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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-08/0006 of 2024/12/20

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:	AKK Gerberbeslag type 1-150, 1-180, 2-125, 2-150, 2-180, 2-200, 3-120, 3-140, 3-140 Stainless, 3-160, 3-160 Stainless, 3-180, 3-180 Stainless
Product family to which the above construction product belongs:	Three-dimensional nailing plate (timber to timber cantilever bracket)
Manufacturer:	AKK Industri Industrivej 17 DK-7490 Aulum Internet www.akk-i.dk
Manufacturing plant:	AKK Industri Industrivej Nord 40 DK-7490 Aulum
This European Technical Assessment contains:	27 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:	EAD 130186-00-0603 for Three-dimensional nailing plates
This version replaces:	The previous ETA with the same number issued on 2017-12-21

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II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of product

AKK Industri Gerberbeslag type 1-150, 1-180, 2-125, 2-150, 2-180, 2-200, 3-120, 3-140, 3-140 Stainless, 3-160, 3-160 Stainless, 3-180, 3-180 Stainless are one-piece or two-pieces non-welded, cantilever brackets to be used in timber to timber connections fastened with specific nails.

The cantilever brackets are made from pre-galvanized steel Grade S 250 GD + Z275 according to EN 10326:2004 or stainless steel 1.4401 or 1.4404 according to EN 10088 with a minimum characteristic yield stress of 235 MPa or a minimum ultimate tensile strength of 330 MPa.. Dimensions, hole positions, steel type and typical installations are shown in Annex A.

In addition, the cantilever brackets can be hot dipped galvanized according to EN ISO 1461 with a zinc coating thickness of approximately 55 µm.

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

The cantilever brackets are intended for use in making end-grain to end-grain connections between wood based beams (joists or purlins) in a cantilever system, where requirements for mechanical resistance and stability and safety in use in the sense of the Basic Works Requirements 1 of Regulation (EU) 305/2011 shall be fulfilled.

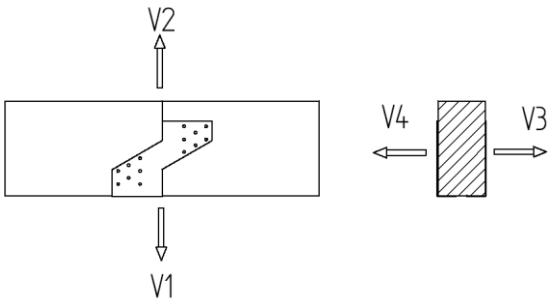
The cantilever brackets can be installed as connections between wood based members such as:

- Structural solid timber classified to C14-C40 according to EN 338 / EN 14081,
- Glulam classified to GL24-GL36 according to EN 1194 / EN 14080,
- LVL according to EN 14374,
- Parallam PSL,
- Intrallam LSL,
- Duo- and Triobalken,
- Layered wood plates,
- Kreuzbalken with minimum thickness of 80 mm
- I-beams with backer blocks on both sides of the web in the header and web stiffeners in the joist
- Plywood according to EN 636

However, the calculation methods are only allowed for a characteristic wood density of up to 350 kg/m^3. Even though the wood based material may have a larger density, this must not be used in the formulas for the load-carrying capacities of the fasteners.

Annex B gives the tables for the characteristic load-carrying capacities of the cantilever bracket connections.
The design of the connections shall be in accordance with Eurocode 5 or a similar national Timber Code.

It is assumed that the forces acting on the cantilever bracket connection are the following $V_1 = F_1$, $V_2 = F_2$, $V_3 = F_3$ *and* $V_4 = F_4$, as shown in the figure below. The forces shall act in the middle of the cantilever bracket. It is assumed that the forces F_1, F_2, F_3 *and* F_4 are acting right at the end of each beam.



The cantilever brackets are intended for use for connections subject to static or quasi static loading.

The zinc-coated hangers are for use in timber structures subject to dry, internal conditions defined by the service classes 1 and 2 of EN 1995-1-1:2004, (Eurocode 5).

The cantilever brackets which are hot dipped galvanized according to EN ISO 1461 with a zinc coating thickness of approximately 55 µm and cantilever brackets made from stainless steel are intended for use in more corrosive environments defined by service class 3 of EN 1995-1-1:2004, (Eurocode 5).

The nails and screws to be used in combination with stainless steel brackets shall be made from suitable stainless material.

The scope of the brackets regarding resistance to corrosion shall be defined according to national provisions that apply at the installation site considering environmental conditions.

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)**	
	Joint Strength - Characteristic load-carrying capacity	See Annex B
	Joint Stiffness	No performance assessed
	Joint ductility	No performance assessed
	Resistance to seismic actions	No performance assessed
	Resistance to corrosion and deterioration	See section 3.6
3.2	**Safety in case of fire (BWR2)**	
	Reaction to fire	The connectors are made from steel classified as Euroclass A1 in accordance with EN13501-1 and Commission Delegated Regulation 2016/364
	Resistance to fire	No performance assessed
3.3	**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, 2 and 3
	Identification	See Annex A

*) See additional information in section 3.4 – 3.7.

3.4 Methods of verification

The characteristic load-carrying capacities have been calculated 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.

The values in annex B have been determined by multiplying the calculated resistance of the connection by k_{mod} to consider load duration and service classes in accordance with EC 5.

3.5 Mechanical resistance and stability

See annex B for characteristic load-carrying capacity in the directions F_1, F_2, F_3 and F_4

The characteristic capacities of the brackets hangers are determined by calculation as described in EAD 130186-00-0603. They should be used for designs in accordance with Eurocode 5 or a similar national Timber Code.

The design models allow the use of fasteners described in Annex A

Connector nails in accordance to ETA-09/0273

The load bearing capacities of the brackets has been determined based on the use of Paslode Connector nails 4,0 x 40 mm in accordance with the ETA-09/0273 for nails. The fastener can be replaced by fastener mentioned in the ETA-09/0273 with the same or higher performance. The capacity of the connection may not be higher than the load mentioned in this ETA.
The capacities of the nails used in calculations are:

$F_{ax,Rk}$ = 0,998kN
$F_{V,Rk}$ = 1,885kN

The brackets are mounted using either full or half nailing.

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.

3.6 Aspects related to the performance of the product

3.6.1 Corrosion protection in service class 1 and 2.
In accordance with EAD 130186-00-0603the cantilever brackets shall have a zinc coating weight of minimum Z275. The steel employed is S250 GD with Z275 according to EN 10346.

3.6.2 Corrosion protection in service class 3.
In accordance with Eurocode 5 the cantilever brackets which are hot dipped galvanized according to EN ISO 1461 with a zinc coating thickness of approximately 55 µm and cantilever brackets made from stainless steel are intended for use in service class 1,2 and 3 according to EN 1995 (Eurocode 5)

3.12 General aspects related to the fitness for use of the product

AKK Industri connectors 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 either the maximum or the minimum pattern as defined in Annex A.

A cantilever brackets connection is deemed fit for its intended use under following conditions:

- Cantilever brackets can be fastened to wood-based members by nails.
- There shall be nails in all holes or a partial nailing pattern as shown in Annex A and prescribed in Annex B can be used.
- The characteristic capacity of the cantilever bracket connection is calculated according to the manufacturer's technical documentation
- The cantilever bracket connection is designed in accordance with Eurocode 5 or an appropriate National Code.
- The gap between the end of the beams, where contact stresses can occur during loading shall be limited. This means that the gap between the ends of the beams connected shall be maximum 3 mm.

- The thickness of the beam shall be at least $l+4d$, where l is the length of the nails in the beam and d the diameter. This is in accordance with Eurocode 5.
- For all types of cantilever brackets except type 3: The cross section of the beam to be carried shall have sharp edges at the lower side against the bottom plate, i.e. it shall be without wane.
- For Cantilever Bracket type 2: The cross section of the carrying beam shall have sharp edges at the top side against the top plate, i.e. it shall be without wane.
- The depth of the beam shall be so large that the top of the beam is at least 20 mm above the upper nail in the side of the beam.
- Cantilever brackets made from stainless steel shall only be fastened with fasteners made from suitable stainless steel. Zinc-coated cantilever brackets shall not be fastened with fasteners of stainless steel.
- Nails to be used shall have a diameter, which fits the holes of the cantilever brackets. They shall have a diameter which is not smaller than the diameter of the hole minus 1 mm.

