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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-15/0018 of 2015-01-05

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:

GH Clip Fix connectors

Product family to which the
above construction product
belongs:

Three-dimensional nailing plate (timber-to-timber
connectors for wind bracing systems)

Manufacturer:

GH-Baubeschläge GmbH
Austraße 34
D-73235 Weilheim/Teck
Tel. +49 7023 743323 0
Fax +49 7023 743323 90
Internet www.holzverbinder.de

Manufacturing plant:

GH-Baubeschläge GmbH
Manufacturing plant I

This European Technical
Assessment contains:

24 pages including 2 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:

Guideline for European Technical Approval (ETAG) No.
015 Three Dimensional Nailing Plates, April 2013, used
as European Assessment Document (EAD).

This version replaces:

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II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of product and intended use

Technical description of the product

The connectors are multi piece, welded and non-welded connectors. They are intended for timber-to-timber connections fastened with screws.

The connectors are made from brass and pre-galvanized steel Grade S 235 GD + min. Z275 (DX51D + Z275) and other specified steel qualities and surface treatments, specified by the holder of the ETA.

This assessment covers the performance of the anchor plates used for the connection between the timber elements and bracing strap, the tensions traps, couplers, various connectors for battens. The assessment does not cover the connections to the foundations, as these will be designed in the individual projects based on the prevailing regulations

Dimensions, hole positions and typical installations are shown in Annex A.

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

The anchor plates are intended for use in making wind bracing connections in load bearing structures, typically as a connection in stabilizing structures between two timber members or between a timber member and a concrete or steel member, where requirements for mechanical resistance and stability and safety in use in the sense of the Basic Works Requirements 1 and 4 of Regulation 305/2011 (EU) shall be fulfilled.

The wood members can be of solid timber, glued laminated timber and similar glued members, or wood-based structural members with a characteristic density of 320 kg/m³.

This requirement to the material of the wood members can be fulfilled by using the following materials:

- Solid timber classified to C18-C40 according to EN 338 / EN 14081.
- Glued members of timber classified to C18 – C40 according to EN338.
- Glued laminated timber classified to GL24c or better according to EN 1194 / EN 14080.
- Laminated Veneer Lumber LVL according to

EN 14374.

- Laminated Strand Lumber, e.g. Parallam and Timber Strand.

Annex B states the load-carrying capacities of the connections for a characteristic density of 320 kg/m³.

For timber or wood based material with a lower characteristic density than 320 kg/m³ the load-carrying capacities shall be reduced by the k_{dens} factor:

$$k_{dens} = \left(\frac{\rho_k}{320} \right)^{0,5}$$

Where ρ_k is the characteristic density of the timber in kg/m³.

The design of the connections shall be in accordance with Eurocode 5 or a similar national Timber Code. The wood members shall have a thickness which is larger than the penetration depth of the screws into the members and shall also fulfill the minimum sizes mentioned in the tables of Annex B.

The connectors are primarily for use in timber structures subject to the dry, internal conditions defined by service class 1 and 2 of Eurocode 5 and for connections subject to static or quasi-static loading.

The scope of the connectors regarding resistance to corrosion shall be defined according to national provisions that apply at the installation site considering environmental conditions. Section 3.11 of this ETA contains the corrosion protection for connectors made from carbon steel.

The provisions made in this European Technical Assessment are based on an assumed intended working life of the connectors of 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.

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

Characteristic	Assessment of characteristic
3.1 Mechanical resistance and stability (BWR1)*)	
Characteristic load-carrying capacity	See Annex B
Stiffness	No performance determined
Ductility in cyclic testing	No performance determined
3.2 Safety in case of fire (BWR2)	
Reaction to fire	The connectors are made from steel classified as Euroclass A1 in accordance with EN 1350-1 and EC decision 96/603/EC, amended by EC Decision 2000/605/EC
3.3 Hygiene, health and the environment (BWR3)	
Influence on air quality	The product does not contain/release dangerous substances specified in TR 034, dated March 2012
3.7 Sustainable use of natural resources (BWR7)	No Performance Determined
3.8 General aspects related to the performance of the product	The connectors have been assessed as having satisfactory durability and serviceability when used in timber structures using the timber species described in Eurocode 5 and subject to the conditions defined by service class 1 and 2
Identification	See Annex A

*) See additional information in section 3.9 – 3.12.

In addition to the specific clauses relating to dangerous substances contained in this European technical Assessment, 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 Construction Products Regulation, these requirements need also to be complied with, when and where they apply.

3.9 Methods of verification

Safety principles and partial factors

The characteristic load-carrying capacities have been determined by testing and subsequent calculation according to Eurocode 5, without considering different ratios between the partial factors for timber connections and steel cross sections. Therefore, in the end use calculation based on this ETA, this shall be considered.

According to clause 6.3.5 of EN 1990 (Eurocode – Basis of structural design) the characteristic resistance for structural members that comprise one material acting in association should be calculated as

$$R_d = (k_{mod} \times R_k) / \gamma_M$$

where γ_M is the partial safety factor for wood connections

3.10 Mechanical resistance and stability

See annex B for characteristic load-carrying capacity of the anchor plates at 25 and 45 degree angles.

The characteristic capacities of the angle brackets are determined by testing as described in the EOTA Guideline 015 clause 5.1.2. They should be used for designs in accordance with Eurocode 5 or a similar national Timber Code.

Screws and nails in accordance with ETA-13/0523

The load bearing capacities of the brackets has been determined based on the use of GH Screws 5,0 x 40 mm

No performance has been determined in relation to ductility of a joint under cyclic testing. The contribution to the performance of structures in seismic zones, therefore, has not been assessed.

No performance has been determined in relation to the joint's stiffness properties - to be used for the analysis of the serviceability limit state.

3.11 Aspects related to the performance of the product

3.11.1 Corrosion protection in service class 1 and 2.

In accordance with ETAG 015 the anchor plates have a zinc coating weight of min. Z275 equivalent to a zinc layer thickness of at least 20 µm.

3.12 General aspects related to the use of the product

The anchors plates are manufactured in accordance with the provisions of this European Technical Assessment using the manufacturing processes as identified in the inspection of the plant by the notified inspection body and laid down in the technical documentation.

The nailing pattern used shall be as defined in Annex A.

The following provisions concerning installation apply:

The structural members to which the brackets are fixed shall be:

- Restrained against rotation.
- Strength class C18 or better, see section 1 of this ETA
- Free from wane under the anchor plate.
- The actual end bearing capacity of the timber member to be used in conjunction with the anchor plate and the appropriateness of the complete wind bracing system shall be checked by the designer of the structure to ensure it is not less than the anchor plate capacity and, if necessary, the bracket capacity reduced accordingly.
- The gap between the timber members does not exceed 3 mm.
- There are no specific requirements relating to preparation of the timber members.

The execution of the connection shall be in accordance with the approval holder's technical literature.

4 Attestation and verification of constancy of performance (AVCP)

4.1 AVCP system

According to the decision 97/638/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

Issued in Copenhagen on 2015-01-05 by



Thomas Bruun
Managing Director, ETA-Danmark

Annex A

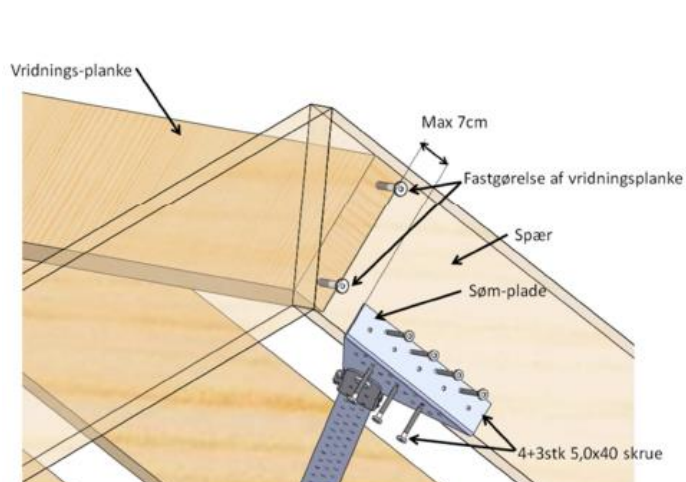
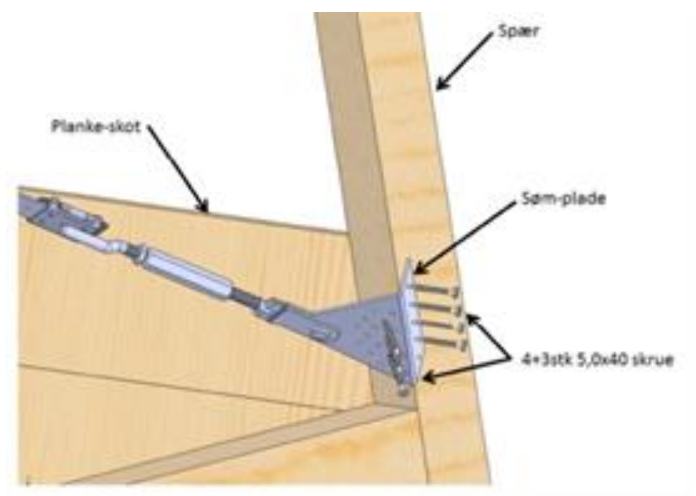
Product details and definitions

Typical installation

Typically the anchor plates are used in a stabilizing structure between two or more timber members. The anchor plates are used in combination with steel bracing straps or diagonal battens.

