ETA-Danmark A/S
Göteborg Plads 1
DK-2150 Nordhavn
Tel. +45 72 24 59 00
Fax +45 72 24 59 04
Internet www.etadanmark.dk

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

European Technical Assessment ETA-13/0614 of 2019/03/12

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:	Jackon Thermomur 250X, 350, 350 HD, 350 Super & 450
Product family to which the above construction product belongs:	Non load-bearing permanent shuttering system based on shuttering elements of EPS
Manufacturer:	Jackon Danmark A/S Lundagervej 20 DK-7622 Hedensted Tel. +45 76 74 16 11 Internet www.jackon.dk
Manufacturing plant:	Jackon AS Sørkilen 3 No-1602 Frederikstad
This European Technical Assessment contains:	19 pages including 1 annex 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:	ETAG 009 for Non load-bearing permanent shuttering kits/systems based on hollow blocks or panels of insulating materials and sometimes concrete used as an EAD
This version replaces:	The ETA with the same number and issued on 2015-01-08

II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of product and intended use

Technical description of the product
Jackon Thermomur 250X, 350, 350 HD, 350 Super & 450 is a non-load bearing permanent shuttering system based on elements made of EPS and HDPE with rib parts of HDPE (see Annex 1) applicable as formwork for reinforced concrete walls cast in-situ.

The shuttering elements consist of two one-layered, 50-200 mm thick expanded polystyrene (EPS) leaves. High density polyethylene (HDPE) rail anchors are integrated in the shuttering leaves when they are moulded. The rail anchors are vertical and serve as clamps for fastening of gypsum, plywood or wood battens.

The upper and lower surfaces of the shuttering leaves are staggered to ensure precise locking between the elements. The outer and inner surfaces as well as the vertical end surfaces of the shuttering elements are smooth.

The distance between the rail anchors are 150 mm. The rail anchors are visible at the inner and outer surface of the shuttering elements were the spacers are fastened. The rail anchors provide a concrete thickness of 150 mm.

The shape of the spacers makes them suitable for precise location of the reinforcement bars for the concrete and secures a correct position of the reinforcement.

The kit consists of the following elements:
- standard shuttering elements – Top element – Half element
- Corner elements
- Extended foundation shuttering leaves

For the shuttering leaves expanded polystyrene particle foam designated EPS-EN13163:2012 T2-L3-W3-Sb2-P3-BS250-DS(N)5-CS (10)150 according to EN 13163 is used.

The tensile strength of the EPS-leaves perpendicular to faces shall be more than 100 kPa (TR100, according to EN 13163) and the relative changes in length, width and thickness under specified constant normal conditions shall not exceed more than ± 0,5 % according to EN 13163 (EN 1603).

The apparent density ρ_a of the EPS-leaves is in the range between 23 and 30 kg/m³ according EN 13163 and the modulus of shear according EN 12090 shall be at least 1,0 MPa and must not exceed 3,8 MPa.

The declared value of thermal conductivity is $\lambda D = 0.031$ W/mK (for Thermomur Super) and $\lambda D = 0.035$ W/mK, for the other variants, according EN 13163.

The material characteristics, dimensions and tolerances of the shuttering elements not indicated in Annex 1 are given in the technical documentation of the ETA.

The technical documentation of the ETA is deposited with ETA-Danmark and, as far as relevant for the tasks of the approved bodies involved in the attestation of conformity procedure, is handed over to the approved bodies.

Assembly of the shuttering kit is done at the construction site.

2 Specification of the intended use in accordance with the applicable EAD

The kit is intended to be used for the construction of internal walls as well as external walls above or below ground which are load-bearing (structural) or non-loadbearing (non-structural), including those which are subject to fire regulations.

When using this type of construction below ground, a waterproofing according to applicable national rules shall be provided depending on whether ground water not exerting pressure or ground water exerting pressure is to be dealt with. The waterproofing shall be protected from mechanical damage by a smash-resistant protective layer.

The ETA is issued for the shuttering kit's "Jackon Thermomur 250X, 350, 350 HD, 350 Super & 450" on the basis of agreed information, deposited with ETA-Danmark, which identifies the shuttering kit that has been assessed and evaluated. Changes to the production process, the kit or the components which could result in this deposited information being incorrect, shall be notified to ETA-Danmark before the changes are introduced. ETA-Danmark will decide whether or not such changes affect the ETA and consequently the shuttering leaves into the rail anchors is possible for external cladding and internal gypsum boards and linings. The part of fixings which is relevant for the mechanical resistance shall be in the concrete.

The provisions made in this European technical assessment are based on an assumed working life of the shuttering kit of at least 50 years.

The indications given on the working life cannot be interpreted as a guarantee given by the producer or Assessment Body, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

For the intended use it is essential to protect this type of construction against effects of the weather.