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

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

4.1 AVCP system

According to the decision 97/638/EC of the European Commission1, 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 provided for 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 2024-12-20 by

Thomas Bruun
Managing Director, ETA-Danmark

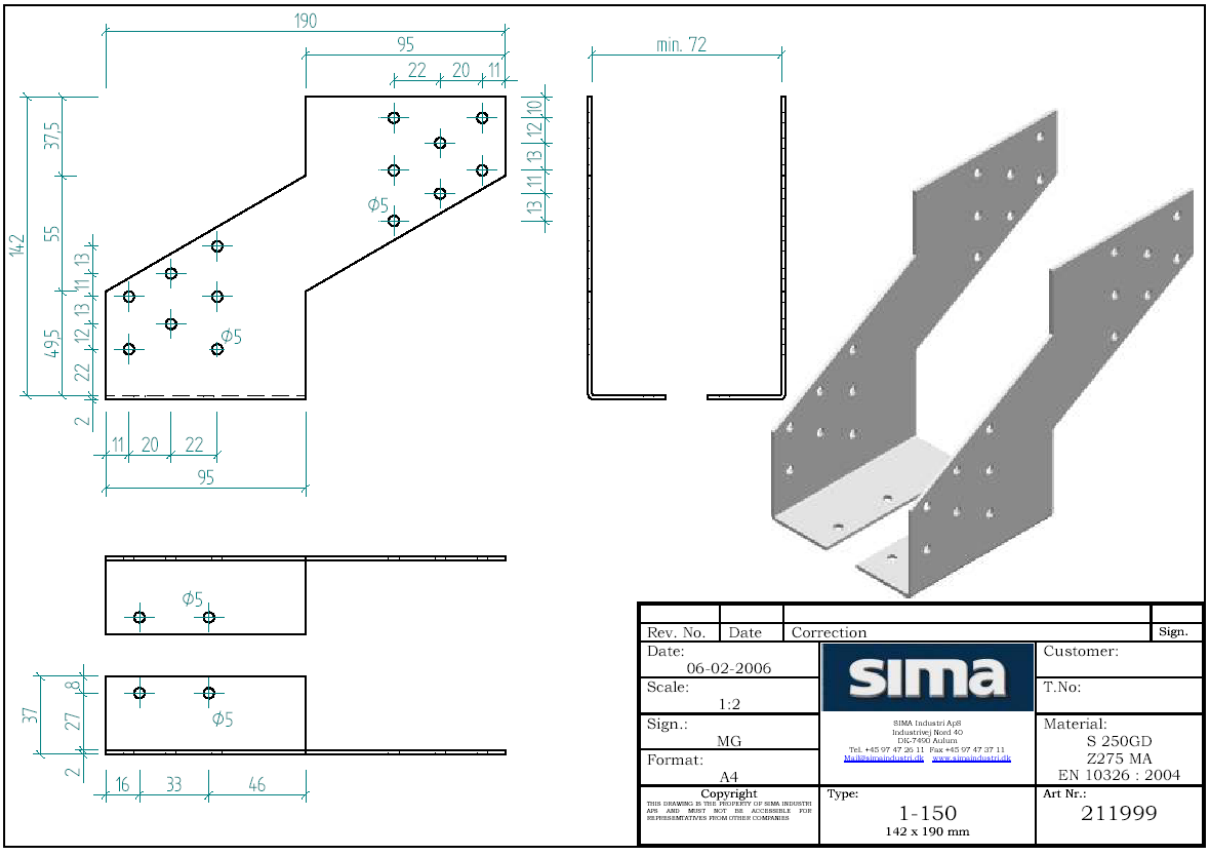
Annex A
Product details and definitions

Fastener specification

Nail and screw type	Nail and screw size (mm)		Finish	ETA
	Diameter	Length		
Paslode Connector nail	4,0	40	Electroplated zinc	09/0273

Cantilever bracket specification

Cantilever brackets type 3 can be fastened by full or partial nailing. For the bracket specification the following indications apply:
Holes marked in green are used in case of half nailing
Holes marked with green and blue are used in case of full nailing
Holes marked with red are never used
Note that the drawings, hole positions etc. also apply for brackets which are hot dipped galvanized according to EN ISO 1461 with a zinc coating thickness of approximately 55 μm.



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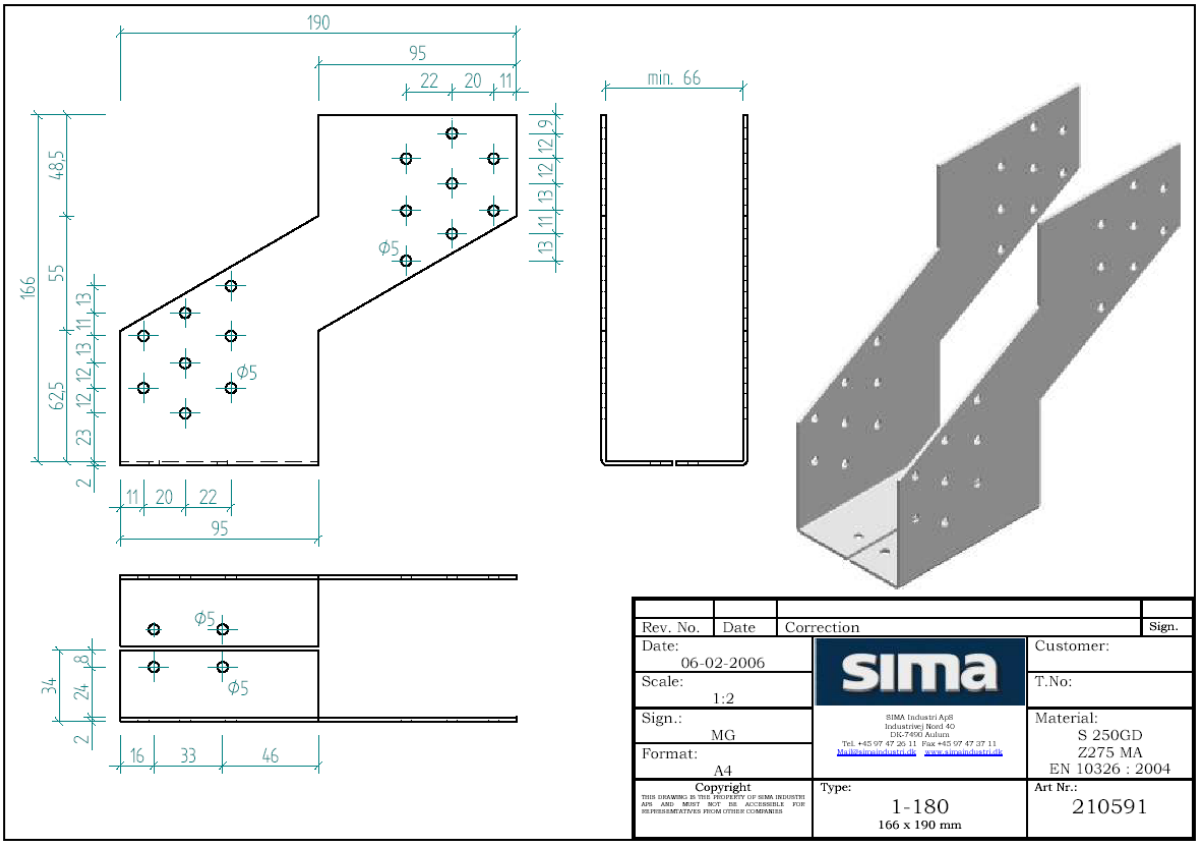

