loads likely to be encountered in service (see section 8).

Condensation risk — the product can adequately limit the risk of surface condensation. The risk of interstitial condensation will depend on the location and humidity class and should be assessed for each project (see section 9).

Durability — the product will remain effective as an insulating material for the life of the building and will have adequate resistance to damage (see section 12).

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 First issue: 1 July 2013

John Albon — Head of Approvals
Energy and Ventilation

Claire Curtis-Thomas
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, Xtroliner Soffit Plus, if installed, used and maintained in accordance with the provisions of 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 can sustain and transmit wind loads to the structural floor. See section 8.5 of this Certificate.
Requirement:	B2(1)	Internal fire spread (linings)
Comment:		The product has a B-s1, d0 fire rating and so its use is unrestricted under this Requirement. See sections 7.1 and 7.2 of this Certificate.
Requirement:	C2(c)	Resistance to moisture
Comment:		The risk of interstitial condensation must be assessed for each construction. The product can adequately limit the risk of surface condensation. See sections 9.1 and 9.3 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		The product can contribute to meeting this Requirement. See sections 6.1 and 6.2 of this Certificate.
Regulation:	7	Materials and workmanship
Comment:		The product is an acceptable material. See section 12 and the *Installation* part of this Certificate.
Regulation:	26	CO_2 emission rates for new buildings
Comment:		The product can contribute to meeting this Regulation. See sections 6.1 and 6.2 of this Certificate.

The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)	Fitness and durability of materials and workmanship
Comment:		The product can contribute to a construction satisfying this Regulation. See section 12 and the *Installation* part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard:	1.1	Structure
Comment:		The product can sustain and transmit wind loads to the structural floor. See section 8.5 of this Certificate.
Standard:	2.5	Internal linings
Comment:		The product has a B-s1, d0 fire rating and so its use is unrestricted under this Standard, with reference to clause 2.5.1[(1)(2)]. See sections 7.1 and 7.2 of this Certificate.
Standard:	3.15	Condensation
Comment:		The risk of interstitial condensation must be assessed for each construction. The products can adequately limit the risk of surface condensation, with reference to clauses 3.15.1[(1)(2)] and 3.15.4[(1)(2)]. See sections 9.1 and 9.4 of this Certificate.
Standard:	6.1(b)	Carbon dioxide emissions
Standard:	6.2	Building insulation envelope
Comment:		The product can contribute to a floor satisfying these Standards, with reference to clauses, or parts of, 6.2.1[(1)(2)], 6.2.3[(1)], 6.2.4[(2)], 6.2.5[(2)], 6.2.6[(1)], 6.2.7[(1)], 6.2.8[(1)(2)] to 6.2.11[(1)(2)], 6.2.12[(2)] and 6.2.13[(1)(2)]. The product cannot enable a floor to meet U value requirements of 0.15 $W \cdot m^{-2} \cdot K^{-1}$ and 0.18 $W \cdot m^{-2} \cdot K^{-1}$. See sections 6.1 and 6.2 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. In addition the product can contribute to a construction meeting a higher level of sustainability as defined in this Standard, with reference to clauses 7.1.4[(2)] [Aspect 1[(2)]], 7.1.6[(2)] [Aspect 1[(2)]] and 7.1.7[(2)] [Aspect 1[(2)]]. See section 6.2 of this Certificate.
Regulation:	12	Building standards applicable to conversions
Comment:		Comments made in relation to the product 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)].

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

The Building Regulations (Northern Ireland) 2012

Regulation:	23	Fitness of materials and workmanship
Comment:		The product is acceptable. See section 12 and the *Installation* part of this Certificate.
Regulation:	29	Condensation
Comment:		The risk of interstitial condensation must be assessed for each construction. See section 9.1 of this Certificate.
Regulation:	30	Stability
Comment:		The product can sustain and transmit wind loads to the structural floor. See section 8.5 of this Certificate.

Regulation:	34	Internal fire spread — Linings
Comment:		The product has a B-s1, d0 fire rating and so its use is unrestricted under this Regulation. See sections 7.1 and 7.2 of this Certificate.
Regulation:	39(a)(i)	Conservation measures
Regulation:	40(2)	Target carbon dioxide emission rate
Comment:		The product can contribute to meeting these Regulations. See sections 6.1 and 6.2 of this Certificate.

Construction (Design and Management) Regulations 2007

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

Information in this Certificate may assist the client, CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

See sections: 1 *Description* (1.2) and 3 *Delivery and site handling* (3.6) of this Certificate.

Additional Information

NHBC Standards 2013

In the opinion of the BBA, the use of Xtroliner Soffit Plus, in relation to this Certificate, is not subject to the requirements of these Standards.

