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Agrément Certificate

21/5985

Product Sheet 2

CPG UK INSULATED CONCRETE FORM (ICF) SYSTEM

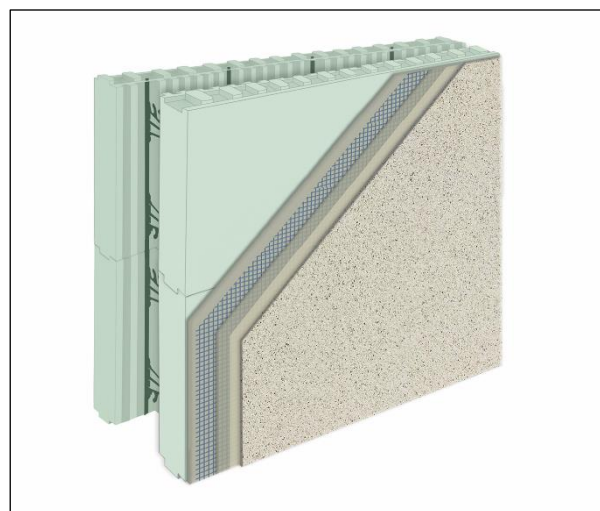
DRYVIT ICF 500 RENDER SYSTEM

This Agrément Certificate Product Sheet⁽¹⁾ relates to the Dryvit ICF 500 render system, for use over the Nudura Solid Insulated Wall System. The system provides permanent insulated formwork and a render finish for external walls in domestic and non-domestic buildings, subject to height restrictions.

(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 system components have adequate strength to resist the loads associated with installation, and can adequately resist wind loads and impact damage (see section 6).

Thermal performance — the system contributes to the overall thermal performance of the wall construction (see section 7).

Condensation — the system can contribute to limiting the risk of interstitial and surface condensation (see section 9).

Behaviour in relation to fire — the system's reaction to fire classification is B-s1, d0 in accordance with BS EN 13501-1 : 2007 and its use is restricted in some cases (see section 12).

Durability — when installed and maintained in accordance with the Certificate holder's recommendations and the terms of this Certificate, the systems will remain effective for at least 30 years. The durability can be extended to 60 years by using certain fixings and by following a planned inspection and an effective maintenance schedule (see sections 14 and 15).

The BBA has awarded this Certificate to the company named above for the system described herein. This system 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: 11 March 2022

Hardy Giesler
Chief Executive Officer

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 MUST check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA directly.

Any photographs are for illustrative purposes only, do not constitute advice and should not be relied upon.

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Regulations

In the opinion of the BBA, the Dryvit ICF 500 Render System, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying 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 system can sustain and transmit wind loads to the ICF wall. See sections 6.2 to 6.11 of this Certificate.
Requirement:	B4(1)	External fire spread
Comment:		The system is restricted by this Requirement. See sections 12.1 to 12.4 of this Certificate.
Requirement:	C2(b)	Resistance to moisture
Comment:		The system can provide protection against rain ingress. See section 10.1 of this Certificate.
Requirement:	C2(c)	Resistance to moisture
Comment:		The system can adequately limit the risk of surface condensation and contribute to minimising the risk of interstitial condensation. See sections 9.1, 9.3 and 9.4 of this Certificate.
Requirement:	L1(a)(i)	Conservation of fuel and power
Comment:		The system can contribute to satisfying this Requirement. See sections 7 and 8.1 of this Certificate.
Regulation:	7(1)	Materials and workmanship
Comment:		The system is acceptable. See sections 15.1 to 15.3 and the <i>Installation</i> part of this Certificate.
Regulation:	7(2)	Materials and workmanship
Comment:		The system is restricted by this Regulation. See sections 12.1 to 12.4 of this Certificate.
Regulation:	26	Materials and workmanship (applicable to Wales only)
Regulation:	26A	Fabric energy efficiency rates for new dwellings (applicable to England only)
Regulation:	26A	Primary energy consumption rates for new buildings (applicable to Wales only)
Regulation:	26B	Fabric performance values for new dwellings (applicable to Wales only)
Comment:		The system can contribute to satisfying these Regulations. See sections 7 and 8.1 of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Durability, workmanship and fitness of materials
Comment:		The system can contribute to a construction satisfying this Regulation. See sections 14 and 15.1 to 15.3 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards applicable to construction
Standard	1.1	Structure
Comment:		The system can sustain and transmit wind loads to the ICF wall. See sections 6.2 to 6.11 of this Certificate.

Standard: Comment:	2.4	Cavities The system is restricted by these Standards, with reference to clauses 2.4 ⁽¹⁾⁽²⁾ , 2.4.4 ⁽¹⁾ and 2.4.6 ⁽²⁾ . See section 12.3 of this Certificate.
Standard: Comment:	2.6	Spread to neighbouring buildings The system is restricted by this Standard, with reference to clauses 2.6.4 ⁽¹⁾⁽²⁾ , 2.6.5 ⁽¹⁾ and 2.6.6 ⁽²⁾ . See sections 12.1 to 12.3 and 12.5 of this Certificate.
Standard: Comment:	2.7	Spread on external walls The system is restricted by this Standard in some cases, with reference to clauses 2.7.1 ⁽¹⁾⁽²⁾ . See sections 12.1 to 12.3 and 12.5 of this Certificate.
Standard: Comment:	3.10	Precipitation The system can contribute to a construction satisfying this Standard, with reference to clauses 3.10.1 ⁽¹⁾⁽²⁾ and 3.10.2 ⁽¹⁾⁽²⁾ . See section 10.1 of this Certificate.
Standard: Comment:	3.15	Condensation Walls can adequately limit the risk of surface condensation, with reference to clauses 3.15.1 ⁽¹⁾⁽²⁾ , 3.15.4 ⁽¹⁾⁽²⁾ and 3.15.5 ⁽¹⁾⁽²⁾ of this Standard. Walls can contribute to minimising the risk of interstitial condensation, with reference to clauses 3.15.1 ⁽¹⁾⁽²⁾ and 3.15.5 ⁽¹⁾⁽²⁾ of this Standard. See sections 9.2 to 9.4 of this Certificate.
Standard: Comment:	6.1(b)	Carbon dioxide emissions The system can contribute to satisfying this Standard, with reference to clauses 6.1.1 ⁽¹⁾ , 6.1.2 ⁽²⁾ and 6.1.6 ⁽¹⁾ . See sections 7 and 8.1 of this Certificate.
Standard: Comment:	6.2	Building insulation envelope The system can contribute to satisfying this Standard, with reference to clauses 6.2.1 ⁽¹⁾⁽²⁾ , 6.2.3 ⁽¹⁾ , 6.2.4 ⁽¹⁾⁽²⁾ , 6.2.5 ⁽²⁾ and 6.2.6 ⁽²⁾ . See sections 7 and 8.1 of this Certificate.
Standard: Comment:	7.1(a)(b)	Statement of sustainability The system can contribute to satisfying 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 system can contribute to meeting higher levels of sustainability as defined in this Standard, with reference to clauses 7.1.4 ⁽¹⁾ [Aspects 1 ⁽¹⁾⁽²⁾ and 2 ⁽¹⁾], 7.1.6 ⁽¹⁾⁽²⁾ [Aspects 1 ⁽¹⁾⁽²⁾ and 2 ⁽¹⁾], 7.1.7 ⁽¹⁾ [Aspect 1 ⁽¹⁾], 7.1.9 ⁽²⁾ [Aspect 1 ⁽²⁾] and 7.1.10 ⁽²⁾ [Aspect 1 ⁽²⁾]. See section 7 of this Certificate.
Regulation: Comment:	12	Building standards applicable to conversions Comments in relation to the system 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 (as amended)

Regulation: Comment:	23(a)(i) (iii)(b)(i)	Fitness of materials and workmanship The system is acceptable. See section 15.1 to 15.3 and the <i>Installation</i> part of this Certificate.
Regulation: Comment:	28(b)	Resistance to moisture and weather The system can provide protection against rain ingress. See section 10.1 of this Certificate.
Regulation: Comment:	29	Condensation The system can contribute to minimising the risk of interstitial condensation. See sections 9.3 and 9.4 of this Certificate.

Regulation: Comment:	30	Stability The system can sustain and transmit wind loads to the ICF wall. See sections 6.2 to 6.11 of this Certificate.
Regulation: Comment:	36(a)	External fire spread The system is restricted by this Regulation. See sections 12.1 to 12.4 of this Certificate.
Regulation: Comment:	39(a)(i)	Conservation measures The system can contribute to satisfying this Regulation. See sections 7 and 8.1 of this Certificate.
Regulation: Comment:	40(2)	Target carbon dioxide emission rate The system can contribute to satisfying this Regulation. See sections 7 and 8.1 of this Certificate.

Construction (Design and Management) Regulations 2015

Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

See section: 3 *Delivery and site handling* (3.2 and 3.6) and the *Installation* part of this Certificate.

Technical Specification

1 Description

1.1 The Dryvit ICF 500 Render System comprises a reinforced basecoat, primers, finishes and decorative coatings. In addition, mechanical fixings are required for the 60 year system. They are suitable for use over the Nudura Solid Insulated Wall System as defined in Product Sheet 1 of this Certificate.

1.2 The basecoat is prepared and trowel-applied to the external face of the prepared Nudura form work. The reinforcement mesh is immediately positioned into the basecoat and trowelled into position. Additional basecoat is applied to fully embed the mesh.

1.3 The system can be designed to achieve either a 30 or 60 year service life. For the 60 year durability system, all profiles must be made of stainless steel and appropriate fixings must be installed through the reinforcing mesh and basecoat layer.

1.4 After the basecoat has fully cured, the primer is applied, followed by the finish and where relevant the decorative coating.

1.5 The Dryvit ICF 500 render system comprises basecoat, meshes, primers, finishes and decorative coatings, as follows:

Basecoat

- Fibercoat — polymer-modified, cement-based powder adhesive requiring the addition of 5.5 to 6 litres of clean water per 25 kg bag. The basecoat is applied to a thickness of between 3 and 5 mm, at a coverage of approximately 3 to 8 kg·m⁻²

Reinforcement

- Dryvit Standard Plus 150 mesh — 1 m or 1.22 m wide alkali-resistant glass fibre mesh with a nominal weight of 150 g·m⁻² and 4.6 by 3.6 mm grid size
- Dryvit Standard Plus 200 mesh — 1.22 m wide alkali-resistant glass fibre mesh with a nominal weight of 200 g·m⁻² and 4 by 4 mm grid size

- Dryvit Panzer 260 mesh — 1 m wide alkali-resistant glass fibre mesh with a nominal weight of $260 \text{ g}\cdot\text{m}^{-2}$ and 6 by 6 mm grid size. The mesh is applied to a maximum height of 2 metres
- Dryvit Panzer 500 mesh — 1 m wide alkali-resistant glass fibre mesh with a nominal weight of $522 \text{ g}\cdot\text{m}^{-2}$ and 4 by 3.3 mm grid size. The mesh is applied to a maximum height of 2 metres
- Dryvit Panzer 700 mesh — 1 m wide alkali-resistant glass fibre mesh with a nominal weight of $700 \text{ g}\cdot\text{m}^{-2}$ and 4.3 by 4.3 mm grid size. The mesh is applied to a maximum height of 2 metres

Mechanical fixings (for use in the 60 year system only)

Mechanical fixing⁽¹⁾⁽²⁾ — anchors of adequate length to suit the substrate and insulation thickness, approved by the BBA and supplied by the Certificate holder, and selected from:

- Ejotharm NT U — a polyethylene, high-density polyethylene (HDPE) anchor sleeve with a stainless steel⁽²⁾ centre pin
- Ejotharm STR U — a polyethylene, HDPE anchor sleeve with a stainless steel⁽²⁾ centre screw
- Ejotharm STR U 2G — a polyethylene, HDPE anchor sleeve with a stainless steel⁽²⁾ centre screw
- Koelner TFIX-8S — a polypropylene anchor sleeve with a stainless steel⁽²⁾ centre screw (with head coating of polyamide PA6)
- Bravoll PTH-KZ — a polypropylene anchor sleeve with a stainless steel⁽²⁾ centre pin (with head coating of polyamide)
- Bravoll PTH-S — a polypropylene anchor sleeve with a stainless steel⁽²⁾ centre screw (with head coating of polyamide).

