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Authorised and notified according to Article 29 of the Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011

MEMBER OF EOTA

European Technical Assessment ETA-20/1182 of 2020/12/15

I General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: ETA-Danmark A/S

Trade name of the construction product:	NUDURA Integrated Building Technology Insulated Concrete Form System
Product family to which the above construction product belongs:	Prefabricated Building Units
Manufacturer:	NUDURA Inc. 27 Hooper Road Unit No 10 Barrie Ontario Canada L4N 9S3
Manufacturing plant:	NUDURA QUEBEC Manufacturing Plant 870 Industriel Boulevard Granby Quebec J2J 1A4 Canada
This European Technical Assessment contains:	20 pages including 3 annexes which form an integral part of the document
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of:	European Technical Assessment Guideline (ETAG) Nº 009 Non Load-Bearing Permanent Shuttering Kits/Systems Based on the Hollow Blocks or Panels of Insulating Materials and Sometimes Concrete, Edition June 2002, used as the European Assessment Document
This version replaces:	

Translations of this European Technical Assessment in other languages must fully correspond to the original issued document and should be identified as such.

1 Technical description of the product

The NUDURA Integrated Building Technology Insulated Concrete Form System (henceforth known as the NUDURA ICF System) is formwork comprising factory assembled units consisting of two panels of expanded polystyrene (EPS) each 67 mm thick (standard form) or 102 mm thick (XR-35), mechanically fixed together using an arrangement of hinged polypropylene webs moulded into each panel at the production stage.

Various forms are available within the range as described in this section, allowing overall wall widths of 235, 286, 337, 387 and 438 mm (standard ICF) and 305, 356, 407, 457 and 508 mm (XR-35) to be formed. The characteristics of the formwork components are:

- EPS panels — green in colour, moulded from EPS beads. The panels have a nominal density of 21.6 $kg \cdot m^{-3}$ and a thermal conductivity of 0.036 $W \cdot m^{-1} \cdot K^{-1}$. For nominal dimensions of the EPS panels, see Annex 1, Figure A1
- polypropylene spacers — black in colour, manufactured from recycled polymer and hinged at the internal face of the EPS panels to allow ease of transporting to site. They are available in five sizes, to give nominal concrete core widths of 102, 152, 203, 254 and 305 mm. The spacer webs are designed with slots to receive horizontal reinforcement; the flanges, built into the EPS forms, can be used to screw-fix lightweight finishes such as plasterboard and weatherproofing systems (subject to load limitations — see ETA holder's data sheets).

The upper and lower surfaces of the EPS forms incorporate small castellations so that adjoining forms lock together without fixings. Forms can be used either way up (except brick ledge forms). The spacers run full height of the form and serve to hold the forms together and prevent the floats lifting during the concrete pour. The inner surfaces of the EPS panels feature vertical, dovetail grooves that allow full bonding with the concrete and provide locks for the end caps. The outer surfaces are lightly grooved vertically at 51 mm centres to aid cutting and trimming. The forms interlock, and build up horizontally and vertically into a tight rigid formwork. The wall is formed by filling the formwork with concrete.

The system's components are available in the range given in Annex 1, Figures A1 and A2, and illustrated in Annex 2, Figure A3, with the characteristics listed in Annex 3.

NUDURA Plus Series inserts are additional EPS inserts which may be attached to the 67 mm formwork panels to increase the thickness and thermal resistance of the formwork. The inserts are available in thicknesses of 25, 51, 102 and 152 mm, with an EPS thermal conductivity of 0.036 $W \cdot m^{-1} \cdot K^{-1}$.

The formwork is used in conjunction with:

- concrete — typically grade C16/20 (to EN 206 : 2013 + A1 : 2016) for plain walls or C20/25 to C50/60 for reinforced concrete, depending on above or below ground use. The concrete can contain an admixture complying with EN 934-2 : 2009 to allow placement by either rodding or free flow, and to allow adequate site time. Vibrating equipment can be used with care
- aggregate — with a recommended maximum size of 10 to 15 mm for concrete walls up to 152 mm nominal core thickness, and 20 mm for concrete walls with a nominal core thickness of 203 mm and above
- components and finishes used in conjunction with the formwork, but not covered by this ETA, are:
  - steel reinforcement — where required, should comply with applicable national Building Regulations and Standards
  - external render — consisting of either:
    - cement-based render of two or three coats of cement/sand/polymer rendering mix, with the basecoat reinforced with stainless steel or galvanized expanded steel lath, screw-fixed to the polypropylene flanges in the form, or
    - acrylic-based render of two coats of proprietary rendering mix, with glass fibre filament or nylon fibre mesh reinforcement within the basecoat applied directly to the surface of the EPS form
  - external masonry — either brickwork or stonework fixed in accordance with the national Buildings Regulations. The type of masonry unit must be to the relevant part(s) of EN 771 and, where masonry tests are required, to the relevant part(s) of EN 1052. Other external finishes can be applied subject to fixing requirements and load limitations
  - internal finish — typically 12.5 mm thick plasterboard fixed directly to the polypropylene flanges with a plaster skim coat or taped joints. Other lining systems can be applied (such as vinyl, acrylic render, steel, wood and cement particle board), subject to load limitations

- brickwork/stonework wall ties to EN 845-1 : 2013
- trestle supports — supplied by the ETA holder.

2 Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter EAD)

The system provides permanent formwork for the construction of in-situ dense aggregate concrete walls and contributes to the thermal insulation of the finished construction. The spacers incorporated during production connect the shuttering panels and resist the pressure of the concrete during filling, and can also support reinforcing bars when required.

3 Performance of the product and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR 1)

3.1.1 Resulting structural pattern

In end-use conditions, walls made with the NUDURA ICF System are walls of continuous type according to ETAG 009, paragraph 2.2, and will have the mechanical characteristics shown in Table 1.

Table 1 Mechanical characteristics

Property	Performance
Structural pattern	Continuous
Filling efficiency (see section 3.1.2)	Free flowing concrete, as per recommended concrete design mix
Steel reinforcement (see section 3.1.3)	Possible

3.1.2 Efficiency of filling

Conformity with the requirements of ETAG 009, section 5.1.2, was assessed through on-site observation of the filling, with concrete of a trial formwork constructed using the system and concrete placed by pump. The efficient filling without bursting of the shuttering and without voids or any uncovered reinforcement in the concrete core was satisfactory. The resistance to filling pressure was determined by observation of the finished shuttering elements, both during and on completion of filling. The requirements in respect of cracking and failure of the system elements and horizontal bowing of shuttering not exceeding 5 mm were also satisfactorily met. Filling must be conducted in accordance with the ETA holder's Installation Manual by persons trained by the ETA holder.

