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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-18/0886 of 2023/08/21

### 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:

Herakulix post bases

Product family to which the above construction product belongs:

Three-dimensional nailing plate (Post bases for the support of timber columns and posts as load-bearing elements)

Manufacturer:

SIHGA GmbH  
Gewerbepark Kleinreith 4  
A-4694 Ohlsdorf  
Tel. +49 7612 / 74370 - 0  
Fax +49 7612 / 74370 - 10  
Internet [www.sihga.com](http://www.sihga.com)

Manufacturing plant:

SIHGA GmbH  
Gewerbepark Kleinreith 4  
A-4694 Ohlsdorf

This European Technical Assessment contains:

38 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 ETA with the same number issued on 2023-02-16

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## **II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT**

### **1 Technical description of product**

The Herakulix post bases are supplied in four types: XS, S, XM, M, L and XL cover different heights. The types XM, M, L and XL are built up identically apart from the length of the circular hollow section used for adjusting the height. Types XS and S are similar constructed but with different dimensions.

Most parts are made of S235JR except the bolts which are grade 8.8, the threaded rod for the types to be inserted in concrete made of grade 4.8, and the cylinder of the hinge type which is 1.0718

The six types are combined by a bolt with a foot plate allowing to a small amount adjustment to an inclined ground. Two other combinations are possible with a fully threaded rod for embedding in not yet hardened concrete or with a hinge allowing larger rotation in one direction and rigid behavior in the direction perpendicular to the hinge.

The post-base KI200 is neither adjustable in height nor for a slope.

The connection to timber post is done with either IdeFix or ZaFix connector according ETA-14/0160 or fully threaded screws GoFix S+ d=6.5 or d=8 according to ETA-11/0425.

Further product description is given in Annex A.

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

The intended use of the post bases is the support of timber columns and posts as load-bearing elements, where requirements for mechanical resistance and stability and safety in use in the sense of the Basic Work Requirements 1 and 4 of the Regulation 305/2011 (EU) shall be fulfilled.

The static and kinematical behaviour of the timber members or the supports shall be as described in Annex A and B.

The timber posts may be of solid timber of strength class C24 or better according to EN 338 or of glued laminated timber according to EN 14080. Minimum dimensions for the post have to be considered (Annex A).

The post base shall be installed as pictured in the drawings. The cross-section of the timber column shall be positioned

centrically and with the end grain plane on the base plate. The end grain of the timber post must in general be plane on the base plate of the post base.

The maximum distance between the foundation and the base plate of the post base is given in Annex A, table A.1 (distance a).

Annex B states the load-carrying capacities of the post bases for solid timber of strength class C24 according to EN 338. The design of the connections shall be in accordance with Eurocode 3 and Eurocode 5 or a similar national code. The anchorage of the post base in the foundation and imperfections exceeding the assumptions in Eurocode 5, 5.4.4 are not part of this ETA.

The post bases are for use in timber structures subject to the service classes 1, 2 and 3 of Eurocode 5 and for connections subject to static or quasi-static loading. The corrosion protection is given by a three-layered coating system “nanogeen”, specification laid down as file at ETA-Danmark.

The metal fasteners must also have a zinc coating for the intended use in service class 3 of EN 1995-1-1 (zinc coating Fe/Zn 25c according to EN ISO 2081). Post-bases assembled with screws GoFix S+ made of stainless steel according to ETA-11/0425 and post-bases with IdeFix or ZaFix according to ETA-14/0160 can additionally be used in service-class 3.

The scope of the post bases regarding resistance to corrosion shall be defined according to national provisions that apply at the installation site considering environmental conditions and in conjunction with the admissible service conditions according to EN 1995-1-1 and the admissible corrosivity category as described and defined in EN ISO 12944-2

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

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Characteristic	Assessment of characteristic
<b>3.1 Mechanical resistance and stability*)</b>	
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
<b>3.2 Safety in case of fire</b>	
Reaction to fire	The post bases are made from steel classified as <b>Euroclass A1</b> in accordance with EN 13501-1 and Commission Delegated Regulation 2016/364
<b>3.3 General aspects related to the performance of the product</b>	
Identification	The post bases 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  See Annex A

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\*) See additional information in section 3.4 – 3.7.

### 3.4 Methods of verification

#### Safety principles and partial factors

The characteristic load-carrying capacities are based on the characteristic values of the connections with metal fasteners, the steel plates and the timber post.

In the case of timber failure or failure of the metal fasteners, the design values shall be calculated according to EN 1995-1-1 by dividing the characteristic values of the load-carrying capacities by different partial factors for the strength properties, and in addition multiplied with the coefficient  $k_{mod}$ .

In the case of steel failure, the design value shall be calculated according to EN 1993-1-1 by reducing the characteristic values of the load-carrying capacity with different partial factors.

The design value of the load-carrying capacity is the smaller value of all load-carrying capacities:

$$F_{Rd} = \min \left\{ \frac{k_{mod} \cdot F_{Rk,T}}{\gamma_{M,T}}, \frac{F_{Rk,S}}{\gamma_{M,S}} \right\}$$

Therefore, for timber failure or failure of the metal fasteners the load duration class and the service class are included. The different partial factors  $\gamma_M$  for steel or timber failure, respectively, are also correctly taken into account.

### 3.5 Mechanical resistance and stability

See Annex B for the characteristic load-carrying capacity in the different directions  $F_1$  to  $F_5$  for solid timber of strength class C24 according to EN 338. Using the load-carrying capacities of the post bases, the specifications in Annex A must be fulfilled. The end grain of the timber post must in general be plane on the base plate of the post base.

The characteristic capacities of the post bases are determined by a combination of calculation according to Eurocode 3 and Eurocode 5 and testing. They should be used for designs in accordance with Eurocode 3 and Eurocode 5 or a similar national code.

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

No performance has been assessed in relation to the anchorage of the post bases in the foundation. It must be checked by the designer of the structure to ensure it is not less than the post base capacity and, if necessary, the post base capacity reduced accordingly. Therefore, the specifications for the lever arms  $e_{F_2/F_3}$  (for load case  $F_2 / F_3$ )

$F_3$ ) and  $e_{F_4/F_5}$  (for load case  $F_4 / F_5$ ) in annex A have to be considered. The lever arm is the distance between the top edge of the foundation and the load.

### 3.6 Aspects related to the performance of the product

Corrosion protection in service class 1, 2 and 3.

In accordance with EAD 130186-00-0603 the post bases are produced of steel grade S235JR according to EN 10025-24 with minimum characteristic yield strength of  $R_{eH} = 235 \text{ N/mm}^2$  and a minimum characteristic tensile strength of  $R_m = 360 \text{ N/mm}^2$ . The bolts are graded 8.8, the threaded rod for the types to be inserted in concrete are made of grade 4.8, and the cylinder of the hinge type is 1.0718.

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

Herakulix and KI200 post bases 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 following provisions concerning product performance apply:

The primary structural member to which the post bases by IdeFix or ZaFix connectors (ETA-14/0160) or GoFix S+ screws (ETA-11/0425) are fixed shall be:

- A timber member of softwood or wood-based material,
- Free from wane under the connector.
- The actual shear and tensile perpendicular to the grain capacity of the timber members to be used in conjunction with the connector is checked by the designer of the structure to ensure it is not less than the connector capacity and, if necessary, the connector capacity reduced accordingly. Models and equations are given in the ETA-14/0160.
- There are no specific requirements relating to preparation of the timber members.

The post base shall be installed centrally in the cross-section of the timber column.

The minimum insertion depth in the turnbuckles should be the diameter of the rod.

The anchorage of the post base in the foundation is not part of this ETA. It must be checked by the designer of the structure to ensure it is not less than the post base capacity and, if necessary, the post base capacity reduced accordingly. Therefore, the specifications for the lever arms  $e_{F_2/F_3}$  (for load case  $F_2 / F_3$ ) and  $e_{F_4/F_5}$  (for

load case  $F_4 / F_5$ ) in Annex A have to be considered. The lever arm is the distance between the top edge of the foundation and the load.

## **4 Attestation and verification of constancy of performance (AVCP)**

### **4.1 AVCP system**

According to the decision 97/638/EC of the European Commission<sup>1</sup>, 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 2023-08-21 by



Thomas Bruun  
Managing Director, ETA-Danmark

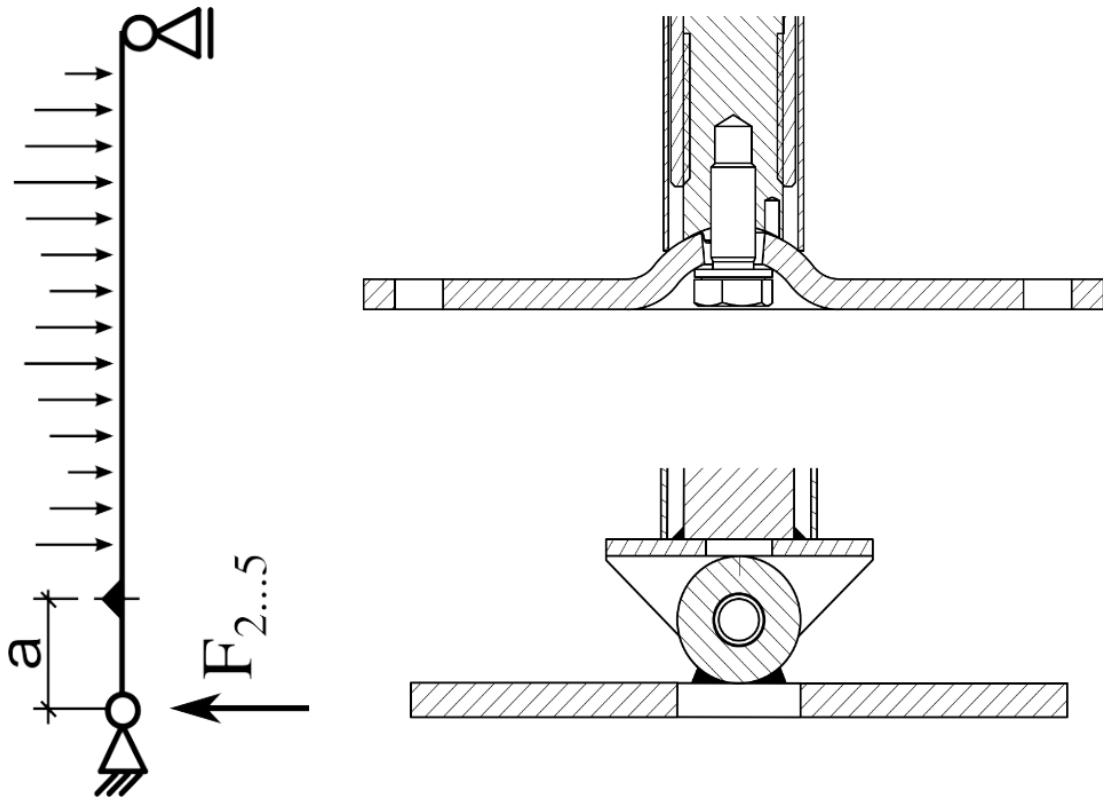
**Annex A**  
**Product details and definitions**

Table A.1 Specifications of the post bases

Post base		Post [mm]		Distances [mm]	
Type	Connection at foot plate	min b = min h	a	e <sub>F2/F3</sub>	e <sub>F4/F5</sub>
Herakulix XS	Foot plate (R,Q)	IF30: 100 mm IF40: 120 mm GoFix S+: 120 mm ZaFix: 120 mm	154	Inclinable	
	Threaded rod – embedded in concrete (B)		135	a	
	Hinge (N)		175	Loaded perp. to plan of rotation a	
Herakulix S	Foot plate (R,Q)	IF30: 100 mm IF40: 120 mm GoFix S+: 120 mm ZaFix: 120 mm	245	Inclinable	
	Threaded rod – embedded in concrete (B)		226	a	
	Hinge (N)		266	Loaded perp. to plan of rotation a	
Herakulix XM	Foot plate (R,Q)	IF30: 100 mm IF40: 120 mm GoFix S+: 120 mm ZaFix: 120 mm	155	inclinable	
	Threaded rod – embedded in concrete (B)		137	a	
	Hinge (N)		180	Loaded perp. to plan of rotation a	
Herakulix M	Foot plate (R,Q)	IF30: 100 mm IF40: 120 mm GoFix S+: 120 mm ZaFix: 120 mm	220	inclinable	
	Threaded rod – embedded in concrete (B)		202	a	
	Hinge (N)		245	Loaded perp. to plan of rotation a	
Herakulix L	Foot plate (R,Q)	IF30: 100 mm IF40: 120 mm GoFix S+: 120 mm ZaFix: 120 mm	350	inclinable	
	Threaded rod – embedded in concrete (B)		332	a	
	Hinge (N)		375	Loaded perp. to plan of rotation a	
Herakulix XL	Foot plate (R,Q)	IF30: 100 mm IF40: 120 mm GoFix S+: 120 mm ZaFix: 120 mm	460	inclinable	
	Threaded rod – embedded in concrete (B)		442	A	
	Hinge (N)		485	Loaded perp. to plan of rotation a	
KI200		IF30: 140 mm IF40: 140 mm	200	IF30: a+23 mm IF40: a+28 mm	

The post-base types with inclinable joint at the foot plate and the hinge loaded in the plane of rotation are rigidly jointed at the head plate and modelled with a hinge at the foot plate. For these types the connection to foundation must not be designed for a bending moment. For the other types a bending moment for the connection to the foundation might be calculated by taking into account the distances e<sub>F2/F3</sub> and e<sub>F4/F5</sub> and the loading F<sub>2,5</sub>.