The distance from the centre of the holes in which the steel bracing straps are fastened to the connectors to the end of the steel bracing strap shall be minimum $3d=15\text{ mm}$.

Wind bracing connectors placed on the lower side of the rafters



Examples of connections between a bracing strap and the connectors

Fasteners

Table A.1 Specified fasteners

Screws	Nail and screw size		Finish	
	Diameter [mm]	Length [mm]		
GH connector screws	5,0	40 - 70	Electroplated zinc	CE marked according to ETA-13/0523
GH connector Nails	5,0	40 - 100	Electroplated zinc	CE marked according to ETA-13/0523

Tension bands

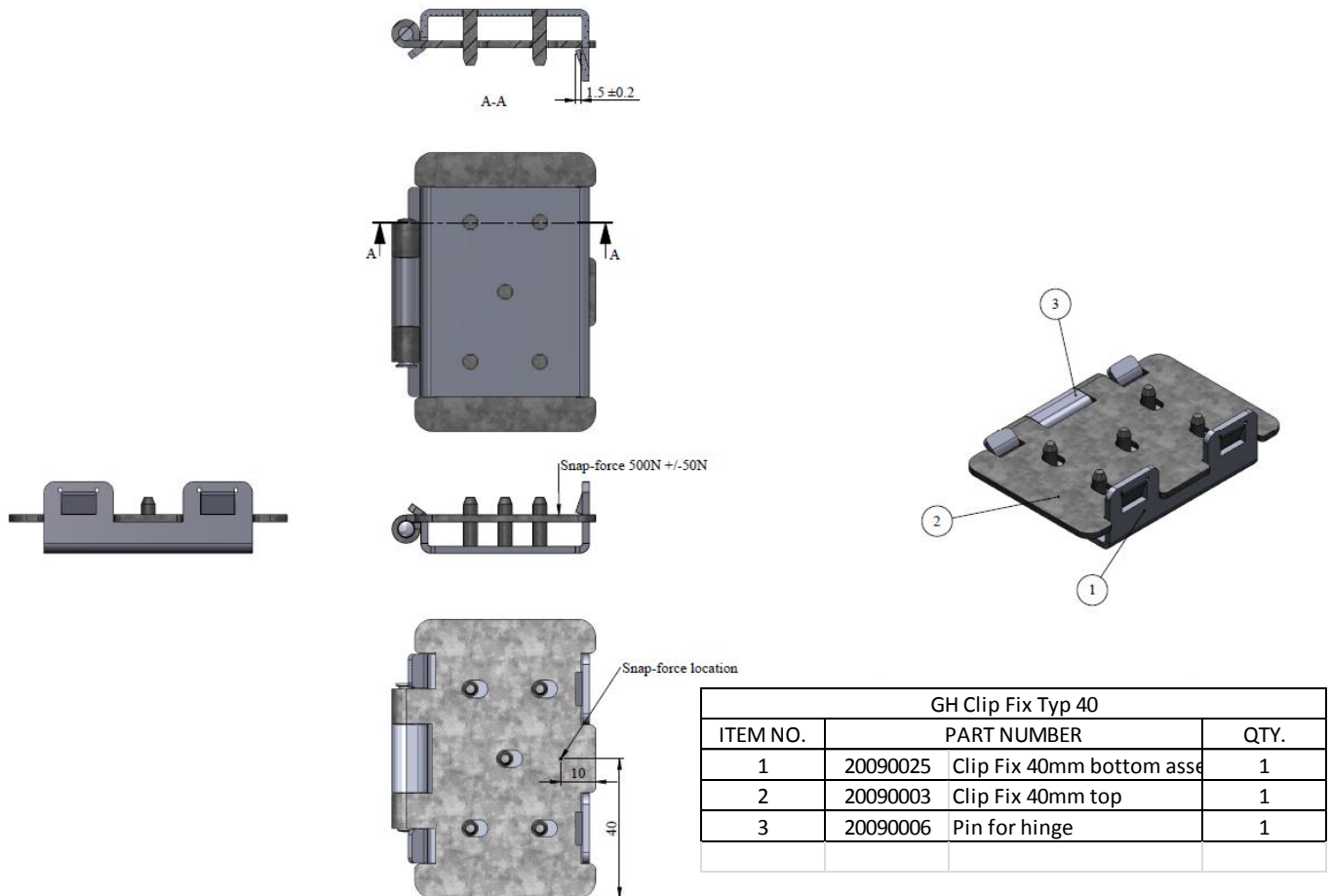
GH Wind-Strap Tie; Dimensions: width = 40 mm or 60 mm; Thickness= 1,5; German national approval no. Z-9.1-524 or CE marked to EN 14545; Steel S350GD to EN 10346:2004

Production drawings

The main material of the component is described below. The material compositions and surface treatments are deposited with ETA-Danmark A/S.

Clip Fix Type 40 coupler

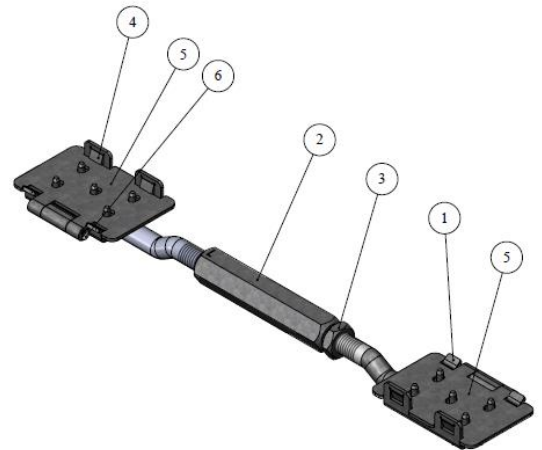
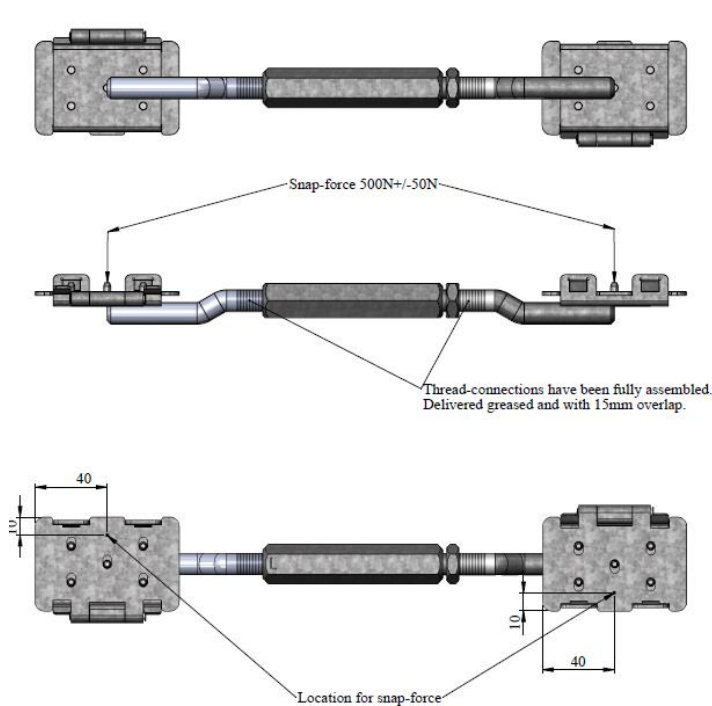
The main parts are made from pre-galvanized steel DX51D + Z275 (S235GD + Z275) according to EN 10346 with tolerances according to EN 10143. The material compositions of smaller parts such as bushings, pins and rods are deposited with ETA-Danmark



GH Clip Fix Typ 40			
ITEM NO.	PART NUMBER		QTY.
1	20090025	Clip Fix 40mm bottom asse	1
2	20090003	Clip Fix 40mm top	1
3	20090006	Pin for hinge	1