3.1.3 Possibility of steel reinforcement

The instructions in the ETA holder's Installation Manual are appropriate to install steel reinforcement for walls according to EN 1992-1-1, EN 1998-1 : 2005 (Chapter 5 *Large lightly reinforced walls*) or corresponding national rules. NUDURA Inc. can provide detailed information on the requirements for reinforcement according to structural and durability requirements. The requirements according to ETAG 009, Chapter 6.1.3 are met satisfactorily.

3.2 Safety in case of fire (BWR 2)

3.2.1 Reaction to fire

Table 2 Reaction to fire

Property	Classification
Reaction to fire	Euroclass E to EN 13501-1

3.2.2 Resistance to fire

The EI and REI values as shown in Table 3 are calculated according to ETAG 009, Annex C, Table 1, and EN 1992-1-2, Tables 5.3 and 5.4, using a minimum concrete strength of C16/20 for plain walls or C20/25 for reinforced concrete.

Table 3 Fire resistance

Overall thickness of the wall (mm)	Thickness of the Concrete core (mm)	Standard fire resistance for non-load-bearing walls	Standard fire resistance for load-bearing walls
235	102	EI 90	REI 30
286	152	EI 180	REI 120
337	203	EI 240	REI 120
387	254	EI 240	REI 120
438	305	EI 240	REI 180

3.3 **Health, hygiene and the environment (BWR 3)**

3.3.1 **Dangerous substances**

According to the manufacturer's declaration regarding the shuttering elements, taking account of the EU database 8, the NUDURA ICF System does not contain any dangerous substances.

3.3.2 **Water vapour permeability**

The product may be regarded as EPS with a water vapour diffusion factor (μ) of 60 according to EN 12524. The values for the water vapour diffusion resistance of concrete depending on density and type of concrete are also tabulated in EN 12524.

3.3.3 **Water absorption**

The requirements according to ETAG 009, Clause 6.3.3, are met satisfactorily.

3.3.4 **Watertightness**

As finishes are not part of the shuttering system, the "No performance assessed" option in ETAG 009, Table 3, is used.

3.4 **Safety and accessibility in use (BWR 4)**

3.4.1 **Bond strength and resistance to impact load**

Bond strength

The EPS is effectively bonded to the concrete core by mechanical interlocking of the internal vertical dovetail slots and the concrete. The bond strength (insulation to concrete) was based on visual observations during removal of pieces of shuttering in order to study filling efficiency, which was found to be acceptable.

Resistance to impact load

No effect was detected after soft body impact. When tested for hard body impact, an indentation with a diameter of 50 mm was observed on the EPS panel. Care should be taken on site to avoid hard body impact. During installation on site, damage to the system could result from striking by objects. After construction, the system will be covered with cladding and therefore will be protected from impact loads.

3.4.2 **Resistance to filling pressure**

The resistance to filling pressure has been determined by observation of the finished shuttering elements, both during filling and on completion of the filling, and is satisfactory for filling up to heights of approximately 4 m. The requirements in respect of cracking and failure of the system elements and horizontal bowing of shuttering are also satisfactorily met. The vertical alignment of the formwork needs checking and/or adjustment during filling. This can be achieved using the trestle supports supplied by the ETA holder.

3.4.3 **Safety against personal injuries by contact**

As delivered to site, the shuttering elements do not have sharp or cutting edges. The soft surface of the shuttering means there is no risk of abrasion or personal injury. The requirements according to ETAG 009, Chapter 6.4.3, are satisfactorily met.

3.5 **Protection against noise (BWR 5)**

3.5.1 **Airborne sound insulation**

The testing of walls for airborne sound insulation is performed under end-use conditions in accordance with EN ISO 10140-3 : 2010. The airborne sound insulation of constructions incorporating the NUDURA ICF System and various wall finishes (outside the scope of the ETA) are included in Table 4.

Table 4 Sound reduction index (Rw) of walls

Thickness (mm)	Total thickness of wall (mm)	Rw (C;Ctr) (dB)
Insulated concrete wall with concrete core of 152 mm (6'')	286	51 (-4;0)
Insulated concrete wall with one layer of gypsum board CGC Sheetrock 12.5 mm on both sides	311	51 (-2;4)
Insulated concrete wall with one layer of gypsum board CGC Sheetrock 12.5 mm on both sides, and plasterboard BA13 Placo Phonique on external side	323.5	54 (-1;4)
Insulated concrete wall with one layer of gypsum board CGC Sheetrock 12.5 mm on both sides, and one asphalt layer of SOPREMA covered with plasterboard BA13 Placo Phonique on external side	337	56 (-1;-5)
Insulated concrete wall with one layer of gypsum board CGC Sheetrock 12.5 mm on internal side, and bare concrete on external side	231.5	57 (-1;-4)
Insulated concrete wall with concrete core of 203 mm	337	52 (-3;1)
Insulated concrete wall with concrete core of 203 mm and one layer of gypsum board CGC Sheetrock 12.5 mm on both sides	362	54 (-3;-5)
Insulated concrete wall with concrete core of 203 mm, one layer of gypsum board CGC Sheetrock 12.5 mm on internal side, and bare concrete on external side	282.5	61 (-2;-5)
Insulated concrete wall with concrete core of 203 mm, one layer of gypsum board CGC Sheetrock 12.5 mm on internal side, and inner partition on external side	353	≥ 68 (-1;-5)
Concrete wall of 203 mm (without EPS panels both sides)	203	66 (-2;-5)

3.5.2 **Sound absorption**

No performance assessed.

3.6 **Energy economy and heat retention (BWR 6)**

3.6.1 **Thermal resistance**

The nominal thermal conductivity (λ) of the ICF is 0.036 $W \cdot m^{-1} \cdot K^{-1}$. The total wall resistance, and consequently its U-value, would depend on the construction. A construction comprising the NUDURA ICF System can achieve the U-values/thermal resistances defined in Tables 5 and 6.