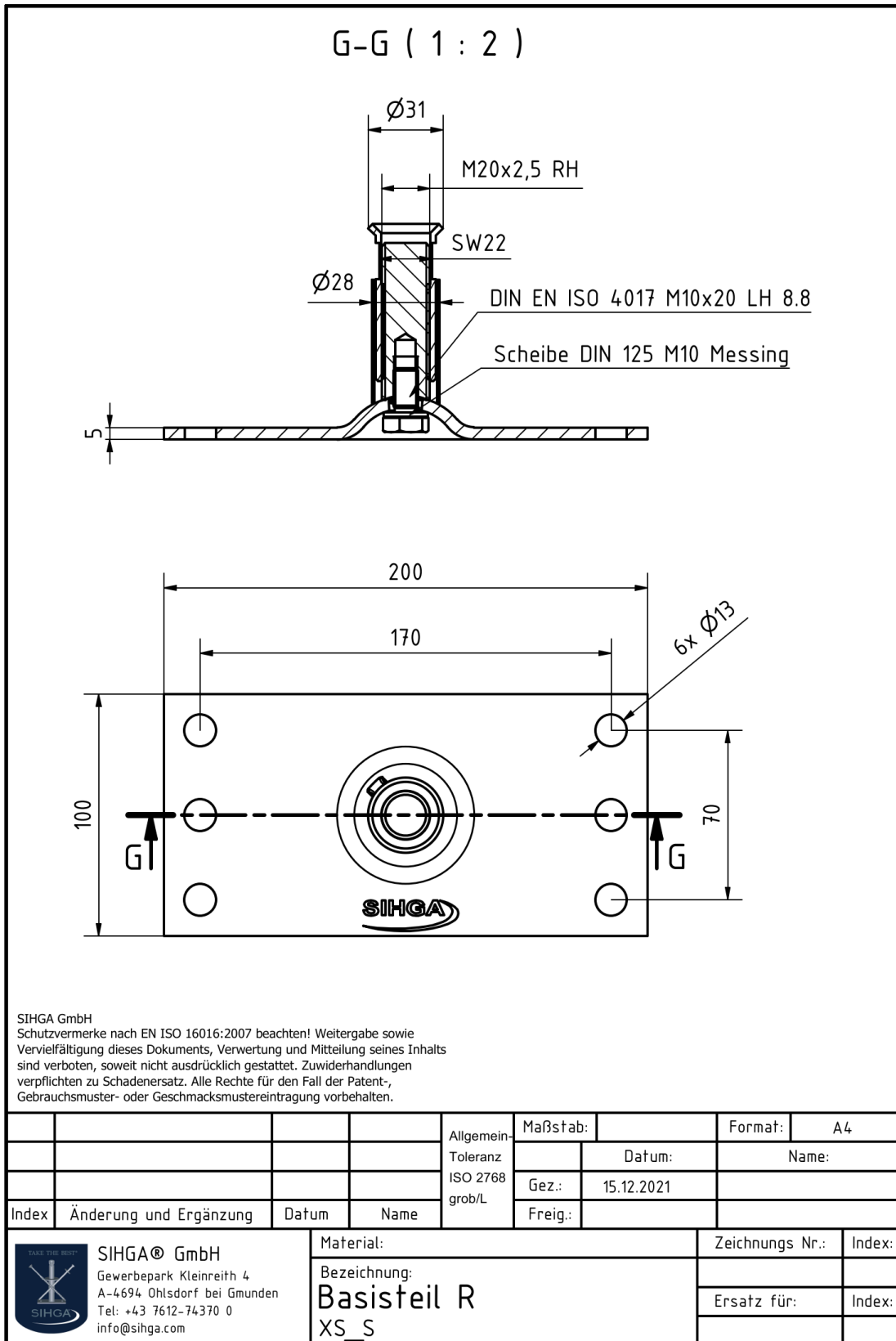


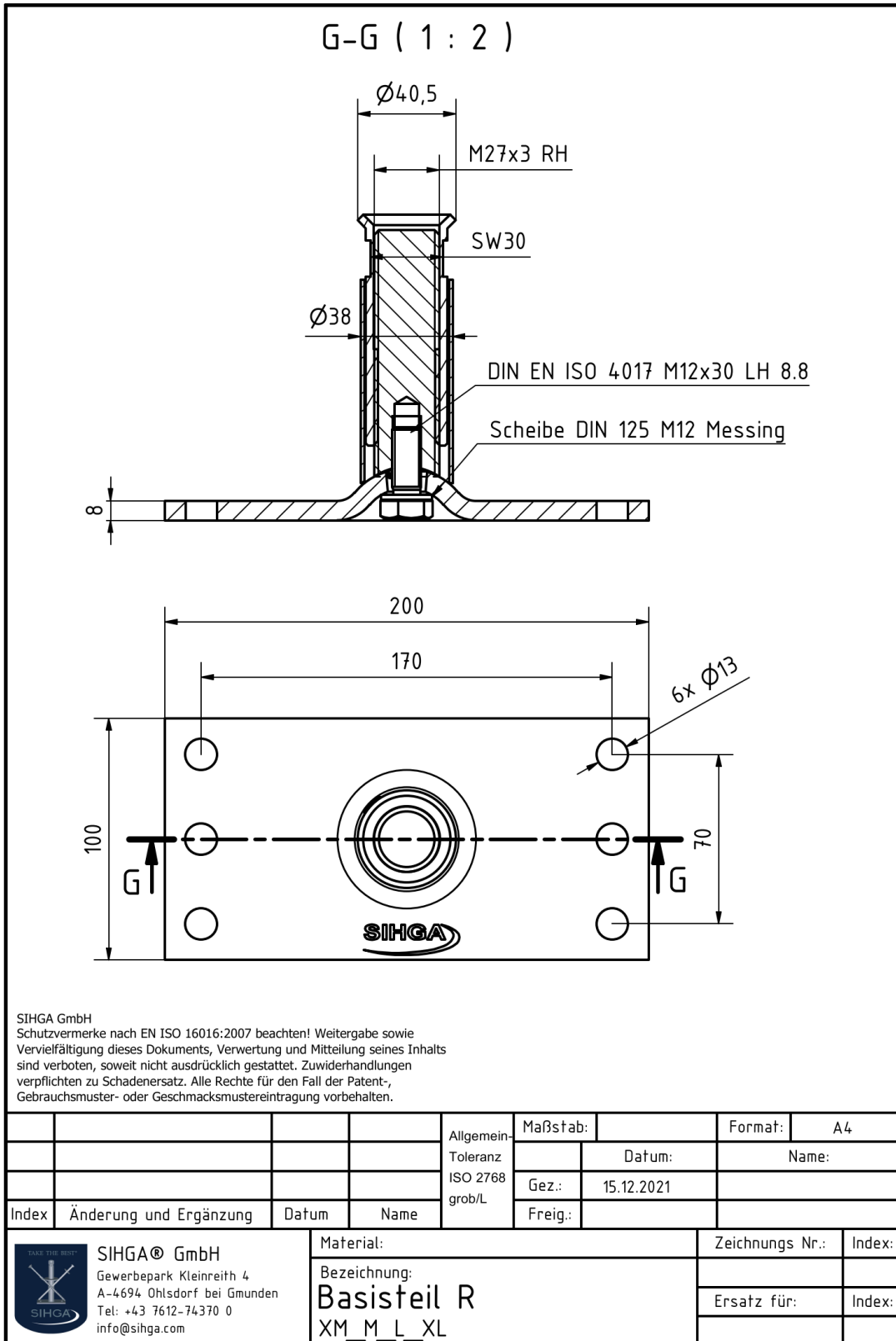


Inclinable foot types and appropriate model

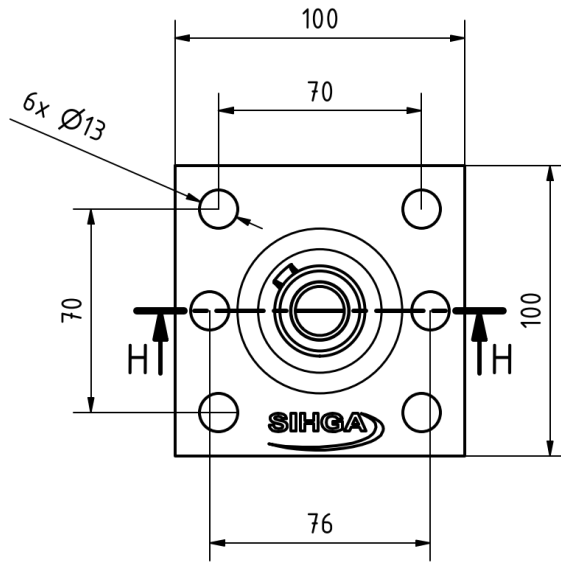
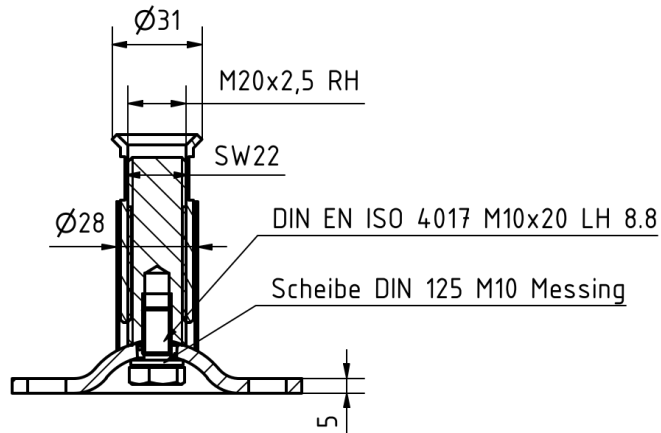
Table A.2 Specifications of the metal fasteners

Fastener type	Size	Specification
IdeFix	IF 30, IF 40 loadable by lateral forces $F_{2..5}$	ETA-14/0160
ZaFix	For loading by tension or compression exclusively	ETA-14/0160
GoFix	For laterally loaded post-bases S+ $\varnothing 6.5$ mm l=140 mm, $\varnothing 8$ mm l=125 mm or $\varnothing 8$ mm l=195 mm For loading by tension exclusively S+ $\varnothing 6.5$ mm l=140 mm or $\varnothing 8$ mm l=195 mm	ETA-11/0425