Clip Fix 40 Tightner

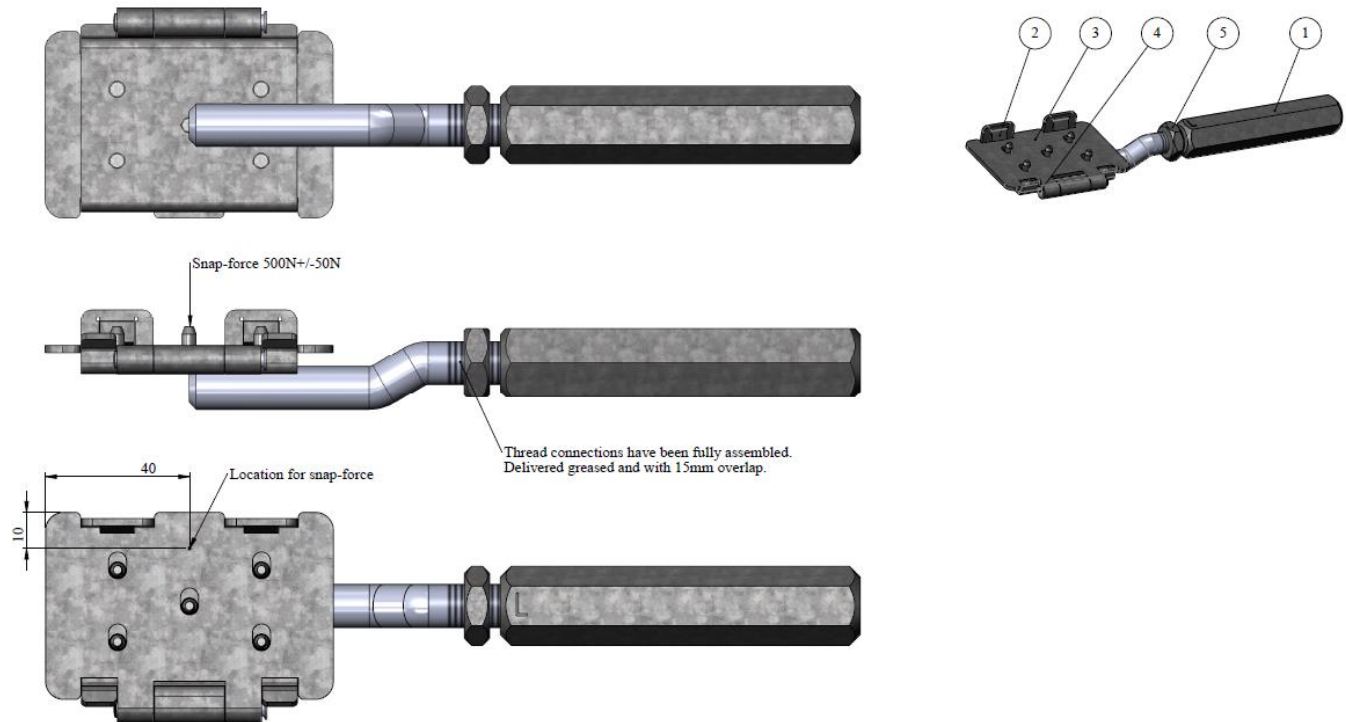
The main parts are made from pre-galvanized steel DX51D + Z275 (S235GD + Z275) according to EN 10346 with tolerances according to EN 10143. The material compositions of smaller parts such as bushings, pins and rods are deposited with ETA-Danmark



GH Clip Fix Tightener Typ 40			
ITEM NO.	PART NUMBER		QTY.
1	20090027	Tightender for Clip Fix bottom R assembly	1
2	20090009	Bushing long	1
3	20090010	Bushing short	1
4	20090026	Tightender for Clip Fix bottom L assembly	1
5	20090003	Clip Fix Top	2
6	20090006	Pin for hinge	2

Clip Fix Type 40 Tightener for anchor M12

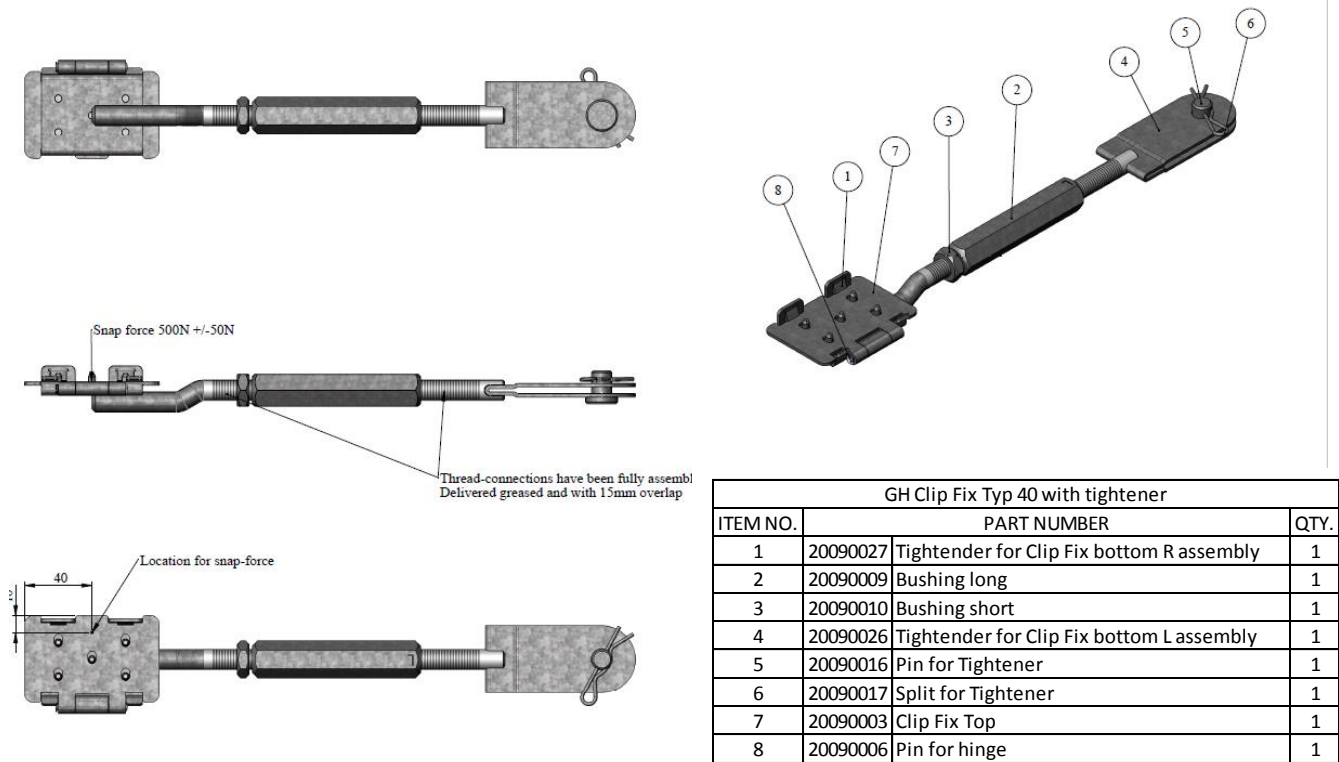
The main parts are made from pre-galvanized steel DX51D + Z275 (S235GD + Z275) according to EN 10346 with tolerances according to EN 10143. The material compositions of smaller parts such as bushings, pins and rods are deposited with ETA-Danmark



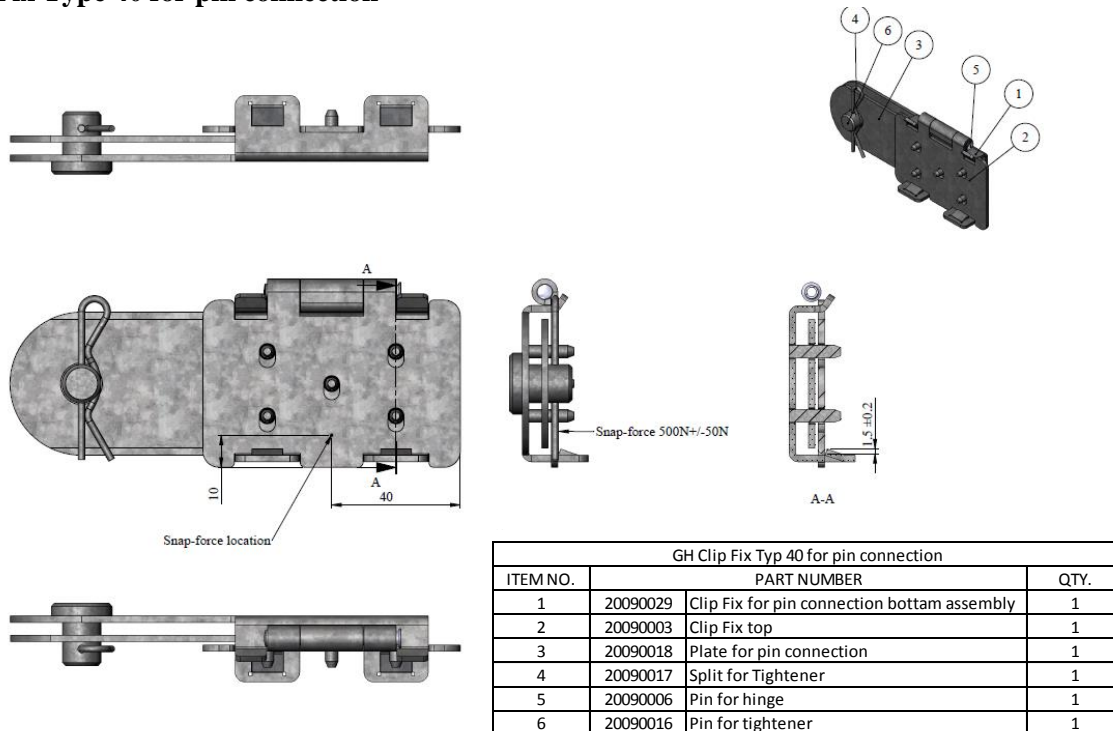
GH Clip Fix Typ 40 Connector M12 for anchors			
ITEM NO.	PART NUMBER		QTY.
1	20090009	Busching long	1
2	20090026	Tightender for Clip Fix bottom L assembly	1
3	20090003	Clip Fix Top	1
4	20090006	Pin for hinge	1
5	20090004	Busching short L	2