Table 5 Thermal resistance

Construction type	U-value ($W \cdot m^{-2} \cdot K^{-1}$)	Thermal resistance ($m^2 \cdot K \cdot W^{-1}$)
ICF with 152 mm concrete core	0.29	3.49
ICF with 152 mm concrete core and 25 mm Plus Series insert	0.24	4.18
ICF with 152 mm concrete core and 51 mm Plus Series insert	0.20	4.91
ICF with 152 mm concrete core and 102 mm Plus Series insert	0.16	6.32
ICF with 152 mm concrete core and 152 mm Plus Series insert	0.13	7.71
ICF with 152 mm concrete core *External:* 50 mm unvented cavity and 102 mm brick outer leaf with stainless steel wall ties *Internal*: 12.5 mm gypsum board on 15 mm dabs, 3 mm gypsum plaster Total wall thickness: 466.5 mm	0.24	4.15
ICF with 152 mm concrete core and 25 mm Plus Series insert *External:* 50 mm unvented cavity and 102 mm brick outer leaf with stainless steel wall ties *Internal*: 12.5 mm gypsum board on 15 mm dabs, 3 mm gypsum plaster Total wall thickness: 491.5 mm	0.21	4.84
ICF with 152 mm concrete core and 51 mm Plus Series insert *External:* 50 mm unvented cavity and 102 mm brick outer leaf with stainless steel wall ties *Internal*: 12.5 mm gypsum board on 15 mm dabs, 3 mm gypsum plaster Total wall thickness: 519.5 mm	0.18	5.57
ICF with 152 mm concrete core and 102 mm Plus Series insert *External:* 50 mm unvented cavity and 102 mm brick outer leaf with stainless steel wall ties *Internal*: 12.5 mm gypsum board on 15 mm dabs, 3 mm gypsum plaster Total wall thickness: 570.5 mm	0.14	6.98
ICF with 152 mm concrete core and 152 mm Plus Series insert *External:* 50 mm unvented cavity and 102 mm brick outer leaf with stainless steel wall ties *Internal*: 12.5 mm gypsum board on 15 mm dabs, 3 mm gypsum plaster Total wall thickness: 620.5 mm	0.12	8.37
ICF with 152 mm concrete core *External:* 18 mm sand/cement render *Internal*: 12.5 mm gypsum board on 15 mm dabs, 3 mm gypsum plaster Total wall thickness: 332.5 mm	0.26	3.85
ICF with 152 mm concrete core and 25 mm Plus Series insert *External:* 18 mm sand/cement render *Internal*: 12.5 mm gypsum board on 15 mm dabs, 3 mm gypsum plaster Total wall thickness: 357.5 mm	0.22	4.55
ICF with 152 mm concrete core and 51 mm Plus Series insert *External:* 18 mm sand/cement render *Internal*: 12.5 mm gypsum board on 15 mm dabs, 3 mm gypsum plaster Total wall thickness: 384.5 mm	0.19	5.27
ICF with 152 mm concrete core and 102 mm Plus Series insert *External:* 18 mm sand/cement render *Internal*: 12.5 mm gypsum board on 15 mm dabs, 3 mm gypsum plaster Total wall thickness: 436.5 mm	0.15	6.69
ICF with 152 mm concrete core and 152 mm Plus Series insert *External:* 18 mm sand/cement render *Internal*: 12.5 mm gypsum board on 15 mm dabs, 3 mm gypsum plaster Total wall thickness: 486.5 mm	0.12	8.07

Note: Internal and external finishes are outside the scope of this ETA. Contact the ETA holder for advice.

Table 6 Thermal resistance (XR-35)

Construction type	U-value ($W \cdot m^{-2} \cdot K^{-1}$)	Thermal resistance ($m^2 \cdot K \cdot W^{-1}$)
XR-35 ICF with 152 mm concrete core	0.17	5.81
XR-35 ICF with 152 mm concrete core with 25 mm Plus Series insert	0.15	6.54
XR-35 ICF with 152 mm concrete core with 51 mm Plus Series insert	0.14	7.25
XR-35 ICF with 152 mm concrete core with 102 mm Plus Series insert	0.12	8.62
XR-35 ICF with 152 mm concrete core with 152 mm Plus Series insert	0.10	10.05
XR-35 ICF with 152 mm concrete core *External:* 50 mm unvented cavity and 102 mm brick outer leaf with stainless steel wall ties *Internal*: 12.5 mm gypsum board on 15 mm dabs, 3 mm gypsum plaster Total wall thickness: 550.5 mm	0.15	6.49
XR-35 ICF with 152 mm concrete core and 25 mm Plus Series insert *External:* 50 mm unvented cavity and 102 mm brick outer leaf with stainless steel wall ties *Internal*: 12.5 mm gypsum board on 15 mm dabs, 3 mm gypsum plaster Total wall thickness: 575.5 mm	0.14	7.18
XR-35 ICF with 152 mm concrete core and 51 mm Plus Series insert *External:* 50 mm unvented cavity and 102 mm brick outer leaf with stainless steel wall ties *Internal*: 12.5 mm gypsum board on 15 mm dabs, 3 mm gypsum plaster Total wall thickness: 601.5 mm	0.13	7.90
XR-35 ICF with 152 mm concrete core and 102 mm Plus Series insert *External:* 50 mm unvented cavity and 102 mm brick outer leaf with stainless steel wall ties *Internal*: 12.5 mm gypsum board on 15 mm dabs, 3 mm gypsum plaster Total wall thickness: 652.5 mm	0.11	9.32
XR-35 ICF with 152 mm concrete core and 152 mm Plus Series insert *External:* 50 mm unvented cavity and 102 mm brick outer leaf with stainless steel wall ties *Internal*: 12.5 mm gypsum board on 15 mm dabs, 3 mm gypsum plaster Total wall thickness: 702.5 mm	0.09	10.71
XR-35 ICF with 152 mm concrete core *External:* 18 mm sand/cement render *Internal*: 12.5 mm gypsum board on 15 mm dabs, 3 mm gypsum plaster Total wall thickness: 416.5 mm	0.16	6.17
XR-35 ICF with 152 mm concrete core and 25 mm Plus Series insert *External:* 18 mm sand/cement render *Internal*: 12.5 mm gypsum board on 15 mm dabs, 3 mm gypsum plaster Total wall thickness: 441.5 mm	0.15	6.90
XR-35 ICF with 152 mm concrete core and 51 mm Plus Series insert *External:* 18 mm sand/cement render *Internal*: 12.5 mm gypsum board on 15 mm dabs, 3 mm gypsum plaster Total wall thickness: 467.5 mm	0.13	7.57
XR-35 ICF with 152 mm concrete core and 102 mm Plus Series insert *External:* 18 mm sand/cement render *Internal*: 12.5 mm gypsum board on 15 mm dabs, 3 mm gypsum plaster Total wall thickness: 518.5 mm	0.11	9.01
XR-35 ICF with 152 mm concrete core and 152 mm Plus Series insert *External:* 18 mm sand/cement render *Internal*: 12.5 mm gypsum board on 15 mm dabs, 3 mm gypsum plaster Total wall thickness: 568.5 mm	0.10	10.42

Note: Internal and external finishes are outside the scope of this ETA. Contact the ETA holder for advice.