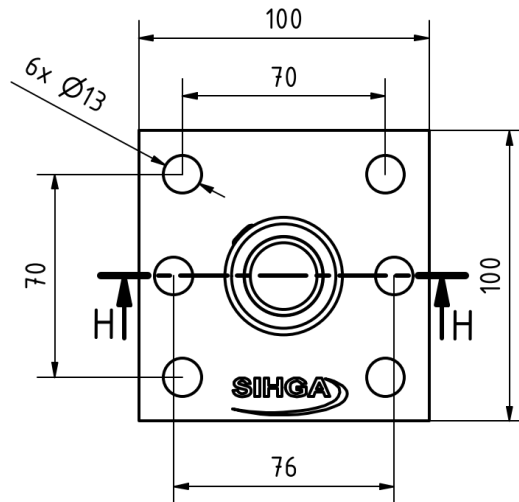
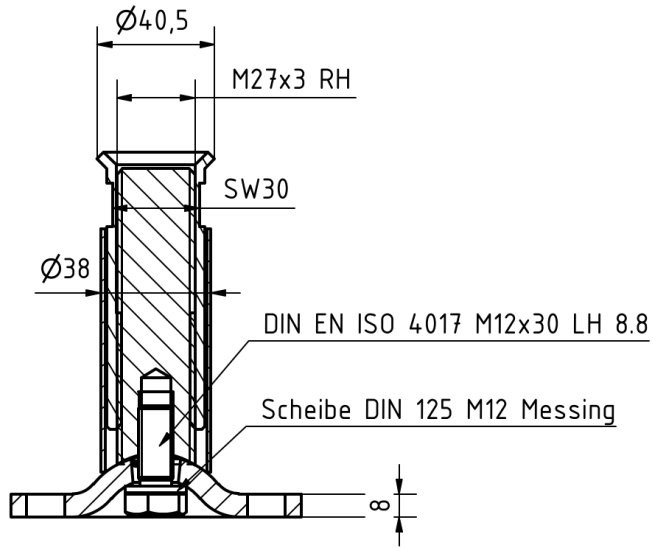
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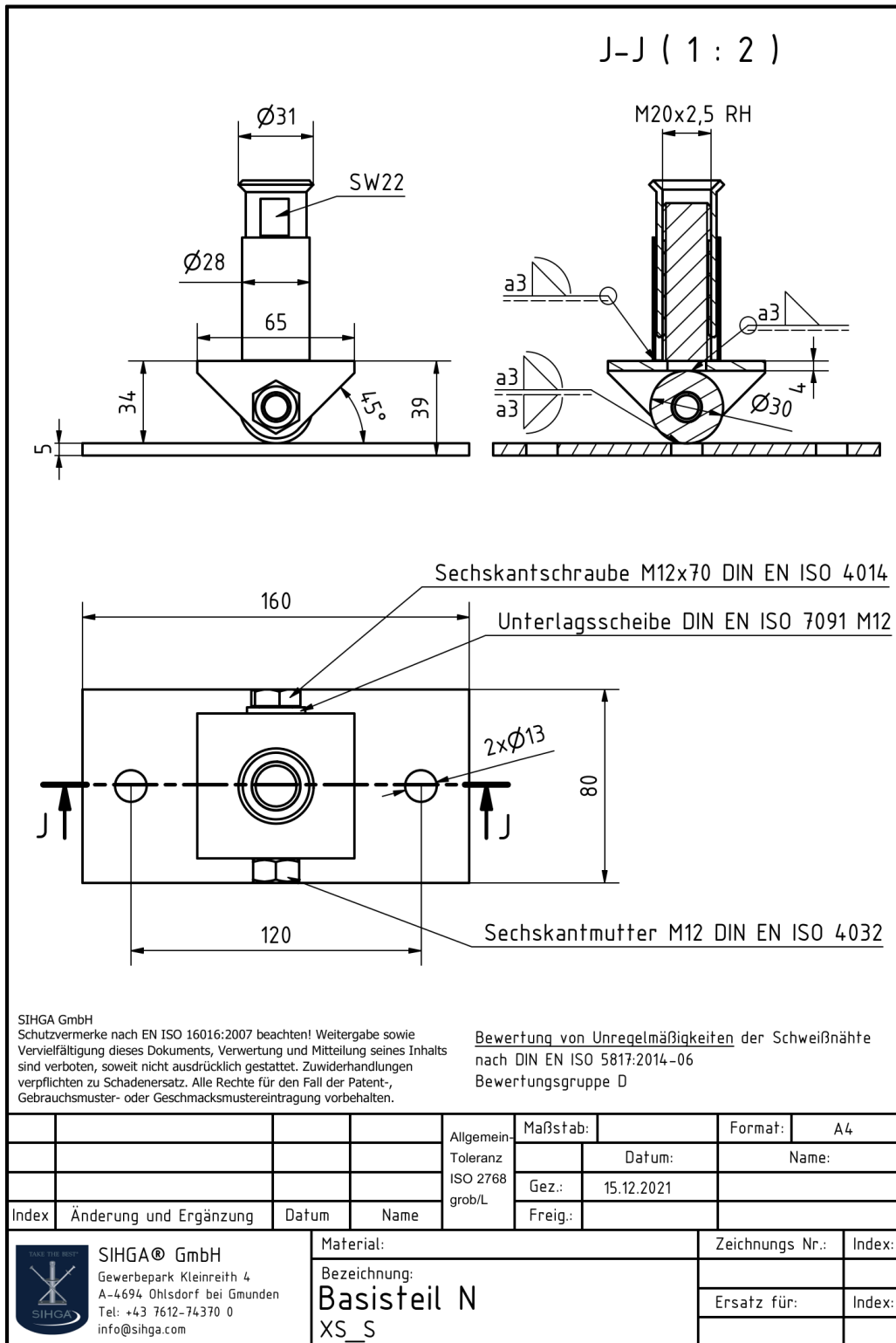
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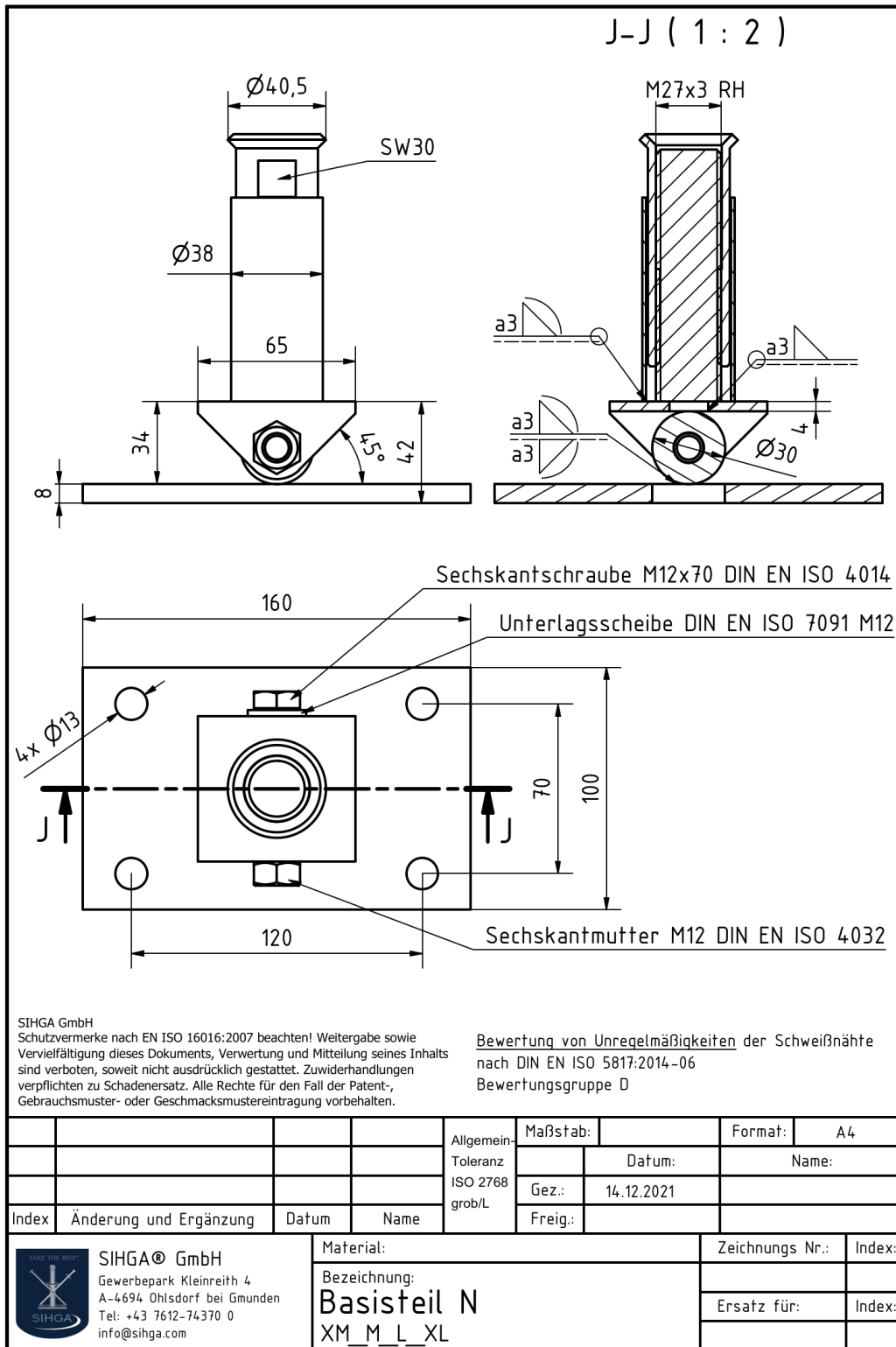
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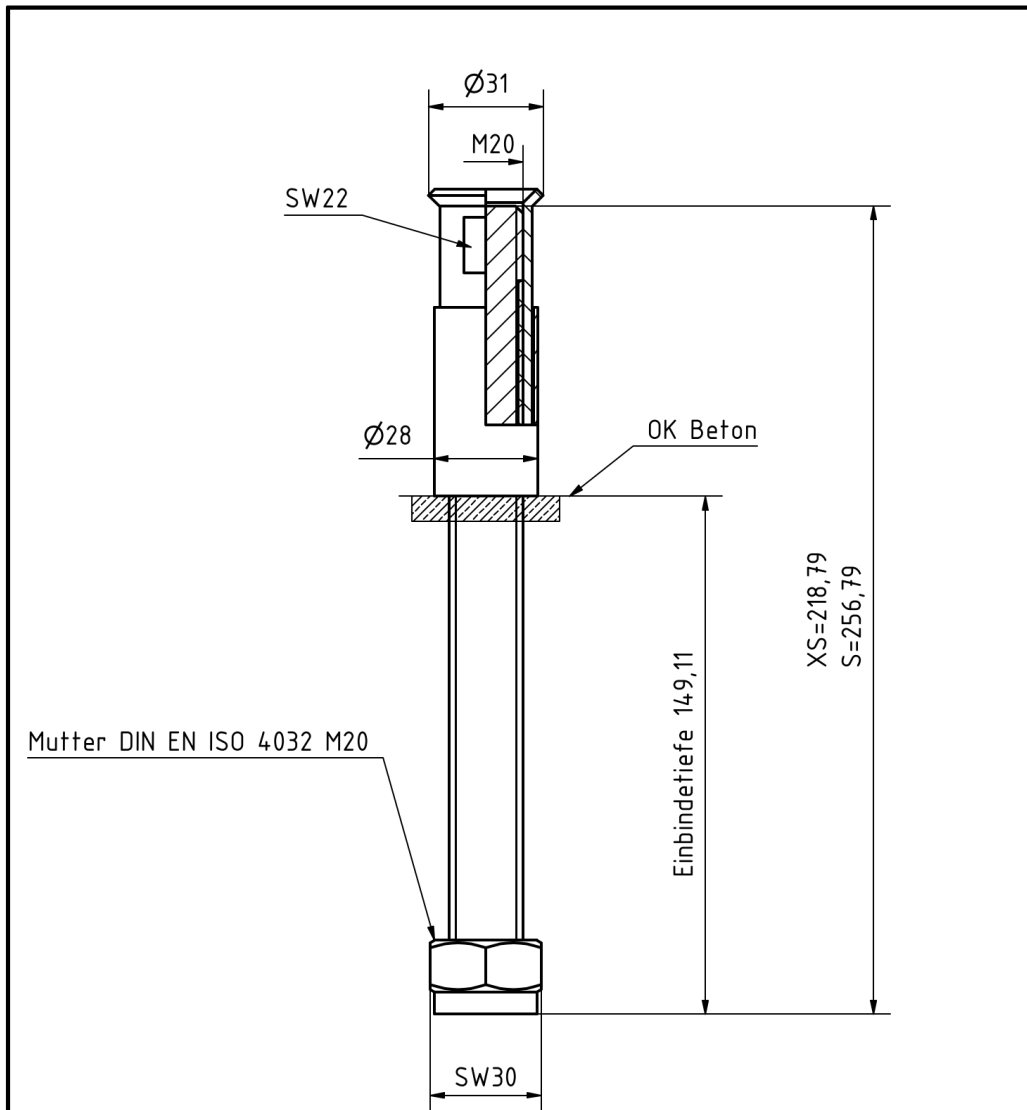


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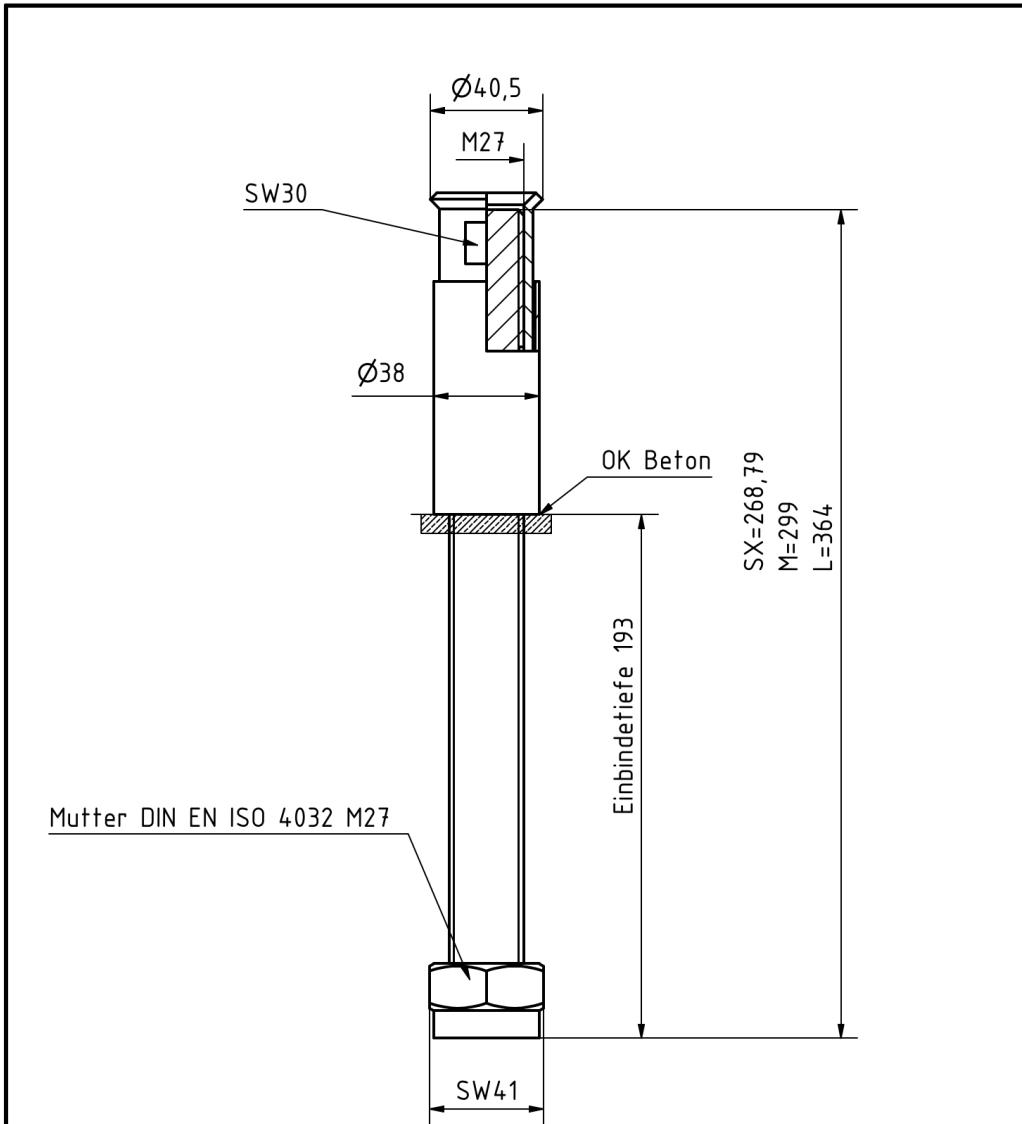