Clip Fix Type 40 with tightener

The main parts are made from pre-galvanized steel DX51D + Z275 (S235GD + Z275) according to EN 10346 with tolerances according to EN 10143. The material compositions of smaller parts such as bushings, pins and rods are deposited with ETA-Danmark

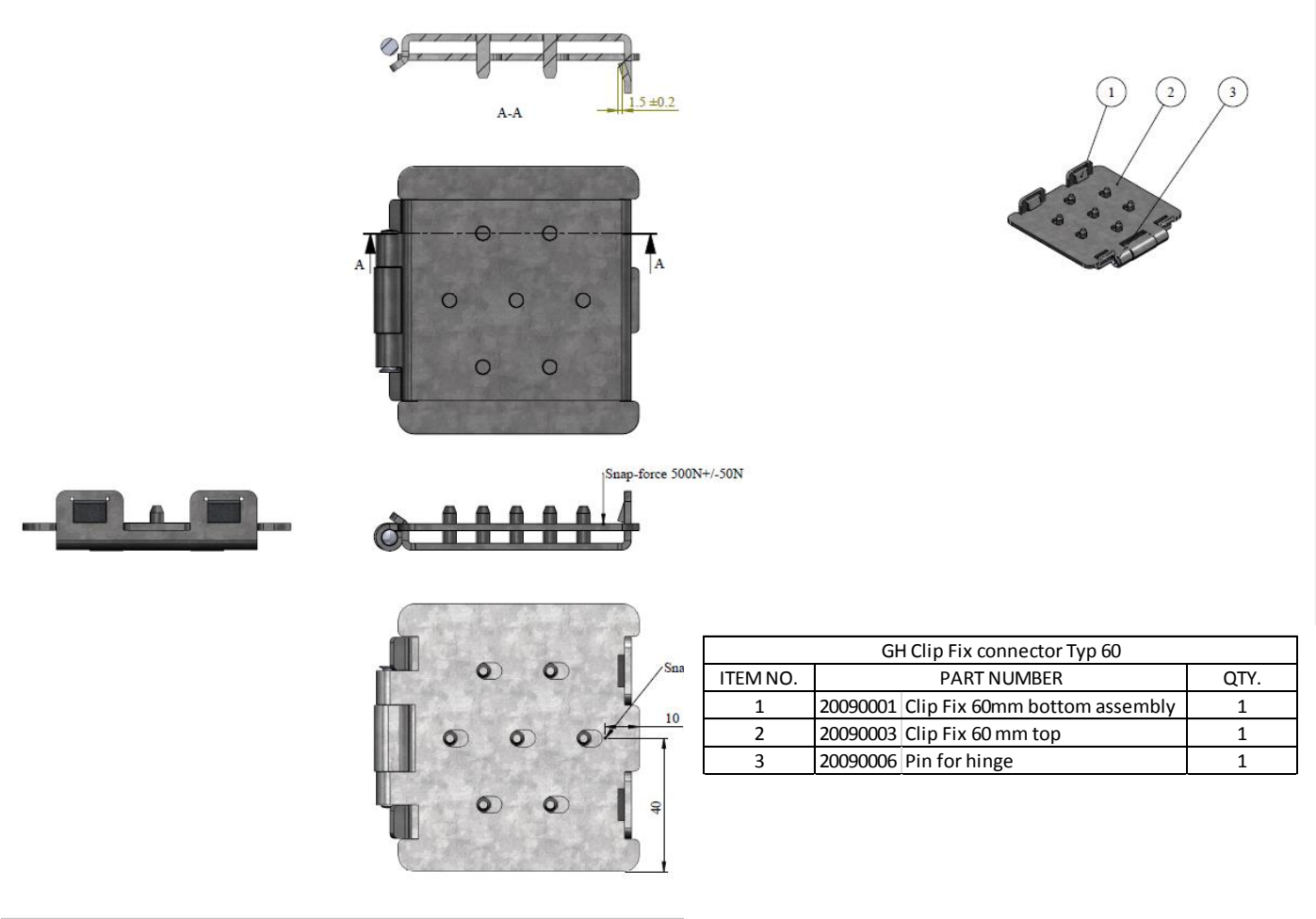


Clip Fix Type 40 for pin connection



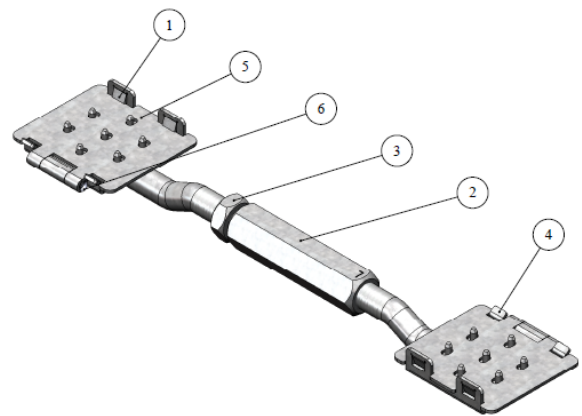
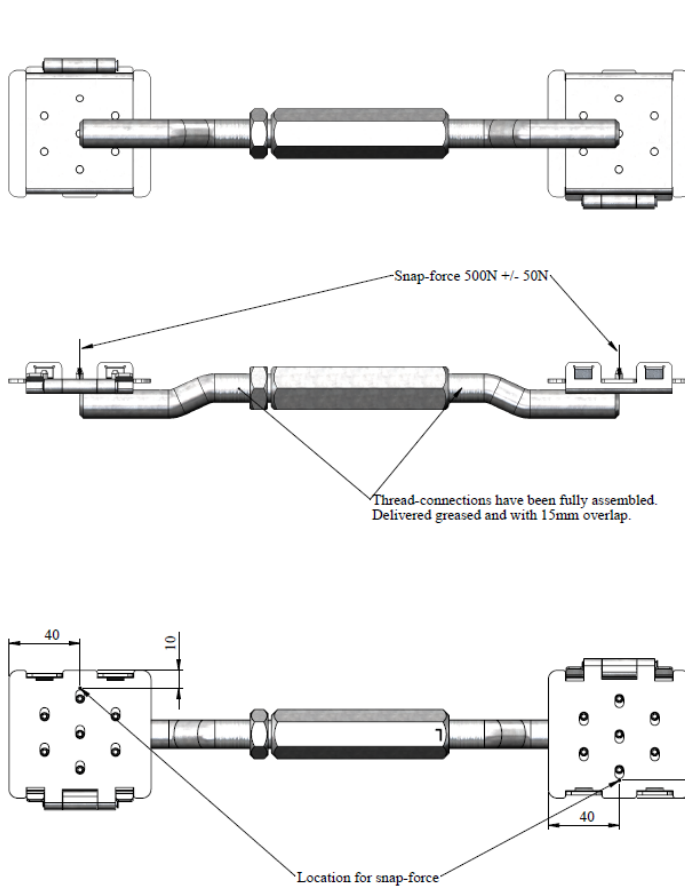
Clip Fix Type 60

The main parts are made from pre-galvanized steel DX51D + Z275 (S235GD + Z275) according to EN 10346 with tolerances according to EN 10143. The material compositions of smaller parts such as bushings, pins and rods are deposited with ETA-Danmark