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

Characteristic	Assessment of characteristic
3.1 Mechanical resistance and stability (BWR 1)	
Resulting structural pattern	In end use conditions walls made with shuttering elements Jackon Thermomur 250X, 350, 350 HD, 350 Super & 450 are continuous type concrete walls.
Efficiency of filling	Considering the instructions in the installation guide of the ETA holder the efficient filling of concrete without bursting of the shuttering and without voids or any uncovered reinforcement in the concrete core is possible, and the requirements according EAD 17-34-0309 2.2.2 are considered satisfied.
Possibility of steel reinforcement	The instructions in the installation guide of the ETA holder are appropriate to install steel reinforcement for walls according to EN 1992-1-1 or corresponding national rules. The requirements according to EAD 17-34-0309; 2.2.3 are met satisfactorily.
3.2 Safety in case of fire (BWR 2)	
Reaction to fire	No performance is assessed for Jackon Thermomur 250X, 350, 350 Super & 450
Resistance to fire	The walls will be exposed to the fire on only one side. For a continuous type of load-bearing walls ("REI") or non-loadbearing walls ("EI"); a minimum concrete strength of C 20/25 (according to EN 206) the system meets the criteria for **REI90 and EI90** for elements with a concrete core thickness of 150 mm The design of the building has to take into consideration the secondary effects of fire. Especially constraints, introduced by thermal strain, should be sufficiently low and appropriate building joints should be foreseen. Structural requirements under normal conditions, valid in the place of use, may require larger dimensions. Concrete cover for the reinforcement has to be observed according to the rules valid in the place of use[1]
3.3 Hygiene, health and the environment (BWR 3)	
Content, emission and/or release of dangerous substances	According to the manufacturers declaration the shuttering elements Jackon Thermomur 250X, 350, 350 HD, 350 Super & 450 contain no substances according to EOTA TR034, §2.1, taking into account the installation conditions of the construction product and the release scenarios resulting from there.
Water vapour permeability	The tabulated design value of the water vapour diffusion resistance coefficient of expanded polystyrene (EPS) according to EN 12524 is **μ = 60.**

1 *The classifications of the walls constructed with the shuttering system "Jackon Thermomur 250X, 350, 350 HD,350 Super & 450" regarding to fire resistance are valid only for walls without openings (for windows or doors for examples).*

Characteristic	Assessment of characteristic
	Using this value to verify the annual moisture balance or the maximum amount of interstitial condensation according to EN ISO 13788 will be on the safe side. The values for the water vapour diffusion resistance of concrete depending on density and type are tabulated in EN 12524
Water absorption	No performance assessed
Watertightness	No performance assessed
3.4 Safety and accessibility in use (BWR 4)	
Bond strength and resistance to impact load	No performance assessed
Resistance to filling pressure	The requirements according to EAD 17-34-0309; 2.2.11are met satisfactorily. To resist the filling pressure the bending tensile strength of the EPS-shuttering leaves shall be more than 250 kPa. The pull-out strength between HDPE-spacers and EPS-shuttering leaves shall be at least 484 N.
Safety to personal injuries	Delivered on site, the shuttering elements do not have sharp or cutting edges. Because of the soft surface of the shuttering leaves there is no risk of abrasion or of cutting people.
3.5 Protection against noise (BWR 5)	
Airborne sound insulation	No performance assessed
Sound absorption	No performance assessed
3.6 Energy economy and heat retention (BWR 6)	
Thermal transmittance	Assessment of the thermal conductivity of EPS has been done according to EN 13163. The declared value of thermal conductivity is 0.031 W/mK (for Thermomur Super) and λD = 0.035 W/mK, for the other variants**.** The table below shows the thermal transmittance of the elements in end use conditions (with concrete infill and rendering applied on the outside of the EPS surface), calculated in accordance with EN ISO 69469 from the declared value of thermal conductivity λ_D = 0.031 W/mK according to EN 13163 for the shuttering leaves. The thermal conductivity of the concrete core, gypsum board and wood are according to EN 12524.

Characteristic	Assessment of characteristic

Wall structure, outer wall	U-value [W/m²K]
Jackon Thermomur 250x	0,180-0,305
Jackon Thermomur 350	0,121-0,166
Jackon Thermomur 350 HD	0,145-0,217
Jackon Thermomur 350 Super	0,111-0,148
Jackon Thermomur 450	0,090-0,113

Thermal inertia

No performance assessed

3.7 Sustainable use of natural resources (BWR 7)

Resistance to deterioration

The requirements according to EAD 17-34-0309; 2.2.17 are met satisfactorily.

Physical agents
The relative changes of the EPS-leaves in length, width and thickness under specified constant normal conditions shall not exceed more than ± 0,5 % DS(N)5 according to EN 13163 (EN 1603).

Chemical agents
Spacers are made of polyethylene. There is no corrosion of spacer in concrete.
The finishes of the wall are not part of the ETA. Assessment of the cleaning agent of the surface is not possible.

Biological agents
The application of EPS as thermal insulating material for decades has shown that it sufficiently protects against fungi, bacteria, algae and insects.

EPS does not provide a food value and in general it does not contain voids suitable for habitation by vermin.

Resistance to normal use damages

Concrete walls (without consideration of the finishes), erected with shuttering system Jackon Thermomur 250X, 350, 350 HD, 350 Super & 450 and designed according EN 1992-1-1 respectively in lack of availability of EN 1992-1-1 according national design rules, lead to the assumption that concrete infill insures an adequate resistance of the complete wall under normal used impact loads.

Incorporation of ducts
The instructions in the installation guide of the ETA holder are appropriate to produce horizontal perforations through the walls. The voids for horizontally passing ducts are made on-site; the voids diameter shall coincide with the diameter of the duct, before placing the concrete the ducts are installed in the voids

Characteristic	Assessment of characteristic
	Fixings of objects Fixing of objects in the shuttering leaves into the rail anchors is possible for external cladding and internal gypsum boards and linings. The part of fixings which is relevant for the mechanical resistance shall be in the concrete.