Technical Specification

1 Description

1.1 Xtroliner Soffit Plus comprises of magnesium silicate board adhesively bonded to rigid polyisocyanurate insulation board having a composite foil-facing on both sides.

1.2 The product has the nominal characteristics shown in Table 1:

Table 1 Nominal characteristics

Length (mm)	2400
Width (mm)	1200
Insulation thickness (mm)	25 to 120 (in 5 mm increments)
Magnesium silicate board thickness (mm)	6
Edge profile	square

1.3 Only stainless steel fixings with a minimum shank diameter of 8 mm, head diameter of 35 mm, a characteristic pull-through resistance value exceeding 1174 N and assuming no failure of the fixing head, may be used with the product.

2 Manufacture

2.1 Raw materials are injected onto the lower foil-facer on a conveyor belt. The exothermic reaction expands the foam, which then comes into contact with the upper foil-facer. An automated process cures and cuts the product to the required size. The magnesium silicate board is adhered to the insulation board to complete the process.

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 Xtratherm Ltd has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by Loss Prevention Certification Board (Certificate 851).

3 Delivery and site handling

3.1 The product is delivered to site on pallets, which are shrink-wrapped with polythene, bearing a label containing the manufacturer's trade name, product description, and the BBA identification mark incorporating the number of this Certificate.

3.2 When moving the product, protective gloves and footwear should be worn.

3.3 Care must be taken to avoid damaging corners and edges.

3.4 It is essential that the product is stored such that it is raised off the ground, is inside or under cover on a flat, dry, level surface in a well-ventilated area. The product must be protected from rain, snow and prolonged exposure to

sunlight. Boards that have been allowed to get wet or that are damaged must not be used. Nothing should be stored on top of boards.

3.5 The product must not be exposed to a naked flame or other ignition sources. The product must not be exposed to solvents or other chemicals.

3.6 When using power saws and sanders for cutting, dust extraction equipment must be used to control dust levels. The magnesium silicate board occupational exposure limit[1] must not exceed 10 $mg \cdot m^{-3}$ for inhalable dust and 4 $mg \cdot m^{-3}$ for fume and respirable dust.

(1) EH40/2005: *Workplace exposure limits.*

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Xtroliner Soffit Plus.

Design Considerations

4 General

4.1 Xtroliner Soffit Plus is effective in reducing the thermal transmittance (U value) of new or existing exposed concrete floor decks in car parks, storage areas, loading bays and other similar areas, beneath habitable buildings.

4.2 Existing constructions must be in a good state of repair. Defects must be made good prior to installation.

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 Thermal performance

6.1 Calculations of thermal transmittance (U value) should be carried out in accordance with BS EN ISO 6946 : 2007 and BRE Report BR 443 : 2006, using the thermal conductivity ($\lambda_{90/90}$) value of 0.021 $W \cdot m^{-1} \cdot K^{-1}$ for the insulation, and a thermal resistance value of 0.033 $m^2 \cdot K \cdot W^{-1}$ for the magnesium silicate board.

6.2 Example calculations in Table 2 indicate that the product can enable, or contribute to enabling, a floor to meet most design U values quoted in the documents supporting the national Building regulations.

Table 2 Example floor U values[1]

U value requirement[1] ($W \cdot m^{-2} \cdot K^{-1}$)	Insulation thickness (mm)[2]
0.15	—
0.18	—
0.20	115
0.22	100
0.25	90

Note: Values include reduction due to a 0.01 $W \cdot m^{-2} \cdot K^{-1}$ gap correction and the mechanical fixings causing bridging — $\Delta U/U > 3\%$ of U value. 4.2 fixings per m^2, $\lambda = 17\ W \cdot m^{-1} \cdot K^{-1}$ and cross sectional diameter of 8 mm.

(1) Construction (internal to external): 150 mm concrete and Xtroliner Soffit Plus (insulation + 6 mm magnesium silicate).

(2) Nearest available thickness.

6.3 Designers must limit excessive heat loss at junctions between the wall and the structural floor.

7 Properties in relation to fire

7.1 The composite product achieved the fire rating B-s1, d0 when classified to BS EN 13501-1 : 2007. The underlying polyisocyanurate insulation material, with an aluminium foil-facing has been shown to have a fire rating of C-s2, d0 when classified to BS EN 13501-1 : 2007. When the product is correctly installed, the polyisocyanurate insulation material itself will be protected and will not contribute to the developing stages of a fire.

7.2 The use of the product as soffit insulation to exposed floor decks is unrestricted by the national Building Regulations in relation to internal fire spread over linings.

7.3 If the product is painted or covered, the fire performance of particular coatings is outside the scope of this Certificate and should be the subject of assessment and/or test by a UKAS accredited fire testing laboratory.