3.6.2 **Influence of moisture transfer on insulating capacity of wall**

No performance assessed.

3.6.3 **Thermal inertia**

The values for the heat capacity of concrete and EPS are tabulated in EN ISO 10456 : 2007.

3.7 **Aspects of durability and serviceability**

The provisions made in this ETA are based on an assumed working life for the system of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be used as a means for selecting the appropriate product in relation to the expected economically reasonable working life of the works.

3.7.1 **Resistance to deterioration**

Physical agents

No performance assessed.

Chemical agents

Ties are made of polypropylene. There is no corrosion of the polypropylene ties in concrete. The finishes of the wall are not part of the ETA. Determination of the effects of cleaning agents on the surface is not possible. The requirements of ETAG 009, Clause 6.7.1.2, are met satisfactorily.

Biological agents

The EPS does not support the growth of mould and fungi. The requirements of ETAG 009, Clause 6.7.1.3 are met satisfactorily.

3.7.2 **Resistance to damage during normal use**

Normal use impacts

It is assumed that the concrete core of concrete walls (without consideration of the finishes) constructed using the NUDURA ICF System, and designed according to EN 1992-1-1 or national design rules, will have an adequate resistance to impact loads under normal use. The requirements according to ETAG 009, Clause 6.7.2.1 are met satisfactorily.

Incorporation of ducts

It is essential that any ducts in the walls are included at the design stage rather than drilled/cut after installation, as this could result in damage that must be repaired.

Fixing of objects

NUDURA shuttering kits allow the possibility of fixing objects to the shuttering kits at specific points where the polypropylene ties are designed to resist the applied loads as shown in Table 7. Where the fixing is to be made in a position not coinciding with a polypropylene tie, the mechanical resistance of the EPS must not be relied upon; all fixings must be placed into the concrete core.

Table 7 Design resistance of various fixing types and the polypropylene tie

Fastener type	Tensile force (N)	Shear force (N)
Paulin Dura-Grip No. 6 x 2 coarse drywall screws	179	289
No. 8 x 2 metal screws number 608-64	195	245
Compass Marker Darts No. 8 x 1-3/4 cement board screws	207	369
No. 8 x 2 construction screws number 214-633	209	356
No. 10 x 2 metal screws number 208-700	208	338
No. 10 x 2 wood screws number 197-700	226	396
Trillium Screw No. 10 x 2 hex head with washer coarse thread self-tapping	227	485
No. 12 x 2 metal screws number 846-256	220	396
Fastenel HWSL SMS No. 14 X 2 ZA screws number 1131155	246	325
1/4 - 14 X 1-3/4 AB screws	220	458
Tree Island 1-1/2” ring nails	80	49
6” Brick Ledge screws	241	—

3.8 **Identification of the product**

The panels are wrapped in plastic bearing the manufacturer’s name, product type, dimensions, quantity, date of fabrication, batch reference details and CE mark. In relation to transportation and storage, the panels should be treated as conventional insulation products.

4 Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base

According to the Decision 98/599/EC(1) of the European Commission(2), amended by Decision 2001/596/EC, the system of AVCP [see Regulation (EU) No. 305/2011, Annex V], as shown in Table 8.

(1) Official Journal of the European Communities L 287 of 24.10.1998.
(2) Official Journal of the European Communities L 209 of 02.08.2001.

Table 8 System AVCP

Product	Intended use	System
Permanent insulation shuttering kits/systems	Construction of external and internal walls in buildings subject to fire regulations	2+

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the Assessment and Verification of Constancy of Performance (AVCP) are laid down in the control plan deposited at ETA-Danmark A/S prior to CE marking.

Issued in Copenhagen on 2020-12-15 by

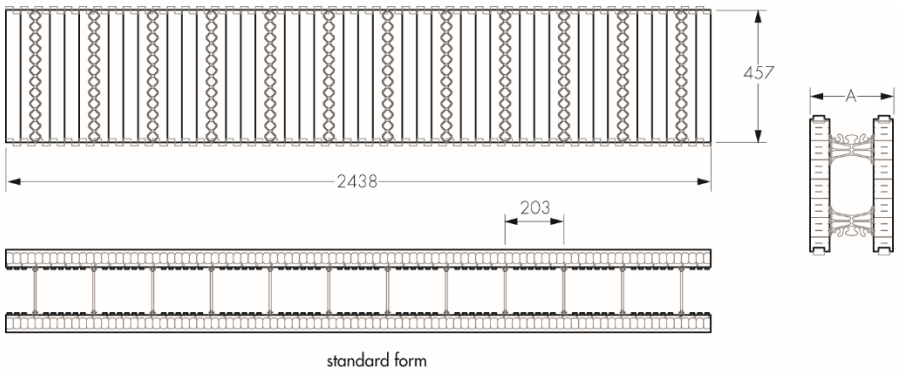
Thomas Bruun

Managing Director, ETA-Danmark A/S

ANNEX 1 PRODUCT RANGE

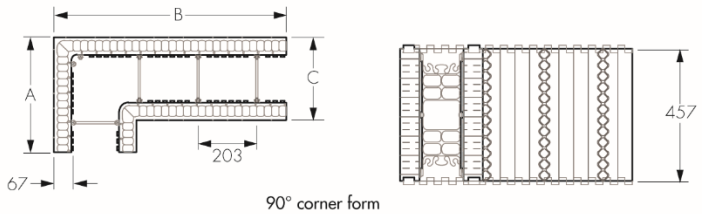
This annex applies to the NUDURA Integrated Building Technology Insulated Concrete Form System as described in the main body of the European Technical Assessment.