(1) Other fixings may be used provided they can be demonstrated to have equal or higher pull-out strength, plate diameter and plate stiffness characteristics.

(2) Polyethylene (HDPE), polyamide or polypropylene anchor sleeve with a stainless steel pin or screw to grades 1.4301 or 1.4401 to BS EN 10088-2 : 2014 are required in order to achieve a 60 year durability performance.

Primers

- Dryvit Color Prime Plus — ready to use water-based acrylic primer, available in a range of colours, for use with the acrylic (PMR, FD PMR, speciality finishes), silicone-silicate (Hybrid) and silicone (HDP) finishing coats
- Dryvit Demandit Smooth — ready to use water-based acrylic primer, available in a range of colours, for use with the Custom Brick finish coat
- Dryvit Wood Prime — ready to use water-based acrylic primer, for use with mineral finishing coat Drytex Wood Effect together with Wood Glaze matt or Wood Glaze decorative coats.

Finishing coats

Acrylic speciality finishing coats

- Dryvit Stonemist and Dryvit Stonemist T — acrylic-based emulsion containing aggregate (Dryvit Stonemist T additionally contains mica). Available in grain sizes from 0.6 to 0.8 mm, and with a coverage of 2.6 to $3.5 \text{ kg}\cdot\text{m}^{-2}$
- Dryvit Ameristone — acrylic-based emulsion containing aggregate. Available in grain sizes from 0.8 to 2.5 mm, and with a coverage of 3 to $4.5 \text{ kg}\cdot\text{m}^{-2}$
- Dryvit TerraNeo — acrylic-based emulsion containing aggregate and mica. Available in grain sizes from 0.8 to 2.5 mm, and with a coverage of 3 to $3.5 \text{ kg}\cdot\text{m}^{-2}$

Acrylic finishing coats

- Dryvit PMR — acrylic-based emulsion containing aggregates and coalescing and thickening agents. Available in seven textures, with grain sizes of 2 mm (Quarzputz), 2 mm (Sandpebble 2), 1.6 mm (Sandpebble), 1.2 mm (Sandpebble Fine), 1.2 mm (Sandblast), 0.6 mm (Freestyle) and 0.6 mm (Limestone). Applied at a coverage of 1 to $3.8 \text{ kg}\cdot\text{m}^{-2}$
- Dryvit FD PMR — acrylic-based emulsion with drying accelerator containing aggregate and coalescing and thickening agents. Available in five textures, with the following grain sizes: 2 mm (Quarzputz), 1.6 mm (Sandpebble), 1.2 mm (Sandpebble Fine), 1.2 mm (Sandblast) and 0.6 mm (Freestyle), and with a coverage of 1 to $2.8 \text{ kg}\cdot\text{m}^{-2}$

Silicone finishing coats

- Dryvit HDP — silicone emulsion with hydrophobic additives and aggregate. Available in six textures, with the following grain sizes: 2 mm (Quarzputz), 1.6 mm (Sandpebble), 1.2 mm (Sandpebble Fine), 1.2 mm (Sandblast), 0.6 mm (Freestyle) and 0.6 mm (Limestone), and with a coverage of 1 to 2.8 kg·m⁻²

Hybrid Silicone-Silicate finishing coats

- Dryvit Hybrid — silicone/silicate/acrylic binder emulsion. Available in seven textures, with the following grain sizes: 1.5 mm (Sandpebble), 2 mm (Sandpebble 2), 1.2 mm (Sandpebble Fine), 1.2 mm (Sandblast), 1.2 mm (Quarzputz Fine), 0.6 mm (Freestyle) and 0.6 mm (Limestone), and with a coverage of 1 to 3.8 kg·m⁻²

Mineral finishing coats

- Dryvit Drytex — polymer-modified mineral finishing coat, requiring the addition of 5 to 6 litres of clean water per 25 kg bag. Available in seven textures, with grain sizes of 3 mm (Sandpebble 3), 2 mm (Quarzputz), 2 mm (Sandpebble 2), 1.6 mm (Sandpebble), 1.2 mm (Quarzputz Fine), 1.2 mm (Sandblast) and 0.6 mm (Freestyle). Applied at a coverage of 1.1 to 3.8 kg·m⁻²
- Dryvit Drytex Wood Effect — polymer-modified mineral finishing coat, requiring the addition of 5.5 to 6.5 litres of clean water per 25 kg bag. Available in grain size 0.5 mm and over coated with the Wood Glaze or Wood Glaze Matt decorative coats. The product is applied to a thickness of between 4 and 5 mm at a coverage of 4.5 to 5 kg·m⁻²

Custom Brick Effect

- Dryvit Custom Brick⁽¹⁾ — acrylic-based emulsion. Available with a grain size of 0.6 mm and in a range of colours. Applied at a coverage rate of 1.2 to 2 kg·m⁻² over Demandit Smooth, with a self-adhesive cardboard template to form a Custom Brick Effect.

(1) Ameristone, TerraNeo, Stonemist and Stonemist T can also be used to form a Custom Brick Effect.

Decorative coats

- Dryvit Demandit Smooth — acrylic emulsion, available in a range of colours, for use with mineral finishing coats excluding Dryvit Drytex Wood Effect
- Dryvit Silstar / Silstar Pro — silicone resin emulsion, available in a range of colours, for use with mineral finishing coats
- Dryvit HyDroPhobic — silicone resin emulsion with hydrophobic additives, available in a range of colours, for use with mineral finishing coats excluding Dryvit Drytex Wood Effect
- Dryvit Wood Glaze and Dryvit Wood Glaze Matt — acrylic emulsions, available in a range of colours, for use with the Dryvit Drytex Wood Effect finishing coat.

1.6 Components and finishes specified for use with the system, but outside the scope of this Certificate, are:

- concrete core — as specified in PS 1
- steel reinforcement — used when required, should comply with BS 4449 : 2005
- waterproofing membrane — supplied by the Certificate holder as required (see section 11.2)
- temporary bracing and alignment support system as supplied by the Certificate holder
- internal finish — typically 12.5 mm thick plasterboard or a dry-lined finish, with or without a plaster skim coat conforming to BS EN 1992-1-2 : 2004
- trestle supports — supplied by the Certificate holder.
- sealants, backer rods and compressible tapes — supplied by the Certificate holder
- expanding PU foam — supplied by the Certificate holder
- a range of compatible window sealing solutions — supplied by the Certificate holder
- a range of aluminium, PVC-U or stainless steel profiles, comprising:
 - base profile
 - edge profile

- corner profile with optional PVC-U nosing
- render stop profile
- Movement joint
- Expansion joint
- Dryvit Dryflex Base Coat – an acrylic co-polymer which when mixed with Portland cement is used as a water-resistant base coat for below DPC installations
- Dryvit Stone Wool HD Slab – a high density stone wool insulation which is cut to size and used to form fire barriers in the Nudura Solid Insulated Wall System
- Dryvit Algo Stop fungicidal wash
- Dryvit Efflorescence Remover.

2 Manufacture

2.1 The Nudura Solid Insulated Wall System is manufactured from expanded polystyrene (EPS) in accordance with BS EN 13163 : 2012, and components of the Dryvit ICF 500 render system are manufactured by the Certificate holder or bought in from suppliers to an agreed specification.

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 the manufacturer of the Dryvit ICF 500 render system has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015 by Centrum Certyfikacji Jakości (Certificate 24/S/2018).

3 Delivery and site handling

3.1 Good site practice should be observed to prevent damage to the components.

3.2 Components of the Dryvit ICF 500 render system are delivered in the quantities and packaging listed in Table 1. Each package carries the product identification and manufacturer's batch number.

Table 1 Component supply details

Component	Quantity and packaging
Dryvit Roxhesive (adhesive) Dryvit Fibercoat (adhesive/basecoat)	25 kg bags
Dryvit Drytex (finishing coat) Dryvit Drytex Wood Effect (finishing coat)	
Dryvit Stonemist (finishing coat) Dryvit Stonemist T (finishing coat)	23 kg pails
Dryvit PMR (finishing coat) Dryvit FD PMR (finishing coat) Dryvit HDP (finishing coat)	24.72 kg pails
Dryvit Hybrid (finishing coat) Custom Brick (finishing coat)	
Dryvit Ameristone (finishing coat)	24 kg pails
Dryvit TerraNeo (finishing coat)	22 kg pails
Dryvit Color Prime Plus (primer) Dryvit Demandit Smooth (primer and decorative coat) Dryvit Wood Prime (primer) Dryvit Silstar / Silstar Pro (decorative coat) Dryvit HyDroPhobic (decorative coat)	17.36 kg pails
Dryvit Wood Glaze and Dryvit Wood Glaze Matt (decorative coat)	12.7 or 3.17 kg pails
Dryvit Standard Plus 150 mesh	Rolls, 1 m wide by 50 m length Rolls, 1.22 m wide by 45.7 m length
Dryvit Standard Plus 200 mesh	Rolls, 1 m wide by 50 m length
Dryvit Panzer 260 mesh	Rolls, 1 m wide by 50 m length
Dryvit Panzer 500 mesh	Rolls, 1.22 m wide by 22.9 m length
Dryvit Panzer 700 mesh	Rolls, 1.22 m wide by 22.9 m length

3.3 The EPS components should be stored and protected in accordance with the Certificate holder's recommendations.

3.4 The powder adhesives and mineral renders must be stored in dry conditions, off the ground, and protected from moisture. Contaminated materials should be discarded.

3.5 The primers and finishes must be stored in tightly closed original packaging in cool, dry conditions and protected from excessive heat and frost.

3.6 Care must be taken when handling the EPS components to avoid damage and contact with solvents or materials containing volatile organic components, such as newly treated timber. The elements must not be exposed to open flame or other ignition sources.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the Dryvit ICF 500 render system.

4 Use

4.1 The Dryvit 500 ICF render system is for use on external surface of the Nudura Solid Insulated Wall System, in domestic and non-domestic buildings, subject to structural and fire considerations.

4.2 Walls formed from the system are subject to design and supervision by a suitably qualified and competent individual, and adherence to structural design to British or European Standards.

4.3 Movement joints should be incorporated into the system in line with expansion joints in the building structure and in accordance with the Certificate holder's recommendations for the specific installation.

4.4 The render system provides protection from the ingress of rain to the insulation and provides a decorative finish. It is essential that the detailing techniques specified in this Certificate are carried out to a high standard if the ingress of water into the insulation is to be avoided and the full thermal benefit obtained from treatment with the system (eg the insulation must be protected by an overhang, and window sills should be designed and installed so as to direct water away from the building).

4.5 The fixing of sanitary pipework, plumbing, rainwater goods, satellite dishes, clothes lines, hanging baskets and similar items to the system is outside the scope of this Certificate.

4.6 The designer should select a construction appropriate to the local wind-driven rain index, paying due regard to the design detailing, workmanship and materials to be used.

4.7 It is essential that the system is installed and maintained in accordance with the conditions set out in this Certificate.

5 Practicability of installation

5.1 Construction of the system is carried out by trained operatives experienced with this type of system, in accordance with the Certificate holder's installation manual.