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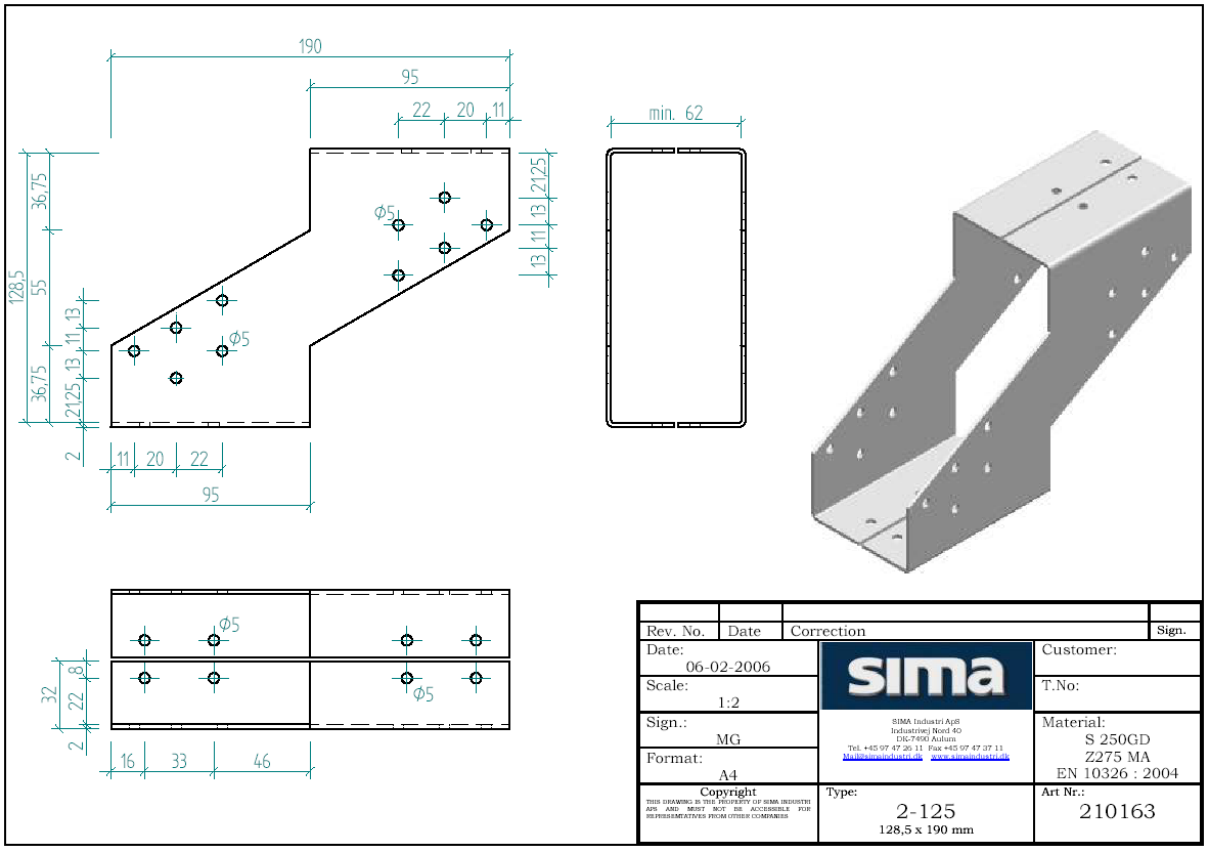

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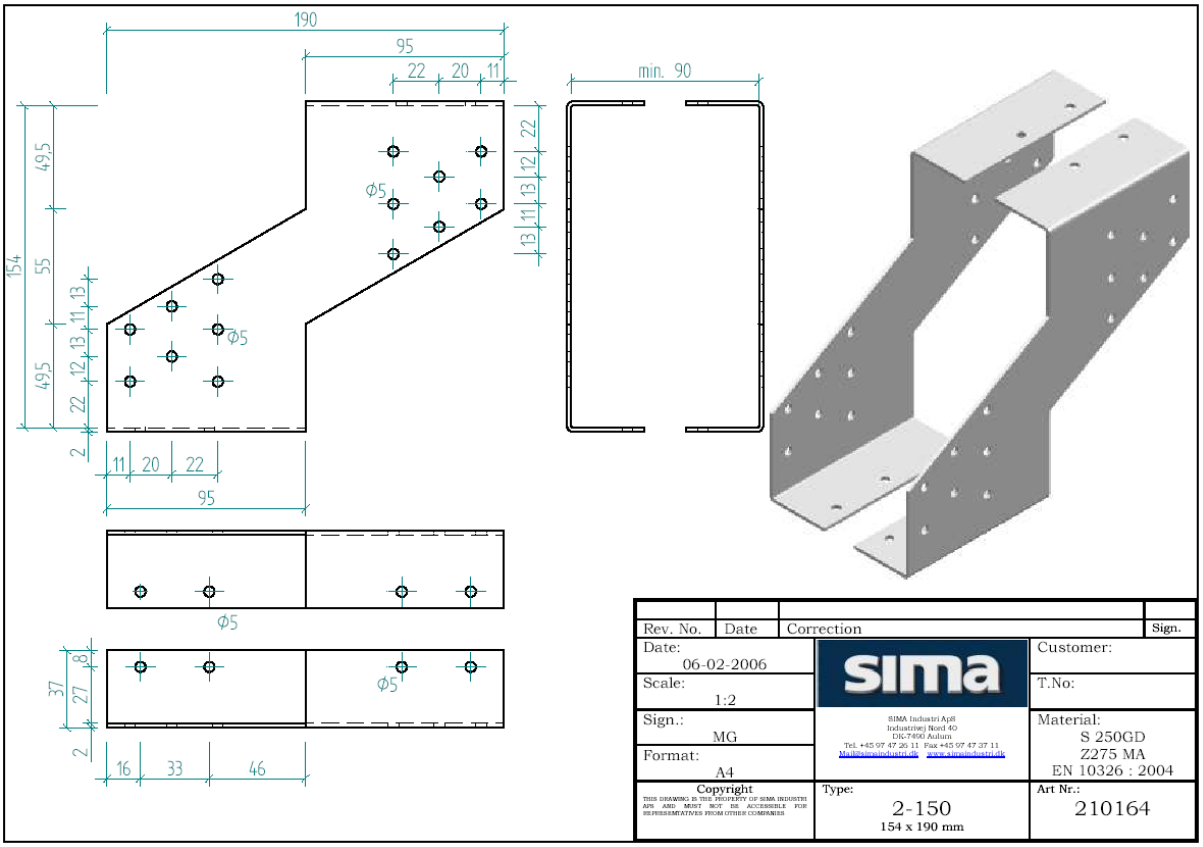