8 Mechanical resistance and stability

8.1 The product is mechanically fixed to the structural floor with a minimum of 12 fixings per board, and the fixing pattern is shown in Figure 1.

8.2 The product attached to a suitable structural floor with an appropriate number of fixings can adequately resist design loads applicable in the UK.

8.3 Positive wind load (pressure) is transferred to the substrate structural floor directly via bearing and compression of the product.

8.4 Negative wind pressure (suction) is resisted by stainless steel fixings, which retain the product.

8.5 The wind loads on the structural floor should be calculated in accordance with BS EN 1991-1-4 : 2005 and its UK National Annex. Special consideration should be given to locations with high wind-load pressure coefficients as additional fixings may be necessary. In accordance with BS EN 1990 : 2002 and its National Annex, it is recommended that a load factor of 1.5 is used to determine the ultimate wind load to be resisted by the product.

8.6 Assessment of structural performance for individual buildings must be carried out by a suitably qualified and experienced individual to confirm that:

- the structural floor has adequate strength to resist additional loads that may be applied as a result of installing the product
- the proposed product and associated fixing layout provides adequate resistance to negative wind loads (based on the results of the site investigation).
- an appropriate number of site-specific pull-out tests conducted on the substrate of the building to determine the minimum resistance to failure of the fixings. The characteristic pull-out resistance should be determined in accordance with the guidance given in ETAG 014 : 2002, Annex D.

8.7 The number and centres of fixings should be determined by the system designer. Provided the structural floor is suitable and an appropriate fixing is selected, the mechanical fixings will transfer the weight of the product to the structural floor.

8.8 The resistance forces data given in Table 3 are the results of calculations based upon pull-through resistances determined by the BBA from tests on a stainless steel anchor with a 35 mm diameter plates

Table 3 Example calculation sheet to establish ultimate wind load capacity

Factor (unit)	Product[1] 2.4 m x 1.2 m
Product thickness (m)	All product thicknesses
Characteristic pull-through resistance[2] (per anchor) (N)	1174
Factor of safety	3
Design pull-through resistance[3] (N)	391

(1) Calculation based on insulation board 2.4 m by 1.2 m (total area 2.88 m^2) attached by twelve fixings (ie 4.16 fixings per m^2).
(2) Pull-through resistance of the product over the head of the fixing (see section 1.3).
(3) The safety factor of 3 is applied and based on the assumption that all boards are quality control tested to ensure consistency of the tensile strength perpendicular to the face of the board.

9 Condensation risk

Interstitial condensation

9.1 Floors incorporating the product can limit the risk of interstitial condensation up to and including the humidity classes shown in Table 4 when they are designed and constructed in accordance with BS 5250 : 2011, Annex D and Annex F. When designing buildings, an assessment will need to be made, using the values in section 9.2, and the result will be construction and location specific. The calculation will be sensitive to the water vapour resistance of the concrete slab above the product and the overall floor construction.

Table 4 Suitable use

Location	Suitable use
London	Humidity class 4 (dwellings with high occupancy) and lower
Manchester	Humidity class 3 (dwellings with low occupancy) and lower
Edinburgh	Humidity class 2 (offices, shops)

9.2 For the purposes of calculations, the vapour resistivity/resistance value of the individual components may be taken as:

- insulation core 300 $MN \cdot s \cdot g^{-1} \cdot m^{-1}$
- each foil-facing 7000 $MN \cdot s \cdot g^{-1}$
- magnesium silicate board 1.7 $MN \cdot s \cdot g^{-1}$.

Surface condensation

9.3 Floors will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 0.7 $W \cdot m^{-2} \cdot K^{-1}$ at any point.

9.4 Floors will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed 1.2 $W \cdot m^{-2} \cdot K^{-1}$ at any point.

10 Materials in contact — wiring installations

10.1 De-rating of electric cables should be considered in areas where the product restricts the flow of air.

10.2 Recessed lighting must not be used with this form of insulation.

11 Maintenance

The product does not require maintenance. Minor surface damage can be repaired with proprietary fillers. Further advice should be sought from the Certificate holder. Major damage may require the replacement of product.

12 Durability

The product will remain effective as a soffit insulation for the life of the building providing major damage does not occur during service.

Installation

13 General

13.1 Installation of Xtroliner Soffit Plus must be in accordance with the Certificate holder's installation instructions and the requirements of this Certificate.

