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Agrément Certificate

24/7241

Product Sheet 2 Issue 1

DURISOL WALLING SYSTEM

DURISOL PERMANENT FORMWORK SYSTEM USED WITH PAREX MONOREX GF RENDER FINISH

This Agrément Certificate Product Sheet⁽¹⁾ relates to the Durisol Permanent Formwork System used with Parex Monorex GF Render Finish, for use as permanent insulating formwork in the formation of loadbearing and non-loadbearing internal walls, external walls with a weatherproof finish, and separating walls, in domestic and non-domestic buildings, subject to height restrictions.

(1) Hereinafter referred to as 'Certificate'.

The assessment includes

Product factors:

- compliance with Building Regulations
- compliance with additional regulatory or non-regulatory information where applicable
- evaluation against technical specifications
- assessment criteria and technical investigations
- uses and design considerations

Process factors:

- compliance with Scheme requirements
- installation, delivery, handling and storage
- production and quality controls
- maintenance and repair

Ongoing contractual Scheme elements†:

- regular assessment of production
- formal 3-yearly review



KEY FACTORS ASSESSED

- Section 1. Mechanical resistance and stability
- Section 2. Safety in case of fire
- Section 3. Hygiene, health and the environment
- Section 4. Safety and accessibility in use
- Section 5. Protection against noise
- Section 6. Energy economy and heat retention
- Section 7. Sustainable use of natural resources
- Section 8. Durability

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 issue: 5 September 2024

Hardy Giesler
Chief Executive Officer

This BBA Agrément Certificate is issued under the BBA's Inspection Body accreditation to ISO/IEC 17020. Sections marked with † are not issued under accreditation.

The BBA is a UKAS accredited Inspection Body (No. 4345), Certification Body (No. 0113) and Testing Laboratory (No. 0357).

Readers MUST check that this is the latest issue of this Agrément Certificate by either referring to the BBA website or contacting the BBA directly.

The Certificate should be read in full as it may be misleading to read clauses in isolation.

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

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SUMMARY OF ASSESSMENT AND COMPLIANCE

This section provides a summary of the assessment conclusions; readers should refer to the later sections of this Certificate for information about the assessments carried out.

Compliance with Regulations

Having assessed the key factors, the opinion of the BBA is that the Durisol Permanent Formwork System used with Parex Monorex GF Render Finish, 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 Building Regulations 2010 (England and Wales) (as amended)

Requirement: B3(4)	Internal fire spread (structure)
Comment:	The system is restricted by this Requirement. See section 2 of this Certificate.
Requirement: B4(1)	External fire spread
Comment:	The system is restricted by this Requirement. See section 2 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 section 3 of this Certificate.
Requirement: E1	Protection against sound from other parts of the building and adjoining buildings
Requirement: E2(a)	Protection against sound within a dwelling-house etc
Comment:	Wall can adequately satisfy these Requirements. See section 5 of this Certificate.
Requirement: L1(a)(i)	Conservation of fuel and power
Comment:	The system can contribute to satisfying this Requirement, although compensating fabric measures may be required. See section 6 of this Certificate.
Regulation: 7(1)	Materials and workmanship
Comment:	The system is acceptable. See sections 8 and 9 of this Certificate
Regulation: 7(2)	Materials and workmanship
Comment:	The system is restricted by this Regulation. See section 2 of this Certificate.
Regulation: 25B	Nearly zero-energy requirements for new buildings
Regulation: 26	CO₂ emission rates for new buildings
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)
Regulation: 26C	Target primary energy rates for new buildings (applicable to England only)
Regulation: 26C	Energy efficiency rating (applicable to Wales only)
Comment:	The system can contribute to satisfying these Regulations, although compensating fabric and/or service measures may be required. See section 6 of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation: 8(1)	Fitness and durability of materials and workmanship
Comment:	The system can contribute to a construction satisfying this Regulation. See sections 8 and 9 of this Certificate.
Regulation: 8(3)	Fitness and durability of materials and workmanship
Comment:	The system is restricted by this Regulation. See section 2 of this Certificate.

Regulation:	9	Building Standards – construction
Standard:	2.1	Compartmentation
Standard:	2.2	Separation
Standard:	2.3	Structural protection
Comment:		The system is restricted by these Standards in some cases, with reference to clauses 2.1.12 ⁽²⁾ , 2.2.4 ⁽²⁾ , 2.2.5 ⁽²⁾ , 2.2.6 ⁽¹⁾ , 2.2.7 ⁽¹⁾ , 2.2.8 ⁽¹⁾ and 2.3.2 ⁽¹⁾⁽²⁾ . See section 2 of this Certificate.
Standard:	2.4	Cavities
Comment:		The system is restricted by this Standard, with reference to clauses 2.4.2 ⁽¹⁾⁽²⁾ , 2.4.4 ⁽¹⁾ and 2.4.6 ⁽²⁾ . See section 2 of this Certificate.
Standard:	2.6	Spread to neighbouring buildings
Comment:		The system is restricted by this Standard, with reference to clauses 2.6.5 ⁽¹⁾ and 2.6.6 ⁽²⁾ . See section 2 of this Certificate.
Standard:	3.15	Condensation
Comment:		Walls can adequately limit the risk of surface condensation, with reference to clauses 3.15.1 ⁽¹⁾⁽²⁾ and 3.15.4 ⁽¹⁾⁽²⁾ of this Standard. Walls can contribute to minimising the risk of interstitial condensation, with reference to clauses 3.15.1 ⁽¹⁾⁽²⁾ , 3.15.4 ⁽¹⁾⁽²⁾ and 3.15.5 ⁽¹⁾⁽²⁾ . See section 3 of this Certificate.
Standard:	5.1	Noise separation
Comment:		Separating walls with suitable linings and flanking elements can satisfy this Standard, with reference to clauses 5.1.1 ⁽¹⁾ , 5.1.2 ⁽¹⁾ and 5.1.4 ⁽¹⁾ . See section 5 of this Certificate.
Standard:	5.2	Noise reduction between rooms
Comment:		Internal walls with suitable linings can satisfy this Standard, with reference to clauses 5.2.1 ⁽¹⁾ and 5.2.2 ⁽¹⁾ . See section 5 of this Certificate.
Standard:	6.1(b)(c)	Energy demand
Comment:		The system can contribute to satisfying this Standard, with reference to clauses 6.1.1 ⁽¹⁾ and 6.1.2 ⁽²⁾ , although compensating fabric and/or service measures may be required. See sections 6 of this Certificate.
Standard:	6.2	Building insulation envelope
Comment:		The system can contribute to satisfying this Standard, with reference to clauses 6.2.1 ⁽¹⁾⁽²⁾ , 6.2.3 ⁽¹⁾ and 6.2.4 ⁽²⁾ , although compensating fabric measures may be required. See section 6 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		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. See section 6 of this Certificate.
Regulation:	12	Building standards – conversion
Comment:		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:	23(1)(a)(i)(ii)	Fitness of materials and workmanship
Comment:	(b)(i)(ii)	The system is acceptable. See sections 8 and 9 of this Certificate.
Regulation:	23(2)	Fitness of materials and workmanship
Comment:		The system is restricted by this Regulation. See section 2 of this Certificate.