Figure A1 Standard component details (all dimensions in mm)



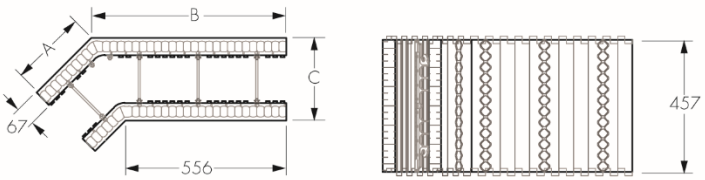
standard form

Nominal concrete core (mm)	Dimension A (mm)
102	235
152	286
203	337
254	387
305	438



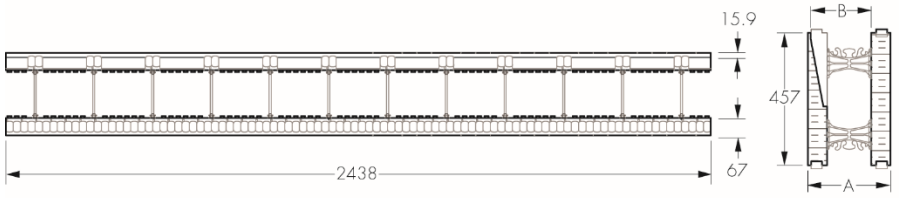
90° corner form

Nominal concrete core (mm)	Dimension (mm)		
	A	B	C
102	397	803	235
152	397	803	286
203	448	854	337
254	498	905	387
305	549	956	438



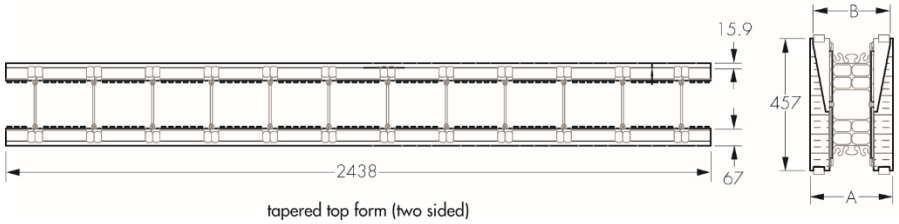
45° corner form

Nominal concrete core (mm)	Dimension (mm)		
	A	B	C
102	267	673	235
152	267	673	286
203	267	673	337
254	318	724	387
305	368	775	438



tapered top form (one sided)

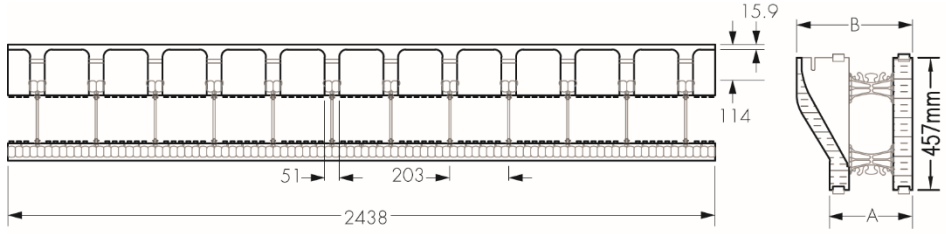
Nominal concrete core (mm)	Dimension (mm)	
	A	B
102	235	152
152	286	203
203	337	254
254	387	305
305	438	356



tapered top form (two sided)

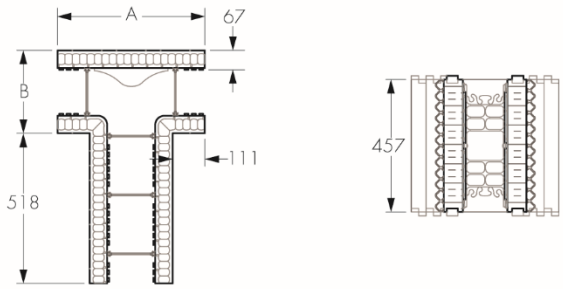
Nominal concrete core (mm)	Dimension (mm)	
	A	B
102	235	203
152	286	254
203	337	305
254	387	356
305	438	406

Figure A1 Standard component details (all dimensions in mm) (continued)



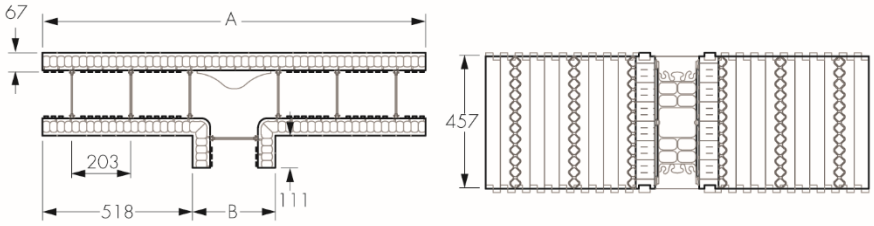
brick ledge form

Nominal concrete core (mm)	Dimension (mm) A	B
102	235	349
152	286	400
203	337	451
254	387	502
305	438	552



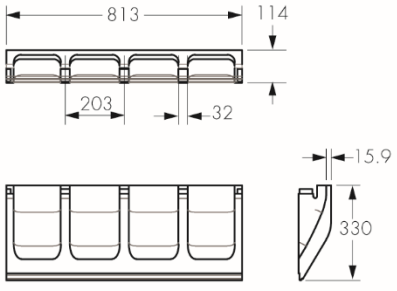
long T-form unit

Nominal concrete core (mm)	Dimension (mm) A	B
102	457	235
152	508	286
203	559	337
254	610	387
305	660	438

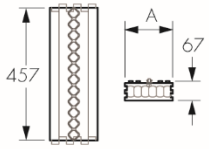


short T-form unit

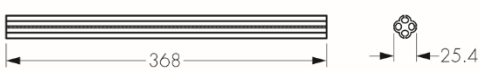
Nominal concrete core (mm)	Dimension (mm) A	B
102	1270	235
152	1321	286
203	1372	337
254	1422	387
305	1473	438