*) In accordance with http://europa.eu.int-/comm/enterprise/construction/internal/dangsub/dangmain.htm In addition to the specific clauses relating to dangerous substances contained in this European Technical Approval, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Products Directive, these requirements need also to be complied with, when and where they apply.

Aspects related to the performance of the product

The European technical assessment is issued for the product on the basis of agreed data/information, deposited with the ETA-Danmark, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to ETA-Danmark before the changes are introduced. ETA-Danmark will decide whether or not such changes affect the assessment and consequently the validity of the CE marking on the basis of the assessment and if so whether further assessment or alterations to the assessment shall be necessary.

3.8 Aspects related to the performance of the product

The shuttering elements are manufactured in accordance with the provisions of the European technical assessment using the automated manufacturing process laid down in the technical documentation.

The manufacturer shall ensure that the requirements in accordance with sections 1, 2, and 4 are made known to those involved in planning and execution. The installation guide is deposited with ETA-Danmark and shall be present at every construction site. If the manufacturer's instructions contain provisions which differ from those stated here, the specifications of the ETA shall apply.

After installation of the shuttering elements the site-mixed or ready mixed concrete is brought in and compacted.
In end use conditions concrete walls of a continuous type of plain or reinforced concrete will be formed according to EN 1992-1-1 or according to corresponding national.

In end use conditions the EPS-shuttering leaves are the main part of the thermal insulation of the walls.

Shuttering elements
The shuttering elements are put together on site in layers without mortar or adhesive. To receive stable floor high formworks the vertical joints between two elements of one layer have to be shifted of at least 25 cm to the vertical joints of the previous and next layer. It is important to ensure that the HDPE-spacers are aligned one above the other.

First of all, two layers of the entire floor plan shall be interlocked according to the installation guide of the ETA holder.

Afterwards leveling to the subsoil is performed (foundation, bottom plate, and slabs). Voids between the shuttering leaves and the uneven subsoil shall be sealed with PU foam before concreting.

The HDPE-spacer shall be stacked (one upon the other) for avoiding segregation of concrete.

Subsequently, according to the installation guide of the ETA holder, the walls shall be interlocked to floor height, leveled and fastened to pull-push props (scaffolding supports).

The pull-push props shall be arranged at a distance of 3,0 m, to be connected over the entire wall height with the shuttering elements and to be fastened to the floor.

The necessary reinforcement according to the structural analysis shall also be installed in an appropriate way.
Corner shuttering elements and T shuttering elements shall be formed according to the manufacturers installation manual.

The values of thermal transmittance respectively thermal conductivity shall be laid down according to the relevant national technical regulation.

Further information is given in the installation manual.

Concreting
For the production of normal concrete with a minimum compressive strength class C20/25 EN 206-1 shall apply. The consistency of concrete on compacting by shaking shall be within the lower consistency range F3 and on compacting by poking within the upper consistency range F3. The maximum aggregate size shall be at least 4 mm and shall not exceed 16 mm. The concrete shall have rapid or middle strength development according to EN 206-1, Table 12.

Placing the concrete shall be performed only by persons who were instructed in the functions and in the proper handling of the shuttering system.

Placing the concrete shall be performed in layers of 0.90 m at a maximum vertical concreting rate of 1.0 m/h.
If equivalent national rules are not available the following instructions shall be considered:

Before the further placing of concrete, cement laitance and detached / loose concrete shall be removed and the day joints shall be sufficiently pre-wetted. At the time of concreting the surface of the older concrete shall be slightly moist, so that the cement paste of the newly brought in concrete can bond well with the older concrete.

If no day joint is planned, placing of the concrete in layers may only be interrupted until the concrete layer brought in last is not solidified yet, so that a good and even bond is still possible between the two concrete layers. When using suitable internal vibrators care shall be taken that the vibrating cylinder can still penetrate the already compacted lower concrete layer.

The concrete may fall freely only up to a maximum height of 2 m, beyond that the concrete shall be placed by discharge pipes or concreting tubes with a diameter of 100 mm at the most and shall be led directly to the place of installation.
Cones from pouring shall be avoided by short distances of the places of fill in.

Planning shall allow for sufficient spaces in the reinforcement for discharge pipes or concreting tubes.

After concreting, the walls may not deviate from the plumb line more than 5 mm per running meter wall height, respectively for a wall height greater than 3.0 m not more than 16 mm.

The floor slab may only be placed on walls made of shuttering elements if a sufficient strength of the infill concrete has been reached.

Ducts crossing and situated inside the wall
Horizontally passing ducts shall be installed according to the installation guide of the ETA holder and shall be taken into account when designing the wall.

Horizontal ducts situated inside the wall cores shall be avoided. If absolutely necessary, these shall be taken into account when designing the wall.
Also, vertical ducts in the concrete core shall be considered, if their diameter exceeds 1/6 of the thickness of the concrete core and the distance of the pipes is less than 2 m.

Reworking and finishes
Walls of the type Jackon Thermomur 250X, 350, 350 HD, 350 Super & 450 shall be protected by finishes (e. g. rendering, plasters, cladding, paneling, coatings). Finishes are not part of the kit and therefore not considered in this ETA. Preferably, for external surfaces the used rendering systems should meet the requirement of EAD 040083-00-0404. The cladding respectively paneling or their substructures shall be anchored in the concrete core or the rail anchors depending on the imposed loads. The execution of the rendering shall be performed according to applicable national rules.