Regulation:	29	Condensation
Comment:		The system can contribute to minimising the risk of interstitial condensation. See section 3 of this Certificate.
Regulation:	35(4)	Internal fire spread – structure
Comment:		The system is restricted by this Regulation. See section 2 of this Certificate.
Regulation:	36(a)	External fire spread
Comment:		The system is restricted by this Regulation. See section 2 of this Certificate.
Regulation:	39(a)(i)	Conservation measures
Comment:		The system can contribute to satisfying this Regulation, although compensating fabric measures may be required. See section 6 of this Certificate.
Regulation:	40(2)	Target carbon dioxide emission rate
Regulation:	43B	Nearly zero-energy requirements for new buildings
Comment:		The system can contribute to satisfying this Regulation, although compensating fabric and/or service measures may be required. See section 6 of this Certificate.
Regulation:	49	Protection against sound from other parts of the building and from adjoining buildings
Comment:		When installed with suitable flanking elements, separating walls incorporating the system can satisfy this Regulation. See section 5 of this Certificate
Regulation:	50(a)	Protection against sound within a dwelling or room for residential purposes
Comment:		A single-leaf, non-loadbearing partition incorporating the system, with suitable plasterboard linings, can satisfy this Regulation. See section 5 of this Certificate.

Additional Information

NHBC Standards 2024

In the opinion of the BBA, the Durisol Permanent Formwork System used with Parex Monorex GF Render Finish, if installed, used and maintained in accordance with this and BBA 21/5888 Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards*, Part 3 *General*, Chapter 3.1 *Concrete and its reinforcement*.

Fulfilment of Requirements

The BBA has judged the Durisol Permanent Formwork System used with Parex Monorex GF Render Finish to be satisfactory for use as a permanent insulating formwork as described in this Certificate. The system has been assessed with Parex Monorex GF Render Finish (the subject of BBA Certificate 21/5888), as loadbearing and non-loadbearing internal walls, external walls with a weatherproof finish, , and separating walls, in domestic and non-domestic buildings, with height restrictions.

ASSESSMENT

Product description and intended use

The Certificate holder provided the following description for the system under assessment. The Durisol Permanent Formwork System used with Parex Monorex GF Render Finish consists of:

- Block Units — range of woodchip-aggregate hollow block units with cross-webs, for laying in a stretcher bond with dry joints (staggered 250 mm) to form the wall construction. Further details on standard units and a description of additional formwork system units are given in Table 1.

Table 1 Durisol unit references and description

Unit reference	Description
S	Standard unit used for forming the walls where a modular dimension of 250 mm is used, allowing a running bond to be achieved
C	Corner unit for an outer corner, in combination with the standard unit
F	Face unit, having one flat face and one rebated, used to form window and door reveals and lintels

- Insulation — mineral wool or polyisocyanurate (PIR) inserts (100 mm thick for 300 mm wide units and 165 mm thick for 365 mm wide units) are inserted into the unit hollows (adjacent to the outside face for external wall use), with the remaining 120 mm thick void to be filled with concrete.
- Parex Monorex GF Render finish — a through-colour, single-coat render applied to a thickness of between 15 and 20 mm, with a layer of TV10 glass fibre mesh encapsulated within the centre of the render.

The system has the nominal characteristics given in Table 2.

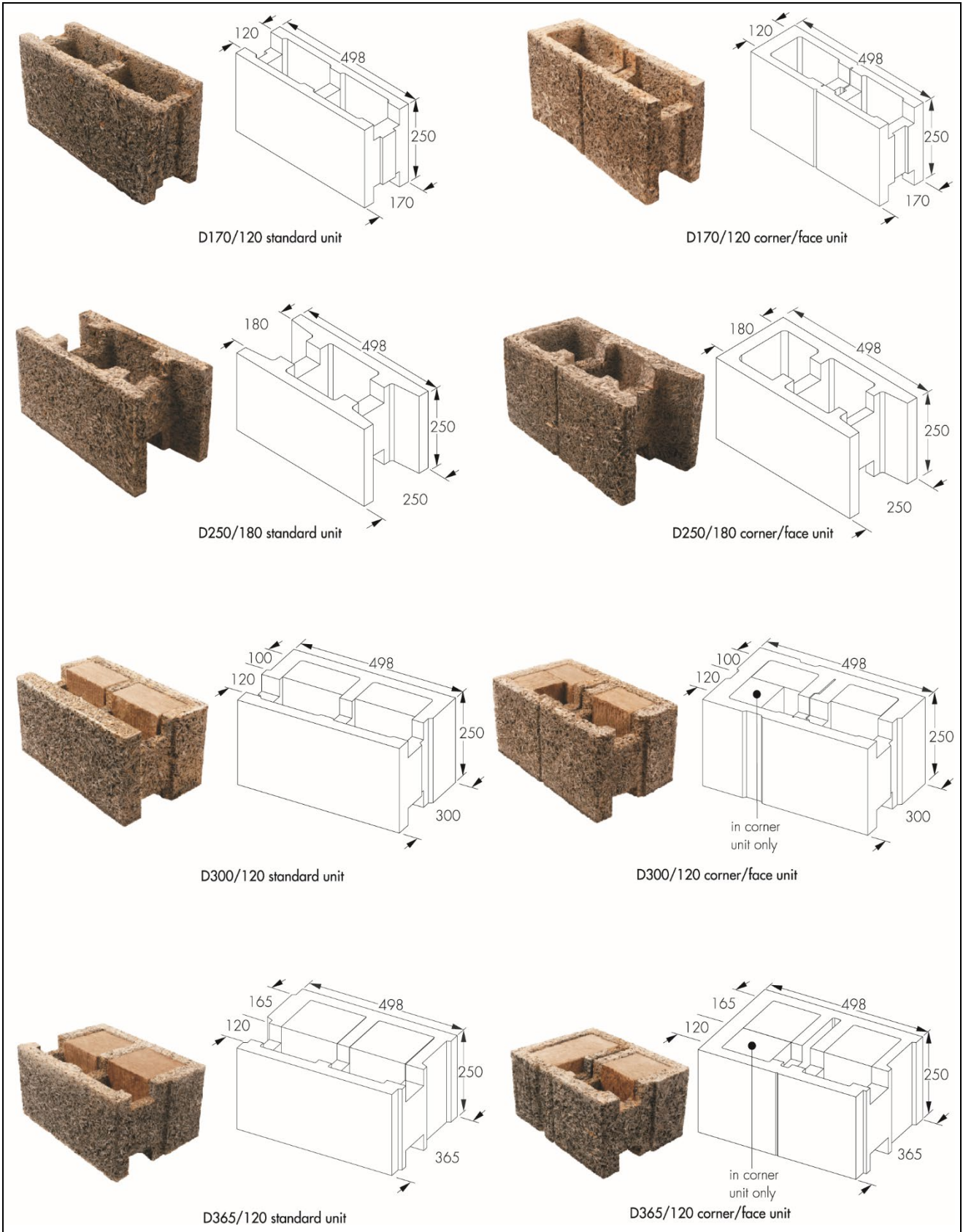
Table 2 Nominal characteristics

Unit nominal characteristic (unit)	Block Units			
	D170/120	D250/180	D300/120	D365/120
Dry density (Unit skins and webs)	500 to 600 kg.m ⁻³			
Length x height (mm)	500 x 250	500 x 250	500 x 250	500 x 250
Width (mm)	170	250	300	365
Concrete core thickness (mm)	120	180	120	120
Web thickness (mm)	25	35	40	40
Insulation thickness	-	-	100	165
PIR inserts or mineral wool ⁽¹⁾ (mm)				