Clip Fix Type 60 Tightener

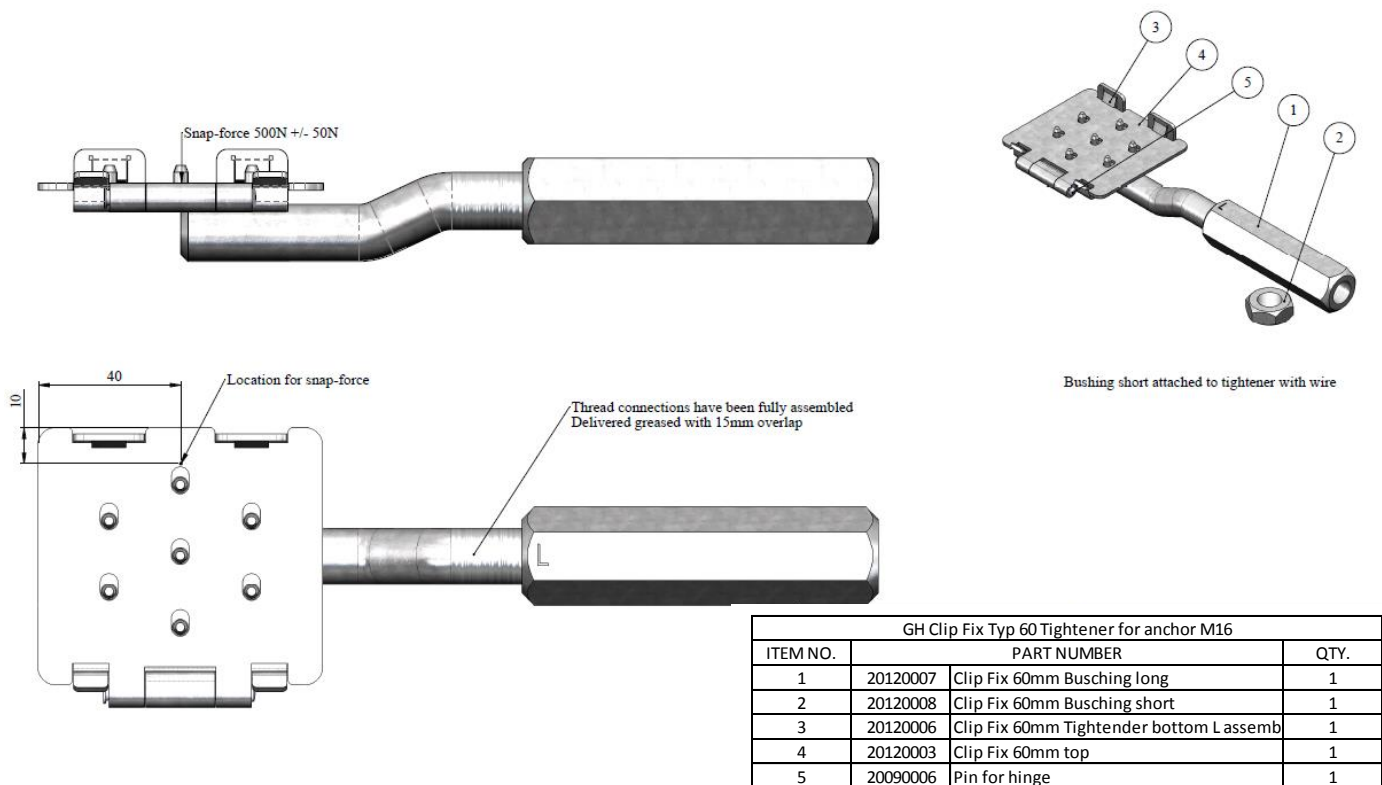
The main parts are made from pre-galvanized steel DX51D + Z275 (S235GD + Z275) according to EN 10346 with tolerances according to EN 10143. The material compositions of smaller parts such as bushings, pins and rods are deposited with ETA-Danmark



GH Clip Fix Spanner Typ 60			
ITEM NO.	PART NUMBER		QTY.
1	20120006	Tightender for Clip Fix 60 bottom R assembly	1
2	20120007	Clip Fix 60 Bushing long	1
3	20120008	Clip Fix 60 Bushing short	1
4	20120006	Tightender for Clip Fix bottom L assembly	1
5	20120003	Clip Fix 60 Top	2
6	20090006	Pin for hinge	2

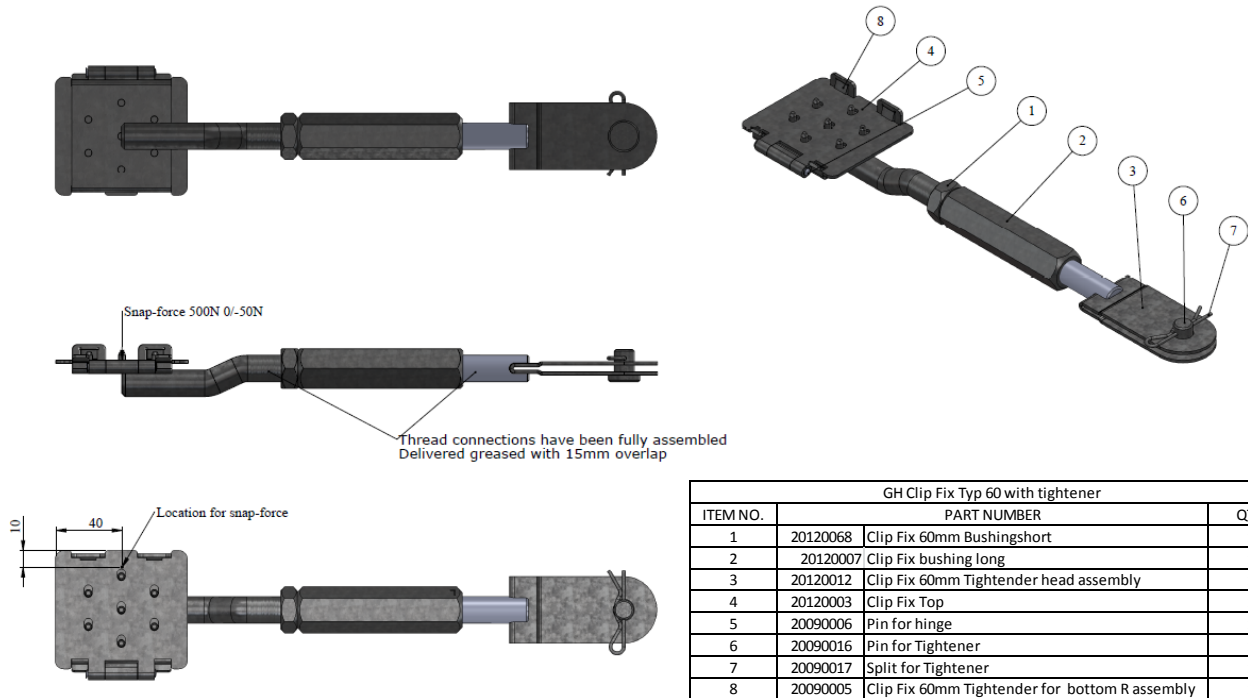
Clip Fix Type 60 Tightener for anchor M16

The main parts are made from pre-galvanized steel DX51D + Z275 (S235GD + Z275) according to EN 10346 with tolerances according to EN 10143. The material compositions of smaller parts such as bushings, pins and rods are deposited with ETA-Danmark

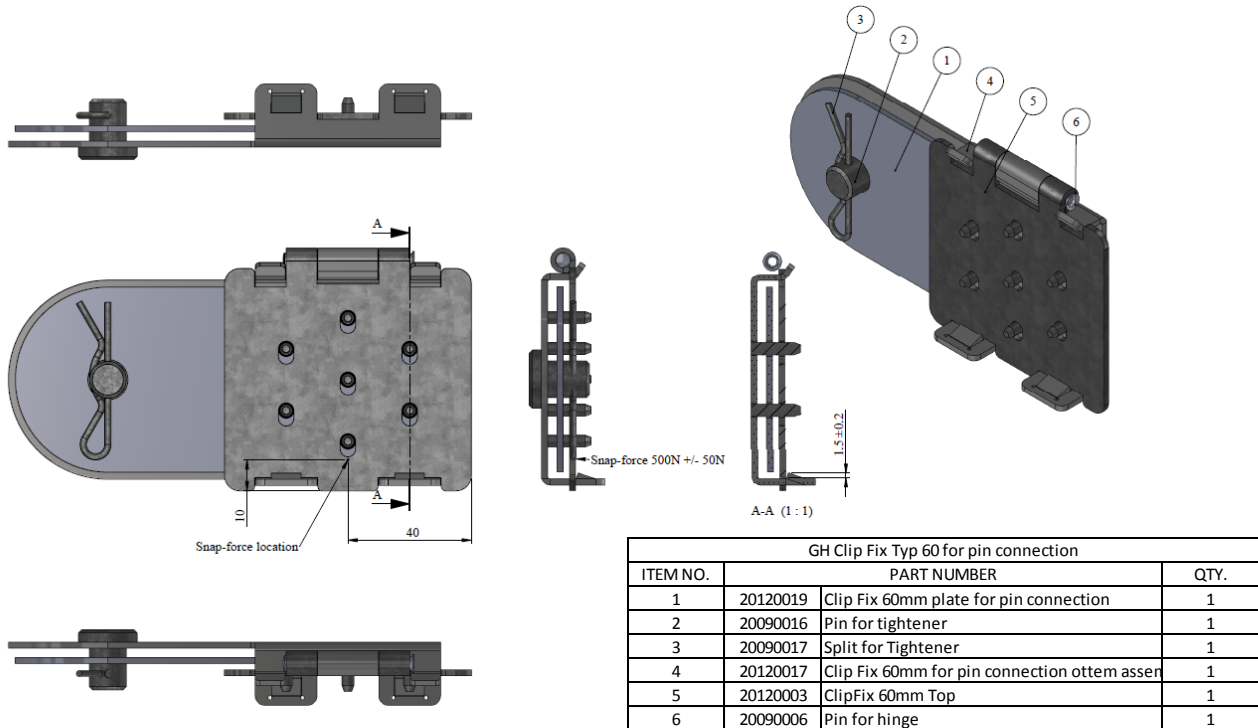


Clip Fix Type 60 with tightener

The main parts are made from pre-galvanized steel DX51D + Z275 (S235GD + Z275) according to EN 10346 with tolerances according to EN 10143. The material compositions of smaller parts such as bushings, pins and rods are deposited with ETA-Danmark