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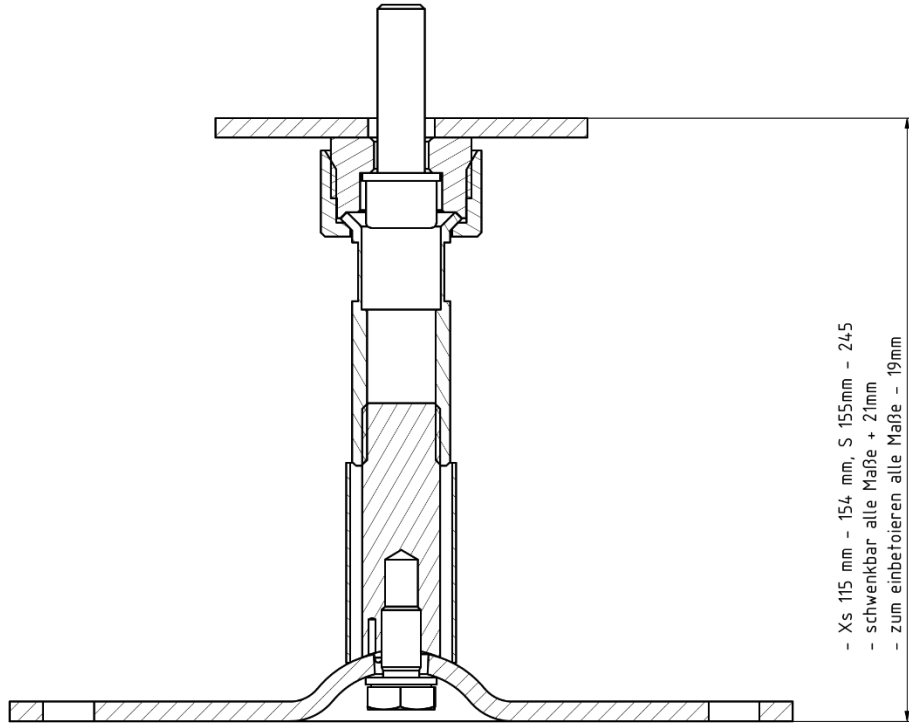
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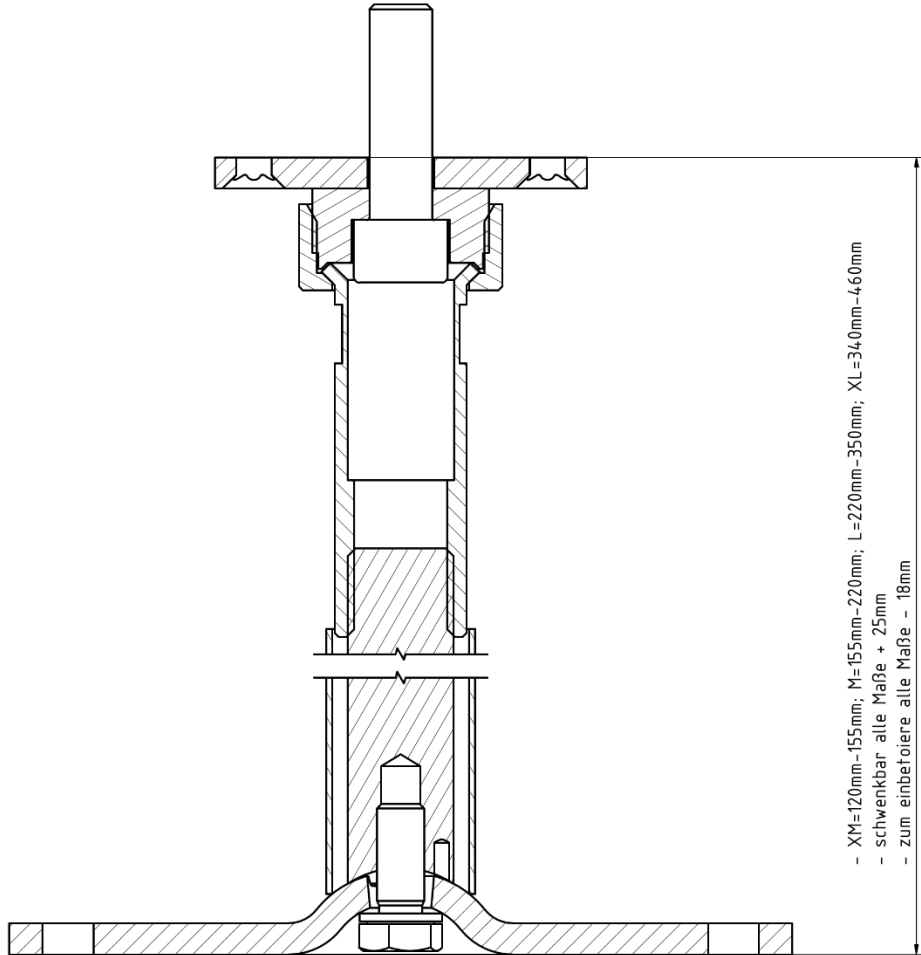
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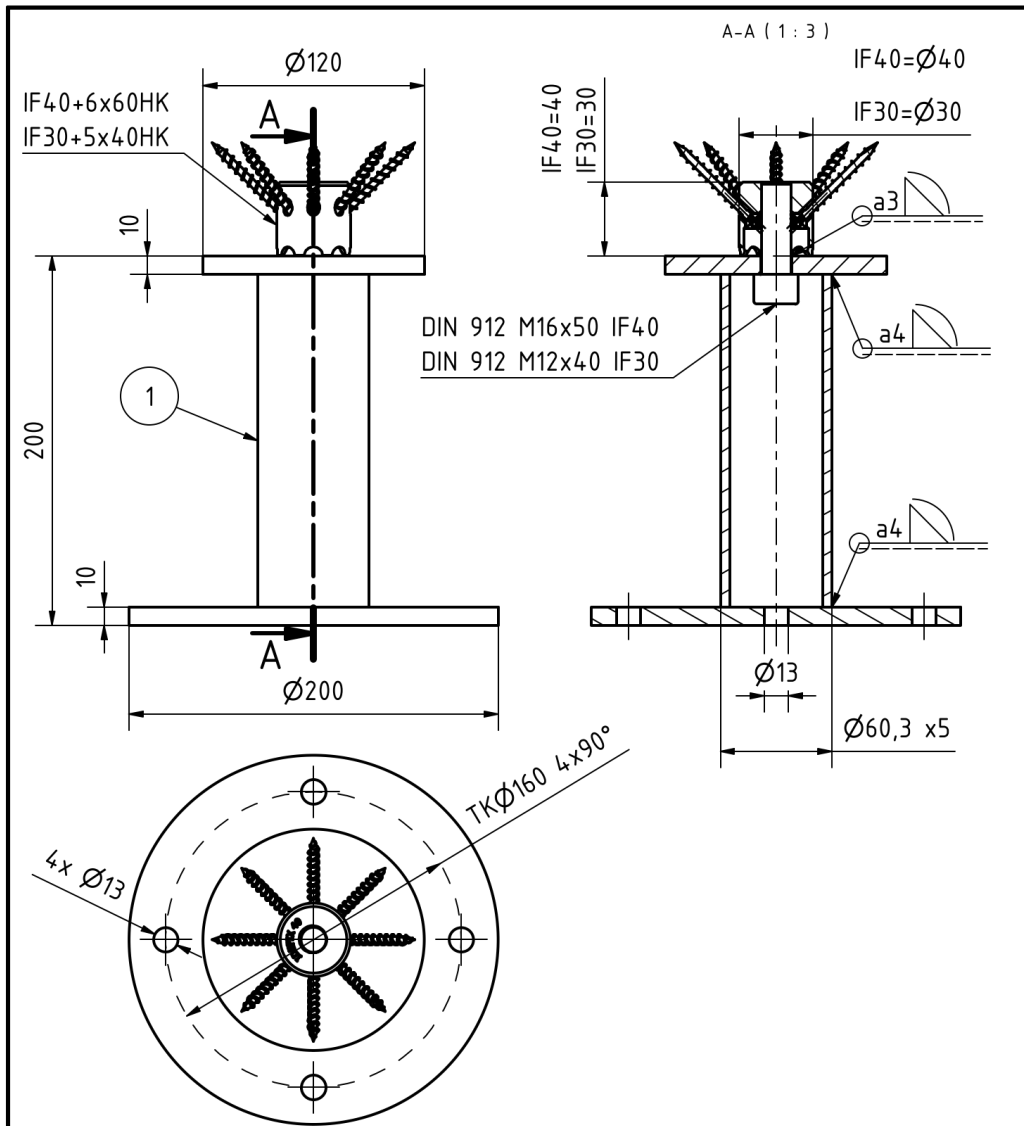
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- XM=120mm-155mm; M=155mm-220mm; L=220mm-350mm; XL=340mm-460mm  
 - schwenkbar alle Maße + 25mm  
 - zum einbetonierte alle Maße - 18mm

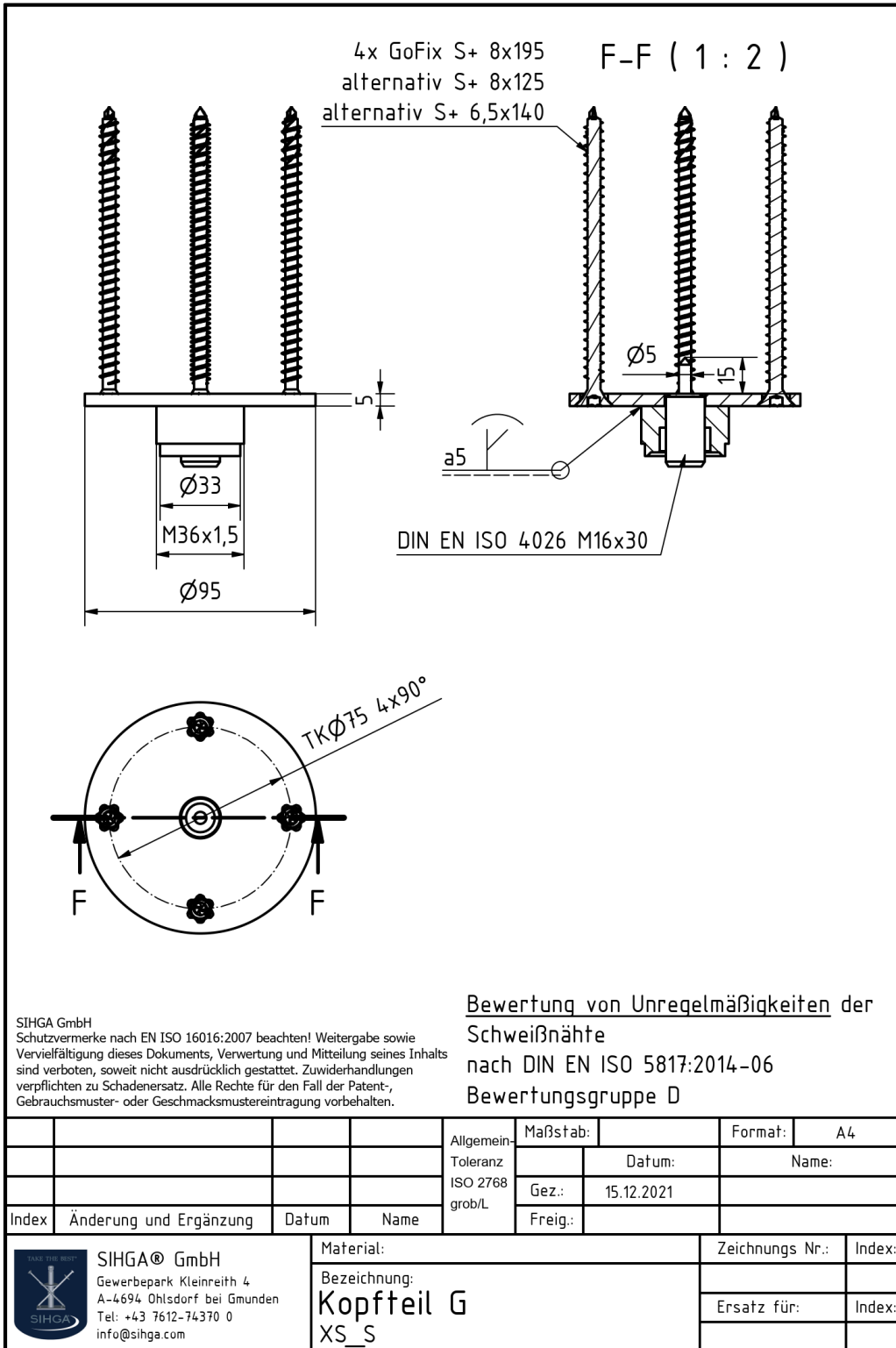
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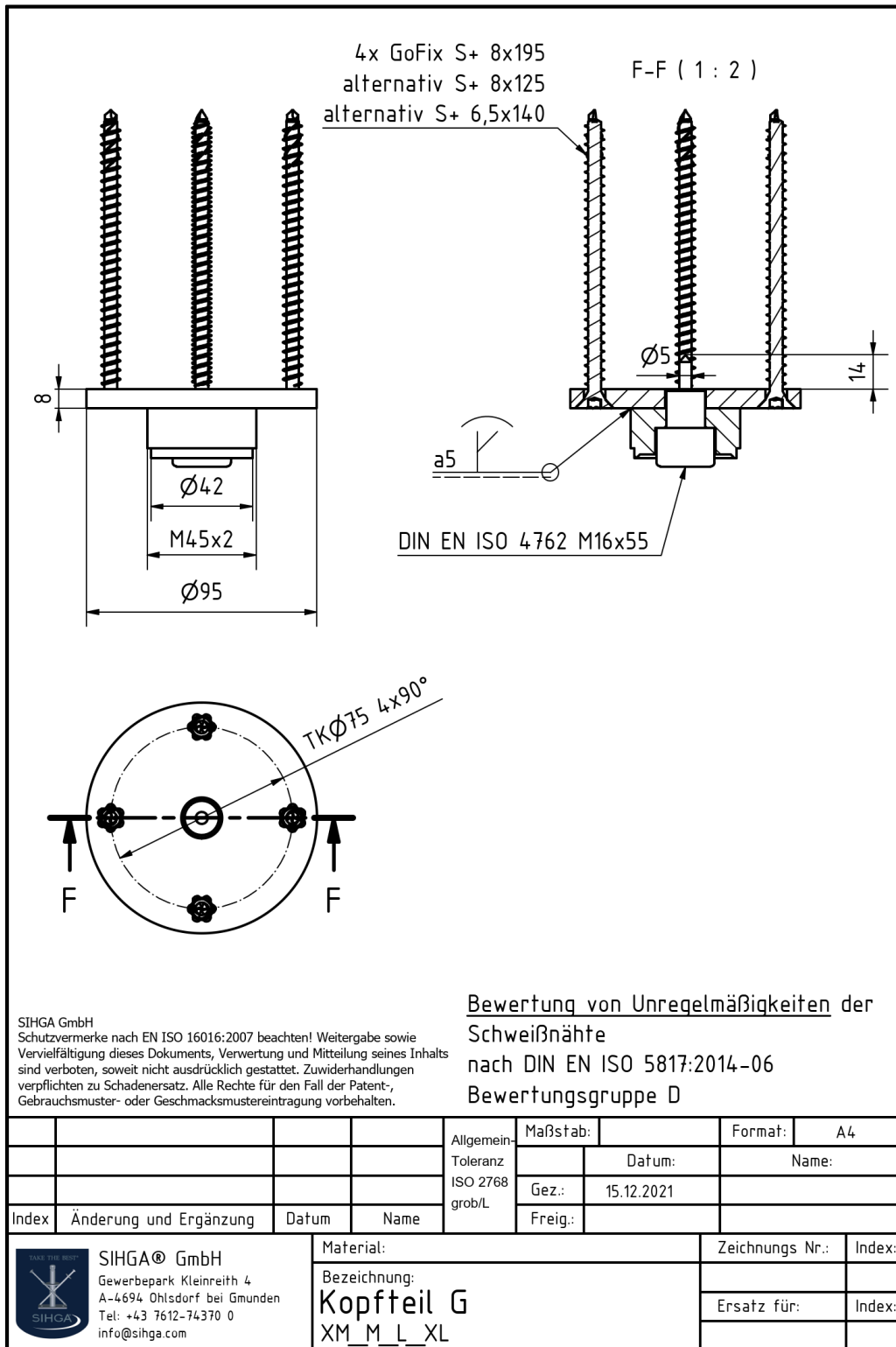