The protection by finishes should be implemented preferably within one month after erecting the structural structure, because of the detrimental influence of weather and UV-radiation on the surface of the EPS-leaves.

Fixing of objects
Fixing of objects in the shuttering leaves is possible for external cladding and internal gypsum boards and linings by screws into the rail anchors. The part of fixings which is relevant for the mechanical resistance shall be in the concrete core. The influence of the fixing to the reduction of the thermal resistance has to be considered according to EN ISO 6946.

4 Attestation and verification of constancy of performance (AVCP)

4.1 AVCP system

According to the decision 2003/655/EC of the European Commission as amended, the system(s) of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) is 2+.

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

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ETA-Danmark prior to CE marking.

Issued in Copenhagen on 2019-03-012 by

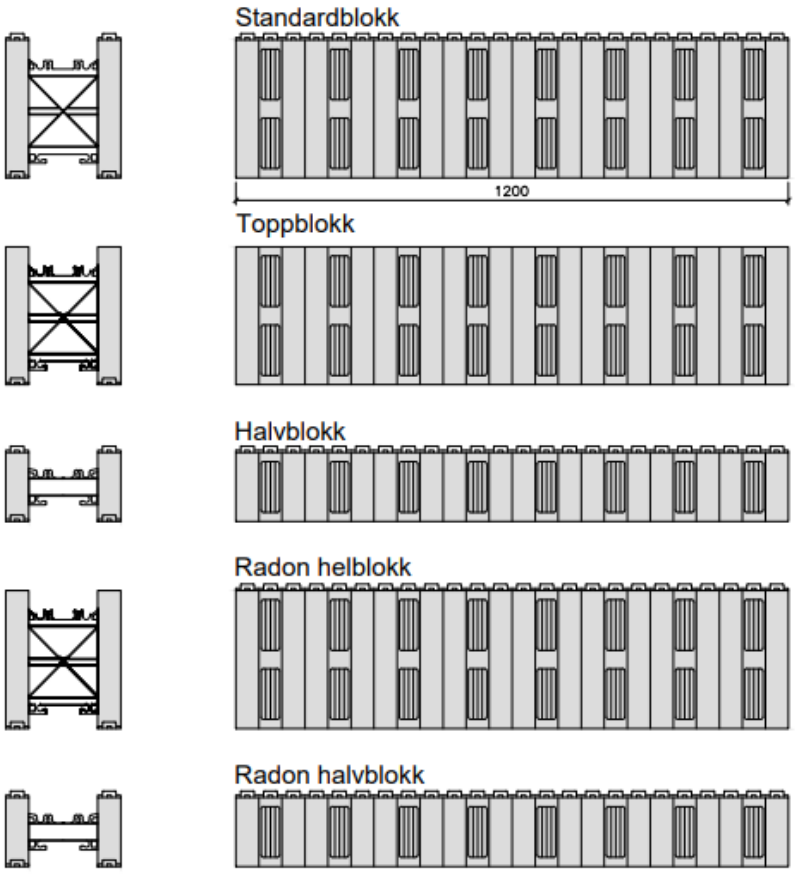
Thomas Bruun
Managing Director, ETA-Danmark