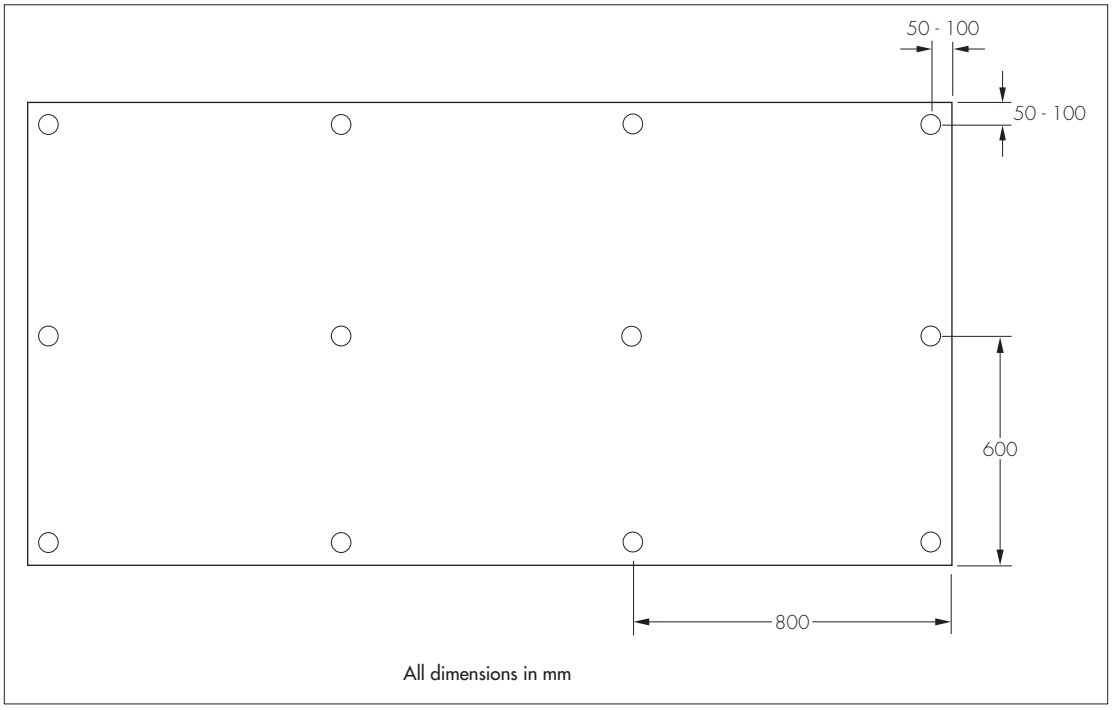
13.2 The product is fixed directly to a concrete soffit.

13.3 The product may be cut using a fine-toothed saw with a hardened blade.

13.4 Board joints should preferably be staggered.

13.5 The board should be fixed to the soffit using the fasteners and their spacings as determined by designs. See example layout in Figure 1.

Figure 1 Fixing layout 2400 mm by 1200 mm board — minimum fixing numbers



13.6 The distance between the fixings and the panel edge should not be less than 50 mm, but not greater than 100 mm.

13.7 The fasteners must penetrate into the concrete soffit to a minimum distance as recommended by the fixing manufacturer and determined by design (see section 9).

13.8 Care should be taken in the detailing of the product at the floor perimeter to ensure adequate protection against precipitation. Proprietary products must be used to adequately seal the product edges from precipitation (outside the scope of this Certificate).

Technical Investigations

14 Tests

Tests were carried out by the BBA on Xtroliner Soffit Plus in accordance with BS EN 13165 : 2012 to determine:

- water vapour permeability of the magnesium silicate board
- water impermeability (magnesium silicate board)
- laminate bond strength between the insulation and the magnesium silicate board
- thermal conductivity
- board flexural strength
- impact resistance
- pull-through strength of the specified fixing.

15 Investigations

15.1 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.

15.2 The following investigations were also carried out:

- U value calculations
- condensation risk analysis
- behaviour in relation to fire
- wind suction resistance.

Bibliography

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

BS EN 1990 : 2002 *Eurocode — Basis of structural design*
NA to BS EN 1990 : 2002 *UK National Annex for Eurocode. Basis of structural design*
BS EN 1991-1-4 : 2005 *Eurocode 1 : Actions on structures — General actions — Wind actions*
NA to BS EN 1991-1-4 : 2005 *UK National Annex to Eurocode 1 : Actions on structures — General actions — Wind actions*

BS EN 13165 : 2012 *Thermal insulation products for buildings — Factory made rigid polyurethane foam (PU) products - Specification*

BS EN 13501-1 : 2007 *Fire classification of construction products and building elements — Classification using test data from reaction to fire tests*

BS EN ISO 6946 : 2007 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*

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

ETAG 014 : 2002 *Guideline for European Technical Approval of Plastic Anchors for fixing of External Thermal Insulation Composite Systems with Rendering*

BRE Report (BR 443 : 2006) *Conventions for U-value calculations*

16 Conditions

16.1 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.

16.2 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.

16.3 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.

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

16.5 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.

16.6 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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