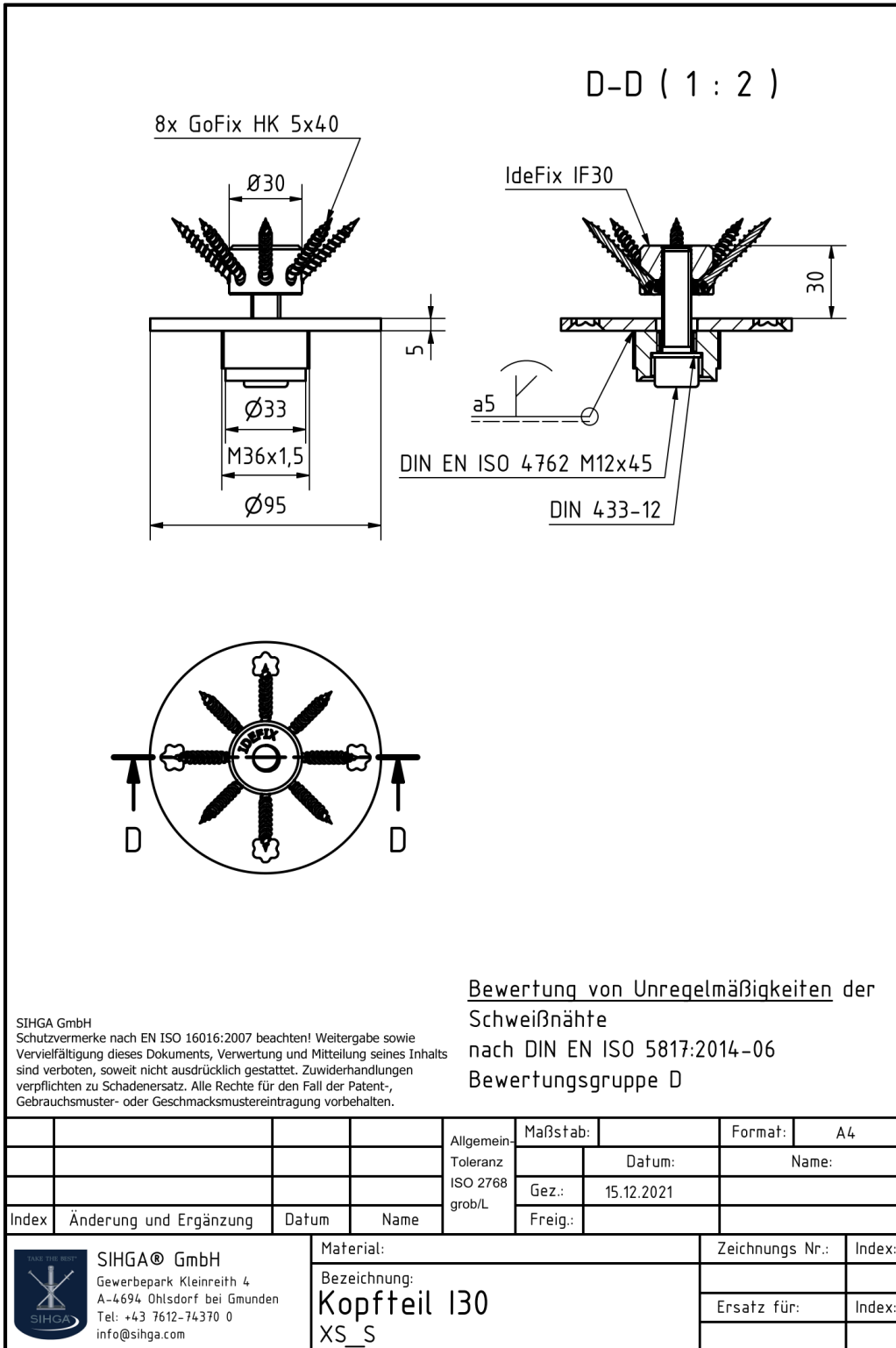
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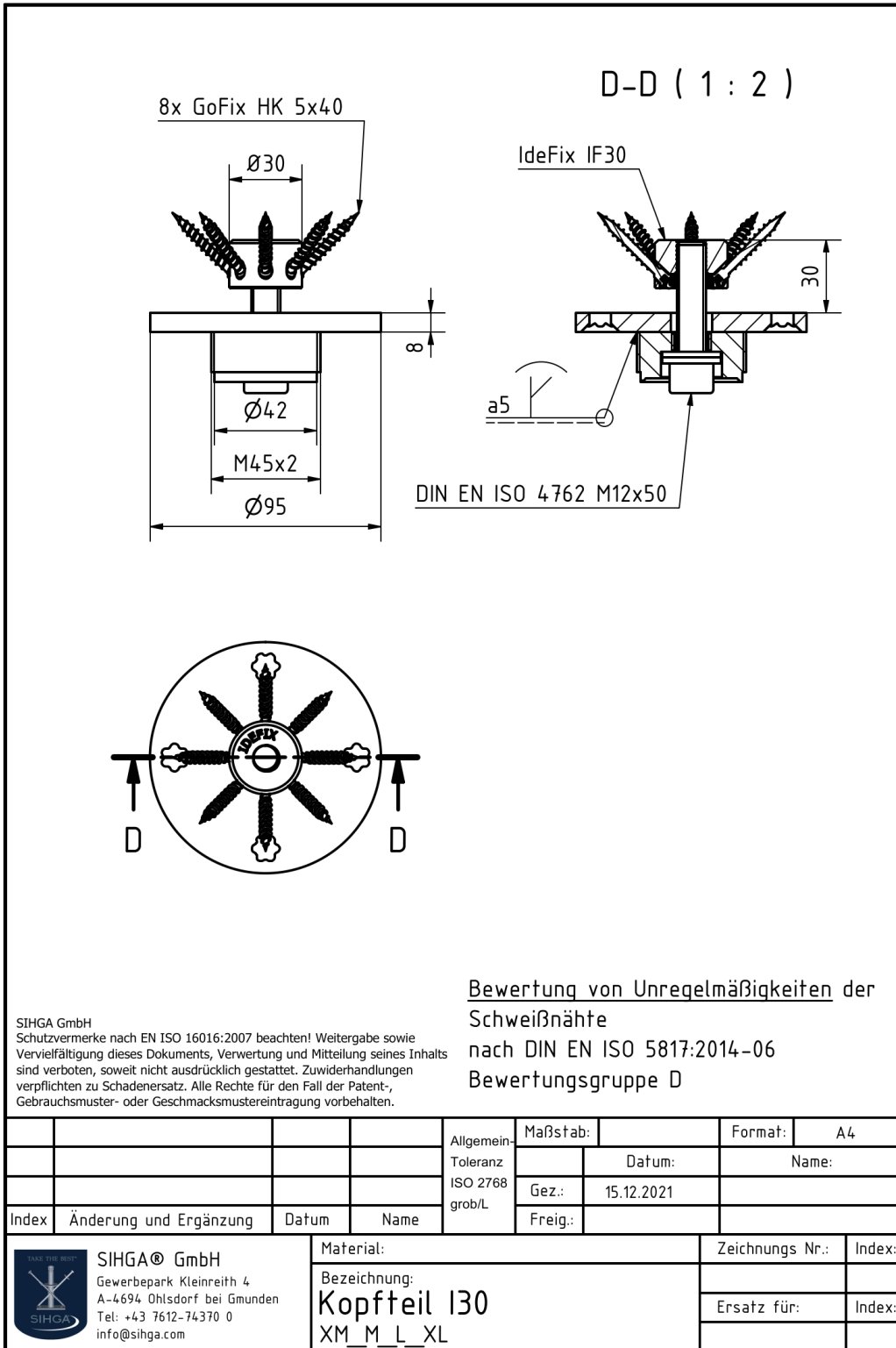
Bewertung von Unregelmäßigkeiten der Schweißnähte  
 nach DIN EN ISO 5817:2014-06  
 Bewertungsgruppe D

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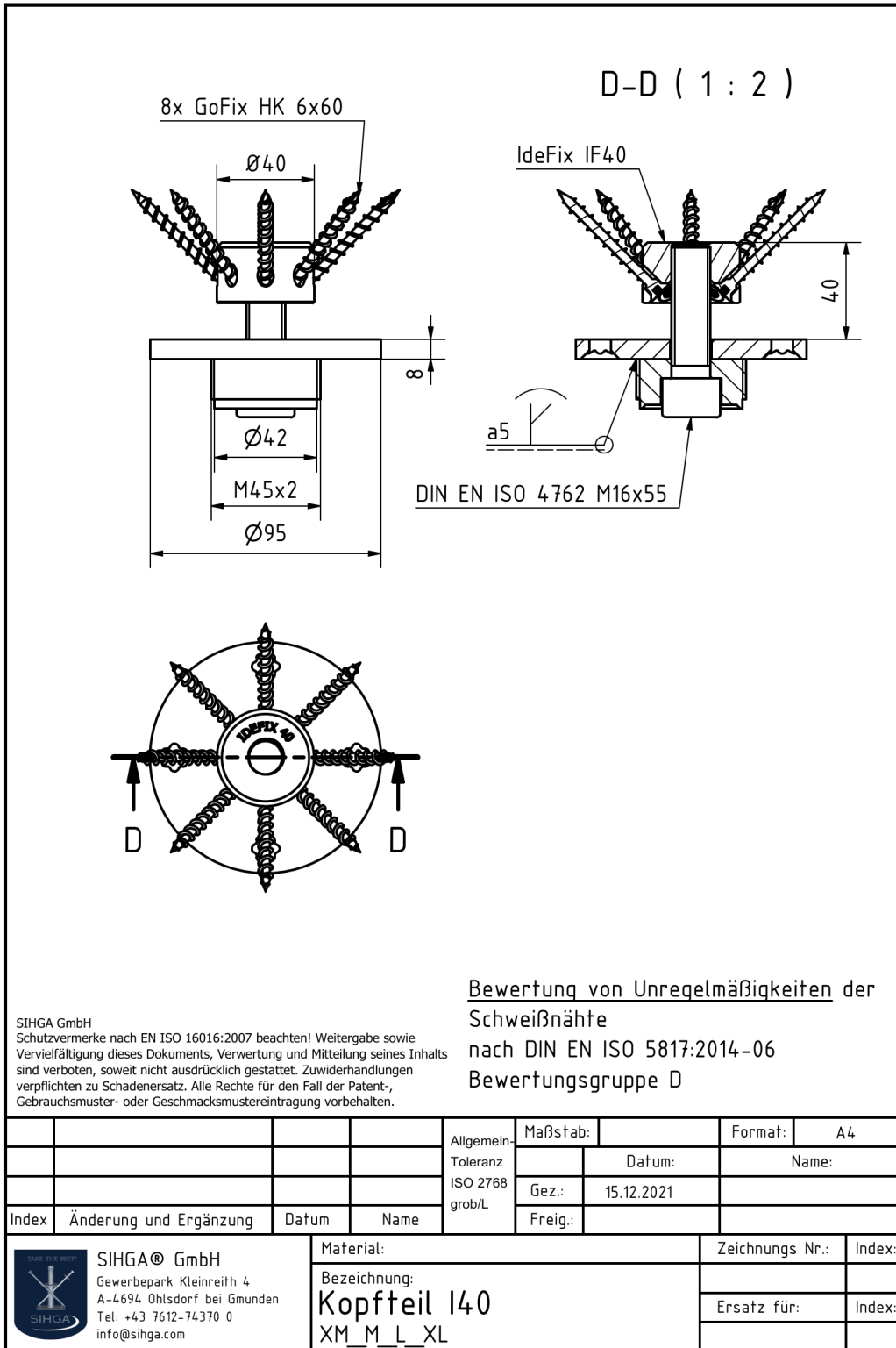