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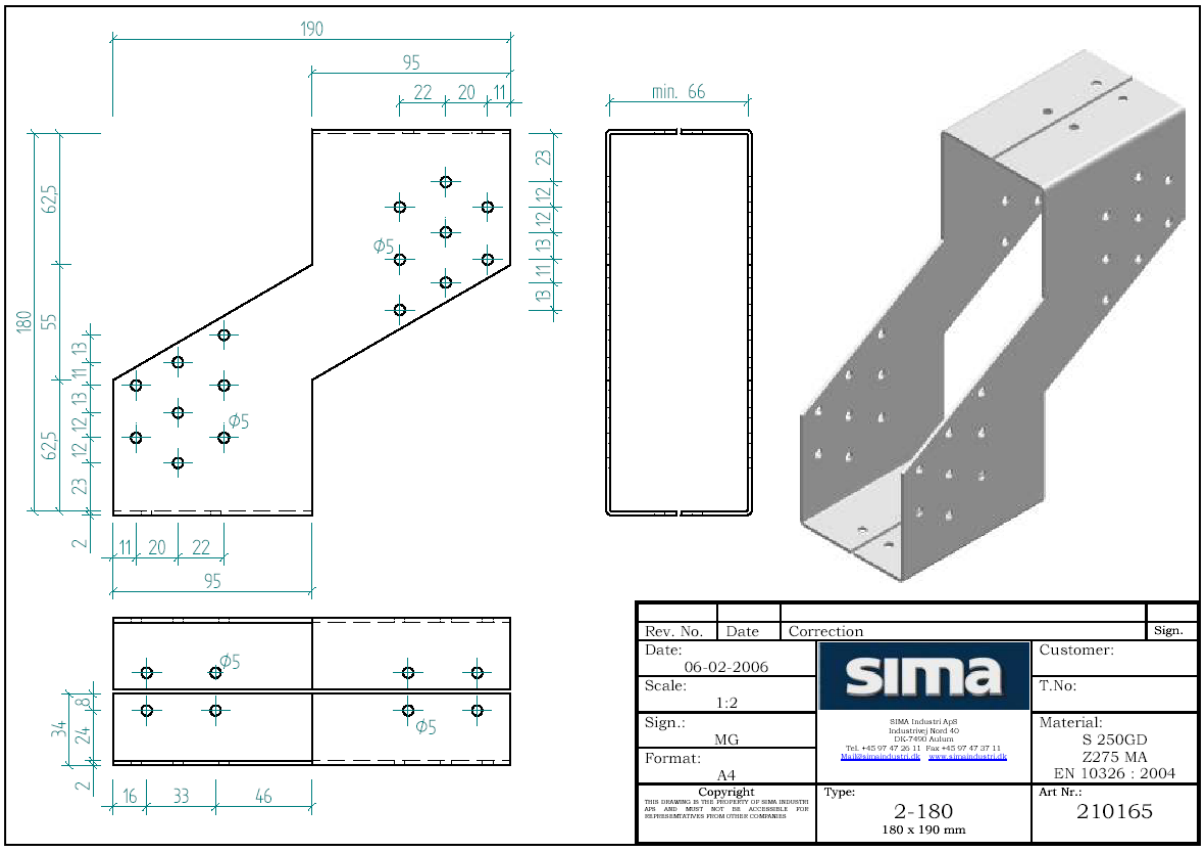

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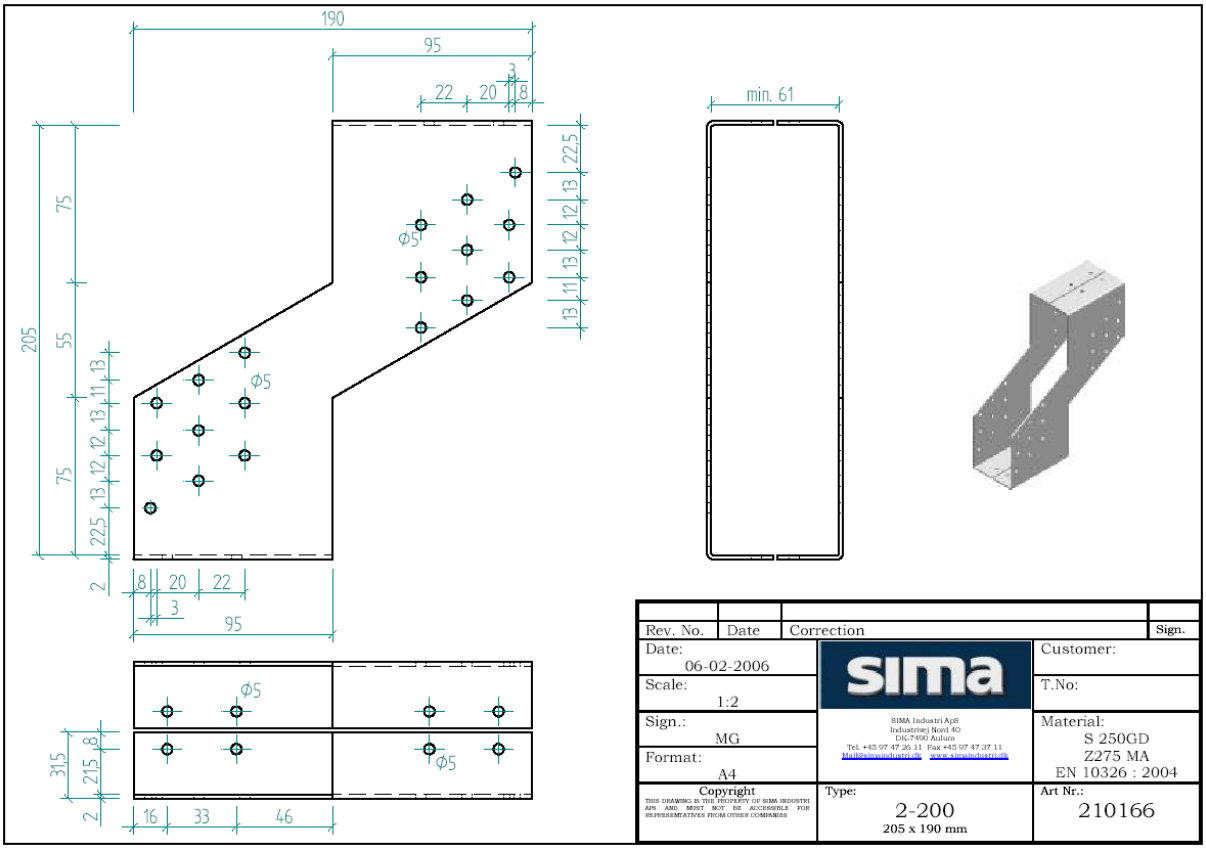

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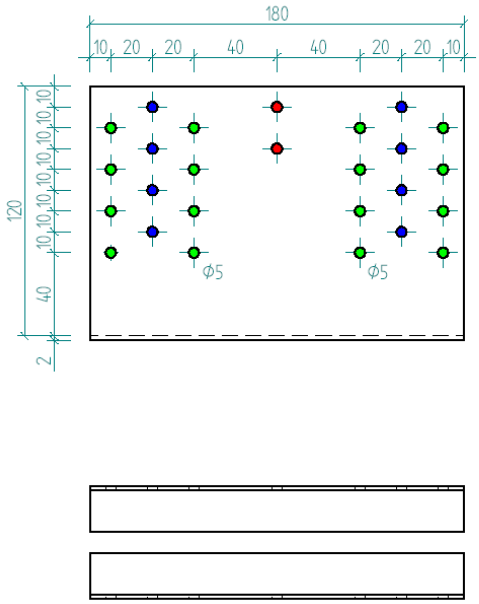

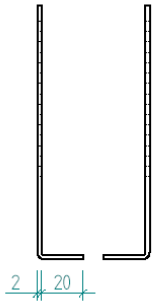

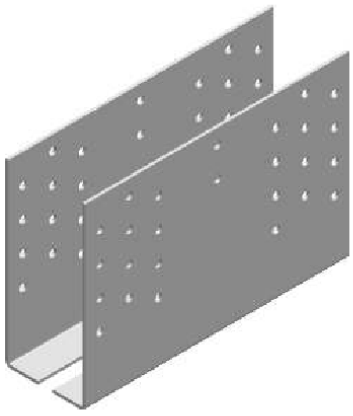

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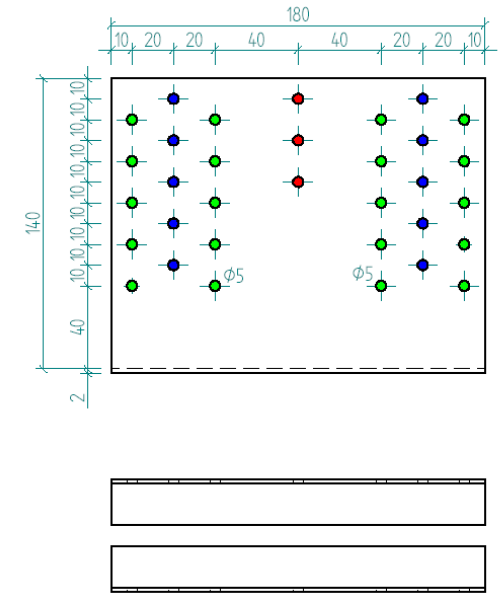