5.2 The render system should only be installed by specialist contractors who have successfully undergone training and registration by the Certificate holder (see section 17).

Note: The BBA operates a UKAS-accredited Approved Installer Scheme for external wall insulation (non-mandatory); details of approved installer companies are included on the BBA's website (www.bbacerts.co.uk).

6 Structural performance

General

6.1 The Certificate holder is ultimately responsible for the design of the system and it is the responsibility of the company installing the systems to accurately follow the installation manual (see also section 5). The Certificate holder must also verify that a suitably experienced and qualified individual (with adequate professional indemnity) establishes that the wind loads on the different zones of the building's elevation for the specific geographical location have been calculated correctly.



6.2 Installations correctly designed in accordance with this Certificate will safely accommodate the applied loads due to the self-weight of the system, wind and impact.

6.3 Positive wind load is transferred to the concrete core directly via compression through the render systems and the ICF.

6.4 Negative wind load is transferred to the substrate wall via:

- the bond between the ICF and render system (see section 6.5)
- the tensile strength of the ICF (see section 6.6)
- the bond between the concrete core and the ICF interface (see section 6.7)

6.5 The characteristic bond resistance between the ICF and render interface derived from test results was $80 \text{ kN}\cdot\text{m}^{-2}$. The design resistance of the bond between the ICF and render (N_{RD1}) should be taken as the characteristic bond resistance divided by a partial factor of 9.

6.6 The characteristic tensile resistance of the ICF may be taken as $26 \text{ kN}\cdot\text{m}^{-2}$ and should be divided by a partial material factor of 2.5 to establish the ultimate design resistance of the insulation ($R_{dt.ins}$).

6.7 The characteristic bond resistance between the concrete core and the ICF may be taken as not less than $80 \text{ kN}\cdot\text{m}^{-2}$. The design resistance of the bond between the concrete core and insulation (N_{RD2}) should be taken as this value divided by a partial factor of 9.

6.8 The data obtained from sections 6.4 to 6.7 must be assessed against the design wind load and the following expression must be satisfied⁽¹⁾.

For safe design:

$$R_d \geq W_e$$

$$R_{db.ins/render} = N_{RD1} / 9$$

$$R_{dt.ins} = \text{characteristic tensile strength of ICF} / 2.5$$

$$R_{db.sub/ins} = N_{RD2} / 9$$

Where:

R_d is the design ultimate resistance ($\text{kN}\cdot\text{m}^{-2}$) taken as the minimum of $R_{db.ins/render}$, $R_{dt.ins}$, and $R_{db.sub/ins}$

W_e is the maximum design wind load ($\text{kN}\cdot\text{m}^{-2}$)

$R_{db.ins/render}$ is the bond design resistance between the insulation and render ($\text{kN}\cdot\text{m}^{-2}$)

N_{RD1} is the design adhesive bond resistance between the insulation and render based on tests ($\text{kN}\cdot\text{m}^{-2}$)

$R_{db.sub/ins}$ is the bond design resistance between the insulation and concrete core ($\text{kN}\cdot\text{m}^{-2}$)

N_{RD2} is the design bond resistance between insulation and concrete core ($\text{kN}\cdot\text{m}^{-2}$).

6.9 If the design wind resistance is lower than the design wind load, and for all systems designed for 60-year durability, the system would need to be mechanically fixed using the fixings specified in Section 1.5 of this Certificate.

Impact resistance

6.10 Hard body impact tests were carried out in accordance with ETAG 004 : 2013. The systems are suitable for use in the Use Categories up to and including those specified in Table 2 of this Certificate.

Table 2 Impact resistance of systems

Render systems: Dryvit Fibercoat basecoat with Glass fibre mesh + finishing coats + decorative coats, as indicated below:	Particle size (mm)	Category ⁽¹⁾
		Any single mesh
Standard Plus 150 + Color Prime Plus + Hybrid Limestone	0.6	I
Standard Plus 150 + Color Prime Plus + silicone finishing coats HDP Limestone	0.6	II
Standard Plus 150 + Color Prime Plus + FD PMR Freestyle	0.6	I
Standard Plus 150 + Color Prime Plus + PMR Limestone	0.6	I
Standard Plus 150 + Color Prime Plus + Stonemist T	0.8	I
Standard Plus 150 + Demandit Smooth + Stonemist T	0.8	II
Standard Plus 150 + Drytex Freestyle + Demandit Smooth	0.6	II
Standard Plus 150 + Drytex Freestyle + Hydrophobic	0.6	II
Standard Plus 150 + Drytex Freestyle + Silstar	0.6	II
2x Standard Plus 150 + Color Prime Plus + Hybrid Limestone	0.6	I
2x Standard Plus 150 + Color Prime Plus + silicone finishing coats HDP Limestone	0.6	I
2x Standard Plus 150 + Color Prime Plus + FD PMR Freestyle	0.6	I
2x Standard Plus 150 + Color Prime Plus + PMR Limestone	0.6	I
2x Standard Plus 150 + Color Prime Plus + Stonemist T	0.8	I
2x Standard Plus 150 + Demandit Smooth + Stonemist T	0.8	I
2x Standard Plus 150 + Drytex Freestyle + Demandit Smooth	0.6	I
2x Standard Plus 150 + Drytex Freestyle + Hydrophobic	0.6	I
2x Standard Plus 150 + Drytex Freestyle + Silstar	0.6	I
2x Standard Plus 150 + Demandit Smooth + Custom Brick	0.6	I
2x Standard Plus 150 + Mineral finishing coat Drytex Wood Effect + Wood Prime + Wood Glaze	0.5	I
2x Standard Plus 150 + Mineral finishing coat Drytex Wood Effect + Wood Prime + Wood Glaze Matt	0.5	II

- Category I — a zone readily accessible at ground level to the public and vulnerable to hard body impacts but not subjected to abnormally rough use
- Category II — a zone liable to impacts from thrown or kicked objects, but in public locations where the height of the system will limit the size of the impact; or at lower levels where access to the building is primarily to those with some incentive to exercise care
- Category III — a zone not likely to be damaged by normal impacts caused by people or by thrown or kicked objects.



6.11 For high impact zones susceptible to damage (ie 2 m from ground level), the installation of Dryvit Panzer mesh is recommended.

7 Thermal performance



7.1 Calculations of thermal transmittance (U value) should be carried out in accordance with BS EN ISO 6946 : 2017 and BRE Report BR 443 : 2006, using the declared thermal conductivity (λ_D) value of the EPS (green) insulation of $0.036 \text{ W}\cdot\text{m}^{-1}\cdot\text{K}^{-1}$.

7.2 The U-value will depend on the construction of the wall, the external and internal finish and the number and type of fixings used. Example constructions can achieve the thermal resistance (R) and U values given in Table 3, below:

Table 3 Thermal transmittance ⁽¹⁾

Construction type	Plus Series inserts (mm)	Standard 67 mm U value ($\text{W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$)	Standard 67 mm thermal resistance ($\text{m}^2\cdot\text{K}\cdot\text{W}^{-1}$)	XR-35 102 mm U value ($\text{W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$)	XR-35 102 mm thermal resistance ($\text{m}^2\cdot\text{K}\cdot\text{W}^{-1}$)
ICF with 152 mm concrete core	n/a	0.29	3.49	0.17	5.82
	25	0.24	4.18	0.15	6.52
	51	0.20	4.91	0.14	7.24
	102	0.16	6.32	0.12	8.66
	152	0.13	7.71	0.10	10.05
ICF with 152 mm concrete core, external Dryvit ICF 500 render system and plasterboard lining ⁽²⁾	n/a	0.26	3.85	0.16	6.17
	25	0.22	4.55	0.15	6.90
	51	0.19	5.27	0.13	7.57
	102	0.15	6.69	0.11	9.01
	152	0.12	8.07	0.10	10.42

(1) Internal finishes are outside the scope of this Certificate. Contact the Certificate holder for advice.

(2) Dryvit ICF 500 render system as an external finish, with 12.5 mm gypsum board on 15 mm dabs and 3 mm gypsum plaster internally.

Junctions

7.3 The system can contribute to maintaining continuity of thermal insulation at junctions with other elements, and minimise thermal bridges and air infiltration. Detailed guidance can be found in the documents supporting the national Building Regulations.

7.4 Accredited ψ values for a number of common junction types are available from the Certificate holder. ψ Values are not covered by this Certificate.

8 Airtightness



8.1 Walls formed from the system can achieve adequate resistance to unwanted air infiltration provided there is effective sealing around junctions and penetrations.

8.2 Completed buildings are subject to pre-completion testing in accordance with the requirements, and exceptions, in the documents supporting the national Building Regulations.

9 Condensation

Surface condensation



9.1 Walls will adequately limit the risk of surface condensation when the thermal transmittance (U value) does not exceed $0.7 \text{ W}\cdot\text{m}^{-2}\cdot\text{K}^{-1}$ at any point, and the junctions with other elements are designed in accordance with the guidance referred to in section 7.3 of this Certificate.



9.2 For buildings in Scotland, wall constructions will be acceptable when the thermal transmittance (U value) does not exceed $1.2 \text{ W} \cdot \text{m}^{-2} \cdot \text{K}^{-1}$ at any point, and the junctions with other elements are designed in accordance with the guidance referred to in BS 5250 : 2021, Annex G. Further guidance may be obtained from BRE Report BR 262 : 2002 and section 7.3 of this Certificate.

Interstitial condensation



9.3 Walls will adequately limit the risk of interstitial condensation when they are designed and constructed in accordance with BS 5250 : 2021, Annexes D and G, and the relevant guidance.

9.4 The water vapour diffusion resistance factor (μ) of the EPS taken from BS EN 13163 : 2012, Table F2, and is 30 to 70 μ (equivalent to a vapour resistivity of $300 \text{ MN} \cdot \text{s} \cdot \text{g}^{-1} \cdot \text{m}^{-1}$).

9.5 The equivalent air layer thickness (s_d) (for the render systems) is shown in Table 4.

Table 4 Water vapour resistance factor and equivalent air layer thickness

Rendering systems : 6 mm thick Fibercoat basecoat with primer + finishing coats (specific particle size) + decorative coats, as indicated below	$S_d(\text{m})$
Mineral finishing coats Drytex (particle size 3 mm) + Demandit Smooth	0.4
Mineral finishing coats Drytex (particle size 3 mm) + Silstar / Silstar Pro	0.4
Mineral finishing coats Drytex (particle size 3 mm) + HyDroPhobic	0.4
Mineral finishing coat Drytex Wood Effect (application thickness 5 mm) + Wood Prime + Wood Glaze	0.4
Mineral finishing coat Drytex Wood Effect (application thickness 5 mm) + Wood Prime + Wood Glaze Matt	0.4
Color Prime Plus + Ameristone, TerraNeo, Stonemist or Stonemist T (application thickness 2.5 mm)	0.5
Color Prime Plus + Acrylic finishing coats PMR (particle size 2 mm)	0.5
Color Prime Plus + Silicone finishing coats HDP (particle size 1.6 mm)	0.4
Color Prime Plus + Silicone-silicate finishing coats HYBRID (particle size 2 mm)	0.5
Demandit Smooth + Custom Brick Effect using Ameristone, TerraNeo, Stonemist and Stonemist T (application thickness 2.5 mm)	0.3
Demandit Smooth + Custom Brick Effect using Custom Brick (application thickness 2 mm)	0.3

10 Weathertightness



10.1 The render system has adequate resistance to water ingress to protect the ICF system and can be used in any UK exposure zones.