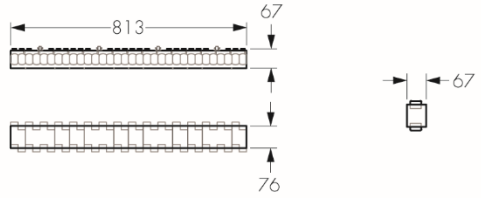
brick ledge extention



standaard end cap with fastening strip

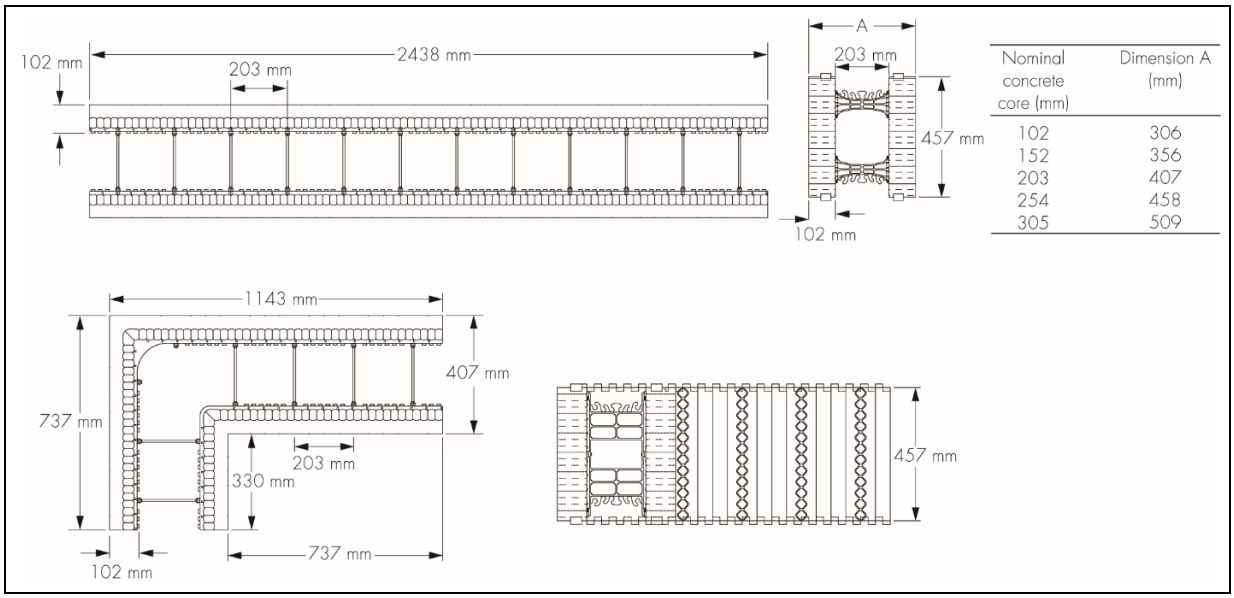


four-way web connector



height adjuster with fastening strips

Figure A2 NUDURA XR-35 details

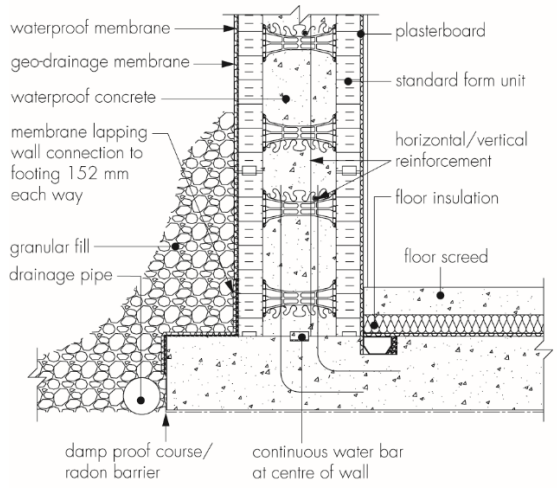


Nominal concrete core (mm)	Dimension A (mm)
102	306
152	356
203	407
254	458
305	509

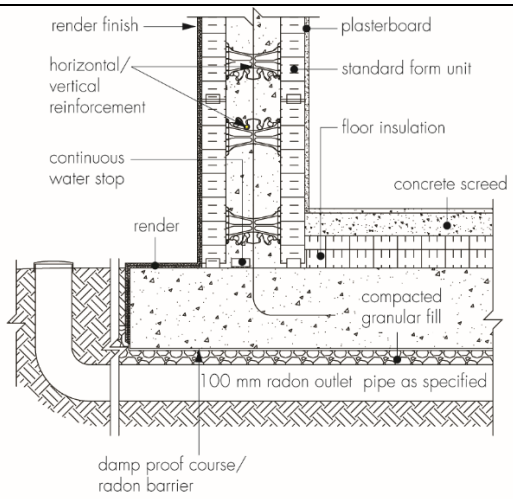
Note: 203 mm XR-35 core forms shown, other core widths as listed are available

ANNEX 2 CONSTRUCTION DETAILS

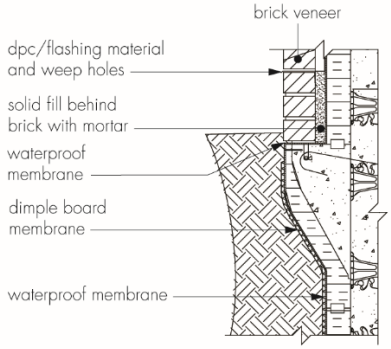
Figure A3 Typical construction details



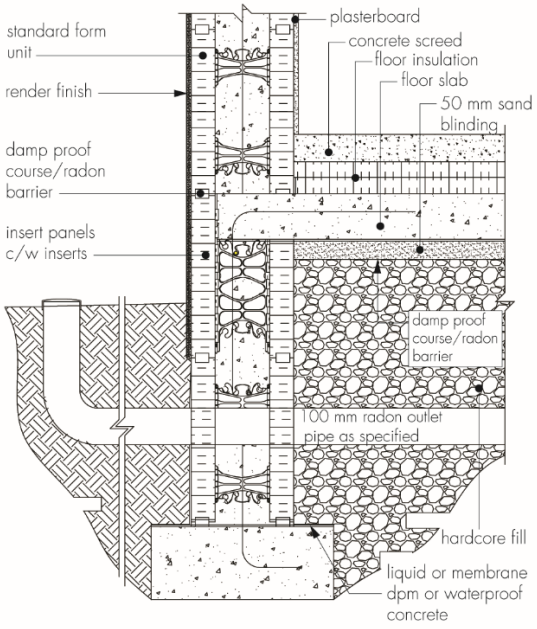
Typical bearing slab/basement foundation