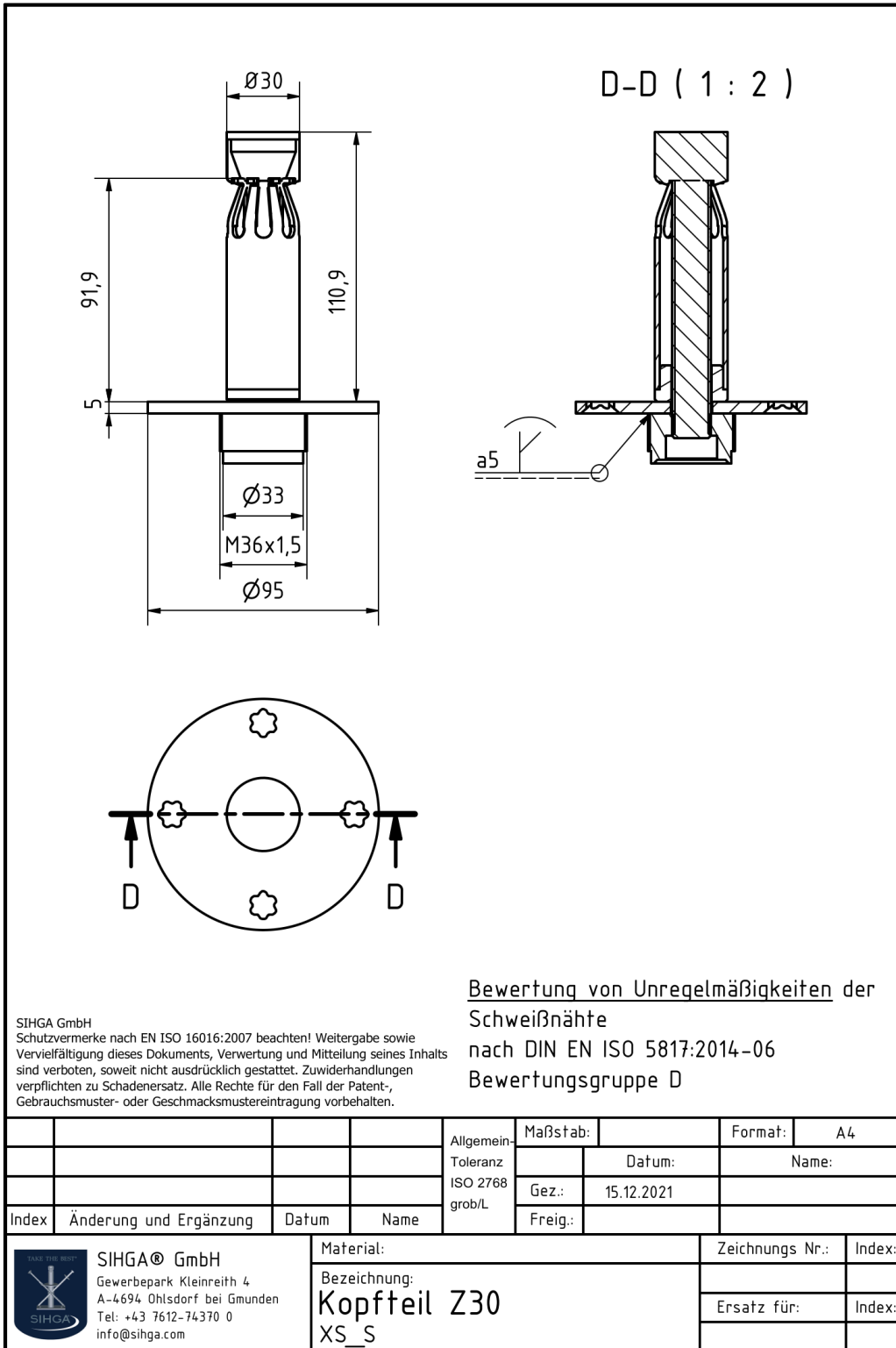


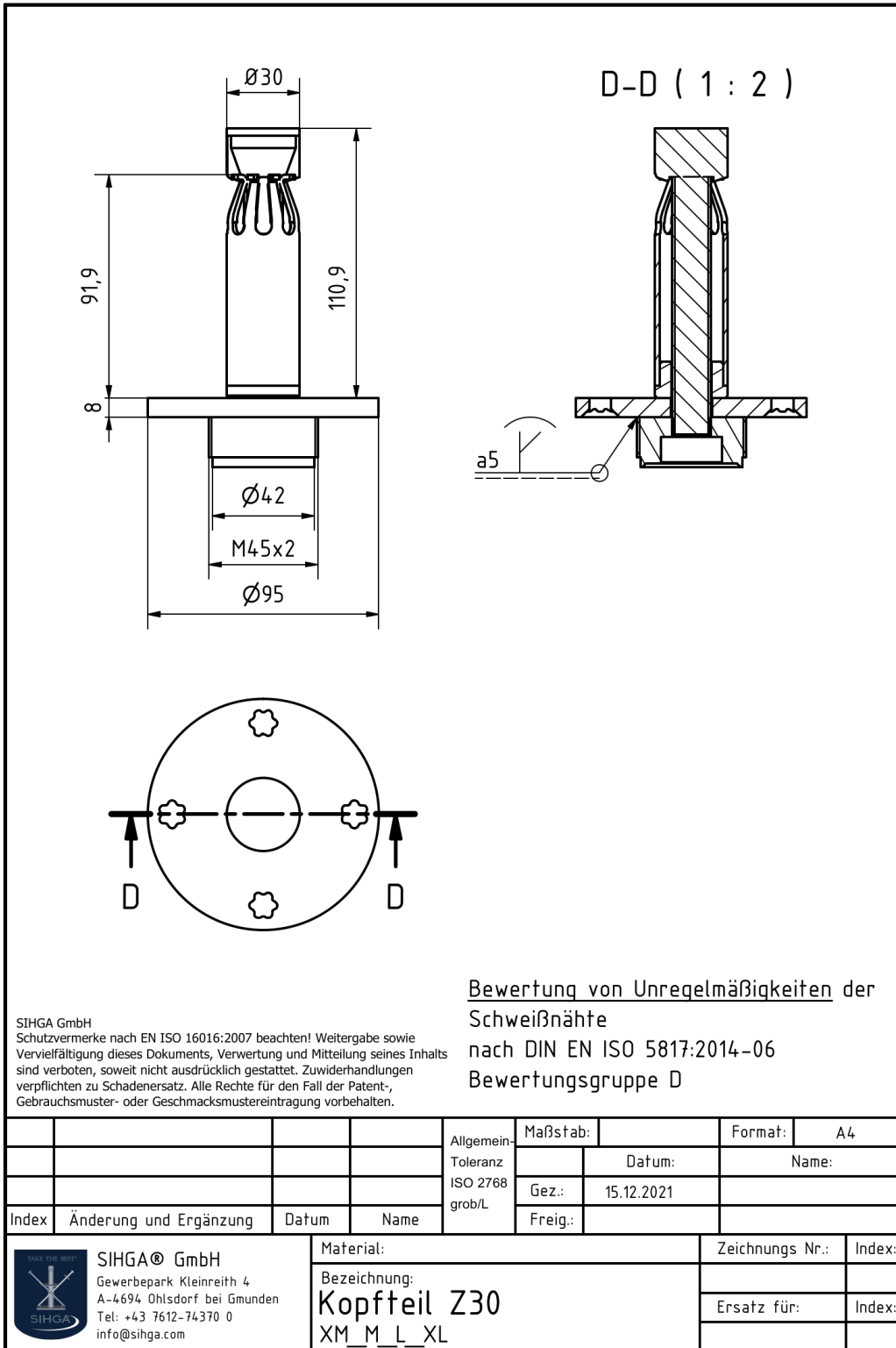


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info@sihga.com

Material:  
Bezeichnung:  
**Kopfteil I40**  
XM\_M\_L\_XL


Zeichnungs Nr.:  
Index:  
Ersatz für:  
Index:

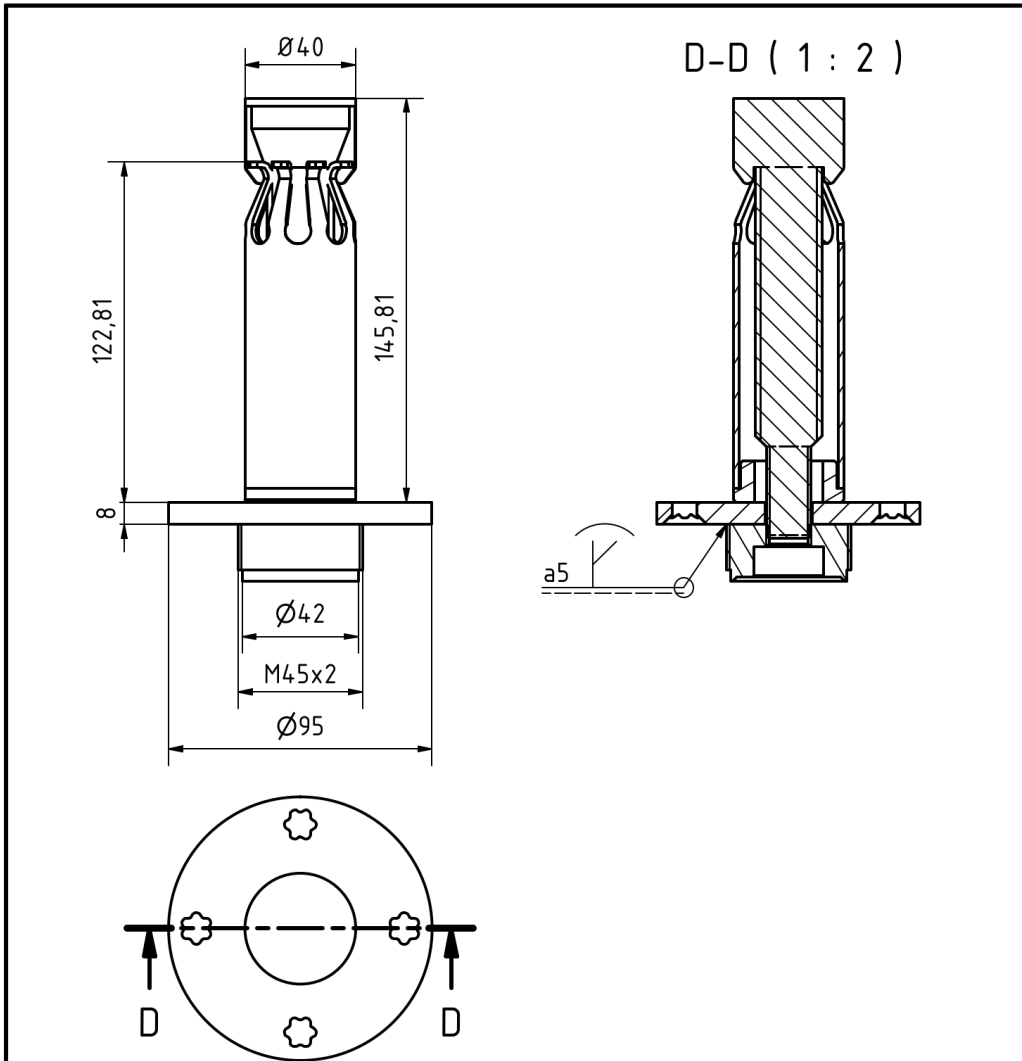




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					Datum:		Name:	
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Index	Änderung und Ergänzung	Datum	Name	Freig.:				
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							Ersatz für:	Index:



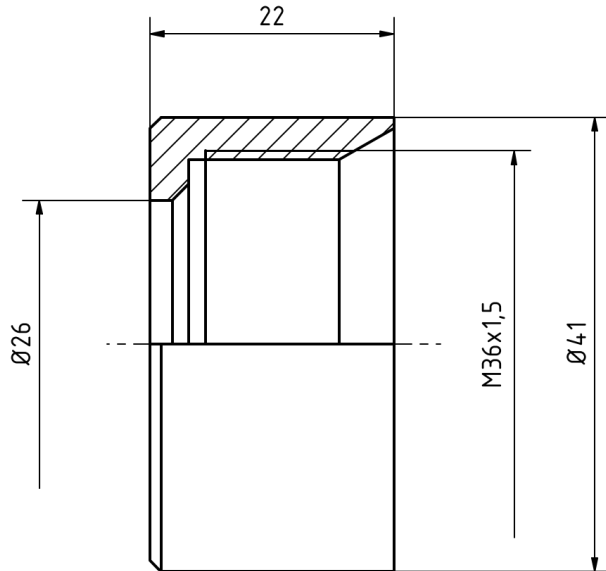
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Index	Änderung und Ergänzung	Datum	Name	Material:		Zeichnungs Nr.:	Index:	
				Bezeichnung: <b>Kopfteil Z40</b> XM_M_L_XL				
						Ersatz für:	Index:	