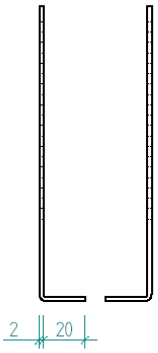

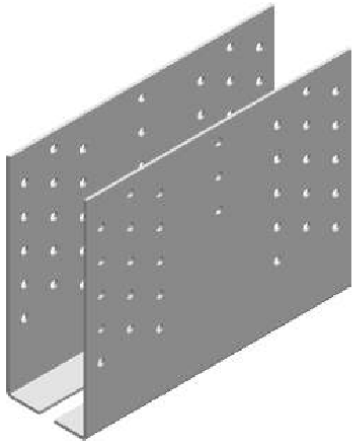

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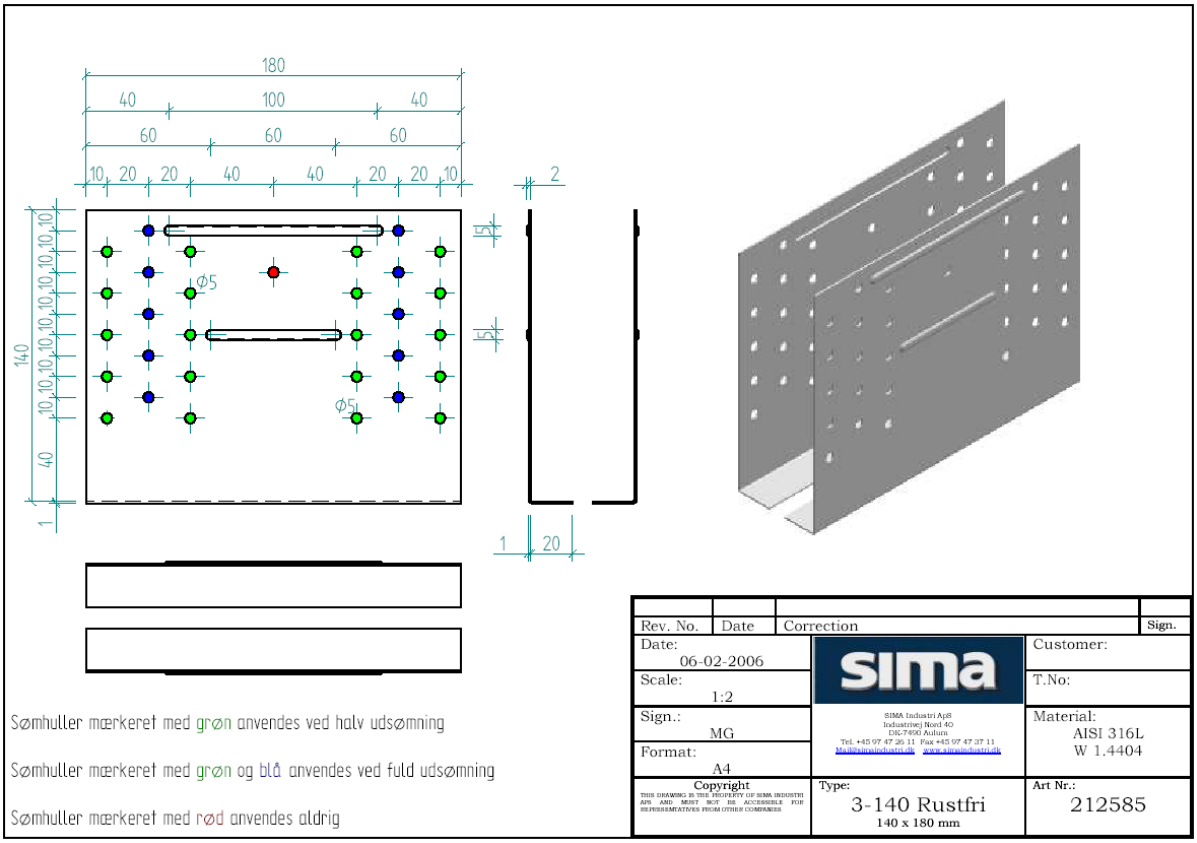

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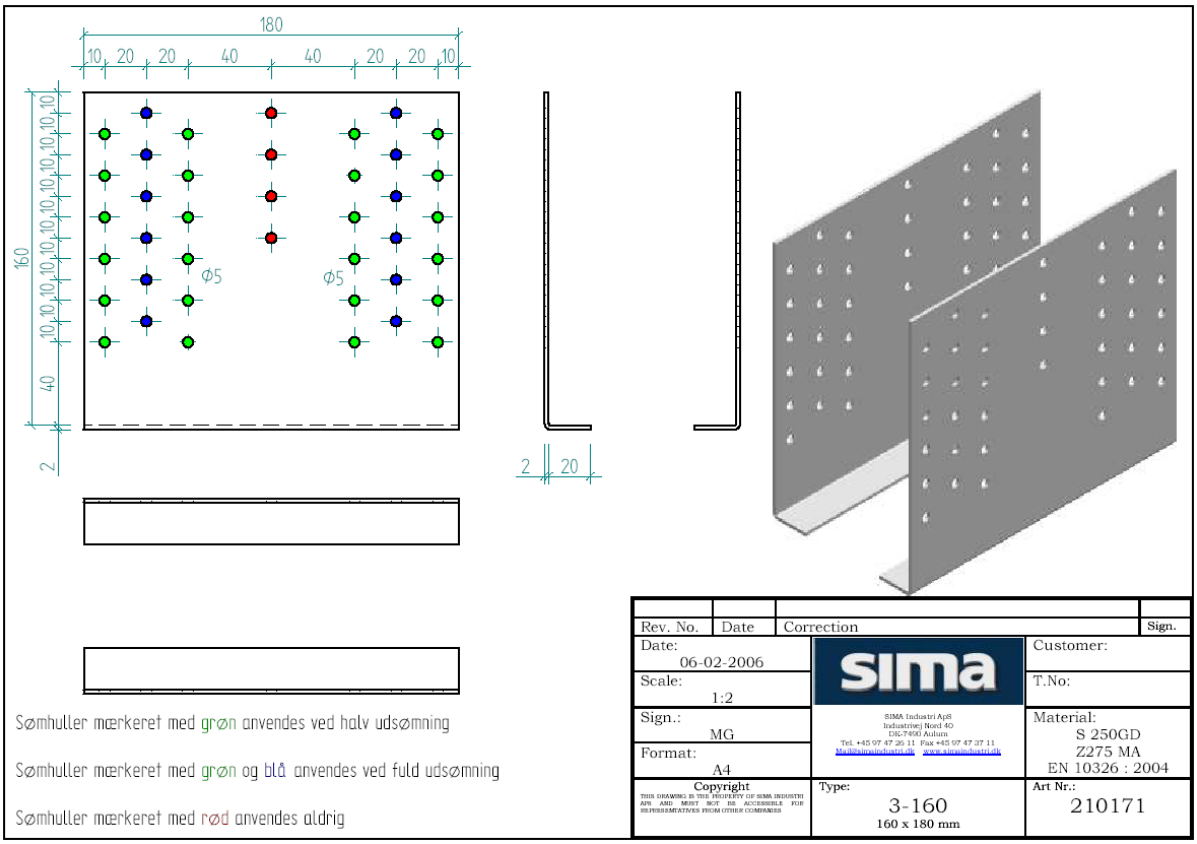