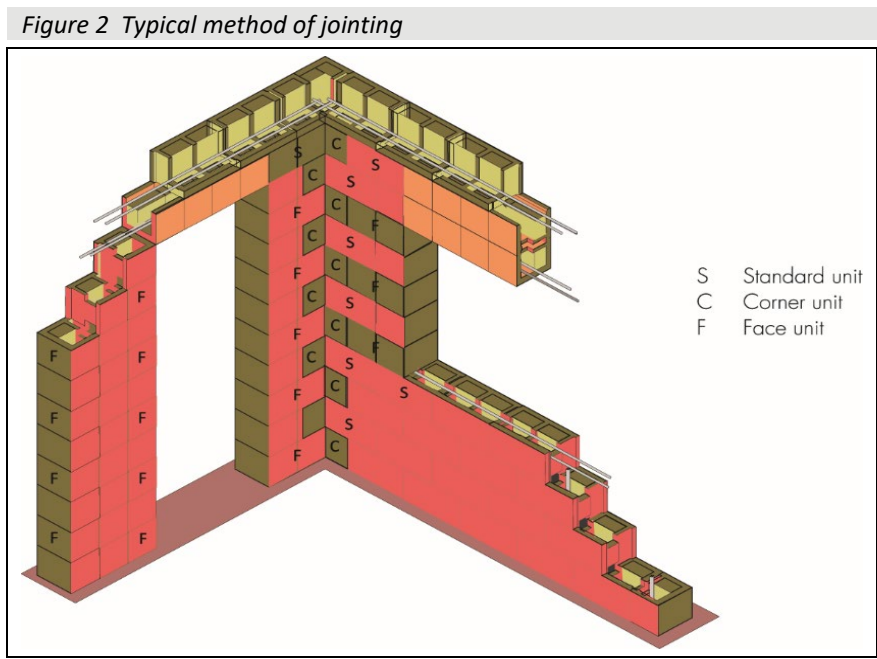
(1) Mineral wool is an optional insulating material, on project request.

Standard, corner and face units are illustrated in Figure 1.

Figure 1 Standard, corner and face units



A typical wall layout using standard and modified units is shown in Figure 2.



Ancillary Items

The Certificate holder recommends the following ancillary items for use with the system, but these materials have not been assessed by the BBA and are outside the scope of this Certificate:

- concrete⁽¹⁾ — typically strength class C25/C35 for reinforced walls and C20/C25 for unreinforced (plain) walls, with a maximum aggregate size of 10 mm, specified to BS EN 206-1 : 2013, BS 8500-1 : 2015 and BS 8500-2 : 2015 and with a high slump class of S5. See section 9.1.6 of this Certificate
- steel reinforcement — where required, must comply with BS 4449 : 2005
- block below damp proof course (DPC) level
- external masonry — 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
- brickwork/stonework ties to BS EN 845-1 : 2013
- temporary bracing and alignment support system as supplied by the Certificate holder
- waterproofing membrane as required (see section 9).

(1) Specific ready mixes are dependent on individual requirements and are outside the scope of this Certificate

Product assessment – key factors

The system was assessed for the following key factors, and the outcome of the assessments is shown below. Conclusions relating to the Building Regulations apply to the whole of the UK unless otherwise stated.

1 Mechanical resistance and stability

Not applicable

2 Safety in case of fire

Data were assessed for the following characteristics.

2.1 Reaction to fire

2.1.1 The Certificate holder has not declared a reaction to fire classification to BS EN 13501-1 : 2018 for the system.

2.1.2 On this basis, the system will be restricted under the documents supporting the national Building Regulations.

2.1.3 In England, Wales and Northern Ireland, the system is unrestricted in terms of proximity to a relevant boundary and, for constructions comprising two leaves of brick or concrete each at least 75 mm thick and with cavities closed around openings and at the top of the wall (with cavity barriers in Northern Ireland), is also unrestricted in terms of height, except for those constructions described in section 2.1.4.

2.1.4 In England, Wales and Northern Ireland, for constructions other than those described in sections 2.1.3, the system must not be used on buildings with a storey 18 m or more above ground level and, in England only, on residential buildings with a storey 11 m or more in height.

2.1.5 In Scotland, the system must not be used on buildings that have a storey 11 m or more above ground level and which contain a dwelling; a building used as a place of assembly, or as a place of entertainment or recreation; a hospital; a residential care building or sheltered housing complex; or a shared multi-occupancy residential building.

2.1.6 In Scotland, the system may be used without restriction on height or proximity to a relevant boundary, other than for buildings described in section 2.1.5, provided it is installed in a cavity that is between two leaves of masonry at least 75 mm thick and which has a cavity barrier around all openings in the wall and at the top of the wall head. For other constructions, the system must not be used on buildings with a storey 11 m or more above ground level or within 1 m of a relevant boundary.

2.2 Resistance to fire

2.2.1 A wall constructed from the system was tested for fire resistance under structural load and the result is given in Table 3.

Table 3 Resistance to fire for wall system under structural loads

System assessed	Construction	Assessment method/ Report ref	Result Fire performance ⁽¹⁾⁽²⁾
Durisol Permanent Formwork System Block Unit D170/120			
Thickness: 170 mm	120 mm thick concrete core using C16/20 strength concrete	BS EN 1363-1 : 1999 BS EN 1365-1: 1999	Loadbearing capacity (R) - 90 minutes; Integrity (E) - 90 minutes; Insulation (I) - 90 minutes
Dimensions: 3000 x 3260 x 170 mm	No render applied		
Load applied vertical: 260 kN·m ⁻¹			

(1) Test report MA 39-VFA 2008-0588.01, issued by Magistrat der Stadt Wien, copies available from the Certificate holder on request.

2.2.2 For wall constructions other than that given in Table 3 of this Certificate, the resistance to fire must be established by a suitably experienced and competent individual, in accordance with the requirements of the documents supporting the national Building Regulations.

2.2.3 Designers must 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.

3 Hygiene, health and the environment

Data were assessed for the following characteristics.

3.1 Water vapour permeability

3.1.1 The water vapour resistance factors of the system components are shown in Table 4.

Table 4 Water vapour resistance factor (μ)

Component assessed	Assessment method	Requirement	Result	
			Minimum surface temperature factor f_{Rsi}	Water vapour resistance factor (μ)
Mineral wool insulation	BS EN ISO 13788 : 2002 BS 5250 : 2021, BRE Report BR 262 : 2002 and BRE Digest 369 : 1992	Value achieved	0.75	8.00
Parex GF render				30

3.2 Condensation

On the basis of data assessed, the system will adequately limit the risk of condensation, when it is designed and constructed in accordance with BS 5250 : 2021.

4 Safety and accessibility in use

Not applicable.

5 Protection against noise

Data were assessed for the following characteristics.

5.1 Resistance to airborne sound

A separating wall structure incorporating the system was tested and the result is given in Table 5.

Table 5 Airborne sound insulation

System assessed	Assessment method	Requirement	Result $R_w^{(1)}$
12.5 mm thick plasterboard, plaster skimmed ⁽²⁾ , Durisol Permanent Formwork System Block Unit D250/180, concrete filled ⁽²⁾ 12.5 mm thick plasterboard, plaster skimmed ⁽²⁾	BS EN ISO 140-4 : 1998	Value achieved	≥ 45 dB

(1) Test report 4791, issued by Ian Sharland Limited 2009, copies available from the Certificate holder on request.

(2) Outside the scope of this Certificate.

5.2 On the basis of data assessed, walls incorporating the system can provide adequate resistance to airborne sound transmission, in accordance with the requirements of the documents supporting the national Building Regulations.

6 Energy economy and heat retention

Data were assessed for the following characteristics.