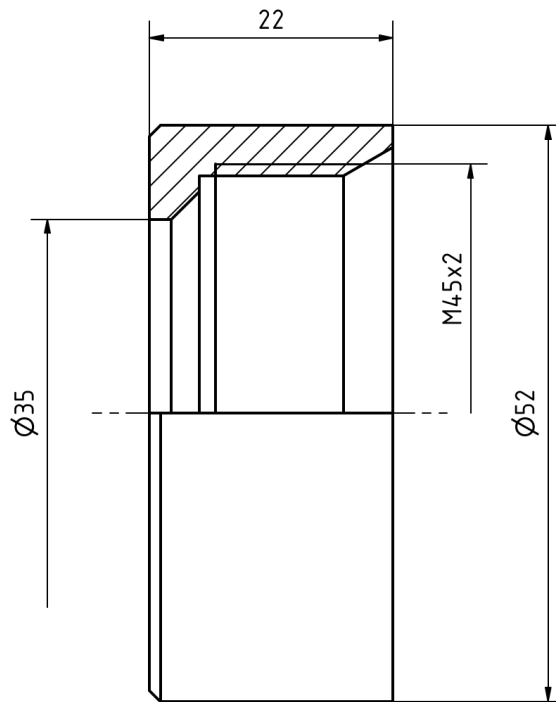


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					Gez.:	15.12.2021		
Index	Änderung und Ergänzung	Datum	Name		Freig.:			
 SIHGA® GmbH Gewerbepark Kleinreith 4 A-4694 Ohlsdorf bei Gmunden Tel: +43 7612-74370 0 info@sihga.com				Material: Bezeichnung: <b>Überwurfmutter</b> XM_M_L_XL		Zeichnungs Nr.: Index:		
						Ersatz für: Index:		

## Annex B

### Characteristic load-carrying capacities

Legend for Table B.1 to B.6:

Height:XS X-Small, S Small, XM X-Medium, M Medium, L Large, XL X-Large

R	rectangular foot plate
Q	quadratic foot plate
K	circular foot plate
I	IdeFix
Z	ZaFix
G	GoFix
B	set in concrete
N	hinge at foot plate, rotation capability in plane perp. to hinge axe

Table B.1 Characteristic load-carrying capacities for post bases XS [kN] grade C24

Post base XS	F <sub>1</sub> (Compression)			F <sub>1</sub> (Tension)			F <sub>2</sub> /F <sub>3</sub>				F <sub>4</sub> /F <sub>5</sub>			
	Timber	Steel		Timber	Steel		Timber		Steel		Timber		Steel	
XSRI30	134		50,1	17,0	19,0		10,1		2,4		10,1		2,4	
XSQI30	134		50,1	17,0	19,0		10,1		2,4		10,1		2,4	
XSRG 6,5x140	145		50,1	10,2	19,0			7,5	2,4			7,5	2,4	
GoFix stainless	145		50,1	10,2	19,0			6,3	2,4			6,3	2,4	
XSRG 8x125	145		50,1	Not assessed				9,2	2,4			9,2	2,4	
GoFix stainless	145		50,1	Not assessed				7,8	2,4			7,8	2,4	
XSRG 8x195	145		50,1	17,3	19,0			11,4	2,4			11,4	2,4	
GoFix stainless	145		50,1	17,3	19,0			9,4	2,4			9,4	2,4	
XSQG 6,5x140	145		50,1	10,2	19,0			7,5	2,4			7,5	2,4	
GoFix stainless	145		50,1	10,2	19,0			6,3	2,4			6,3	2,4	
XSQG 8x125	145		50,1	Not assessed				9,2	2,4			9,2	2,4	
GoFix stainless	145		50,1	Not assessed				7,8	2,4			7,8	2,4	
XSQG 8x195	145		50,1	17,3	19,0			11,4	2,4			11,4	2,4	
GoFix stainless	145		50,1	17,3	19,0			9,4	2,4			9,4	2,4	
XSQZ30	134		50,1	5,7	19,0		Not assessed							
XSRZ30	134		50,1	5,7	19,0		Not assessed							
XSBI30	134		50,1	17,0	19,0		10,1			2,4	10,1			2,4
XSBG 6,5x140	145		50,1	10,2	19,0			7,5		2,4		7,5		2,4
GoFix stainless	145		50,1	10,2	19,0			6,3		2,4		6,3		2,4
XSBG 8x125	145		50,1	Not assessed				9,2		2,4		9,2		2,4
GoFix stainless	145		50,1	Not assessed				7,8		2,4		7,8		2,4
XSBG 8x195	145		50,1	17,3	19,0			11,4		2,4		11,4		2,4
GoFix stainless	145		50,1	17,3	19,0			9,4		2,4		9,4		2,4
XSBZ30	134		50,1	5,7	19,0		Not assessed							
XSNI30	134		50,1	17,0	19,0		10,1		2,4		10,1		5,4	
XSNG 6,5x140	145		50,1	10,2	19,0			7,5	2,4			7,5	5,4	
GoFix stainless	145		50,1	10,2	19,0			6,3	2,4			6,3	5,4	
XSNG 8x125	145		50,1	Not assessed				9,2	2,4			9,2	5,4	
GoFix stainless	145		50,1	Not assessed				7,8	2,4			7,8	5,4	
XSNG 8x195	145		50,1	17,3	19,0			11,4	2,4			11,4	5,4	
GoFix stainless	145		50,1	17,3	19,0			9,4	2,4			9,4	5,4	
XSNZ30	134		50,1	5,7	19,0		Not assessed							
	$\gamma_{M,T}$	$\gamma_{M,o}$	$\gamma_{M,1}$	$\gamma_{M,C}$	$\gamma_{M,o}$	$\gamma_{M,2}$	$\gamma_{M,T}$	$\gamma_{M,C}$	$\gamma_{M,o}$	$\gamma_{M,2}$	$\gamma_{M,T}$	$\gamma_{M,C}$	$\gamma_{M,o}$	$\gamma_{M,2}$

Table B.2 Characteristic load-carrying capacities for post bases S [kN] grade C24

Post base S	F <sub>1</sub> (Compression)		F <sub>1</sub> (Tension)			F <sub>2</sub> /F <sub>3</sub>				F <sub>4</sub> /F <sub>5</sub>				
	Timber	Steel	Timber	Steel		Timber	Steel			Timber	Steel			
SRI30	134	50,1	17,0	19,0		10,1	1,2			10,1	1,2			
SQI30	134	50,1	17,0	19,0		10,1	1,2			10,1	1,2			
SRG 6,5x140	145	50,1	10,2	19,0			7,5	1,2			7,5	1,2		
GoFix stainless	145	50,1	10,2	19,0			6,3	1,2			6,3	1,2		
SRG 8x125	145	50,1	Not assessed				9,2	1,2			9,2	1,2		
GoFix stainless	145	50,1	Not assessed				7,8	1,2			7,8	1,2		
SRG 8x195	145	50,1	17,3	19,0			11,4	1,2			11,4	1,2		
GoFix stainless	145	50,1	17,3	19,0			9,4	1,2			9,4	1,2		
SQG 6,5x140	145	50,1	10,2	19,0			7,5	1,2			7,5	1,2		
GoFix stainless	145	50,1	10,2	19,0			6,3	1,2			6,3	1,2		
SQG 8x125	145	50,1	Not assessed				9,2	1,2			9,2	1,2		
GoFix stainless	145	50,1	Not assessed				7,8	1,2			7,8	1,2		
SQG 8x195	145	50,1	17,3	19,0			11,4	1,2			11,4	1,2		
GoFix stainless	145	50,1	17,3	19,0			9,4	1,2			9,4	1,2		
SQZ30	134	50,1	5,7	19,0		Not assessed								
SRZ30	134	50,1	5,7	19,0		Not assessed								
SBI30	134	50,1	17,0	19,0		10,1			1,8	10,1			1,8	
SBG 6,5x140	145	50,1	10,2	19,0			7,5		1,8		7,5		1,8	
GoFix stainless	145	50,1	10,2	19,0			6,3		1,8		6,3		1,8	
SBG 8x125	145	50,1	Not assessed				9,2		1,8		9,2		1,8	
GoFix stainless	145	50,1	Not assessed				7,8		1,8		7,8		1,8	
SBG 8x195	145	50,1	17,3	19,0			11,4		1,8		11,4		1,8	
GoFix stainless	145	50,1	17,3	19,0			9,4		1,8		9,4		1,8	
SBZ30	134	50,1	5,7	19,0		Not assessed								
SNI30	134	50,1	17,0	19,0		10,1		1,2		10,1		3,0		
SNG 6,5x140	145	50,1	10,2	19,0			7,5	1,2			7,5	3,0		
GoFix stainless	145	50,1	10,2	19,0			6,3	1,2			6,3	3,0		
SNG 8x125	145	50,1	Not assessed				9,2	1,2			9,2	3,0		
GoFix stainless	145	50,1	Not assessed				7,8	1,2			7,8	3,0		
SNG 8x195	145	50,1	17,3	19,0			11,4	1,2			11,4	3,0		
GoFix stainless	145	50,1	17,3	19,0			9,4	1,2			9,4	3,0		
SNZ30	134	50,1	5,7	19,0		Not assessed								
	$\gamma_{M,T}$	$\gamma_{M,o}$	$\gamma_{M,1}$	$\gamma_{M,C}$	$\gamma_{M,o}$	$\gamma_{M,2}$	$\gamma_{M,T}$	$\gamma_{M,C}$	$\gamma_{M,o}$	$\gamma_{M,2}$	$\gamma_{M,T}$	$\gamma_{M,C}$	$\gamma_{M,o}$	$\gamma_{M,2}$



Table B.3 Characteristic load-carrying capacities for post bases **XM** [kN] grade C24

Post base <b>XM</b>	F <sub>1</sub> (Compression)		F <sub>1</sub> (Tension)			F <sub>2</sub> /F <sub>3</sub>			F <sub>4</sub> /F <sub>5</sub>					
	Timber	Steel	Timber	Steel		Timber	Steel		Timber	Steel				
XMRI30	134	98,1	17	38,7		10,1	6,5		10,1	6,5				
XMQI30	134	98,1	17	38,7		10,1	6,5		10,1	6,5				
XMRI40	122	98,1	29	38,7		13,0	6,5		13,0	6,5				
XMQI40	122	98,1	29	38,7		13,0	6,5		13,0	6,5				
XMRG 6,5x140	145	98,1	10,2	38,7		7,5	6,5		7,5	6,5				
GoFix stainless	145	98,1	10,2	38,7		6,3	6,5		6,3	6,5				
XMRG 8x125	145	98,1	Not assessed			9,2	6,5		9,2	6,5				
GoFix stainless	145	98,1	Not assessed			7,8	6,5		7,8	6,5				
XMRG 8x195	145	98,1	17,3	38,7		11,4	6,5		11,4	6,5				
GoFix stainless	145	98,1	17,3	38,7		9,4	6,5		9,4	6,5				
XMQG 6,5x140	145	98,1	10,2	38,7		7,5	6,5		7,5	6,5				
GoFix stainless	145	98,1	10,2	38,7		6,3	6,5		6,3	6,5				
XMQG 8x125	145	98,1	Not assessed			9,2	6,5		9,2	6,5				
GoFix stainless	145	98,1	Not assessed			7,8	6,5		7,8	6,5				
XMQG 8x195	145	98,1	17,3	38,7		11,4	6,5		11,4	6,5				
GoFix stainless	145	98,1	17,3	38,7		9,4	6,5		9,4	6,5				
XMQZ30	134	98,1	5,7	38,7		Not assessed								
XMRZ30	134	98,1	5,7	38,7		Not assessed								
XMQZ40	122	98,1	5,7	38,7		Not assessed								
XMRZ40	122	98,1	5,7	38,7		Not assessed								
XMBI30	134	98,1	17	38,7		10,1		5,9	10,1		5,9			
XMBI40	122	98,1	29	38,7		13,0		5,9	13,0		5,9			
XMBG 6,5x140	145	98,1	10,2	38,7		7,5		5,9	7,5		5,9			
GoFix stainless	145	98,1	10,2	38,7		6,3		5,9	6,3		5,9			
XMBG 8x125	145	98,1	Not assessed			9,2		5,9	9,2		5,9			
GoFix stainless	145	98,1	Not assessed			7,8		5,9	7,8		5,9			
XMBG 8x195	145	98,1	17,3	38,7		11,4		5,9	11,4		5,9			
GoFix stainless	145	98,1	17,3	38,7		9,4		5,9	9,4		5,9			
XMBZ30	134	98,1	5,7	38,7		Not assessed								
XMBZ40	122	98,1	5,7	38,7		Not assessed								
XMNI30	134	98,1	17	38,7		10,1		6,5	10,1		10,4			
XMNI40	122	98,1	29	38,7		13,0		6,5	13,0		10,4			
XMNG 6,5x140	145	98,1	10,2	38,7		7,5	6,5		7,5	10,4				
GoFix stainless	145	98,1	10,2	38,7		6,3	6,5		6,3	10,4				
XMNG 8x125	145	98,1	Not assessed			9,2	6,5		9,2	10,4				
GoFix stainless	145	98,1	Not assessed			7,8	6,5		7,8	10,4				
XMNG 8x195	145	98,1	17,3	38,7		11,4	6,5		11,4	10,4				
GoFix stainless	145	98,1	17,3	38,7		9,4	6,5		9,4	10,4				
XMNZ30	134	98,1	5,7	38,7		Not assessed								
XMNZ40	122	98,1	5,7	38,7		Not assessed								
	$\gamma_{M,T}$	$\gamma_{M,o}$	$\gamma_{M,i}$	$\gamma_{M,C}$	$\gamma_{M,o}$	$\gamma_{M,2}$	$\gamma_{M,T}$	$\gamma_{M,C}$	$\gamma_{M,o}$	$\gamma_{M,2}$	$\gamma_{M,T}$	$\gamma_{M,C}$	$\gamma_{M,o}$	$\gamma_{M,2}$