10.2 Designers and installers should take particular care in detailing around openings, penetrations and movement joints to minimise the risk of water ingress. The Certificate holder and installation manual should be consulted for appropriate construction details

10.3 At the top of walls, the systems should be protected by an adequate coping, overhang or other detail designed for use with these types of systems (see section 18).

11 Damp-proofing and waterproofing

11.1 The system's elements will not transmit moisture by capillary action. The concrete wall formed with the system should be constructed using the specified concrete recommended by the Certificate holder.

11.2 Use of the system below ground to resist the effect of hydrostatic head or ground water ingress has not been assessed and is outside the scope of this Certificate. However, for general guidance, when used below ground or at formation level, eg basements or retaining walls, waterproofing membranes compatible with EPS should be used. A suitable collector drain and backfilling medium should be provided to eliminate the build-up of hydrostatic head behind the wall, where required. The Certificate holder should be consulted for advice on suitable waterproofing materials and methods of waterproofing (see Figure 3).

11.3 When specified, the damp proofing of the wall constructed from the ICF system must be continuous with the damp proof membrane provided in the floor and must achieve continuity with any membrane or damp proof course provided in the external finish of the wall.

12 Behaviour in relation to fire



12.1 The reaction to fire classification⁽¹⁾ for the system is B-s1, d0 in accordance with BS EN 13501-1 : 2007. Reaction to fire classification tests were carried out on the render system applied on EPS boards of maximum density 25 kg/m³.

(1) Institute of Ceramics and Building Materials Test Report Numbers KG/64/19/N

12.2 The classification applies to the full range of thicknesses, finishes, colours and mesh combinations covered by this Certificate.

12.3 The EPS component of the system has a reaction to fire classification of E in accordance with BS EN 13501-1 : 2007; therefore, the system is limited for use in buildings subject to height restrictions – see sections 12.4 and 12.5.



12.4 In England, Wales and Northern Ireland, the system should not be used in buildings with a storey more than 18 m above ground level.

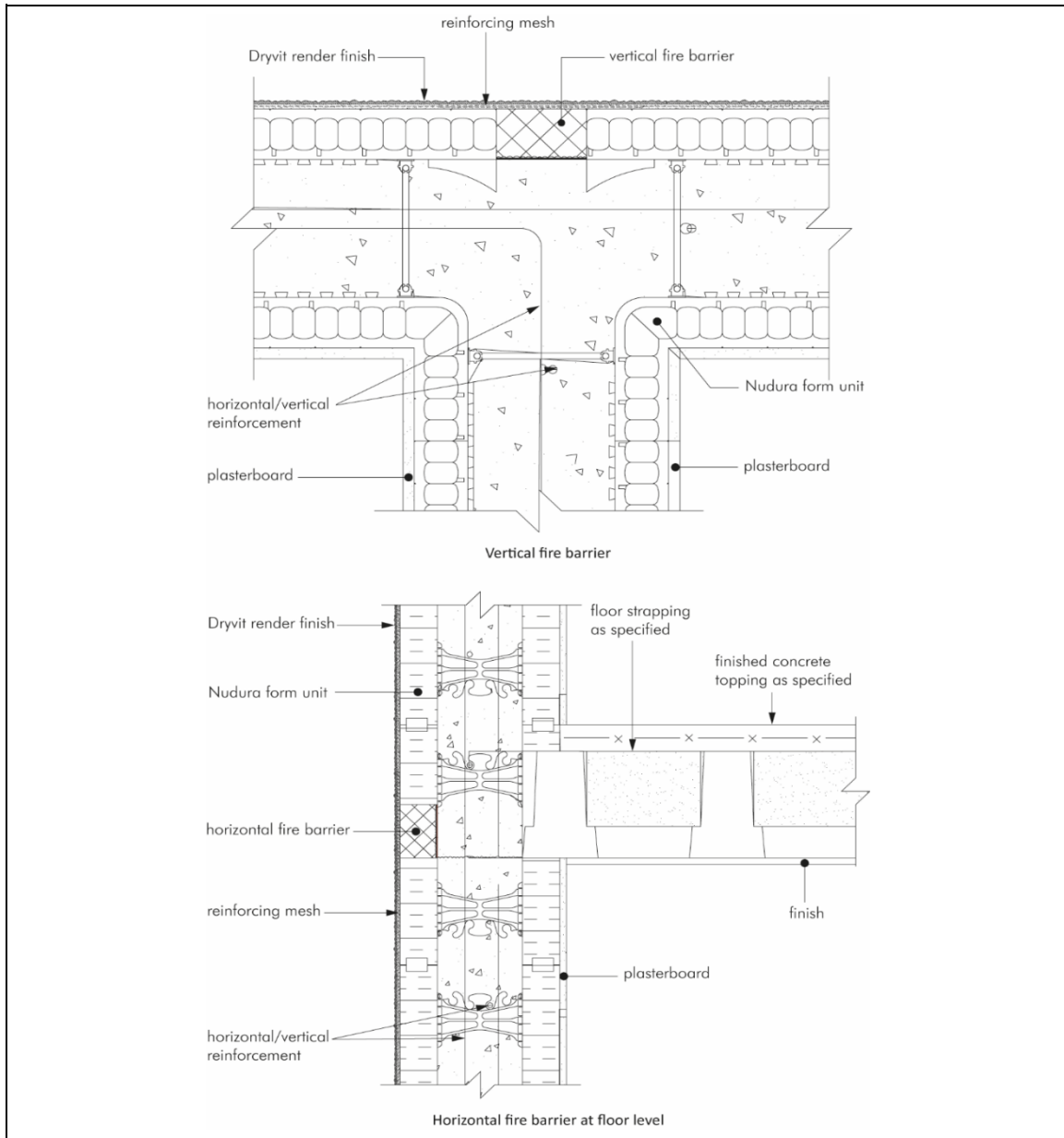


12.5 In Scotland the system may be used on buildings more than 1 m from a boundary and, on houses, 1 m or less from a boundary. With minor exceptions, the system should be included in calculations of unprotected area, except on houses where the external wall behind has the appropriate fire resistance. The system should not be used on any building with a storey more than 11 m above the ground or on any entertainment and assembly building with a total storey area more than 500 m² or on any hospital or residential care building with a total storey area more than 200 m².

12.6 The risk of fire spread over the internal wall surface will depend on the finishes used. The relevant requirements of the national Building Regulations must be observed. Internal finishes are not covered by this Certificate.

12.7 Where the documents supporting the national Building Regulations require fire barriers (outside the scope of this Certificate) to prevent the spread of fire between compartment floors, they must be installed at each floor level above the first floor, ie starting with the second storey. Fire barriers must completely seal any cavity and be chased into the outer EPS formwork (see Figure 1 of this Certificate).

Figure 1 Fire barrier details



12.8 Care must be taken to ensure that all detailing at junctions, including internal wall/floor junctions, adequately maintains the required periods of fire resistance, any cavities formed in the completed walls or service entry points are appropriately fire stopped and detailing around any openings provide sufficient protection to the EPS. The EPS on the interior face should be discontinuous across wall / floor junctions.

Fire resistance of concrete core

12.9 The fire resistance of the wall is a function of the thickness of the concrete core; refer to Product Sheet 1 of this Certificate for details.

12.10 Designers should refer to the relevant national Building Regulations and guidance for detailed conditions of use, particularly in respect of requirements for fire resistances of concrete, cavity closers and barriers, fire stopping of service penetrations and combustibility limitations for other materials and components used in the overall wall construction.

13 Proximity of flues and appliances

Detailed guidance can be found in the documents supporting the national Building Regulations for the provisions that are applicable when the system is installed in close proximity to certain flue pipes and/or heat-producing appliances.

14 Maintenance and repair



14.1 For the Dryvit ICF 500 render system, an initial inspection should be made within 12 months and regularly thereafter to include:

- visual inspection of the render for signs of damage. Cracks in the render exceeding 0.2 mm must be repaired
- examination of the sealant around openings and service entry points
- visual inspection of architectural details designed to shed water to confirm that they are performing properly
- visual inspection to ensure that water is not leaking from external downpipes or gutters; such leakage could penetrate the rendering
- necessary repairs effected immediately and the sealant joints at window and door frames replaced at regular intervals
- maintenance schedules, which should include the replacement and resealing of joints (for example, between the insulation system and window and door frame).

14.2 Damaged areas must be repaired using the appropriate components and procedures detailed in the Certificate holder's installation manual and in accordance with BS EN 13914-1 : 2016.

15 Durability



15.1 The EPS formwork will have a service life in excess of 60 years, provided it is protected from damage by the external and internal finishes of the wall construction and these are adequately maintained.

15.2 The render system will have a service life of at least 30 years, provided any damage to the surface finish is repaired immediately and regular maintenance is undertaken, as described in section 14.

15.3 The systems' service life can be extended to 60 years provided a planned inspection and maintenance programme is introduced in accordance with section 14. An extended 60 years' service life requires the use of stainless steel base and corner profiles, stainless steel fixings or centre pin Grades 1.4301 or 1.4401 and plastic anchor sleeve material such as polyamide (PA6 and PA6.6), polyethylene (PE) or polypropylene (PP) and the following of an appropriate repair and maintenance schedule as covered by the Certificate holder's Repair and Maintenance Manual. In order to achieve this, and depending on the building's location, degree of exposure and detailing, it may be necessary to repair or replace isolated areas. Any damage to the surface finish must be repaired within a time period agreed in the Certificate holder's Maintenance Manual.

15.4 The basecoats and finishes containing cement may be subject to lime bloom. The occurrence of this may be reduced by avoiding application in adverse weather conditions. The effect is transient and is less noticeable on lighter colours.

15.5 The finishes and coatings may become discoloured with time, the rate depending on the initial colour, the degree of exposure and atmospheric pollution, as well as the design and detailing of the wall. In common with traditional renders, discoloration by algae and lichens may occur in wet areas. The appearance may be restored by a suitable power wash, fungicidal treatment or, if required, by over coating (see section below).

15.6 To maintain a high quality aesthetic appearance, it may be necessary to periodically overcoat the systems using a suitable coating (ie one covered by a valid BBA Certificate for this purpose). Care should be taken not to adversely affect the water vapour transmission or fire characteristics of the systems. The advice of the Certificate holder should be sought as to the suitability of a particular product.

Installation

16 Site survey and preliminary work

16.1 Installation of the Dryvit ICF 500 rendering system should only begin once the concrete core in the Nudura Solid Insulated Wall System has cured for a minimum of 28 days.

16.2 A specification is prepared for each elevation of the building indicating:

- the position of beads
- detailing around windows, doors and at eaves
- damp-proof course (dpc) level
- exact position of expansion joints, if required
- areas where flexible sealants must be used
- any alterations to external plumbing
- the position of fire and cavity stop barriers.

16.3 All modifications, such as provision for cavity barriers, fire stopping and necessary repairs to the Nudura Solid Insulated Wall System, must be completed before installation commences.

16.4 Surfaces of the Nudura Solid Insulated Wall System should be clean, dry, structurally sound, free of loose material, organic growth, voids, projections, release agents, coatings, or other materials that may affect the adhesion of the Dryvit ICF 500 Render System.

16.5 There must be no planar irregularities greater than 12 mm within any 3 m radius. Any irregularities over this limit may require re-profiling prior to applying the main base coat layer.

17 Approved installers

Application of the render system, within the context of this Certificate, must be carried out by installers approved, recommended or recognised by the Certificate holder. Such an installer is a company:

- employing operatives who have been trained and approved by the Certificate holder to install the system
- which has undertaken to comply with the Certificate holder's application procedure, containing the requirement for each application team to include at least one member-operative trained by the Certificate holder
- subject to at least one inspection per annum by the Certificate holder to ensure suitable site practices are being employed. This may include unannounced site inspections.