6.1 Thermal conductivity

The system components were assessed for thermal conductivity (λ_D) and the results are shown in Table 5.

Table 6 Thermal conductivity

System component	Assessment method	Requirement	Result λ_D ($W \cdot m^{-1} \cdot K^{-1}$)
Mineral wool insulation	BS EN 13164 : 2012	Declared value	0.04
PIR inserts			0.02
Dense unreinforced concrete			1.70
Durisol wood-chip concrete			0.13
Parex GF render			0.25

6.2 Thermal performance

6.2.1 Details of the web thicknesses are given in Table 7.

Table 7 Webs in units

Web	Typical amount of web thickness in total longitudinal cross-section area of unit (%)
In mineral wool and concrete	30
In mineral wool only	20
None in mineral wool and concrete	50

6.2.2 The thermal transmittance (U value) of a completed wall will depend on the form and the internal and external finishes used. Assessment of a typical construction by computer modelling achieved the result in Table 8.

Table 8 Thermal transmittance

System assessed	Assessment method	Requirement	Result Thermal transmittance (U-value) ($W \cdot m^{-2} \cdot K^{-1}$)
Durisol D300/120 unit ⁽¹⁾⁽²⁾	BS EN ISO 6946 : 2017, BS EN ISO 10211 : 2017 and BRE Report BR 443 : 2019	Value achieved	0.32 ⁽¹⁾

(1) Construction build-up (external to internal: 102 mm brick outer leaf ($\lambda = 0.77 Wm^{-1}K^{-1}$), 75 mm wide unventilated cavity in accordance with BS EN ISO 6947 : 2017, mineral wool insulation ($\lambda = 0.04 Wm^{-1}K^{-1}$), 17.4 % reinforced concrete ($\lambda = 2.40 Wm^{-1}K^{-1}$), Durisol wood chip concrete ($\lambda = 0.13 Wm^{-1}K^{-1}$) bridge based on a density of $536 kg \cdot m^{-3}$, and 12.5 mm plasterboard ($\lambda = 0.25 Wm^{-1}K^{-1}$) fixed over timber battens ($0.13 Wm^{-1}K^{-1}$) spaced at 600 mm centres).

6.2.3 On the basis of data assessed, the walls incorporating the system can contribute towards a construction satisfying the national Building Regulations in respect of energy economy and heat retention, although compensatory fabric/service measures will be required.

7 Sustainable use of natural resources

7.1 Reuse and recyclability

The block units are made from woodchip, which can be recycled.

8 Durability

8.1 The potential mechanisms for degradation and the known performance characteristics of the materials in this system were assessed.

8.2 Service life

8.2.1 Under normal service conditions, the system will have a service life as a permanent formwork equivalent to the concrete wall structure in which it is incorporated, provided it is designed, installed and maintained in accordance with this Certificate and the Certificate holder's instructions.

8.2.2 The nominal concrete cover to reinforcement, for durability purposes, must be that appropriate to 'mild' exposure in accordance with BS 8500-1 : 2015, Table A.1, and BS EN 206-1 : 2013, Table 1.

8.2.3 Under normal service conditions, the render will have a service life of at least 30 years, and adequate colourfastness in excess of 20 years, provided it is designed, installed and maintained in accordance with this Certificate and the Certificate holder's instructions.

8.2.4 The render may be discoloured by water runs and care must be taken to ensure that normal architectural details for shedding water are present and functioning, and that gutters and downpipes are in good condition.

8.2.5 The render may become discoloured over time, the rate depending on the local environment. The appearance can normally be restored by cleaning with water and a suitable brush. In industrial atmospheres, light-coloured renders must be avoided.

8.2.6 The render may suffer from algal growth in a similar manner to traditional external rendered finishes. For additional preventative advice, the Certificate holder should be consulted, but such advice is outside the scope of this Certificate.

8.2.7 In common with traditional renders, the render may be susceptible to lime bloom. The incidence of this may be reduced by proper protection and by avoiding application in winter or adverse weather conditions. The effect is less noticeable on white or lighter colours. For additional preventative advice, the Certificate holder should be consulted, but such advice is outside the scope of this Certificate.

PROCESS ASSESSMENT

Information provided by the Certificate holder was assessed for the following factors:

9 Design, installation, workmanship and maintenance

9.1 Design

9.1.1 The design process was assessed, and the following requirements apply in order to satisfy the performance assessed in this Certificate.

9.1.2 Walls formed from the system that are subject to the national Building Regulations must be designed in accordance with the relevant recommendations of BS 8102 : 2022 and limit principles set out in BS EN 1990 : 2002 to the loadings in BS EN 1991-1-1 : 2002, BS EN 1991-1-2 : 2002, BS EN 1991-1-3 : 2003, BS EN 1991-1-4 : 2005, BS EN 1991-1-5 : 2003, BS EN 1991-1-6 : 2005, BS EN 1991-1-7 : 2006, BS EN 1992-1-1 : 2004 and BS EN 1992-1-2 : 2004 and their UK National Annexes. A suitably experienced and competent individual must also ensure that the foundations (outside the scope of this Certificate) are adequate to support the intended loads.

9.1.3 Walls formed from the system which are not subject to the national Building Regulations must also be designed in accordance with the Standards listed in section 9.1.2.

9.1.4 The concrete is not easily examined after casting. Hence, as specified in BS EN 1992-1-1 : 2004, sections 4 and 8, care must be taken to ensure full compaction. Compaction may be checked by removal of small sections of the unit face, observation and repair or replacement, if required.

9.1.5 Particular attention must be paid to the type of concrete mix⁽¹⁾ used. The Certificate holder recommends the use of self-compacting concrete, which does not require external vibration, but care must be taken to ensure segregation does not occur and that the wet concrete is allowed to flow freely around formed openings and through congested areas of reinforcement. It is recommended that a pumpable concrete of grade C25/C30⁽¹⁾, and aggregate with a maximum size of 10 mm, is used to achieve a slump class (slump) of S3 or higher between 100 and 120 mm, in accordance with BS 8500-1 : 2015. The Certificate holder does not recommend the use of admixtures. If an admixture is used in concrete, it must comply with BS EN 934-2 : 2009 or BS EN 480-1 : 2014, to allow placement by free flow without compaction, or with minimal compaction using vibrating pokers.

(1) Sourced from suppliers who operate a full quality control scheme, such as the Quality Scheme for Ready-Mixed Concrete (QSRMC) or BSI Kitemark.

Thermal performance

9.1.6 Consideration must be given at the design stage to the incorporation of wall fixings, support brackets, service entry points, ducting, pipework, and other building elements, to minimise post-construction cutting or chasing of the formwork units or concrete core. Service penetrations must be sealed effectively, and fire stopped. Other detailing can also be incorporated in the construction of the formwork subject to the Certificate holder’s recommendations, but such advice and products are outside the scope of this Certificate. In carrying out any cutting or modifications to the system, care must be taken not to damage or weaken the formwork elements, which could result in the loss of integrity or overall stability of the temporary construction. Cold bridging effects must also be considered where any services pass through the wall construction.

Fire resistance of concrete core

9.1.7 For reinforced concrete, walls designed in accordance with BS EN 1992-1-1 : 2004 can be used, subject to cover and design load considerations (see Table 9 of this Certificate). For unreinforced walls acting as fire walls, the minimum thickness requirements set out in BS EN 1992-1-2 : 2002, clause 5.4.2, must be taken into account. This assessment does not take account of any additional protection provided by the internal and external finish.