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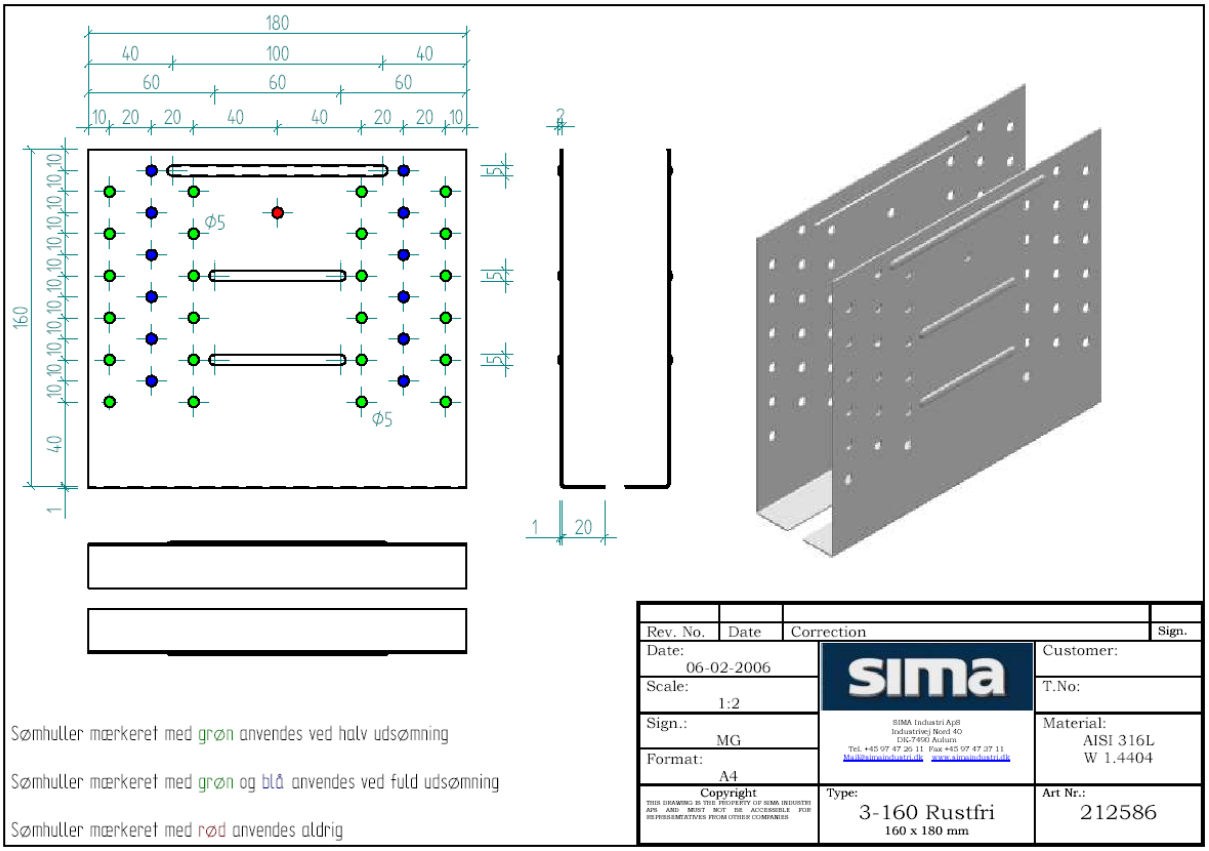

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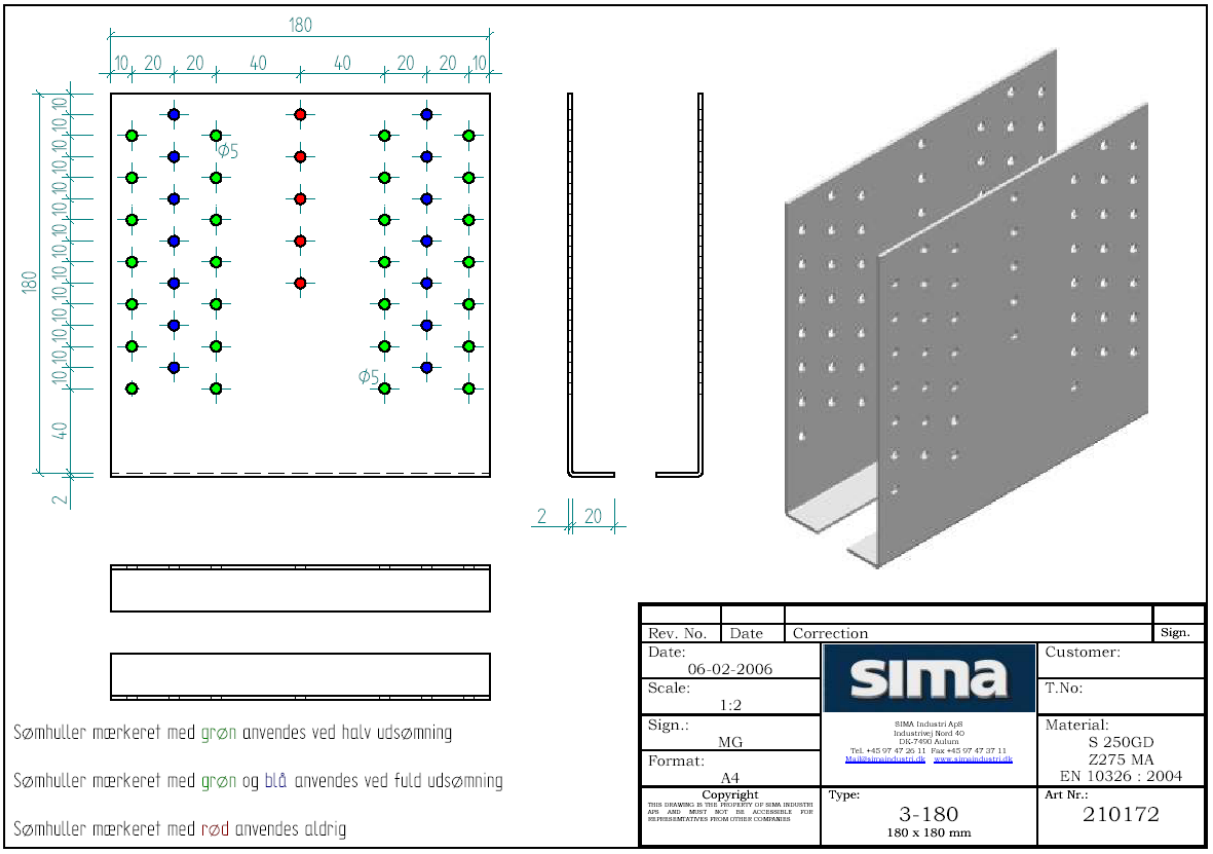