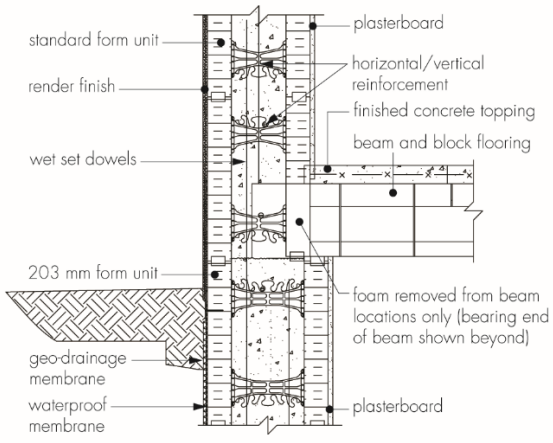
Typical raft slab foundation detail



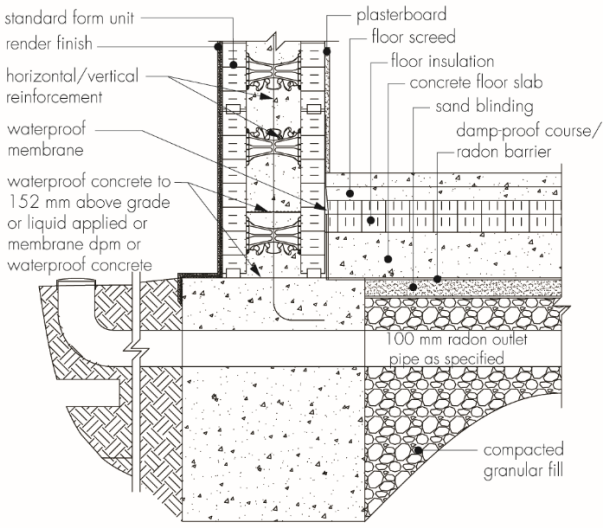
Typical sub-grade brick ledge detail



Typical strip footing foundation detail

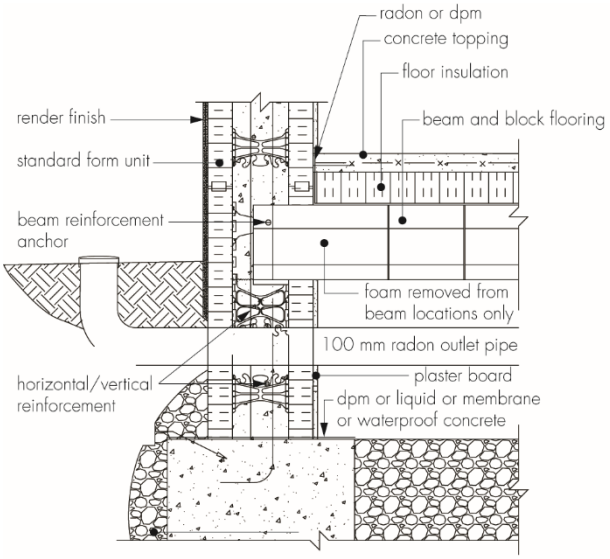


Typical block and beam floor

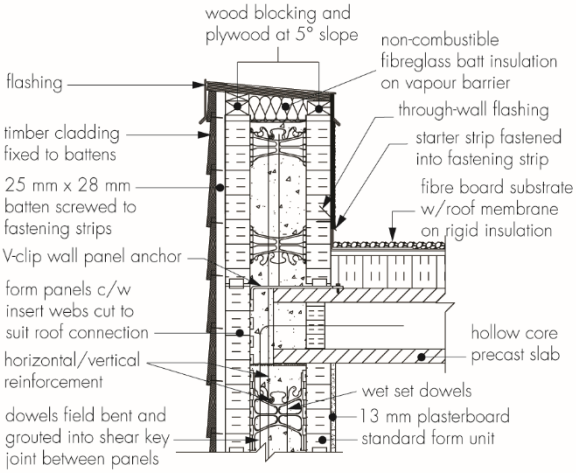


Typical foundation detail

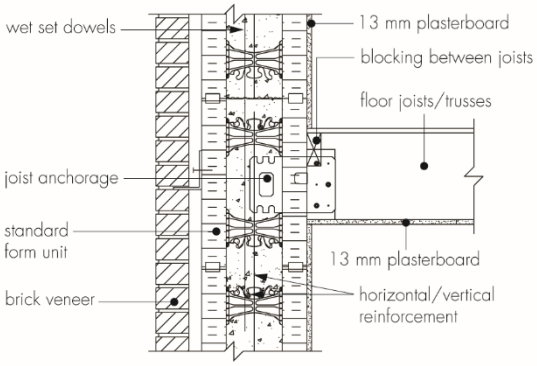
Figure A3 Typical construction details (continued)



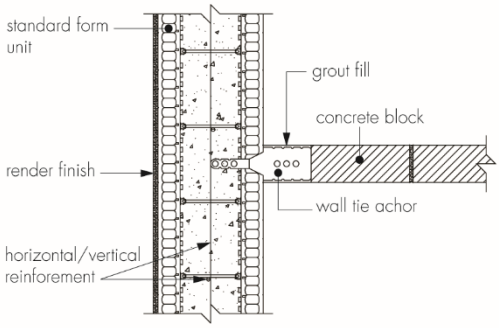
Typical block and beam floor connection



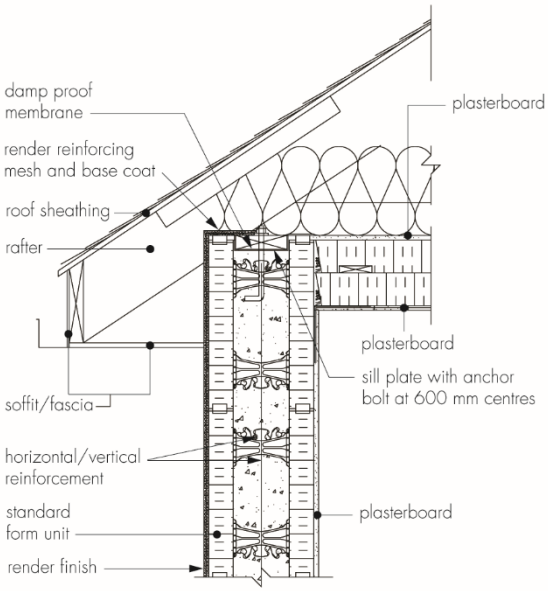
Typical flat roof connection



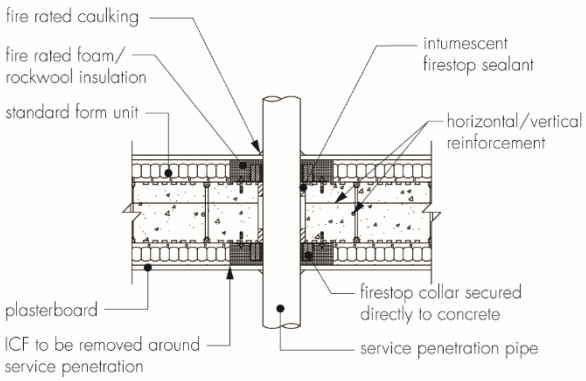
Typical intermediate floor connection



Typical block partition wall connection detail (plan view)