Table 9 Minimum concrete core thickness for loadbearing reinforced concrete walls⁽¹⁾

	Minimum dimensions (mm)			
	Wall thickness/axis ⁽²⁾			
	$\mu_{fi}^{(3)} = 0.35$		$\mu_{fi}^{(3)} = 0.7$	
	wall exposed on one side	wall exposed on two sides	wall exposed on one side	wall exposed on two sides
REI 30	100/10 ⁽⁴⁾	120/10 ⁽⁴⁾	120/10 ⁽⁴⁾	120/10 ⁽⁴⁾
REI 60	110/10 ⁽⁴⁾	120/10 ⁽⁴⁾	130/10 ⁽⁴⁾	140/10 ⁽⁴⁾
REI 90	120/20 ⁽⁴⁾	140/10 ⁽⁴⁾	140/25	170/25

- (1) Taken from BS EN 1992-1-2 : 2002, Table 5.4.
- (2) Centre of reinforcement to nearest exposed surface.
- (3) The definition of μ_{fi} is given in BS EN 1992-1-2 : 2002, clause.3.2(3).
- (4) Normally, the cover specified in BS EN 1992-1-1 : 2004 will control this distance.

Thermal performance

9.1.8 The thermal performance of a building incorporating the system must be evaluated in accordance with the relevant national Building Regulations and is the responsibility of the overall designer of the building. When considering insulation requirements, designers must refer to the detailed guidance contained in the documents supporting the national Building Regulations.

9.1.9 Calculations of thermal transmittance (U value) must be carried out in accordance with BS EN ISO 6946 : 2017, BS EN ISO 10211 : 2007 and BRE Report BR 443 : 2019, using the declared thermal conductivity (λ_D) values of Table 6 in section 6.1.

9.1.10 The U-value of a wall will depend on the amount of reinforcement used in the concrete and the construction of the wall, incorporating any other insulation used. The U-value of a typical wall construction must be designed and confirmed by reference to the requirements of the documents supporting the national Building Regulations.

9.1.11 The system must be designed to contribute to maintaining continuity of thermal insulation at junctions with other elements and minimise thermal bridges and air infiltration.

9.1.12 The risk of interstitial condensation in the external walling is greatest when the building is drying out after construction. Guidance on preventing condensation is given in BRE Digest 369 : 1992, and BRE Report BR 262 : 2002.

9.1.13 Care must be taken by the designer to ensure that reveals are insulated where required (this will depend upon the position of the frame with relation to the front face of the wall and the type of frame) and that there is continuity of insulation around junctions and openings.

9.1.14 However, care should be taken by the designer to ensure that internal and external linings and claddings, junctions, opening details and penetrations are suitably designed and installed to limit the risk of vapour migration by diffusion and convection. Assessments of condensation risk must be carried out in accordance with BS 5250 : 2021, Section 8 and Annex D.

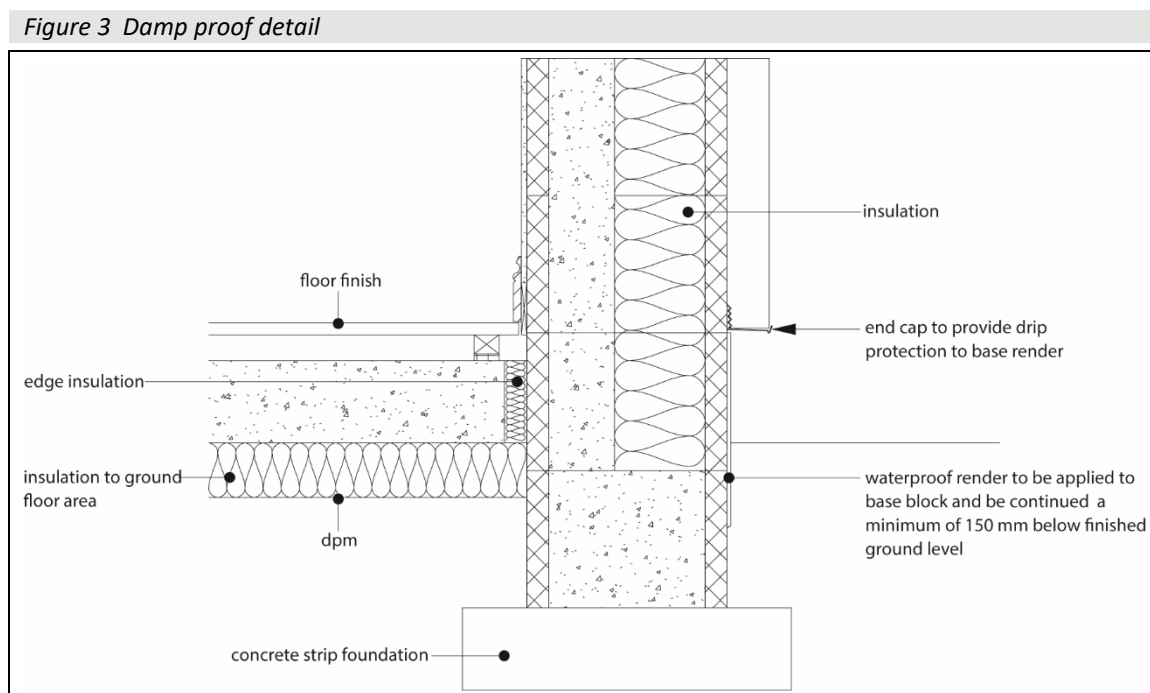
Weathertightness and damp-proofing

9.1.15 Resistance to rain ingress is provided by the render. Care must be taken to ensure the design and construction complies with relevant good practice, the Certificate holder's installation procedures and BBA Certificate 21/5888.

9.1.16 The system is satisfactory for external use in exposure zones up to and including the 'severe' wind-driven rain index category in accordance with PD 6697 : 2019. The guidance given in BRE Report BR 262 : 2002 must be followed with regard to rain penetration in that the designer selects a construction appropriate to the local wind-driven rain index, paying due regard to the design detailing, workmanship and materials to be used.

9.1.17 When the system is used as the inner leaf of an external cavity wall, the outer masonry leaf must be designed and constructed in accordance with BS 5628-3 : 2005 or BS EN 1996-2 : 2006, incorporating DPCs and cavity trays. 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.

9.1.18 Typical damp proofing detail for systems used between the foundation level and the DPC is shown in Figure 3.



9.1.19 Designers must ensure adequate additional sealing at interfaces to prevent air leakages between the wall and other building elements.

Sound insulation

9.1.20 Good working practices should be adopted for sealing all joints. Double or triple layers of plasterboard must be staggered. Relevant practices detailed within the relevant regulatory guidance must be adopted.

9.1.21 Separating walls are subject to pre-completion testing in accordance with the documents supporting the national Building Regulations.

9.1.22 It is essential that care is taken in the design, and during installation, to avoid direct paths for airborne sound transmission and to minimise paths for flanking sound transmission, with appropriate lining.

9.1.23 When installing the system in close proximity to certain flue pipes and/or heat-producing appliances, the guidance in the relevant supporting documents of the national Building Regulations must be followed.

9.2 Installation

9.2.1 Installation instructions provided by the Certificate holder were assessed and judged to be appropriate and adequate.

9.2.2 Installation must be carried out in accordance with this Certificate and the Certificate holder's instructions. A summary of instructions and guidance is provided in Annex A of this Certificate.

9.2.3 Block height concrete walls are normally constructed in one continuous pour, not exceeding pour heights of 1.5 m, progressing around the perimeter of the building using free-flowing, pumpable concrete mixes, to allow concrete flow into corners and window openings.