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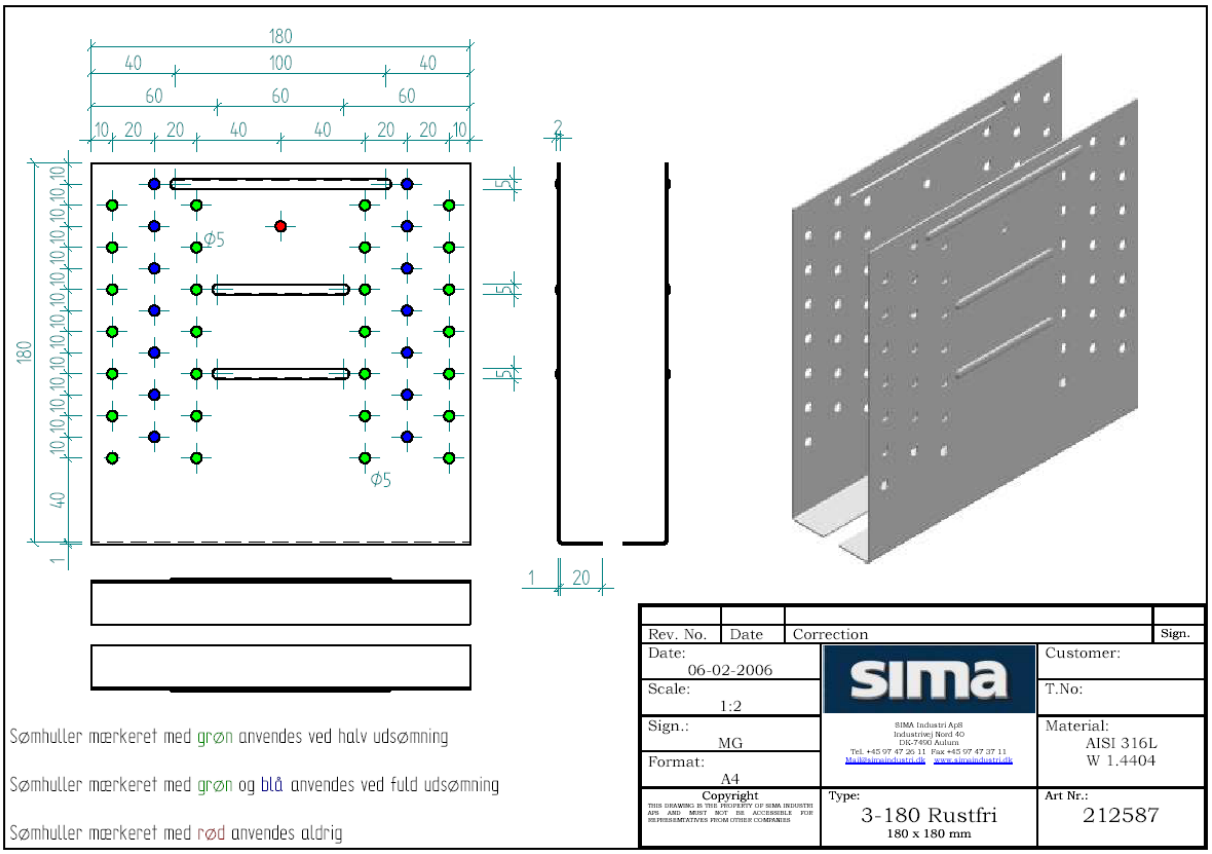
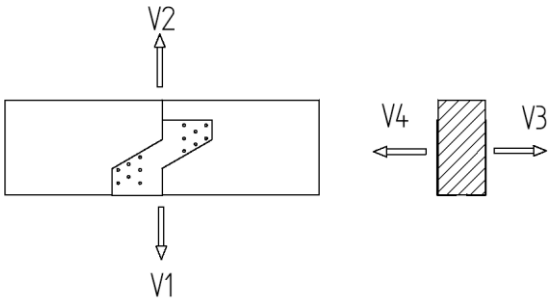


Characteristic capacities of the cantilever bracket connections with nails only.

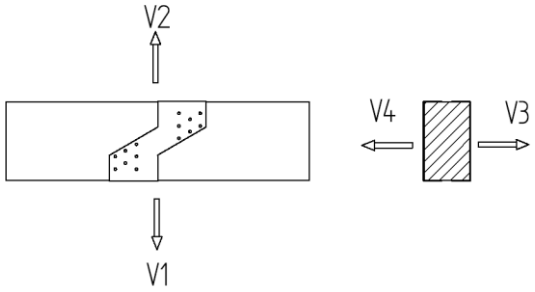
The values are applicable for connectors made from stainless steel with a characteristic yield stress of at least 235 MPa or a characteristic ultimate tensile strength of at least 330 MPa as for ordinary steel of the quality S250GD + Z275 according to EN 10346.

1. Forces

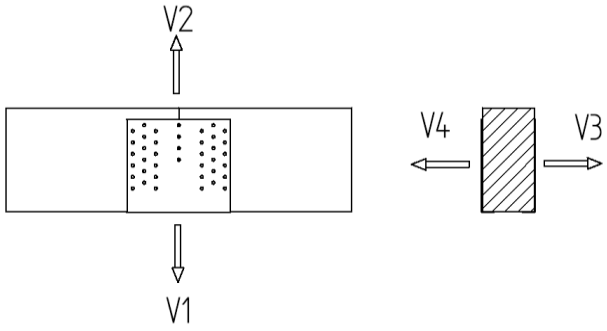
The characteristic load-carrying capacities are for the following force directions:



Type 1 cantilever brackets



Type 2 cantilever brackets



Type 3 cantilever brackets

The directions of the forces are:
V_1 Downward
V_2 Upward
$V_3 = V_4$ Lateral – horizontal

2. Additional conditions

Additionally, the following conditions apply:

There shall be nails in all holes or a partial nailing pattern as described in Annex A can be used.
The thickness of the beam shall be at least $l+4d$, where l is the length of the nails in the beam and d the diameter. This is in accordance with Eurocode 5.

Annex B
Characteristic capacities

Two brackets 1-150 pr. connection					
Paslode Connector nails 4,0 x 40	No. of nails pr connection	Load duration	$F1_d$, [kN]	$F2_d$, [kN]	$F3_d$, [kN]
Full nailing	28	P	3,51	2,23	4,09
		L	4,10	2,60	4,77
		M	4,68	2,97	5,46
		S	5,27	3,34	6,14
		I	6,44	4,08	7,50
Characteristic values					
The characteristic values found by calculation			5,85	3,71	6,82
The values have been assessed in accordance with EC 5 Table 3.1- "Values of K_{mod}"					
V1=F1 V2=F2 V3=V4=F3					

Two brackets 1-180 pr. connection					
Paslode Connector nails 4,0 x 40	No. of nails pr connection	Load duration	$F1_d$, [kN]	$F2_d$, [kN]	$F3_d$, [kN]
Full nailing	32	P	3,51	2,23	4,09
		L	4,10	2,60	4,77
		M	4,68	2,97	5,46
		S	5,27	3,34	6,14
		I	6,44	4,08	7,50
Characteristic values					
The characteristic values found by calculation			5,85	3,71	6,82
The values have been assessed in accordance with EC 5 Table 3.1- "Values of K_{mod}"					
V1=F1 V2=F2 V3=V4=F3					

Two brackets 2-125 pr. connection					
Paslode Connector nails 4,0 x 40	No. of nails pr connection	Load duration	$F1_d$, [kN]	$F2_d$, [kN]	$F3_d$, [kN]
Full nailing	20	P	8,13	2,26	2,65
		L	9,49	2,64	3,09
		M	10,84	3,02	3,53
		S	12,20	3,39	3,97
		I	14,91	4,15	4,85
Characteristic values					
The characteristic values found by calculation			13,55	3,77	4,41
The values have been assessed in accordance with EC 5 Table 3.1- "Values of K_{mod}"					
V1=F1 V2=F2 V3=V4=F3					

Two brackets 2-150 pr. connection					
Paslode Connector nails 4,0 x 40	No. of nails pr connection	Load duration	$F1_d$, [kN]	$F2_d$, [kN]	$F3_d$, [kN]
Full nailing	28	P	10,41	2,23	4,09
		L	12,15	2,60	4,77
		M	13,88	2,97	5,46
		S	15,62	3,34	6,14
		I	19,09	4,08	7,50
Characteristic values					
The characteristic values found by calculation			17,35	3,71	6,82
The values have been assessed in accordance with EC 5 Table 3.1- "Values of K_{mod}"					
V1=F1 V2=F2 V3=V4=F3					

Two brackets 2-180 pr. connection					
Paslode Connector nails 4,0 x 40	No. of nails pr connection	Load duration	$F1_d$, [kN]	$F2_d$, [kN]	$F3_d$, [kN]
Full nailing	32	P	9,81	2,23	4,09
		L	11,45	2,60	4,77
		M	13,08	2,97	5,46
		S	14,72	3,34	6,14
		I	17,99	4,08	7,50
Characteristic values					
The characteristic values found by calculation			16,35	3,71	6,82
The values have been assessed in accordance with EC 5 Table 3.1- "Values of K_{mod}"					
V1=F1 V2=F2 V3=V4=F3					

Two brackets 2-200 pr. connection					
Paslode Connector nails 4,0 x 40	No. of nails pr connection	Load duration	$F1_d$, [kN]	$F2_d$, [kN]	$F3_d$, [kN]
Full nailing	36	P	9,97	3,51	4,27
		L	11,63	4,10	4,98
		M	13,29	4,68	5,70
		S	14,95	5,27	6,41
		I	18,27	6,44	7,83
Characteristic values					
The characteristic values found by calculation			16,61	5,85	7,12
The values have been assessed in accordance with EC 5 Table 3.1- "Values of K_{mod}"					
V1=F1 V2=F2 V3=V4=F3					