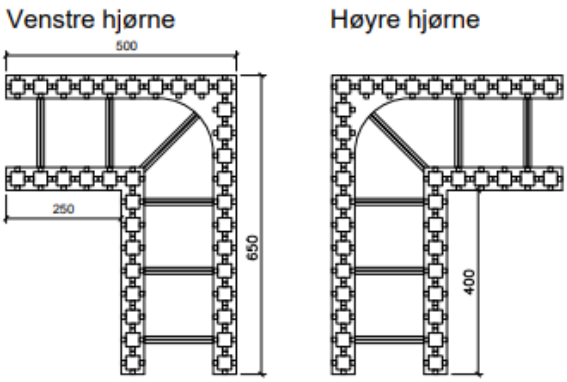
Annex 1
Components and materials

EPS

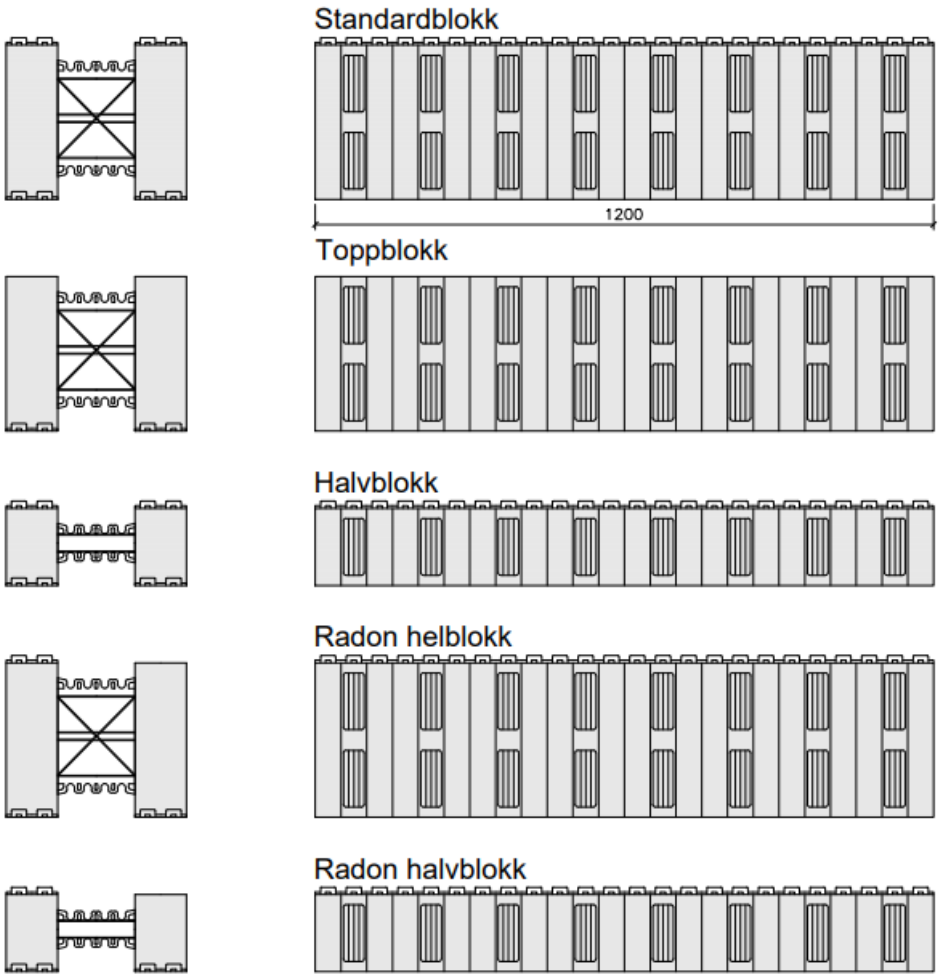
Material characteristics for the EPS:
Bending strength $\sigma_b \geq 250$ kPa according to EN 12089
Dimension stability change ≤ 0,5 % according to EN 13163 and EN 1603
Compressive stress at 10% relative deformation $\sigma_{10} \geq 150$ kPa according to EN 826