9.2.4 All structural point loads such as heavy wall attachments (such as kitchen wall units or central heating boilers) or finishes, fixed either internally or externally, must be fixed back to the concrete core and not directly into the formwork unit skins. Typical methods include the use of timber blocks screwed or bolted into the concrete core or cast-in anchor bolts and metal plates. Further guidance can be found in the Certificate holder's installation manual.

9.2.5 To achieve structurally stable formwork during the construction process, the system must be braced sufficiently to resist the loads imparted on the system by the wet concrete and other construction loads. Attention is required to ensure voids do not occur within the wet concrete around formed openings and congested areas of reinforcement. The Certificate holder is able to provide suitable design mixes on request, but such advice and materials are outside the scope of this Certificate.

Junctions

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

9.3 Workmanship

9.3.1 Practicability of installation was assessed by the BBA, on the basis of Certificate holder's information. To achieve the performance described in this Certificate, installation of the system must be carried out by installers who have been trained by the Certificate holder.

9.4 Maintenance and repair

9.4.1 Ongoing satisfactory performance of the render in use requires that it is suitably maintained. The guidance provided by the Certificate holder was assessed by the BBA and found to be appropriate and adequate.

9.4.2 Regular maintenance checks must be carried out to ensure that architectural details for shedding water clear of the building are present and functioning. External plumbing, fittings, gutters and downpipes must be in good condition to minimise water penetration into the render.

9.4.3 Any damage to the render must be repaired immediately in accordance with the relevant recommendations of BS EN 13914-1 : 2016 using conventional rendering techniques and materials.

10 Manufacture

10.1 The production processes for the system have been assessed, and provide assurance that the quality controls are satisfactory according to the following factors:

10.1.1 The manufacturer has provided documented information on the materials, processes, testing and control factors.

10.1.2 The quality control operated over batches of incoming materials has been assessed and deemed appropriate and adequate.

10.1.3 The quality control procedures and product testing to be undertaken have been assessed and deemed appropriate and adequate .

10.1.4 The process for management of non-conformities has been assessed and deemed appropriate and adequate.

10.1.5 An audit of each production location was undertaken, and it was confirmed that the production process was in accordance with the documented process, and that equipment has been properly tested and calibrated.

† 10.2 The BBA has undertaken to review the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturers are being maintained.

11 Delivery and site handling

11.1 The Certificate holder stated that the system units are supplied shrink-wrapped and delivered to site in packaging according to the type and shape of the unit; the wrapping should not be opened until the contents are required.

11.2 Delivery and site handling must be performed in accordance with the Certificate holder's instructions and this Certificate, including:

11.2.1 Good site practices must be observed to prevent damage to the components.

11.2.2 Packs must be stored either near to the work area for immediate use or stored in a holding area, on level ground and above any standing water away from site traffic movements. Multiple handling must be avoided to reduce the risk of damaging the units.

11.2.3 Due to the units' rough edges, care must be taken by site personnel when handling them, using appropriate protective wear in all cases.

11.2.4 The render is delivered to site in 25 kg bags on pallets; each pallet weighs up to 1.2 tonnes. It must be stored under cover and protected from moisture and frost.

Supporting information in this Annex is relevant to the system but has not formed part of the material assessed for the 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.

Additional information on installation

A.1 Backfilling around the bottom layers of formwork to the ground floor must not take place until the concrete has reached sufficient design strength

A.2 Electrical and plumbing services can be fixed within the formwork voids by cutting small holes or chases into the formwork skins, subject to the Certificate holder’s approval. All electrical services should be ducted. Any services introduced should conform to Building Regulation and health and safety requirements. Further details on fixing methods can be obtained from the Certificate holder, but such advice is outside of the scope of this Certificate.

A.3 A range of installation and floor systems can be accommodated with the system. Typical methods of jointing are shown in Figures 4 and 5.

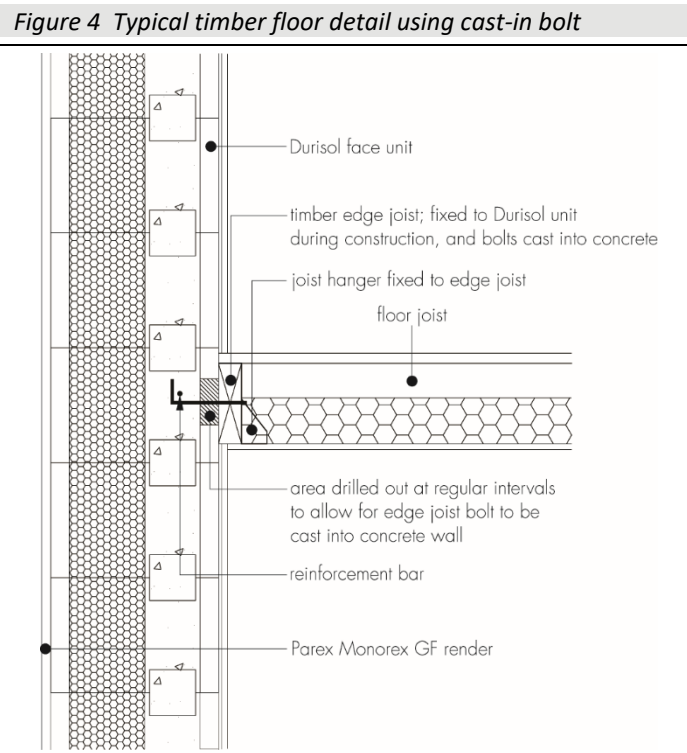
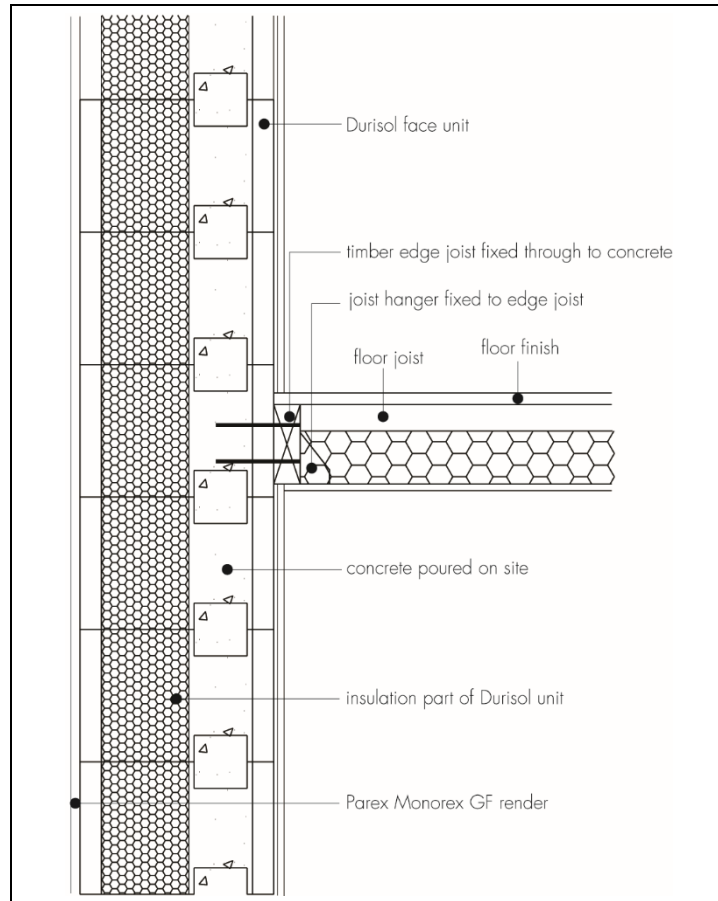