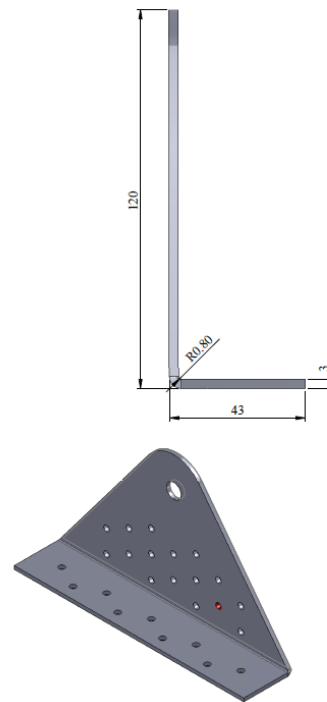
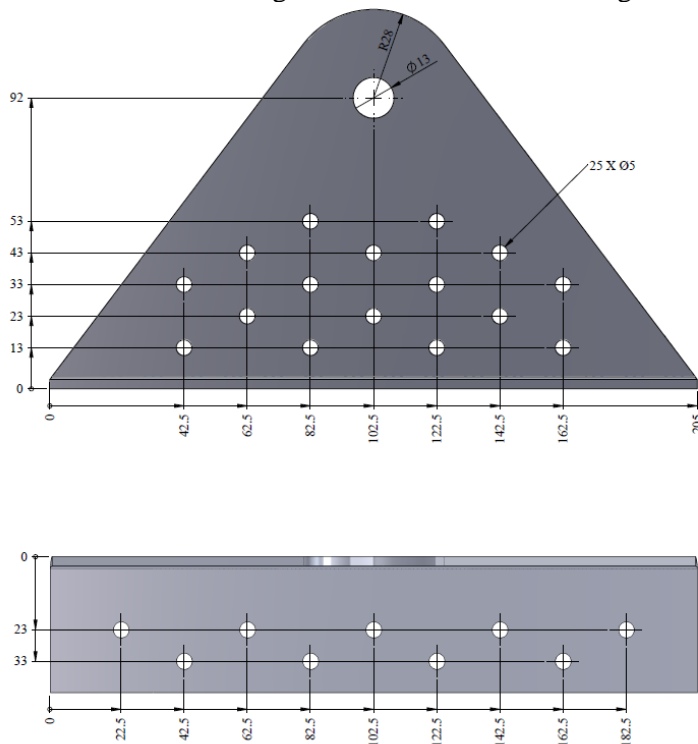


Clip Fix Type 60 for pin connection



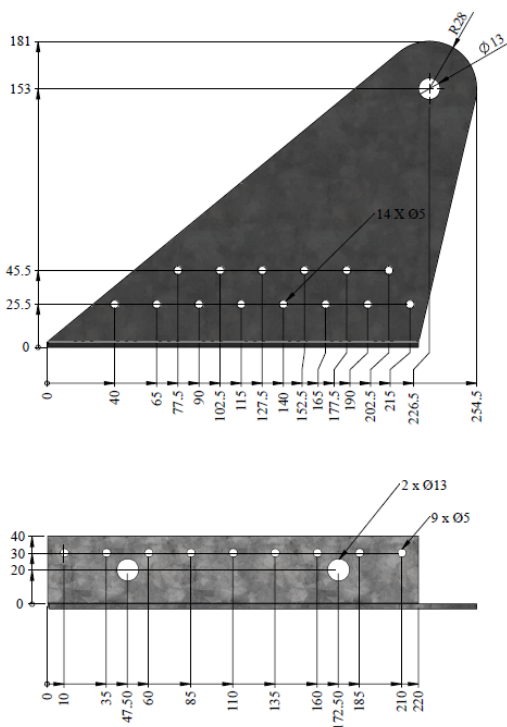
Nail-Bracket asymmetric pre-galvanized

The plates are made from pre-galvanized steel DX51D (S235GD) according to EN 10346 with tolerances according to EN 10143 with electric galvanized or decoatmat coating according to EN 1995-1, service class 2 (12 µm – 30 µm).



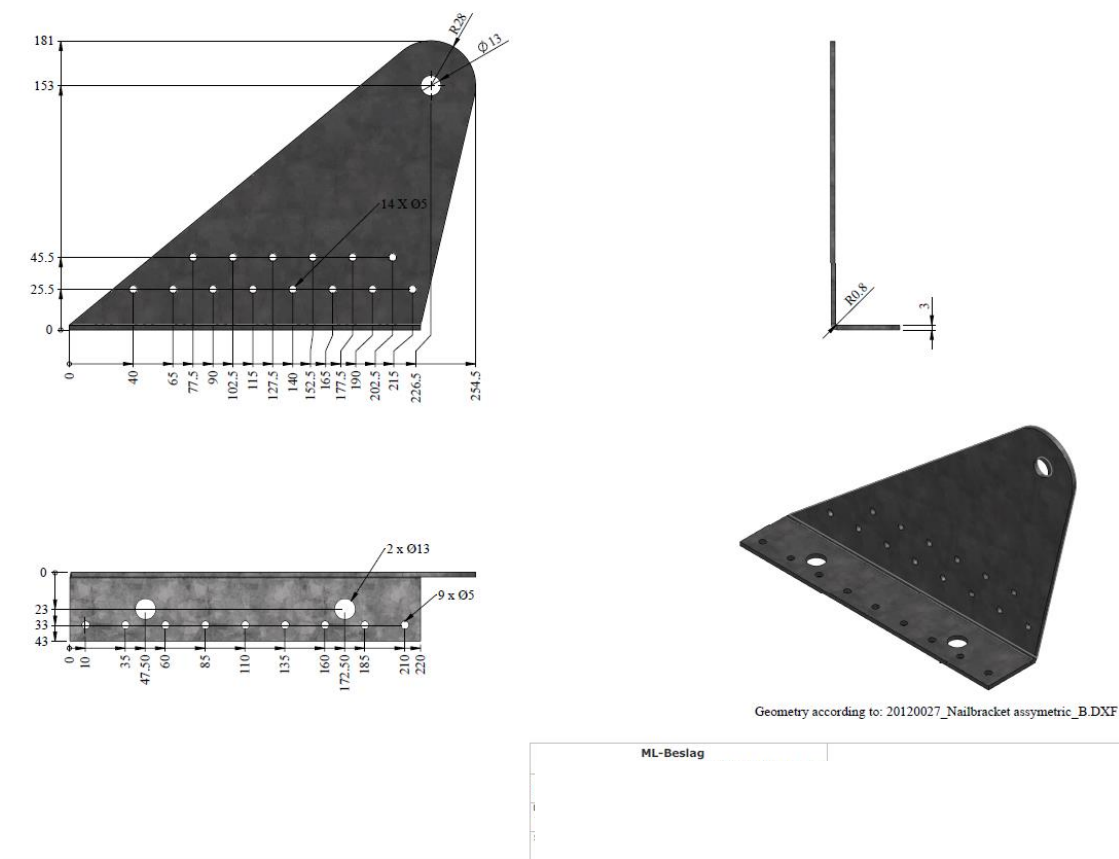
Geometry according to: 20090032_Nailbracket pregalvanized_B.DXF