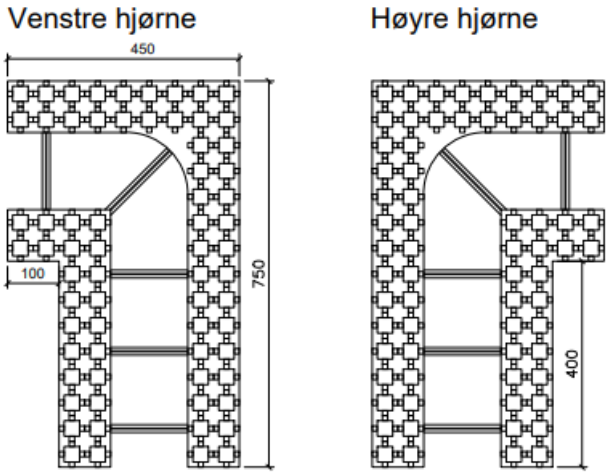
Jackon Thermomur 250X



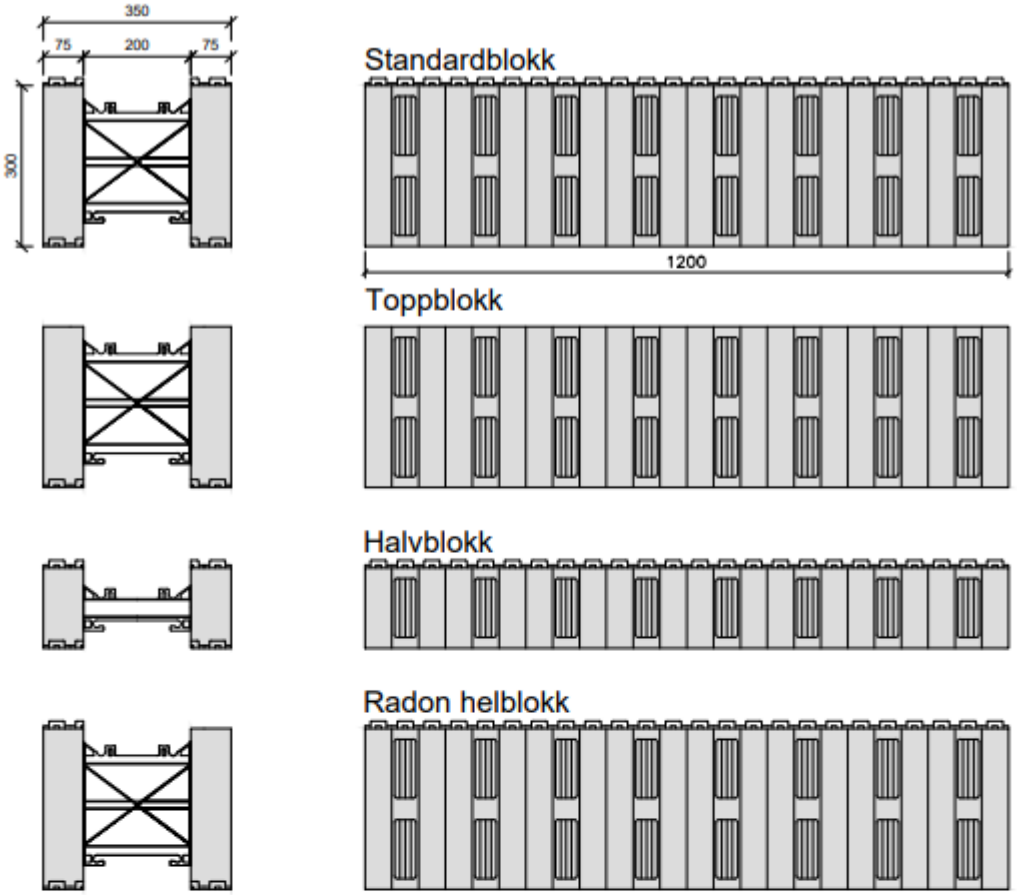


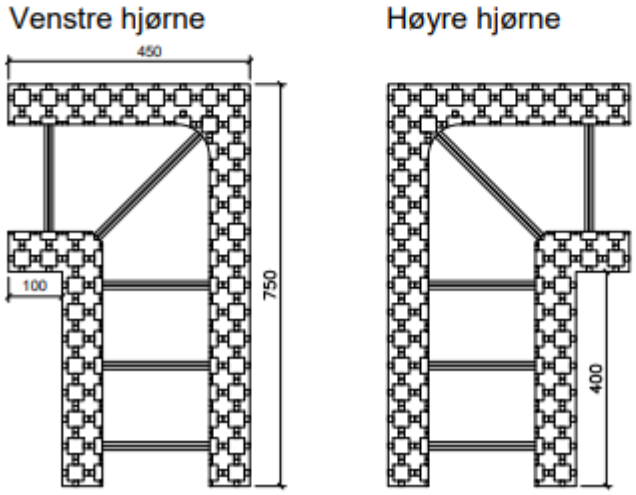
Jackon Thermomur 350 & 350 Super



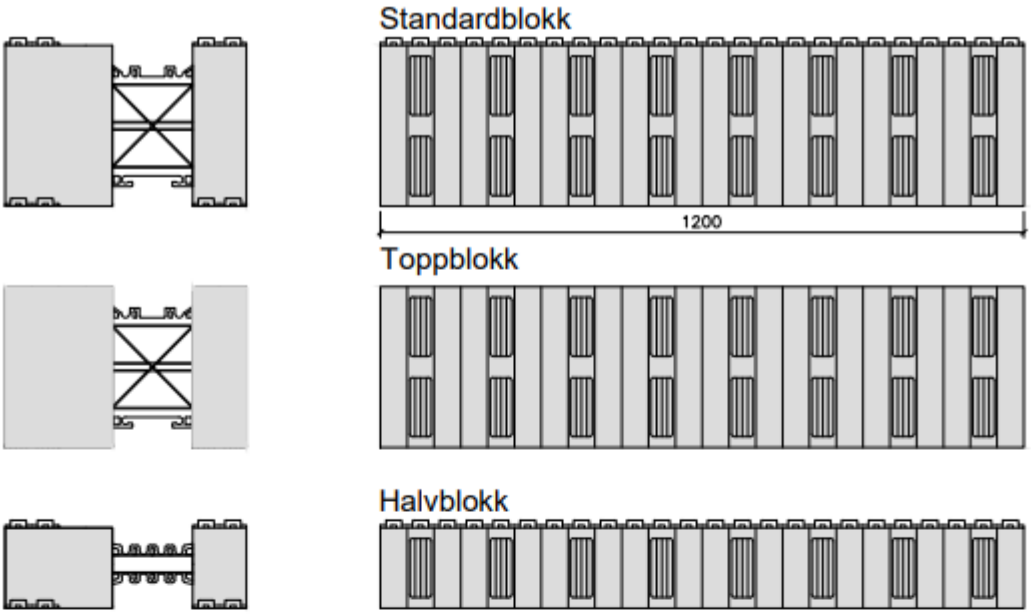


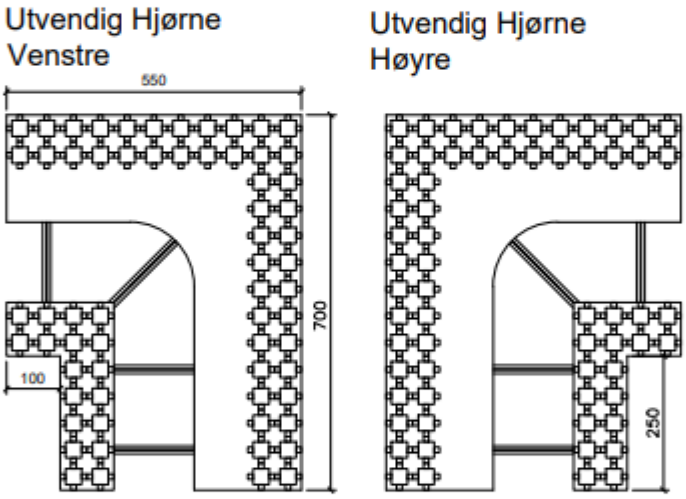
Jackon Thermomur 350 HD

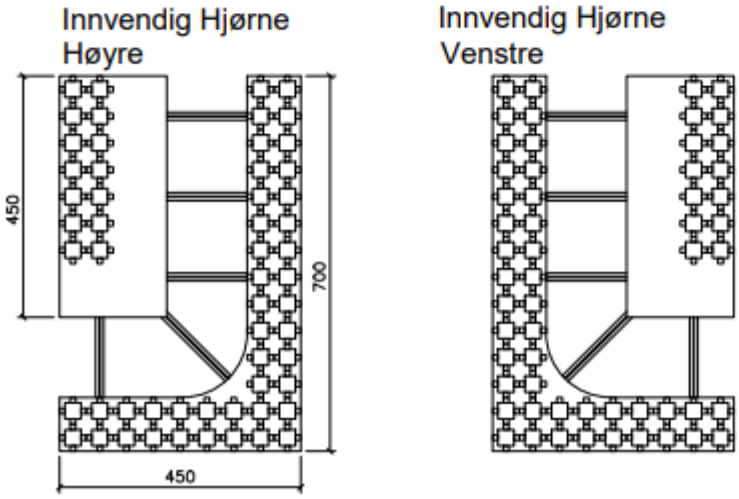