Figure 5 Typical timber floor detail post-fixed with joist hanger



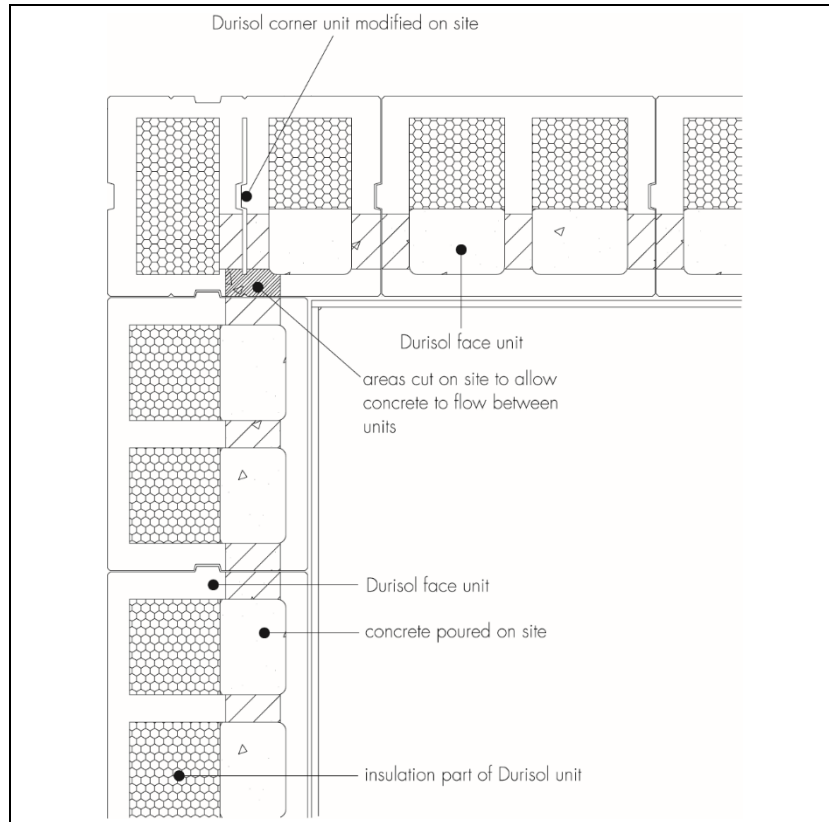
A.4 Openings or ducts for service penetrations can be positioned within the formwork prior to concrete pouring. All service entry points must be sealed to prevent ingress of water, dampness or vermin.

A.5 A range of internal finishes can be applied or fixed directly to the system, but these are outside the scope of this Certificate. The Certificate holder recommends a period of 4 to 7 days from concrete pour to the application of internal finishes.

A.6 The foundation level is checked and the setting out lines for the formwork are made by the main contractor. Any out-of-tolerance levels or inaccuracies in foundations should be made good using a bed of levelling mortar.

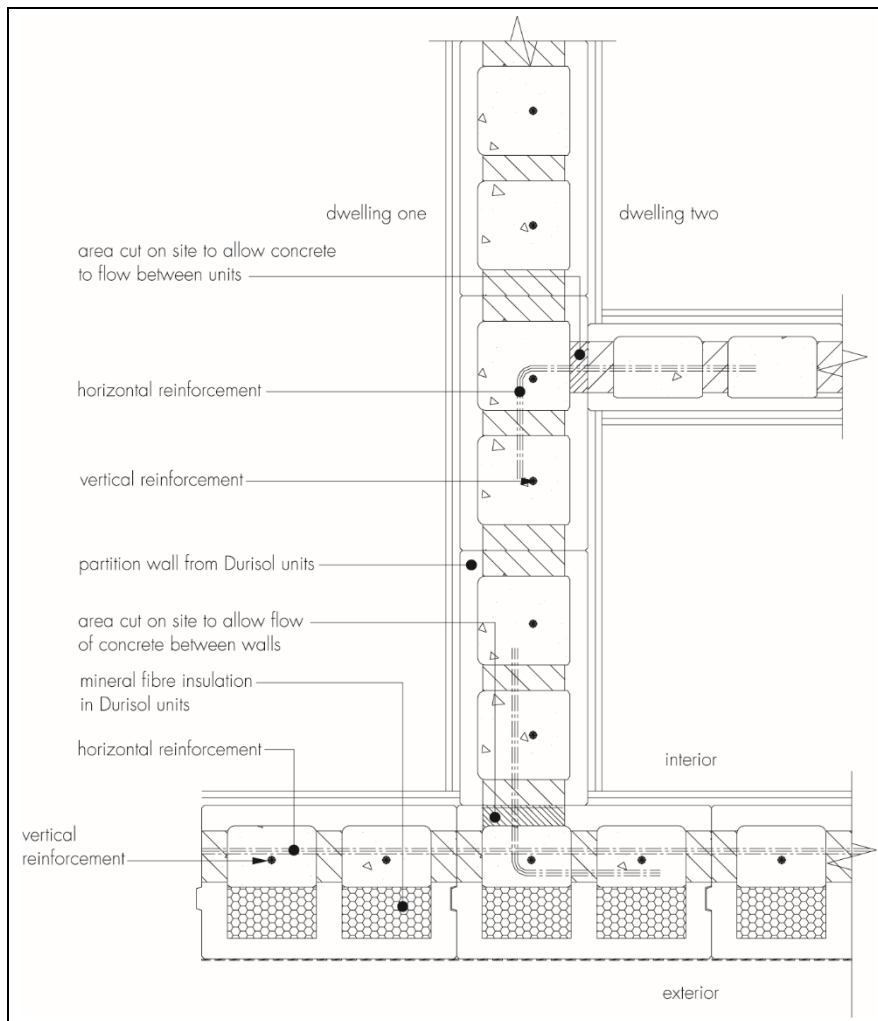
A.7 Construction commences by forming the corners (see Figure 6) of the external walls using corner units and working inwards towards the mid-point of each wall line using standard units (reference S). On subsequent courses, a running bond should be maintained, with vertical joints staggered in stretcher bond fashion. It is important to ensure that horizontal and vertical joints abut tightly. Standard units are cut to size to accommodate window and door openings as laying proceeds.

Figure 6 Typical corner detail



A.8 Following completion of the first course, the formwork is checked for plumb and level and the next five courses laid in a running bond. Separating or internal walls are jointed as shown in Figure 7.

Figure 7 Typical separating/internal wall jointing



A.9 The quantities of reinforcement placed within the system are dependent on design and detail requirements (see section 2). Horizontal reinforcement can be placed in the centre or adjacent to core edges using the preformed slots. Vertical reinforcement can be placed against the horizontal reinforcement and secured using standard reinforcement wire tying methods. Bar lapping lengths in accordance with BS 8110-1 : 1997, BS EN 8110-2 :1985 or BS EN 1992-1-1 : 2004 should be adopted. The system requires that, in plain walls, horizontal reinforcement is provided to tie in internal walls, above structural openings and horizontally at floor levels.

A.10 Prior to concrete pouring, a check should be carried out on the system to include conformance to design and layout, correct alignment and plumb, and to ensure bracings and props are secured. Reinforcement should be checked for correct cover distance and rigidity.