Nail-Bracket asymmetric B

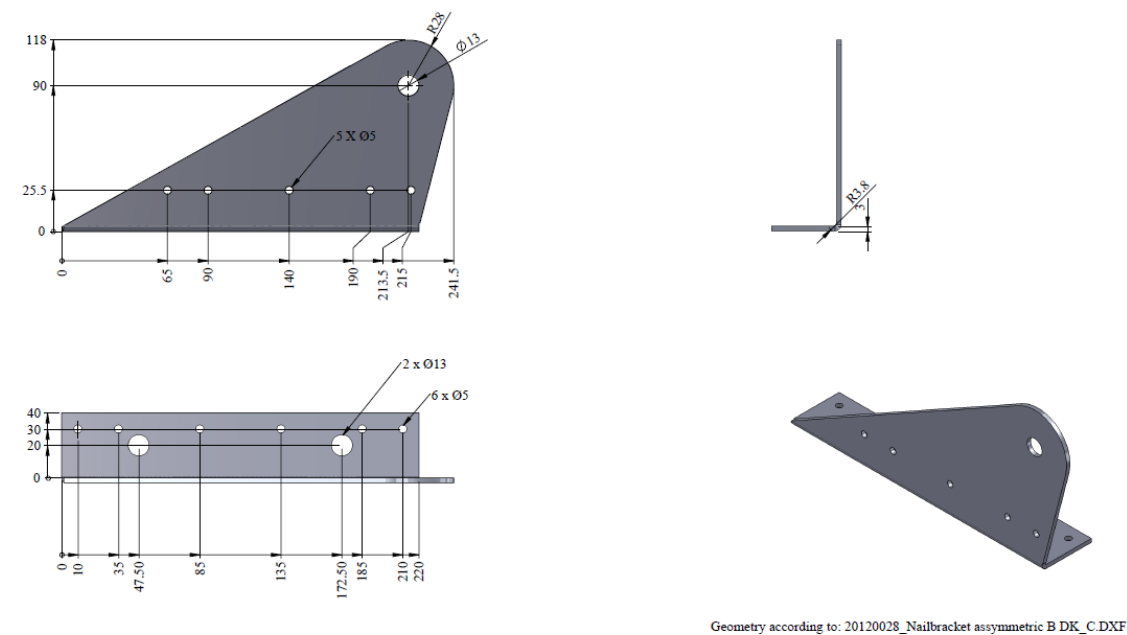


Geometry according to: 20120026_Nailbracket assymetric_B.DXF

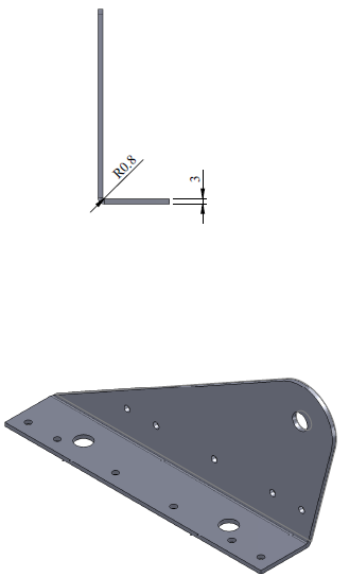
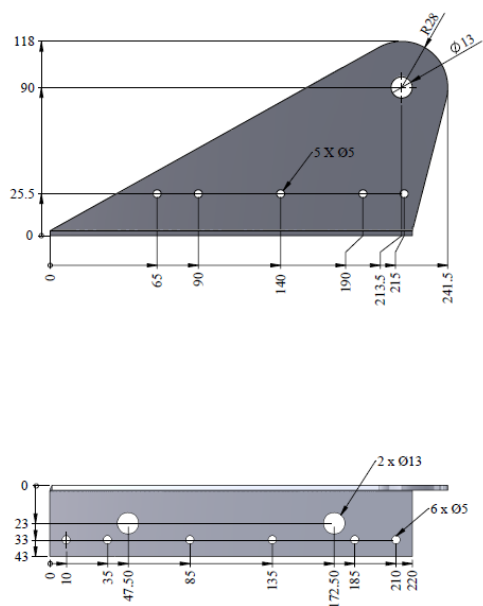
Nail-Bracket asymmetric A



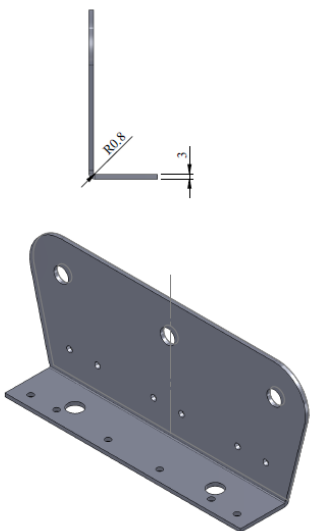
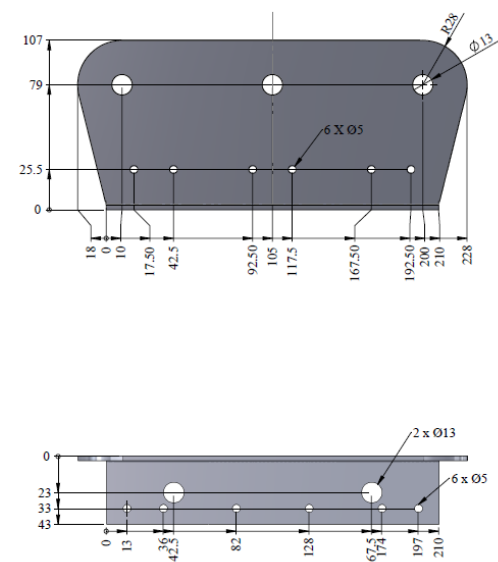
Nail-Bracket asymmetric B small