18 General

18.1 Installation of the ICF System is carried out by trained operatives in accordance with the Certificate holder's installation manual. Typical construction details are shown in Product Sheet 1 of this Certificate.

Installation of the rendering system

18.2 Installation of the rendering system is carried out by trained operatives in accordance with the Certificate holder's installation manual. Typical construction details are shown in Figures 2 to 10 of this Certificate.

18.3 Weather conditions should be monitored to ensure correct application and curing conditions. If exposure to frost is likely or in damp/wet conditions, the render must be protected from rapid drying. The system should not be applied at temperatures below 5°C or above 25°C, except for the following:

- Dryvit Demandit Smooth, Dryvit Stonemist and Dryvit Stonemist T – should only be applied at temperatures from 7°C to 25°C
- Dryvit Ameristone and Dryvit TerraNeo – should only be applied at temperatures from 10°C to 25°C.

18.4 All rendering should be in accordance with the relevant recommendations of BS EN 13914-1 : 2016.

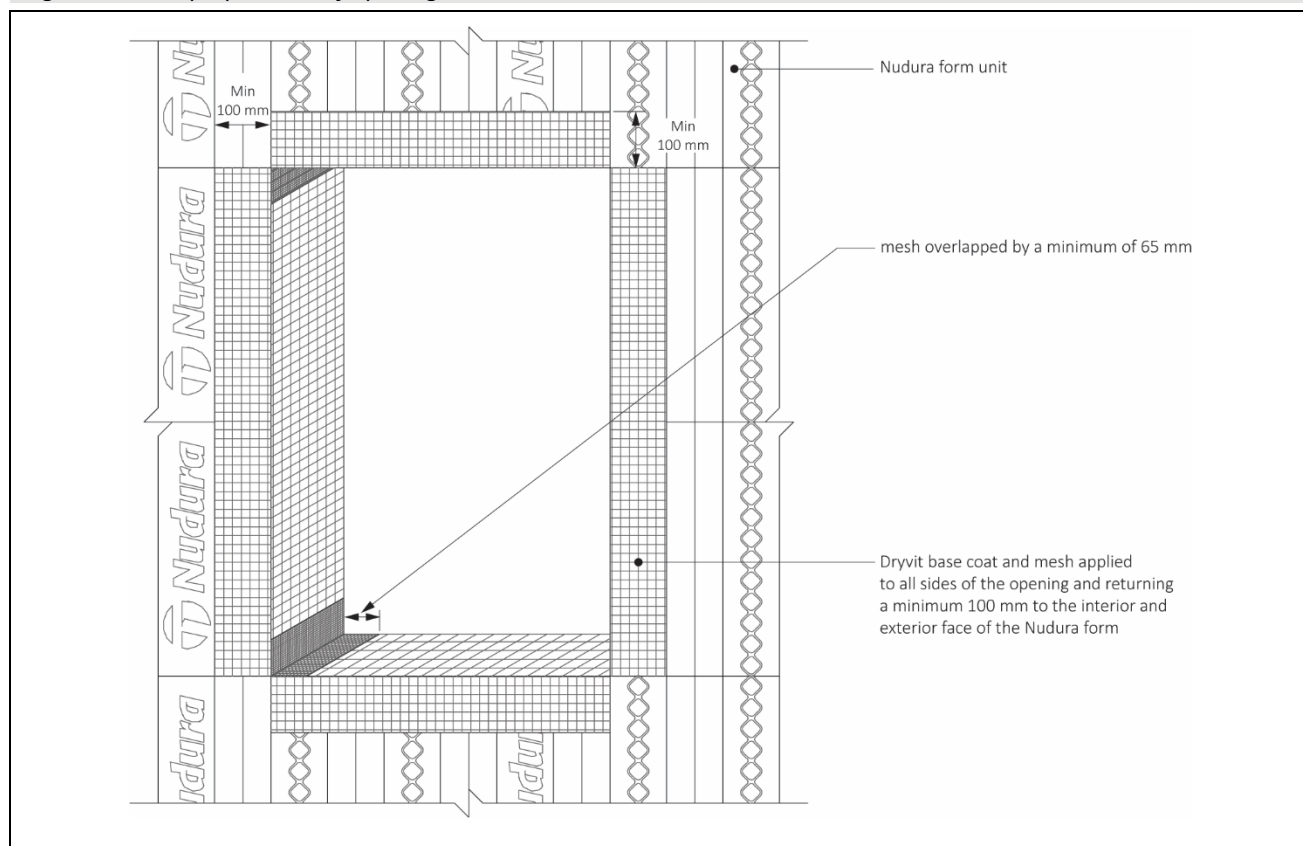
18.5 Before installation takes place, the building designer must confirm where items such as rainwater goods, satellite dishes, clothes lines and hanging baskets will be placed. The fixing points for these items must be specifically considered in the design. This is outside the scope of this Certificate.

18.6 Prior to installing the Dryvit ICF 500 Render System all windows and doors shall be weathertight and sealed in place. The Certificate holder should be contacted for suitable installation and sealing options.

18.7 The preparation of openings and the sealing of penetrations will depend on the type and positioning of the

windows and doors specified on the project. It is recommended that prior to the installation, the full reveal is rendered with base coat and mesh to ensure all exposed EPS is fully encapsulated by the reinforced base coat layer. This also provides a suitable bonding surface for attaching the weathertight compressible seals or sealant around the window, or door. The base coat and mesh must extend through the opening and return on to the exterior and interior face of the ICF a minimum 100 mm. Further information on acceptable sealing solutions is available from the Certificate holder.

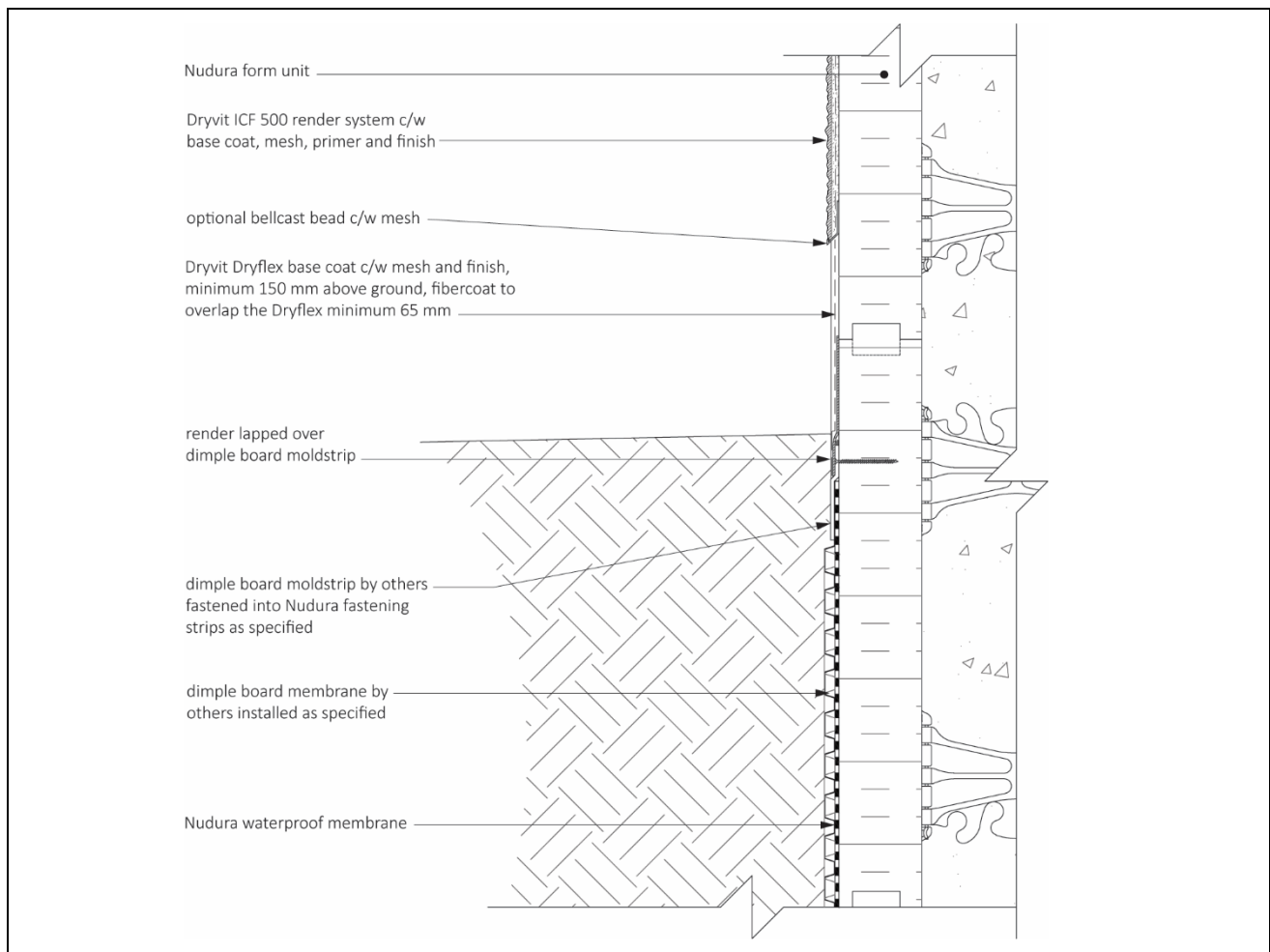
Figure 2 Initial preparation of openings, base coat and mesh



18.8 All windows and doors must be securely fixed, fully sealed and weathertight prior to applying the Dryvit ICF 500 Render System. Guidance on suitable sealing solutions is available from the Certificate holder.

18.9 The Dryvit ICF 500 Render System must be terminated a minimum of 150 mm above the finished ground level. Guidance and details on rendering below this level and forming overlaps with waterproofing membranes are available from the Certificate holder.

Figure 3 Typical section of base detail



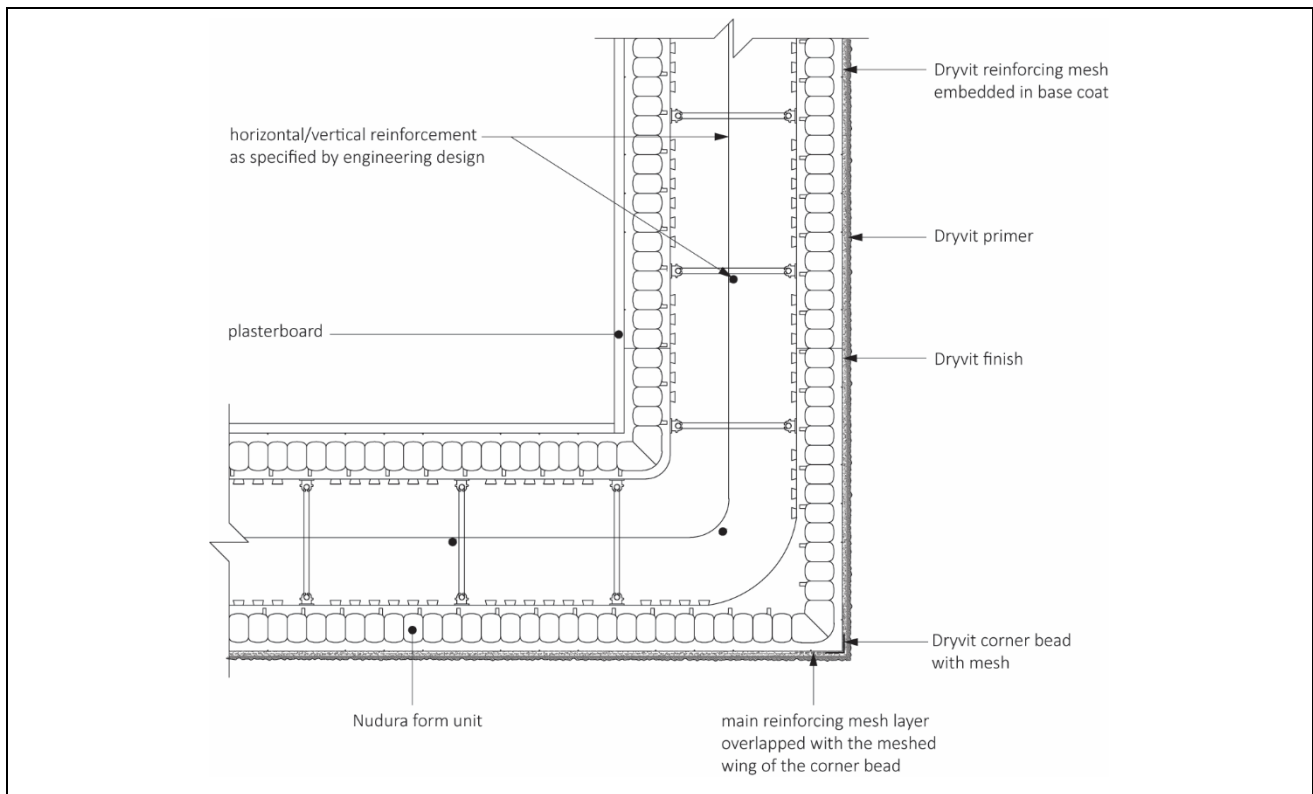
18.10 A bell cast bead with mesh is levelled and secured to the external wall a minimum of 150 mm above the finished ground level using Fibercoat base coat or mechanical fixings at a minimum of 300 mm centres. Mechanical fixings must be secured to the polypropylene webs in the Nudura Solid Insulated Wall System.