Jackon Thermomur 450



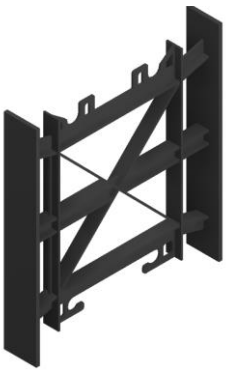


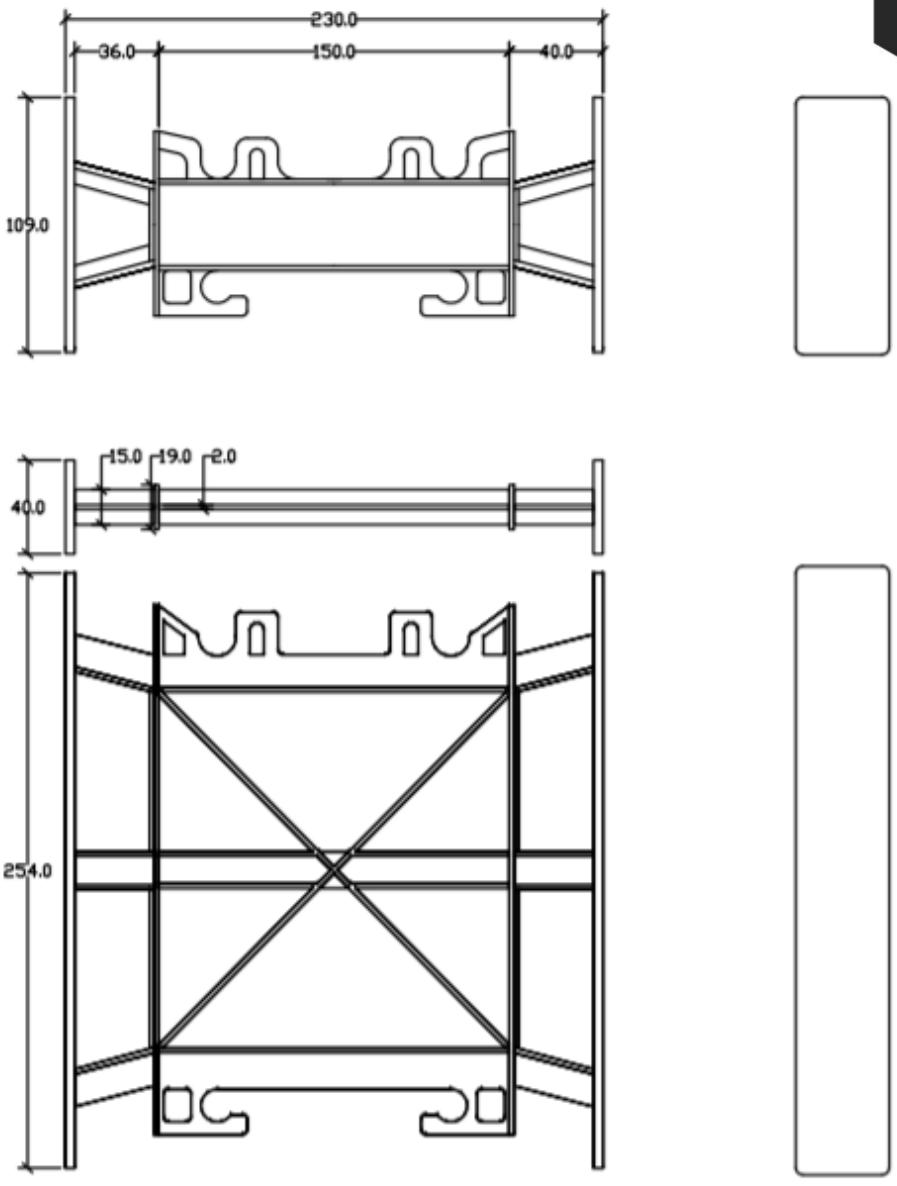


Spacer

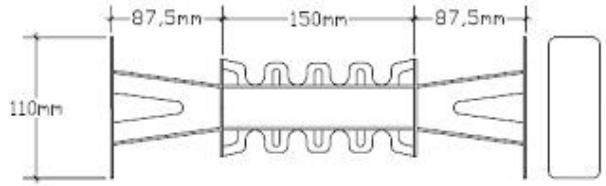
Material characteristics for HDPE:
Yield strength (tensile stress at yield) $\sigma_y \geq 19$ MPa According to EN 12311-2
Young's Modulus ≥ 1100 MPa According to ISO 527-1
Screw pull out ≥ 330 N