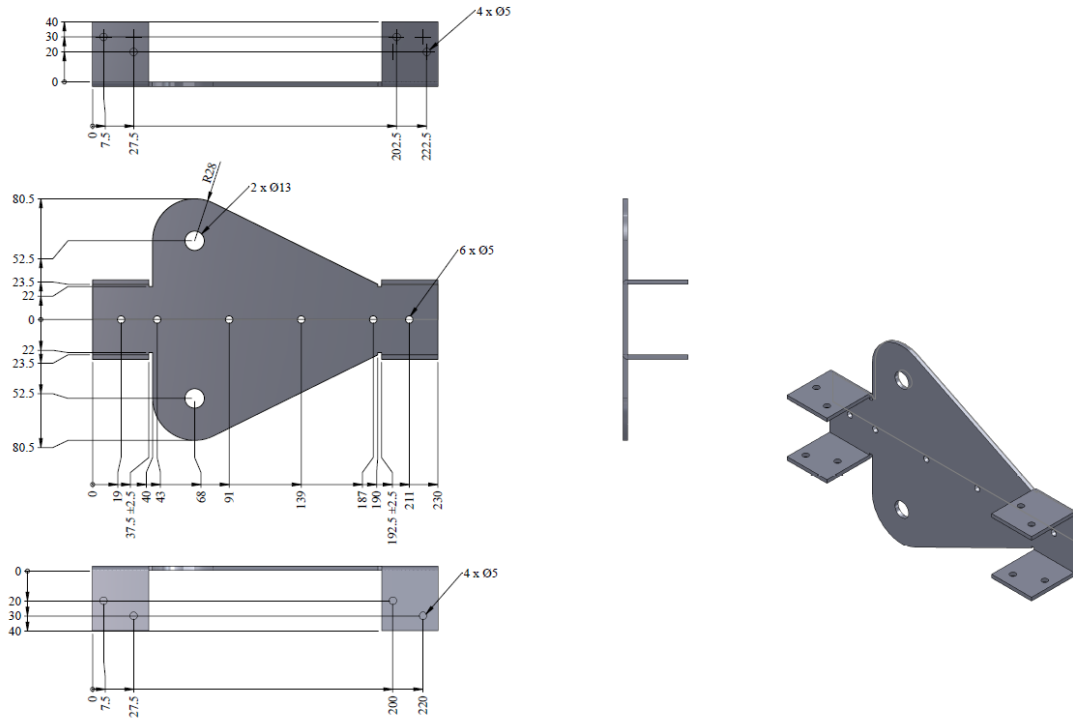
Nail-Bracket assymmetric A small



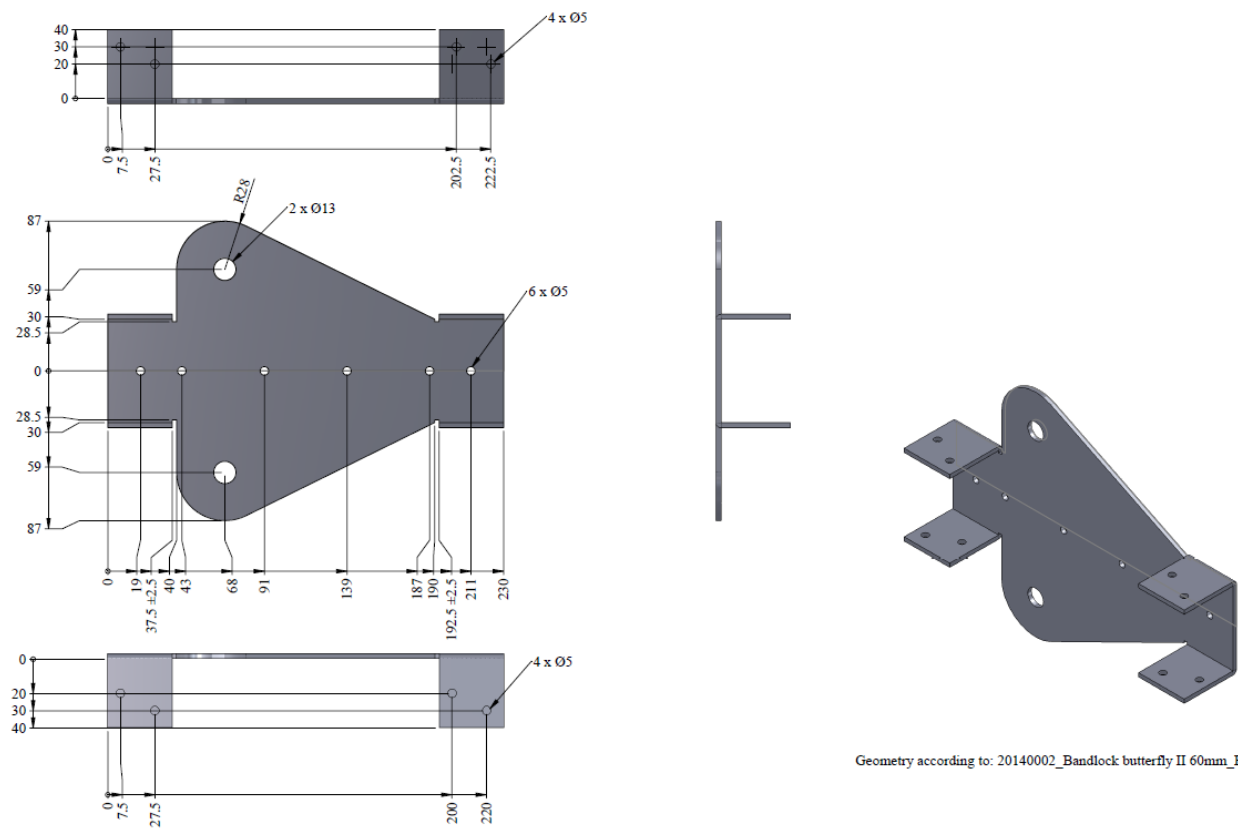
Nail-Bracket double



Clip Fix Butterfly II 47mm

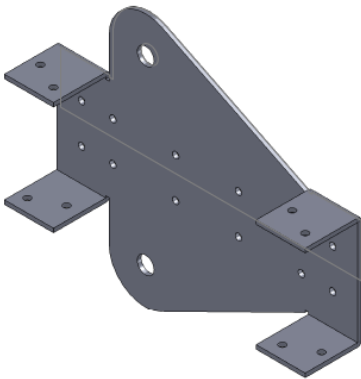
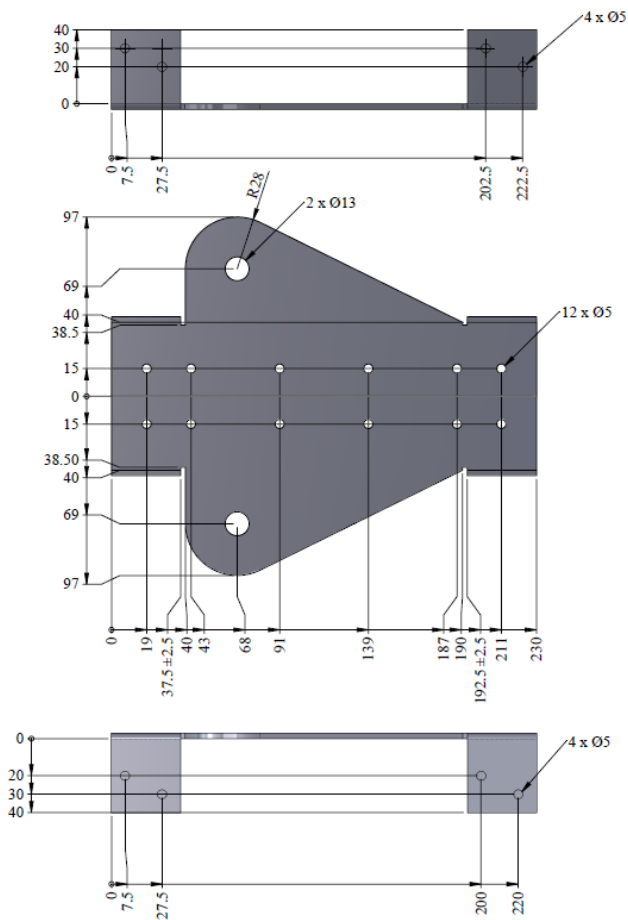


Clip Fix Butterfly II 60mm



Geometry according to: 20140002_Bandlock butterfly II 60mm_B.DXF

Clip Fix Butterfly II 80mm

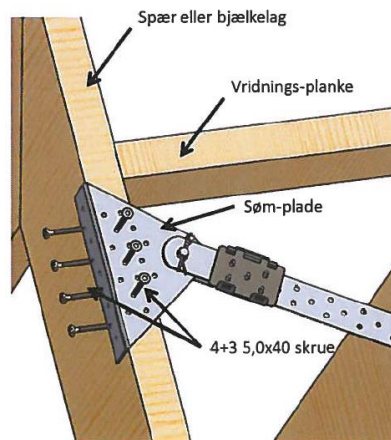


Geometry according to: 20140003_Bandlock butterfly II 80mm_B.DXF

Fastener Pattern

Symmetric and asymmetric anchor plates:

3 screws $5,0 \times 40$ mm in the face and 4 screws $5,0 \times 40$ mm in the flap



Double anchor plates

6 screws $5,0 \times 40$ mm in the face and 6 screws $5,0 \times 40$ mm in the flap

Butterfly anchor plates

6 screws $5,0 \times 40$ mm in the face and 4×2 screws $5,0 \times 40$ mm in the flaps

Annex B**Characteristic load-carrying capacity****Design Basis – general****Strength modification factors for service classes and load-duration classes**

The design values of the load-carrying capacities R_d shall be calculated from the characteristic capacities R_k for the actual service class and load-duration class from the following expression:

$$R_d = \frac{k_{\text{mod}} \cdot R_k}{\gamma_M}$$

with the material partial coefficient γ_M for wood connections. The load duration factor k_{mod} is taken from Eurocode 5 and is for service classes 1 and 2 given in Table B1.

Table B.1. Factor k_{mod} for service class 1 and 2

Load duration classes and k_{mod} factors for service class 1 and 2				
P	L	M	S	I
Permanent	Long term	Medium term	Short term	Instantaneous
0,6	0,7	0,8	0,9	1,1

Density

The characteristic load-carrying capacities of the connections are stated for a characteristic density of 320 kg/m³.

For timber or wood based material with a lower characteristic density than 320 kg/m³ the load-carrying capacities shall be reduced by the k_{dens} factor:

$$k_{\text{dens}} = \left(\frac{\rho_k}{320} \right)^{0,5}$$

Where ρ_k is the characteristic density of the timber in kg/m³.

Timber splitting

The risk of splitting of the timber or wood shall be evaluated for the specific connections. For the connectors used in lattice structures for wind stabilization or stabilization of compressed members of the structure the design of the connection will typically prevent the splitting of the timber or wood. If this is not the case it shall be checked by the rules of Eurocode 5 or a similar national Timber Code that splitting will not occur.

Clip Fix anchors plate

The anchor plates can be fastened by screwing in the face of the anchor into the top of the timber and/or in the edge flap into the side of the timber. When screwing into the edge flap the anchor shall always be placed over the timber. See annex A for the different fastener patterns of the anchors.

The force acts at an angle of 25° - 45° to the battens. The force is in the same plane as the anchors plate (top/bottom side of the timber/truss)

Table B.3. Characteristic load-carrying capacities of symmetric and asymmetric anchor plates, in kN.

Anchor plate	Screws	b _{min} [mm]	Angle with battens
	Number Type		25° - 45°
			Characteristic capacity R _k [kN]
	3 (face) + 4 (flap)	44	12,0

Table B.4. Characteristic load-carrying capacities of double anchor plates, in kN.

Anchor plate	Screws	b_{min} [mm]	Angle with battens	
	Number Type		25°	45°
			Characteristic capacity R_k [kN]	
	6 (face) + 6 (flap)	44	18.7	14.0

Table B.5. Characteristic load-carrying capacities of butterfly anchor plates, in kN.

Anchor plate	Screws	b_{\min} [mm]	Angle with battens	
	Number Type		25°	45°
			Characteristic capacity R_k [kN]	
47 mm 60 mm 80 mm	6 (face) + 4×2 (flap)	44	17,7	15,2

Clip Fix coupler and tension straps

The connection between the anchors plate, tension bands and tension straps is established with the Clip Fix coupler and pins.

Force direction

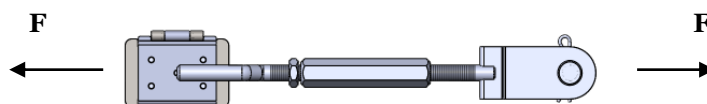


Table B6. Characteristic tensile capacities of tension straps and couplers.

Tension straps or couplers	Dowel diameter [mm]	Characteristic capacity R_k [kN]
Connection with Clip Fix coupler and strap	-	24,2
Connection with Clip Fix tension strap, Clip Fix anchor plate and Clip Fix coupler	12	24,2
GH Wind-Strap Tie with edge reinforcement		1,5 mm × 40 mm: 18,9 1,5 mm × 60 mm: 28,4