18.11 Any joints in the Nudura Solid Insulated Wall System greater than approximately 1.5 mm but less than 7 mm should be filled with expanding foam. Joints above 7 mm should be filled with slivers of insulation.

18.12 Before applying the base coat, the surface of the EPS should be rasped smooth to remove any high spots or irregularities.

18.13 Building corners, door and window heads and jambs are formed using corner bead with mesh profiles in accordance with the Certificate holder's instructions.

Figure 4 Typical outside corner detail



18.14 At all locations the Dryvit ICF 500 Render System must be protected, eg by a minimum 40 mm adequate overhang or by purpose-made sub-sills, seals or flashing.

Movement joints

18.15 Any vertical and horizontal movement joints in the Nudura formwork or concrete core must extend through the render system.

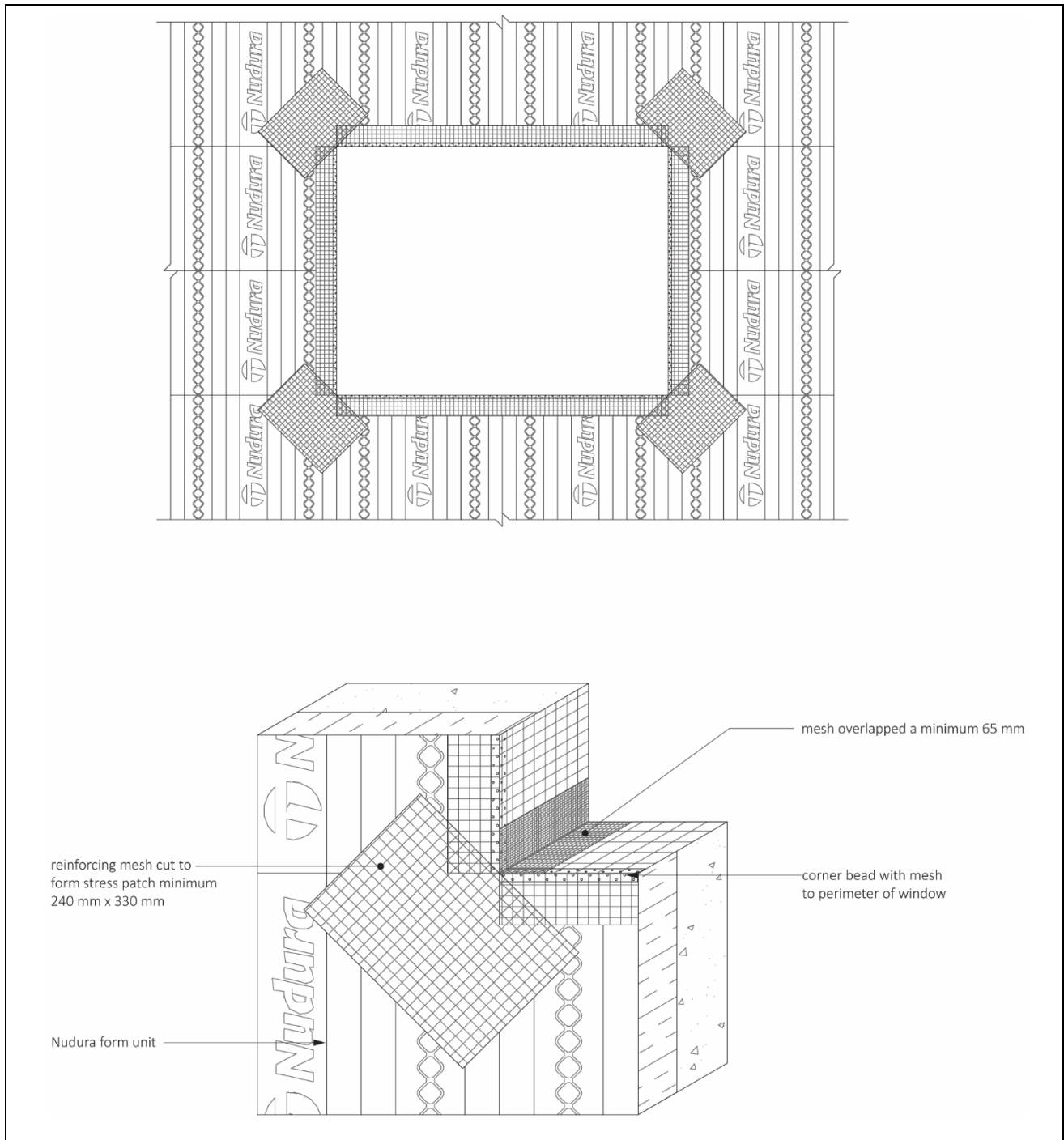
18.16 Expansion joints may be formed using a corner bead with mesh installed either side of the joint (see installation of corner beads). The bead and mesh is embedded in Fibercoat base coat and primed using Color Prime Plus before the seal is installed. The joint between the corner beads is sealed using a sealant over a compressible tape or suitably sized backer rod.

Application of base coat and reinforcing mesh

18.17 Prior to the application of the render coat, the frame seal beads and other relevant seals are positioned and installed at all openings (eg window and doors), overhanging eaves, gas and electric meter boxes, wall vents or where the render abuts any other building material or surface.

18.18 To provide the necessary reinforcement, stress patches of reinforcement mesh (approximate size 240 by 300 mm) are applied with base coat, diagonally over the insulation at the corners of openings.

Figure 5 Additional reinforcement at openings



18.19 The Fibercoat base coat is mixed in a suitable container using potable water and a high-power drill and paddle to create a paste-like mortar, ensuring there are no lumps in the mixed material in accordance with the Certificate holder's instructions. The material must rest for 5 minutes before being mixed again to the required consistency.

18.20 The base coat is applied over the entire surface of the insulation using an angled 8 mm notched trowel, to achieve a uniform thickness of approximately 2 to 3 mm once trowelled flat. The reinforcement mesh is applied and immediately embedded into the basecoat, ensuring the mesh is overlapped at joints by a minimum of 100 mm. A second layer of basecoat (1 to 2 mm thick, approximately) is applied, to obtain a smooth and uniform surface of approximately 3 to 5 mm overall thickness. The reinforcing mesh must not be pinned direct to the surface of the Nudura Solid Insulated Wall System and should be installed centrally and fully embedded in the base coat layer.

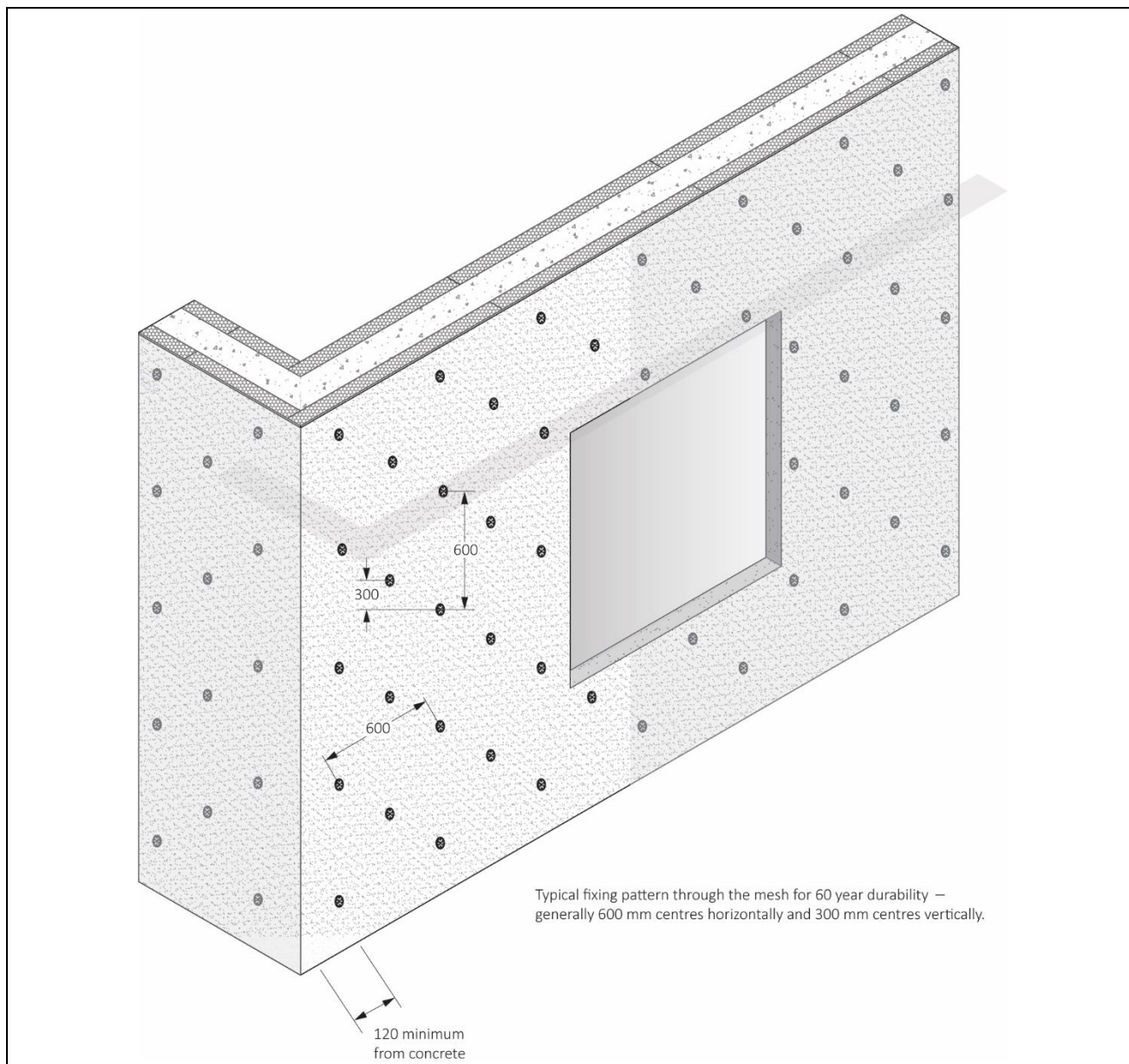
18.21 Where a full second layer of Standard Plus 150 mesh is specified, once the first coat of basecoat has partially dried (between 1 and 4 hours), a second coat is applied using a notched trowel and a full layer of mesh is applied and

embedded in the basecoat (2 to 3 mm thick). The basecoat is levelled to obtain a smooth and uniform surface. The total basecoat layer should give an approximately 5 to 6 mm overall thickness.