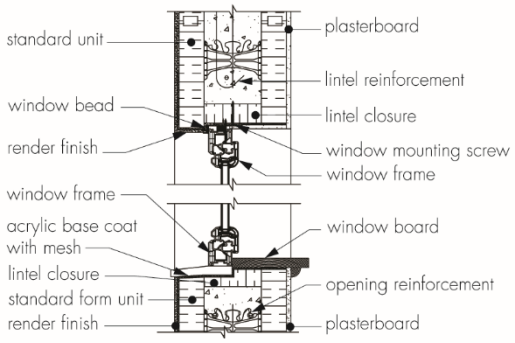


Typical roof rafter detail at top plate

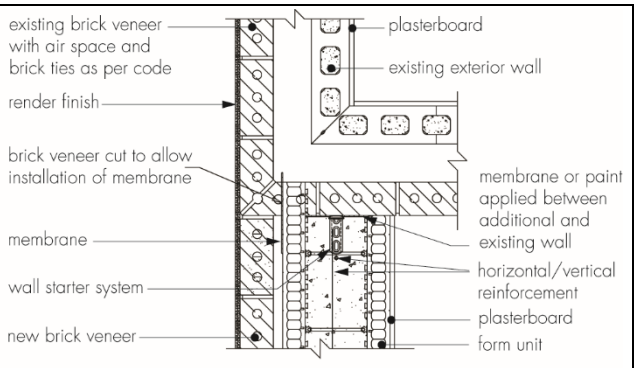


Typical firewall service penetration

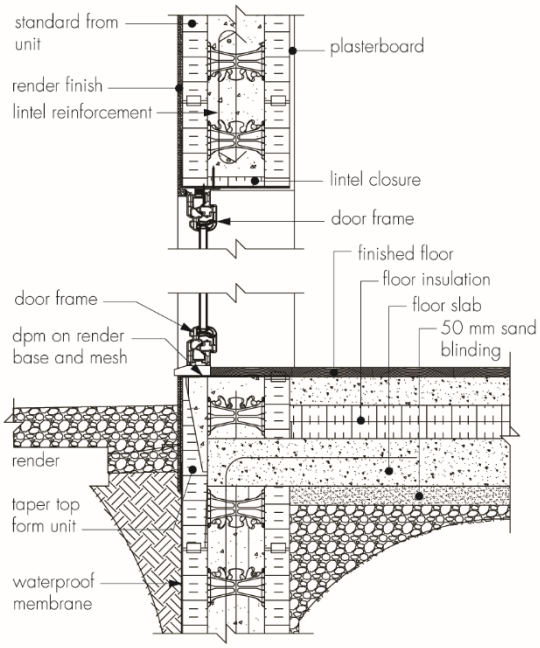
Figure A3 Typical construction details (continued)



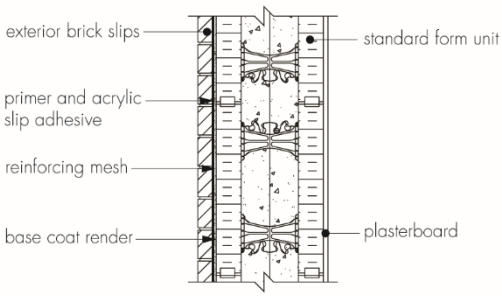
Typical window head and sill detail



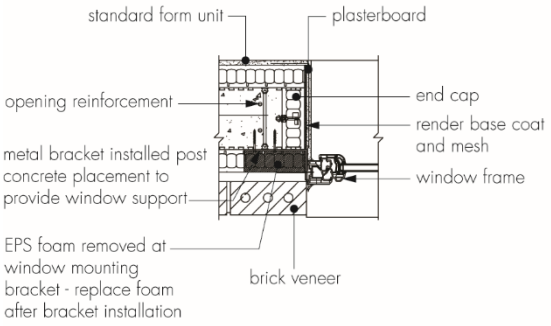
Typical additional to existing building detail (plan view)



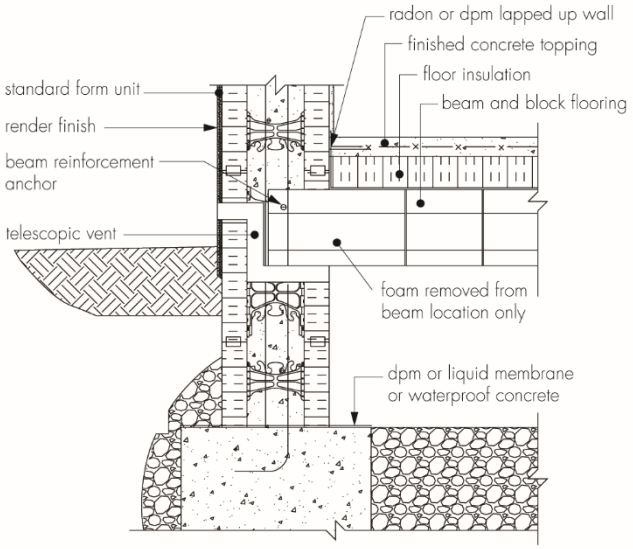
Typical door head and sill detail



Typical brick slip exterior finish detail



Typical window jamb detail (plan view)



Typical block and beam connection at grade

The ETA holder provides a complete set of construction details in their installation manual.

ANNEX 3 PRODUCT PERFORMANCE

Table A3 Product performance and characteristics

Property	Performance
Structural pattern	Continuous
Filling efficiency	Satisfactory
Steel reinforcement	Possible
Reaction to fire (Insulation)	Class E to EN 13501-1 : 2003
Dangerous substances	None
Water vapour permeability	A μ design value of 60 for the EPS based on EN 12524 : 2000
Filling pressure resistance	Formwork needs verticality adjustment/checks during filling
Thermal properties	Thermal conductivity for EPS based on BBA test data to EN 12667 : 2001 is $\lambda_{90/90}$ = 0.036 $W \cdot m^{-1} \cdot K^{-1}$