A.11 Concrete placement should be directly into the formwork voids, directing the line pump nozzle, when used, first around the external walls of the building in a continuous pour allowing concrete to free-flow into corners, above and below window openings. Concrete placement should cease once the concrete is within 50 mm of the top of the sixth course. Where a construction or day joint is to be formed, starter bars should be pushed into the concrete.

A.12 Once the first pour has reached its initial set, placing of the second lift of formwork units can commence and the pouring operation repeated up to the first and subsequent storey heights.

A.13 Lintels to doors and windows are formed from face units by partly cutting the web and one outer vertical side (see Figure 10) to allow the insertion of a lintel reinforcement cage or individual bars. Generally, spans up to 1750 mm can be formed using this method. For larger spans, the face units can be modified as shown in Figure 8 and turned through 90°, laid in a soldier course formation, on a temporary timber support frame, to form the structural opening. Further modification of face units can be carried out to form cast lips for insertion of window frames and sills. A typical opening jamb detail is shown in Figure 9.

Figure 8 Larger span lintel detail (vertical section)

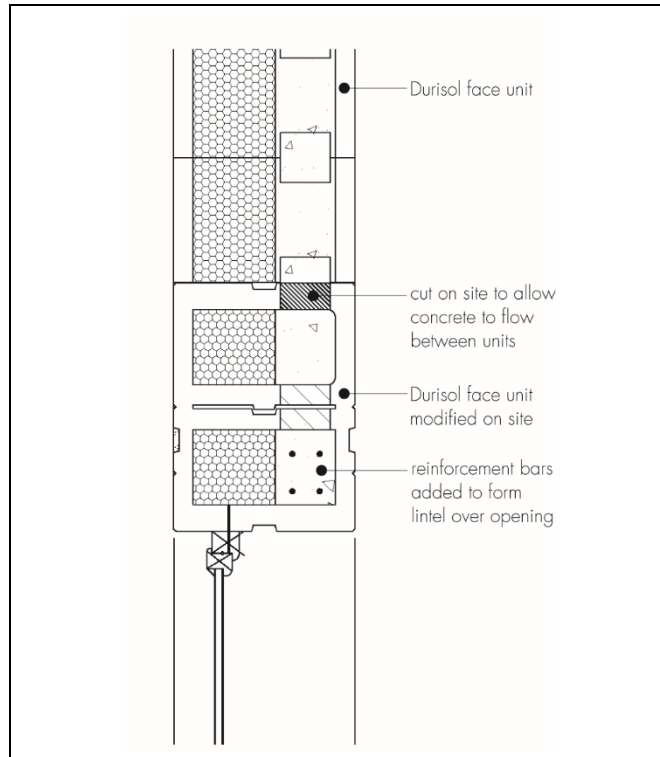
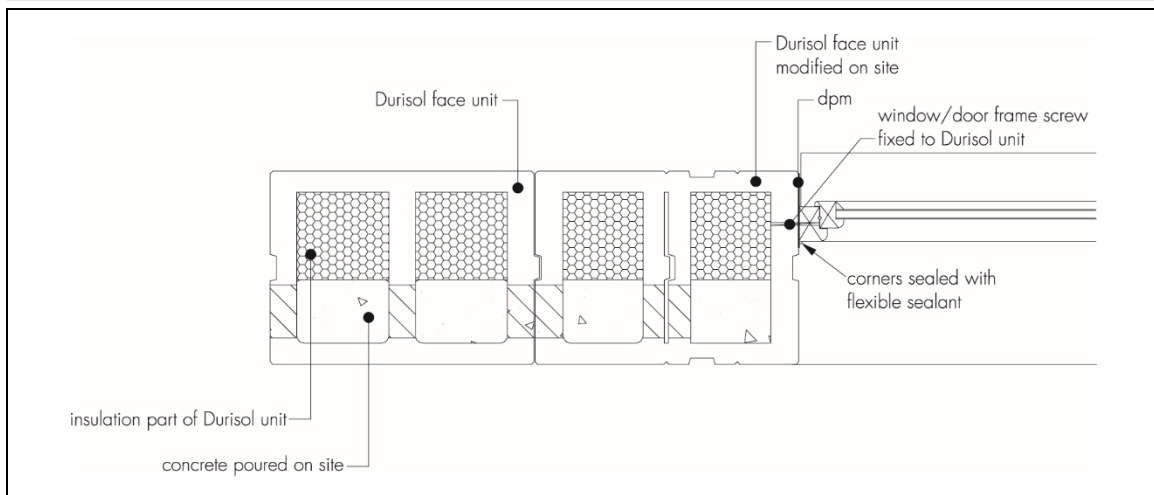
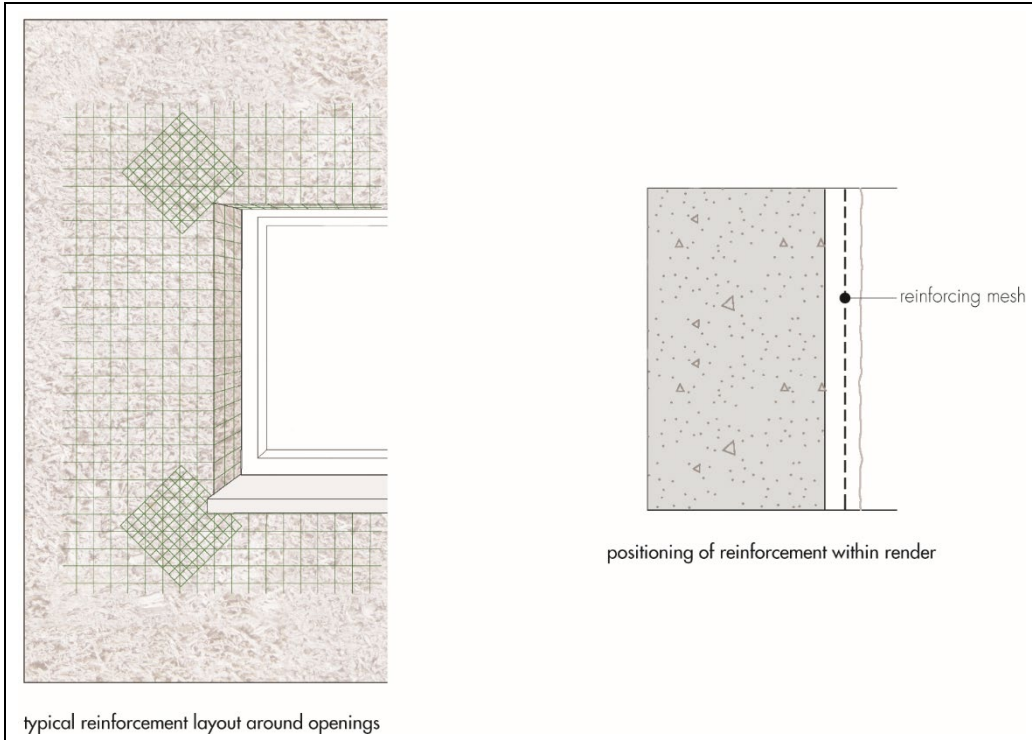


Figure 9 Typical opening jamb detail (horizontal section)



A.14 The render is mixed by adding water and stirring with a drill and paddle, and applied in a single-coat . The glass fibre reinforcing mesh is embedded within the render coat as work proceeds, ensuring that it is located centrally within the render thickness. Additional mesh is placed at corner points of openings.

Figure 10 Location of reinforcing mesh within render thickness and around openings



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Conditions

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- are reviewed by the BBA as and when it considers appropriate.

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