18.22 In situations where the heavy duty Panzer mesh is required, a layer of basecoat, approximately 3 mm thick, is applied over the surface of the Nudura Solid Insulated Wall System and the Panzer mesh embedded. The Panzer mesh should not be overlapped but fitted with close butted joints. The drying period for any basecoat will depend on weather conditions; however, the basecoat (with the heavy duty mesh embedded) should be allowed to dry for at least 24 hours. The Dryvit Standard Plus 150 Mesh should then be applied over the installed Panzer mesh in the manner described in the previous section.

18.23 For systems designed for 60-year durability, while the base coat is still wet, holes are drilled through the reinforced basecoat and into the concrete core of the Nudura Solid Insulated Wall System to the required depth and at the specified frequency and pattern, but not less than 5.5 fixings per square metre (See Figure 6). The mechanical fixings are inserted and tapped or screwed firmly into place, securing the reinforced basecoat to the concrete core of the Nudura. The fixing plate is deliberately slightly over-driven into the base coat to reduce protrusion of the fixing head. Suitable plugs are placed over the screw or pin to fill any recess in the plastic washer head. While the base coat is still wet, the heads of the fixings are coated with additional base coat and 140 by 140 mm stress patches of reinforcement mesh are applied over the mechanical fixing heads and fully embedded within the base coat. Once the first coat has partially dried (between 1 and 4 hours), a second coat (approximately 2 to 3 mm thick) is applied to obtain a smooth and uniform surface of approximately 5 to 6 mm overall thickness. Alternatively, a full second layer of Standard Plus 150 mesh may be installed into the second layer of base coat. The fixing head must be covered with a minimum 3 mm thickness of basecoat.

Figure 6 Typical arrangement of the fixing pattern through the mesh for 60-year durability (5.5 fixings per square metre)



Priming and finishing

18.24 The basecoat must be allowed to dry/cure (24 to 48 hours) before application of the primer/finish coat. Where specified, primers must be allowed to dry in accordance with the Certificate instructions. The drying time is dependent on ambient conditions but will typically be 4 hours for Dryvit Color Prime Plus, Dryvit Wood Prime and Dryvit Demandit Smooth. After the primer is dry but prior to the application of the finishing coat, sealant or compressible seals should be applied as required, as defined in the project-specific site package in accordance with the Certificate holder's instructions.

18.25 The finishes and decorative coats are then applied, using the methods described for the specific finishing coats.

Dryvit Stonemist and Dryvit Stonemist T

18.26 An initial skim coat is applied, using a stainless steel trowel. A second coat is then applied to the wet initial coat with a suitable spray machine (the Certificate holder can advise on suitable equipment). Alternatively, to achieve a flatter texture finish, the second coat may be applied with a stainless steel trowel.

Dryvit Ameristone

18.27 The product is applied in two passes (one horizontally, one vertically) to achieve a uniform finish, with a suitable spray machine.

Dryvit TerraNeo

18.28 The product is applied with a steel trowel, to an approximate 1.6 to 2.5 mm thickness. The surface is lightly floated using a plastic float, in a tight figure of 8 pattern. Floating over the finish lightly several times will bring the large mica flakes to the surface and enhance the granite appearance.

Dryvit Drytex Wood Effect

18.29 The Dryvit Drytex Wood Effect render is applied to the required thickness (see *Finishing coats*), using an 8 to 10 mm notched trowel to create a smooth finish, and is left to dry for approximately 20 to 30 minutes. The imprint surface of a Dryvit Wood Mould is coated with a clean food-grade cooking oil and gently pressed onto the surface of the render, and then pressed with a 150 mm rubber roller to create the desired wood effect. The mould is immediately removed, and the process repeated until the entire wall area is covered. After 24 hours, shallow grooves are cut between the wood-effect imprints using a handheld narrow-bladed electric precision mini circular saw, to create the panel effect. The render is left to dry for a minimum of 48 hours; any oil is removed with a warm mild detergent before applying the Wood Prime with a suitable roller. Once the primer has dried, two coats of Dryvit Wood Glaze or Dryvit Wood Glaze Matt or two coats of Silstar Pro are applied using a suitable brush.

Dryvit Custom Brick Effect

18.30 The process entails coating the basecoat with Dryvit Demandit Smooth to create a mortar joint effect and then applying a self-adhesive cardboard template over it, followed by the selected finishing coat, to form the brick effect. The acrylic finish is applied with a stainless steel trowel flush with the top surface of the template. An impressed texture appearance may be developed on the surface of the freshly applied acrylic finish by using a textured roller. Once dry, the template is removed to reveal the mortar joints. The cardboard template is for single use only; it provides joints of 10 mm width. The surface area of the joints must be less than 30%.

Other textured finishes

18.31 The other finishes are applied to the required thicknesses (see *Finishing coats*) using a stainless steel trowel and finished with a plastic float to create the desired finish. The drying time is dependent on conditions. Dryvit Drytex is overcoated with Dryvit Demandit Smooth, Dryvit Silstar/Silstar Pro or the Dryvit HyDroPhobic decorative coat using a brush, roller or a suitable spray machine.

18.32 Care should be taken in the detailing of the systems around features such as openings, projections and at eaves to ensure adequate protection against water ingress and to limit the risk of water penetrating the system.

18.33 The systems should be allowed to dry thoroughly before painting any of the surrounding features.

18.34 At the top of walls, the systems must be protected by a coping, adequate overhang or adequately sealed, purpose-made flashing.