Two brackets 3-120 pr. connection				
Paslode Connector nails 4,0 x 40	No. of nails pr connection	Load duration	$F1_d$, [kN]	$F3_d$, [kN]
Half nailing Holes marked green	32	P	5,89	5,75
		L	6,87	6,71
		M	7,85	7,66
		S	8,83	8,62
		I	10,79	10,54
Characteristic values				
The characteristic values found by calculation			9,81	9,58
The values have been assessed in accordance with EC 5 Table 3.1- "Values of K_{mod}"				
V1=V2=F1 V3=V4=F3				

Two brackets 3-120 pr. connection				
Paslode Connector nails 4,0 x 40	No. of nails pr connection	Load duration	$F1_d$, [kN]	$F3_d$, [kN]
Full nailing Holes marked green and blue	48	P	5,89	5,75
		L	6,87	6,71
		M	7,85	7,66
		S	8,83	8,62
		I	10,79	10,54
Characteristic values				
The characteristic values found by calculation			9,81	9,58
The values have been assessed in accordance with EC 5 Table 3.1- "Values of K_{mod}"				
V1=V2=F1 V3=V4=F3				

Two brackets 3-140 pr. connection				
Paslode Connector nails 4,0 x 40	No. of nails pr connection	Load duration	$F1_d$, [kN]	$F3_d$, [kN]
Half nailing Holes marked green	40	P	8,00	7,19
		L	9,33	8,39
		M	10,66	9,58
		S	12,00	10,78
		I	14,66	13,18
Characteristic values				
The characteristic values found by calculation			13,33	11,98
The values have been assessed in accordance with EC 5 Table 3.1- "Values of K_{mod}"				
V1=V2=F1 V3=V4=F3				

Two brackets 3-140 pr. connection				
Paslode Connector nails 4,0 x 40	No. of nails pr connection	Load duration	$F1_d$, [kN]	$F3_d$, [kN]
Full nailing Holes marked green and blue	60	P	8,00	7,19
		L	9,33	8,39
		M	10,66	9,58
		S	12,00	10,78
		I	14,66	13,18
Characteristic values				
The characteristic values found by calculation			13,33	11,98
The values have been assessed in accordance with EC 5 Table 3.1- "Values of K_{mod}"				
V1=V2=F1 V3=V4=F3				

Two brackets 3-140 stainless pr. connection				
Paslode Connector nails 4,0 x 40	No. of nails pr connection	Load duration	$F1_d$, [kN]	$F3_d$, [kN]
Half nailing Holes marked green	40	P	9,11	7,19
		L	10,63	8,39
		M	12,15	9,58
		S	13,67	10,78
		I	16,71	13,18
Characteristic values				
The characteristic values found by calculation			15,19	11,98
The values have been assessed in accordance with EC 5 Table 3.1- "Values of K_{mod}"				
V1=V2=F1 V3=V4=F3				

Two brackets 3-140 stainless pr. connection				
Paslode Connector nails 4,0 x 40	No. of nails pr connection	Load duration	$F1_d$, [kN]	$F3_d$, [kN]
Full nailing Holes marked green and blue	60	P	9,11	7,19
		L	10,63	8,39
		M	12,15	9,58
		S	13,67	10,78
		I	16,71	13,18
Characteristic values				
The characteristic values found by calculation			15,19	11,98
The values have been assessed in accordance with EC 5 Table 3.1- "Values of K_{mod}"				
V1=V2=F1 V3=V4=F3				

Two brackets 3-160 pr. connection				
Paslode Connector nails 4,0 x 40	No. of nails pr connection	Load duration	$F1_d$, [kN]	$F3_d$, [kN]
Half nailing Holes marked green	48	P	10,42	8,62
		L	12,16	10,06
		M	13,90	11,50
		S	15,63	12,93
		I	19,11	15,81
Characteristic values				
The characteristic values found by calculation			17,37	14,37
The values have been assessed in accordance with EC 5 Table 3.1- "Values of K_{mod}"				
V1=V2=F1 V3=V4=F3				

Two brackets 3-160 pr. connection				
Paslode Connector nails 4,0 x 40	No. of nails pr connection	Load duration	$F1_d$, [kN]	$F3_d$, [kN]
Full nailing Holes marked green and blue	72	P	10,42	8,62
		L	12,16	10,06
		M	13,90	11,50
		S	15,63	12,93
		I	19,11	15,81
Characteristic values				
The characteristic values found by calculation			17,37	14,37
The values have been assessed in accordance with EC 5 Table 3.1- "Values of K_{mod}"				
V1=V2=F1 V3=V4=F3				

Two brackets 3-160 stainless pr. connection				
Paslode Connector nails 4,0 x 40	No. of nails pr connection	Load duration	$F1_d$, [kN]	$F3_d$, [kN]
Half nailing Holes marked green	48	P	11,88	8,62
		L	13,86	10,06
		M	15,84	11,50
		S	17,82	12,93
		I	21,78	15,81
Characteristic values				
The characteristic values found by calculation			19,80	14,37
The values have been assessed in accordance with EC 5 Table 3.1- "Values of K_{mod}"				
V1=V2=F1 V3=V4=F3				

Two brackets 3-160 stainless pr. connection				
Paslode Connector nails 4,0 x 40	No. of nails pr connection	Load duration	$F1_d$, [kN]	$F3_d$, [kN]
Full nailing Holes marked green and blue	72	P	11,88	8,62
		L	13,86	10,06
		M	15,84	11,50
		S	17,82	12,93
		I	21,78	15,81
Characteristic values				
The characteristic values found by calculation			19,80	14,37
The values have been assessed in accordance with EC 5 Table 3.1- "Values of K_{mod}"				
V1=V2=F1 V3=V4=F3				

Two brackets 3-180 pr. connection				
Paslode Connector nails 4,0 x 40	No. of nails pr connection	Load duration	$F1_d$, [kN]	$F3_d$, [kN]
Half nailing Holes marked green	56	P	13,15	10,06
		L	15,34	11,74
		M	17,53	13,42
		S	19,72	15,09
		I	24,10	18,45
Characteristic values				
The characteristic values found by calculation			21,91	16,77
The values have been assessed in accordance with EC 5 Table 3.1- "Values of K_{mod}"				
V1=V2=F1 V3=V4=F3				

Two brackets 3-180 pr. connection				
Paslode Connector nails 4,0 x 40	No. of nails pr connection	Load duration	$F1_d$, [kN]	$F3_d$, [kN]
Full nailing Holes marked green and blue	84	P	13,15	10,06
		L	15,34	11,74
		M	17,53	13,42
		S	19,72	15,09
		I	24,10	18,45
Characteristic values				
The characteristic values found by calculation			21,91	16,77
The values have been assessed in accordance with EC 5 Table 3.1- "Values of K_{mod}"				
V1=V2=F1 V3=V4=F3				

Two brackets 3-180 stainless pr. connection				
Paslode Connector nails 4,0 x 40	No. of nails pr connection	Load duration	$F1_d$, [kN]	$F3_d$, [kN]
Half nailing Holes marked green	56	P	14,99	10,06
		L	17,49	11,74
		M	19,99	13,42
		S	22,49	15,09
		I	27,49	18,45
Characteristic values				
The characteristic values found by calculation			24,99	16,77
The values have been assessed in accordance with EC 5 Table 3.1- "Values of K_{mod}"				
V1=V2=F1 V3=V4=F3				

Two brackets 3-180 stainless pr. connection				
Paslode Connector nails 4,0 x 40	No. of nails pr connection	Load duration	$F1_d$, [kN]	$F3_d$, [kN]
Full nailing Holes marked green and blue	84	P	14,99	10,06
		L	17,49	11,74
		M	19,99	13,42
		S	22,49	15,09
		I	27,49	18,45
Characteristic values				
The characteristic values found by calculation			24,99	16,77
The values have been assessed in accordance with EC 5 Table 3.1- "Values of K_{mod}"				
V1=V2=F1 V3=V4=F3				