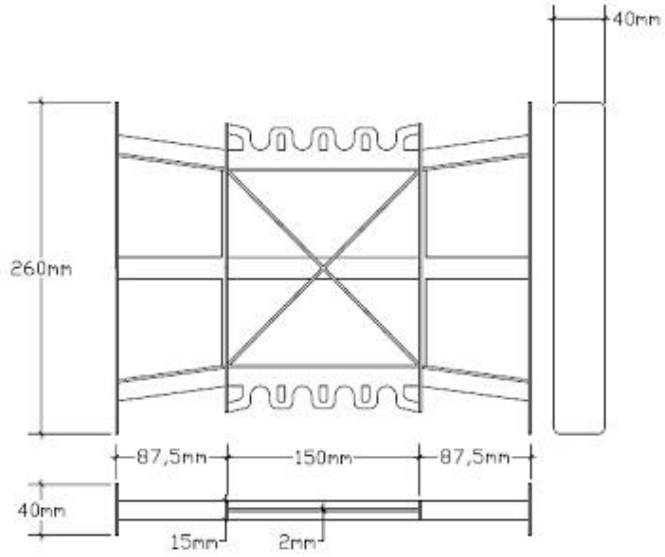
Jackon Thermomur 250X



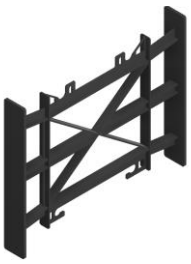


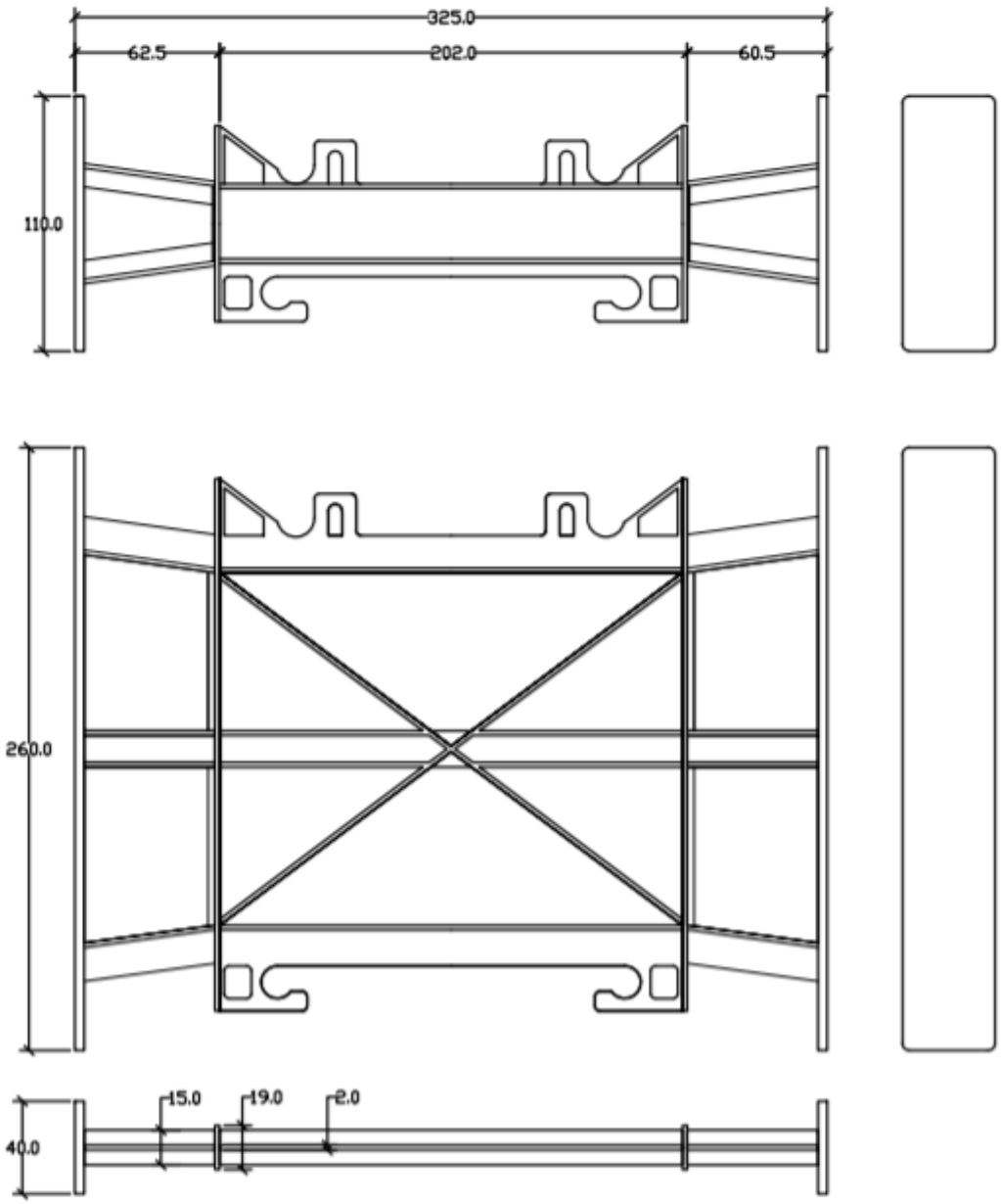
Jackon Thermomur 350 & 350 Super





Jackon Thermomur 350 HD





Jackon Thermomur 450