Figure 7 Typical roof detail

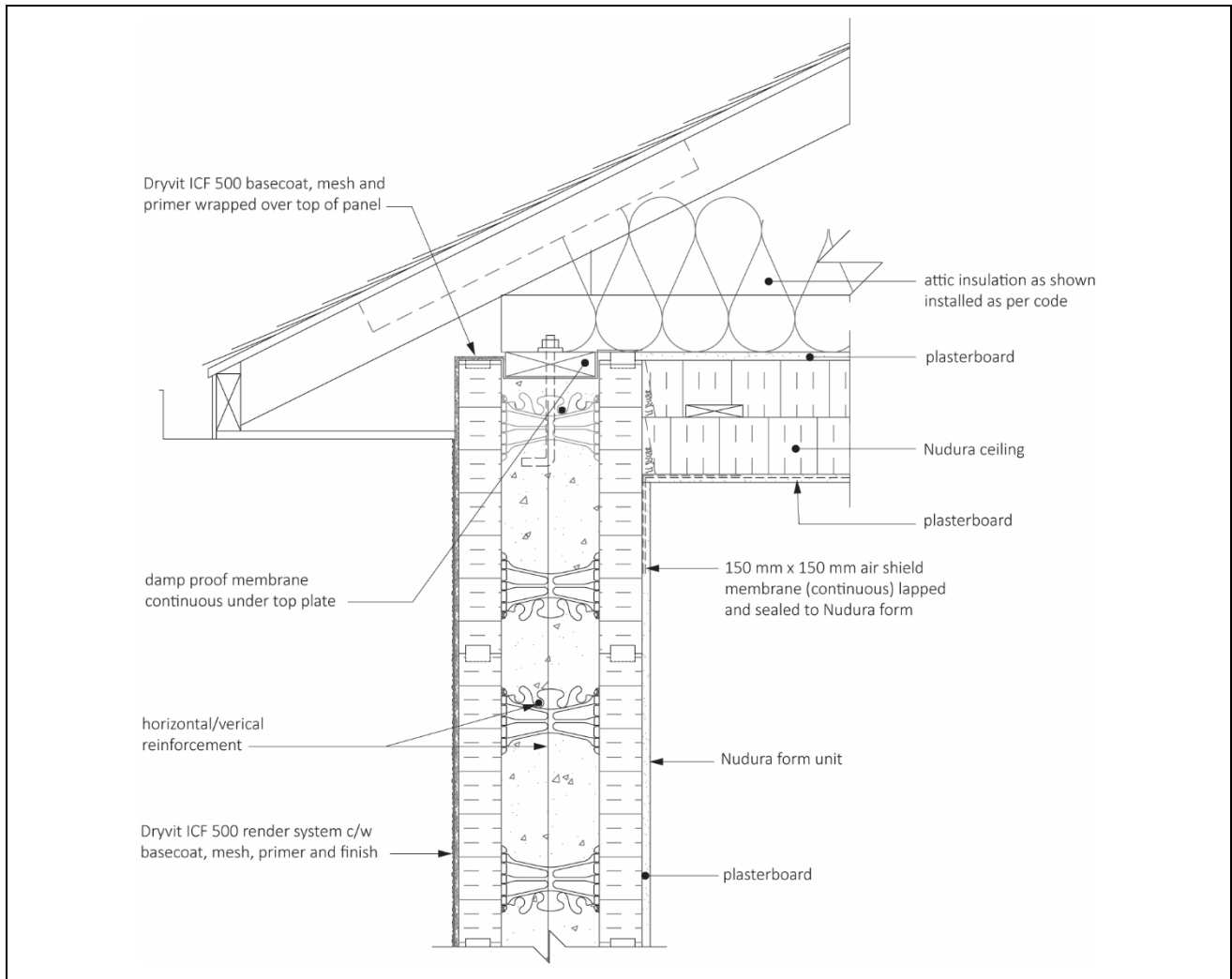


Figure 8 Example Window head detail

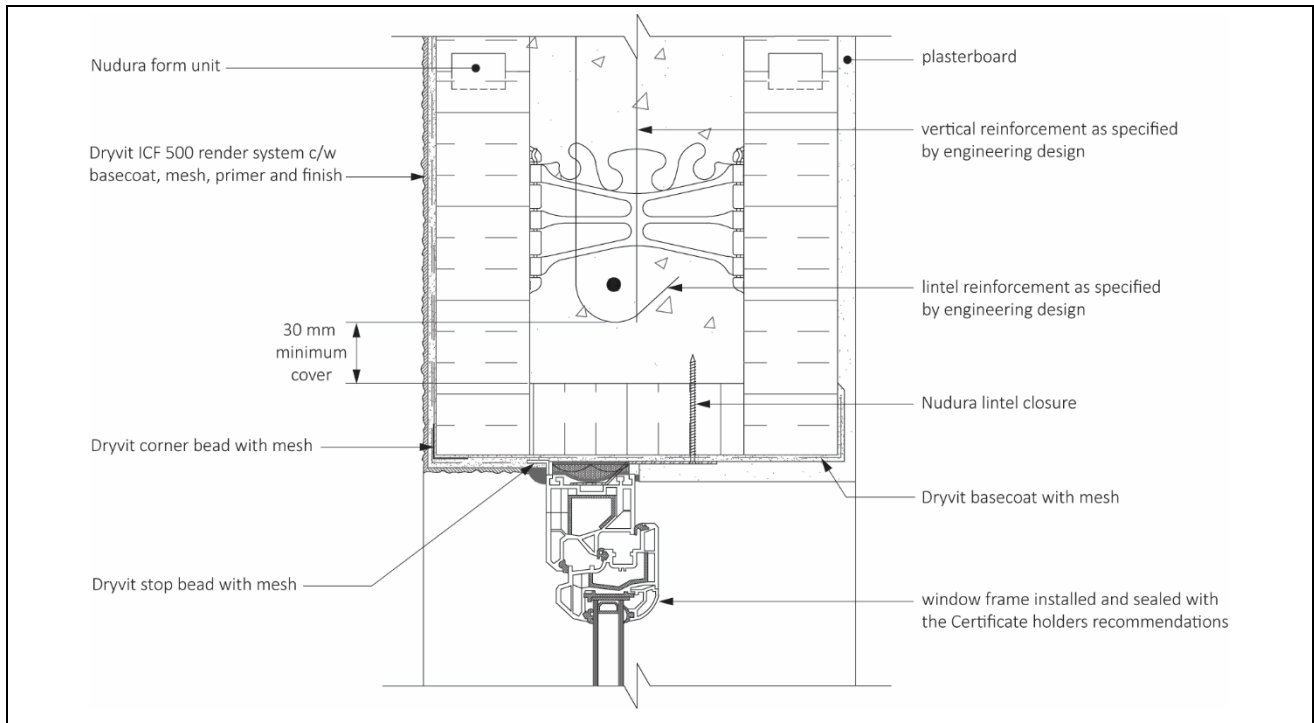


Figure 9 Example Window sill detail

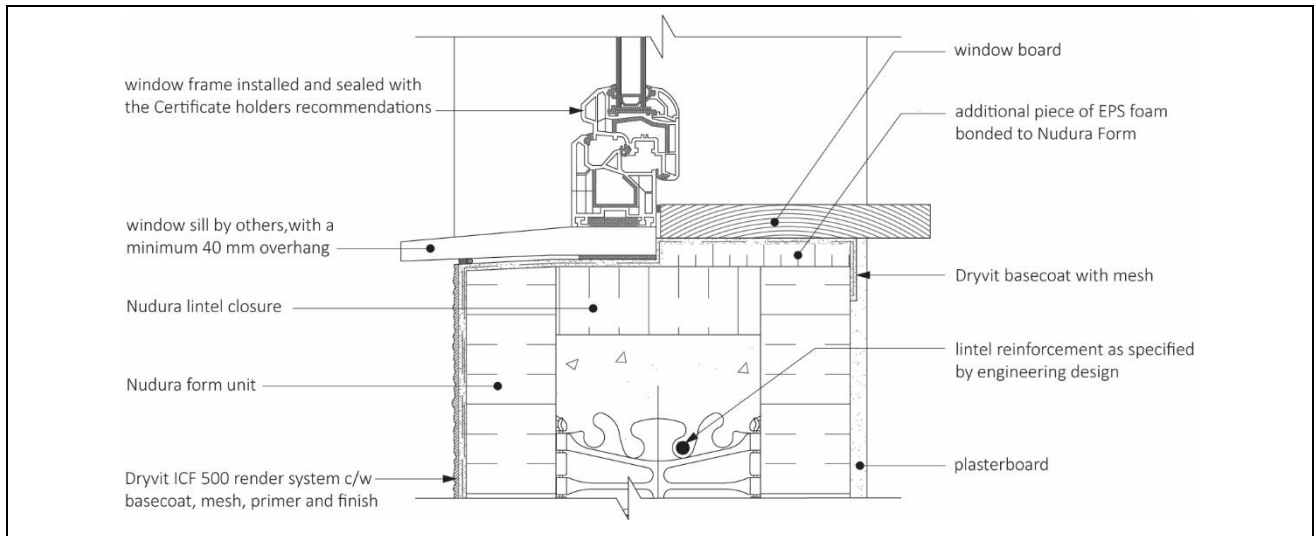
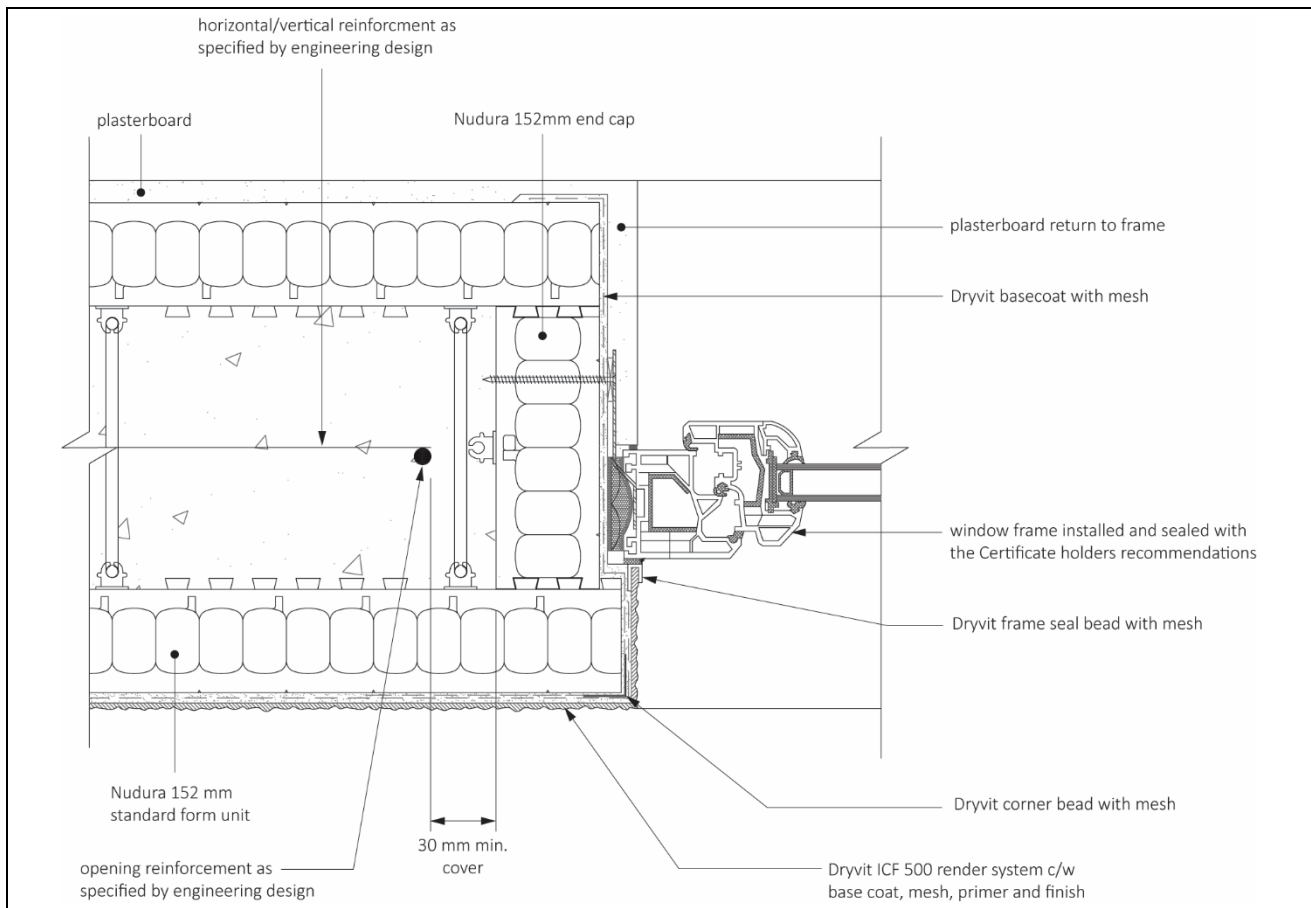


Figure 10 Example Window reveal detail



Technical Investigations

19 Tests

19.1 Tests and Assessments on the Nudura Solid Insulated Wall System were carried out in broad accordance with the requirements of ETAG 009 : 2002 as part of normal construction under site conditions. Observations were made on the possibility of steel reinforcement within the form, resistance to filling pressure and efficiency of filling using pumped concrete. The overall stability of formwork due to the head of wet concrete was also observed.

19.2 The following tests were conducted on the Dryvit ICF 500 render system:

- water vapour permeability
- water absorption
- bond strength test
- reaction to fire
- hygrothermal performance
- impact resistance.

20 Investigations

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

20.2 An assessment was made of existing technical data relating to thermal performance, fire and airtightness.

20.3 A site visit was carried out to witness the installation process including construction of formwork, placement of reinforcement, pouring of concrete and performance of form spacers.

Bibliography

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

BS 4449 : 2005 + A3 : 2016 *Steel for the reinforcement of concrete — Weldable reinforcing steel — Bar, coil and decoiled product — Specification*

BS 8102 : 2009 *Code of practice for protection of below ground structures against water from the ground*

BS 8500-1 : 2015 + A1 : 2019 *Concrete — Complementary British Standard to BS EN 206 — Method of specifying and guidance for the specifier*

BS 8500-2 : 2015 + A1 : 2019 *Concrete — Complementary British Standard to BS EN 206 — Specification for constituent materials and concrete*

BS EN 206: 2013 + A2 : 2021 *Concrete — Specification, performance, production and conformity*

BS EN 480-1 : 2014 *Admixtures for concrete, mortar and grout. Test methods. Reference concrete and reference mortar for testing*

BS EN 845-1 : 2013 + A1 : 2016 *Specification for ancillary components for masonry — Ties, tension straps, hangers and brackets*

BS EN 934-2 : 2009 + A1 : 2012 *Admixtures for concrete, mortar and grout — Concrete admixtures — Definitions and requirements, conformity, marking and labelling*

BS 5250 : 2021 *Code of practice for control of condensation in buildings*

BS EN 1990 : 2002 + A1 : 2005 *Eurocode — Basis of structural design*

BS EN 1991-1-1 : 2002 *Eurocode 1 : Actions on structures — General actions — Densities, self-weight, imposed loads for buildings*

BS EN 1991-1-2 : 2002 *Eurocode 1 : Actions on structures — General actions — Actions on structures exposed to fire*

BS EN 1991-1-3 : 2003 + A1 : 2014 *Eurocode 1 : Actions on structures — General actions — Snow loads*

BS EN 1991-1-4 : 2005 + A1 : 2010 *Eurocode 1 : Actions on structures — General actions — Wind actions*

BS EN 1991-1-5 : 2003 *Eurocode 1 : Actions on structures — General actions — Thermal actions*

BS EN 1991-1-6 : 2005 *Eurocode 1 : Actions on structures — General actions — Actions during execution*

BS EN 1991-1-7 : 2006 + A1 : 2014 *Eurocode 1 : Actions on structures — General actions — Accidental actions*

BS EN 1992-1-1 : 2004 + A1 : 2014 *Eurocode 2 : Design of concrete structures — General rules and rules for buildings*

BS EN 1992-1-2 : 2004 + A1 : 2019 *Eurocode 2: Design of concrete structures — General rules — Structural fire design*

BS EN 12350-2 : 2019 *Testing fresh concrete — Slump-test*

BS EN 13163 : 2012 + A2 : 2016 *Thermal insulation products for buildings — Factory made expanded polystyrene (EPS) products — Specification*

BS EN 13501-1 : 2007 + A1 : 2009 *Fire classification of construction products and building elements - Classification using test data from reaction to fire tests*

BS EN 13914-1 : 2016 *Design, preparation and application of external rendering and internal plastering — External rendering*

BS EN ISO 6946 : 2017 *Building components and building elements — Thermal resistance and thermal transmittance — Calculation method*

BS EN ISO 9001 : 2015 *Quality management systems - Requirements*

ETAG 004 : 2013 *Guideline for European Technical Approval of External Thermal Insulation Composite Systems with Rendering*

ETAG 009 : 2002 *Guideline for European Technical Approval of non-loadbearing permanent shuttering kits/systems based on hollow blocks or panels of insulating materials and sometimes concrete*

21 Conditions

21.1 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.

21.2 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.

21.3 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.

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

21.5 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.

21.6 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.