Table B.4 Characteristic load-carrying capacities for post bases **M**[kN]

Post base <b>M</b>	F <sub>1</sub> (Compression)		F <sub>1</sub> (Tension)			F <sub>2</sub> /F <sub>3</sub>				F <sub>4</sub> /F <sub>5</sub>				
	Timber	Steel	Timber	Steel		Timber	Steel			Timber	Steel			
MRI40	122		98,1	29	38,7		13,0		3,25		13,0		3,25	
MQI40	122		98,1	29	38,7		13,0		3,25		13,0		3,25	
MRG 6,5x140	145		98,1	10,2	38,7			7,5	3,25			7,5	3,25	
GoFix stainless	145		98,1	10,2	38,7			6,3	3,25			6,3	3,25	
MRG 8x125	145		98,1	Not assessed				9,2	3,25			9,2	3,25	
GoFix stainless	145		98,1	Not assessed				7,8	3,25			7,8	3,25	
MRG 8x195	145		98,1	17,3	38,7			11,4	3,25			11,4	3,25	
GoFix stainless	145		98,1	17,3	38,7			9,4	3,25			9,4	3,25	
MQG 6,5x140	145		98,1	10,2	38,7			7,5	3,25			7,5	3,25	
GoFix stainless	145		98,1	10,2	38,7			6,3	3,25			6,3	3,25	
MQG 8x125	145		98,1	Not assessed				9,2	3,25			9,2	3,25	
GoFix stainless	145		98,1	Not assessed				7,8	3,25			7,8	3,25	
MQG 8x195	145		98,1	17,3	38,7			11,4	3,25			11,4	3,25	
GoFix stainless	145		98,1	17,3	38,7			9,4	3,25			9,4	3,25	
MQZ30	134		98,1	5,7	38,7		Not assessed							
MRZ30	134		98,1	5,7	38,7		Not assessed							
MQZ40	122		98,1	5,7	38,7		Not assessed							
MRZ40	122		98,1	5,7	38,7		Not assessed							
MBI40	122		98,1	29	38,7		13,0			4,0	13,0		4,0	
MBG 6,5x140	145		98,1	10,2	38,7			7,5		4,0		7,5	4,0	
GoFix stainless	145		98,1	10,2	38,7			6,3		4,0		6,3	4,0	
MBG 8x125	145		98,1	Not assessed				9,2		4,0		9,2	4,0	
GoFix stainless	145		98,1	Not assessed				7,8		4,0		7,8	4,0	
MBG 8x195	145		98,1	17,3	38,7			11,4		4,0		11,4	4,0	
GoFix stainless	145		98,1	17,3	38,7			9,4		4,0		9,4	4,0	
MBZ30	134		98,1	5,7	38,7		Not assessed							
MBZ40	122		98,1	5,7	38,7		Not assessed							
MNI40	122		98,1	29	38,7		13,0		3,25		13,0		8,1	
MNG 6,5x140	145		98,1	10,2	38,7			7,5	3,25			7,5	8,1	
GoFix stainless	145		98,1	10,2	38,7			6,3	3,25			6,3	8,1	
MNG 8x125	145		98,1	Not assessed				9,2	3,25			9,2	8,1	
GoFix stainless	145		98,1	Not assessed				7,8	3,25			7,8	8,1	
MNG 8x195	145		98,1	17,3	38,7			11,4	3,25			11,4	8,1	
GoFix stainless	145		98,1	17,3	38,7			9,4	3,25			9,4	8,1	
MNZ30	134		98,1	5,7	38,7		Not assessed							
MNZ40	122		98,1	5,7	38,7		Not assessed							
	$\gamma_{M,T}$	$\gamma_{M,o}$	$\gamma_{M,1}$	$\gamma_{M,C}$	$\gamma_{M,o}$	$\gamma_{M,2}$	$\gamma_{M,T}$	$\gamma_{M,C}$	$\gamma_{M,o}$	$\gamma_{M,2}$	$\gamma_{M,T}$	$\gamma_{M,C}$	$\gamma_{M,o}$	$\gamma_{M,2}$

Table B.5 Characteristic load-carrying capacities for post bases **L**[kN]

Post base <b>L</b>	F <sub>1</sub> (Compression)		F <sub>1</sub> (Tension)			F <sub>2</sub> /F <sub>3</sub>				F <sub>4</sub> /F <sub>5</sub>				
	Timber	Steel	Timber	Steel		Timber	Steel			Timber	Steel			
LRI40	122	98,1	29	38,7		13,0	1,9			13,0	1,9			
LQI40	122	98,1	29	38,7		13,0	1,9			13,0	1,9			
LRG 6,5x140	145	98,1	10,2	38,7		7,5	1,9			7,5	1,9			
GoFix stainless	145	98,1	10,2	38,7		6,3	1,9			6,3	1,9			
LRG 8x125	145	98,1	Not assessed			9,2	1,9			9,2	1,9			
GoFix stainless	145	98,1	Not assessed			7,8	1,9			7,8	1,9			
LRG 8x195	145	98,1	17,3	38,7		11,4	1,9			11,4	1,9			
GoFix stainless	145	98,1	17,3	38,7		9,4	1,9			9,4	1,9			
LQG 6,5x140	145	98,1	10,2	38,7		7,5	1,9			7,5	1,9			
GoFix stainless	145	98,1	10,2	38,7		6,3	1,9			6,3	1,9			
LQG 8x125	145	98,1	Not assessed			9,2	1,9			9,2	1,9			
GoFix stainless	145	98,1	Not assessed			7,8	1,9			7,8	1,9			
LQG 8x195	145	98,1	17,3	38,7		11,4	1,9			11,4	1,9			
GoFix stainless	145	98,1	17,3	38,7		9,4	1,9			9,4	1,9			
LQZ30	134	98,1	5,7	38,7		Not assessed								
LRZ30	134	98,1	5,7	38,7		Not assessed								
LQZ40	122	98,1	5,7	38,7		Not assessed								
LRZ40	122	98,1	5,7	38,7		Not assessed								
LBI40	122	98,1	29	38,7		13,0			2,4	13,0			2,4	
LBG 6,5x140	145	98,1	10,2	38,7		7,5			2,4		7,5		2,4	
GoFix stainless	145	98,1	10,2	38,7		6,3			2,4		6,3		2,4	
LBG 8x125	145	98,1	Not assessed			9,2			2,4		9,2		2,4	
GoFix stainless	145	98,1	Not assessed			7,8			2,4		7,8		2,4	
LBG 8x195	145	98,1	17,3	38,7		11,4			2,4		11,4		2,4	
GoFix stainless	145	98,1	17,3	38,7		9,4			2,4		9,4		2,4	
LBZ30	134	98,1	5,7	38,7		Not assessed								
LBZ40	122	98,1	5,7	38,7		Not assessed								
LNI40	122	98,1	29	38,7		13,0		1,9		13,0		5,2		
LNG 6,5x140	145	98,1	10,2	38,7		7,5	1,9			7,5	5,2			
GoFix stainless	145	98,1	10,2	38,7		6,3	1,9			6,3	5,2			
LNG 8x125	145	98,1	Not assessed			9,2	1,9			9,2	5,2			
GoFix stainless	145	98,1	Not assessed			7,8	1,9			7,8	5,2			
LNG 8x195	145	98,1	17,3	38,7		11,4	1,9			11,4	5,2			
GoFix stainless	145	98,1	17,3	38,7		9,4	1,9			9,4	5,2			
LNZ30	134	98,1	5,7	38,7		Not assessed								
LNZ40	122	98,1	5,7	38,7		Not assessed								
	$\gamma_{M,T}$	$\gamma_{M,o}$	$\gamma_{M,1}$	$\gamma_{M,C}$	$\gamma_{M,o}$	$\gamma_{M,2}$	$\gamma_{M,T}$	$\gamma_{M,C}$	$\gamma_{M,o}$	$\gamma_{M,2}$	$\gamma_{M,T}$	$\gamma_{M,C}$	$\gamma_{M,o}$	$\gamma_{M,2}$

Table B.6 Characteristic load-carrying capacities for post bases **XL**[kN]

Post base <b>XL</b>	F <sub>1</sub> (Compression)		F <sub>1</sub> (Tension)			F <sub>2</sub> /F <sub>3</sub>				F <sub>4</sub> /F <sub>5</sub>				
	Timber	Steel	Timber	Steel		Timber	Steel			Timber	Steel			
XLRI40	122	98,1	29	38,7		13,0	1,5			13,0	1,5			
XLQI40	122	98,1	29	38,7		13,0	1,5			13,0	1,5			
XLRG 6,5x140	145	98,1	10,2	38,7		7,5	1,5			7,5	1,5			
GoFix stainless	145	98,1	10,2	38,7		6,3	1,5			6,3	1,5			
XLRG 8x125	145	98,1	Not assessed			9,2	1,5			9,2	1,5			
GoFix stainless	145	98,1	Not assessed			7,8	1,5			7,8	1,5			
XLRG 8x195	145	98,1	17,3	38,7		11,4	1,5			11,4	1,5			
GoFix stainless	145	98,1	17,3	38,7		9,4	1,5			9,4	1,5			
XLQG 6,5x140	145	98,1	10,2	38,7		7,5	1,5			7,5	1,5			
GoFix stainless	145	98,1	10,2	38,7		6,3	1,5			6,3	1,5			
XLQG 8x125	145	98,1	Not assessed			9,2	1,5			9,2	1,5			
GoFix stainless	145	98,1	Not assessed			7,8	1,5			7,8	1,5			
XLQG 8x195	145	98,1	17,3	38,7		11,4	1,5			11,4	1,5			
GoFix stainless	145	98,1	17,3	38,7		9,4	1,5			9,4	1,5			
XLQZ30	134	98,1	5,7	38,7		Not assessed								
XLRZ30	134	98,1	5,7	38,7		Not assessed								
XLQZ40	122	98,1	5,7	38,7		Not assessed								
XLRZ40	122	98,1	5,7	38,7		Not assessed								
XLBI40	122	98,1	29	38,7		13,0			2,2	13,0			2,2	
XLBG 6,5x140	145	98,1	10,2	38,7		7,5			2,2		7,5		2,2	
GoFix stainless	145	98,1	10,2	38,7		6,3			2,2		6,3		2,2	
XLBG 8x125	145	98,1	Not assessed			9,2			2,2		9,2		2,2	
GoFix stainless	145	98,1	Not assessed			7,8			2,2		7,8		2,2	
XLBG 8x195	145	98,1	17,3	38,7		11,4			2,2		11,4		2,2	
GoFix stainless	145	98,1	17,3	38,7		9,4			2,2		9,4		2,2	
XLBZ30	134	98,1	5,7	38,7		Not assessed								
XLBZ40	122	98,1	5,7	38,7		Not assessed								
XLNI40	122	98,1	29	38,7		13,0		1,5		13,0		4,1		
XLNG 6,5x140	145	98,1	10,2	38,7		7,5	1,5			7,5	1,5			
GoFix stainless	145	98,1	10,2	38,7		6,3	1,5			6,3	1,5			
XLNG 8x125	145	98,1	Not assessed			9,2	1,5			9,2	1,5			
GoFix stainless	145	98,1	Not assessed			7,8	1,5			7,8	1,5			
XLNG 8x195	145	98,1	17,3	38,7		11,4	1,5			11,4	1,5			
GoFix stainless	145	98,1	17,3	38,7		9,4	1,5			9,4	1,5			
XLNZ30	134	98,1	5,7	38,7		Not assessed								
XLNZ40	122	98,1	5,7	38,7		Not assessed								
	$\gamma_{M,T}$	$\gamma_{M,o}$	$\gamma_{M,1}$	$\gamma_{M,C}$	$\gamma_{M,o}$	$\gamma_{M,2}$	$\gamma_{M,T}$	$\gamma_{M,C}$	$\gamma_{M,o}$	$\gamma_{M,2}$	$\gamma_{M,T}$	$\gamma_{M,C}$	$\gamma_{M,o}$	$\gamma_{M,2}$

Table B.7 Characteristic load-carrying capacities for post bases KI 200[kN]

Post base KI 200	F <sub>1</sub> (Compression)			F <sub>1</sub> (Tension)			F <sub>2</sub> /F <sub>3</sub> ; F <sub>4</sub> /F <sub>5</sub>			
	Timber	Steel		Timber	Steel		Timber		Steel	
I30	134	203	183	17	203	196	10,1			12,5
I40	122	203	183	29	203	196	13,0			12,2
	$\gamma_{M,T}$	$\gamma_{M,o}$	$\gamma_{M,1}$	$\gamma_{M,C}$	$\gamma_{M,o}$	$\gamma_{M,2}$	$\gamma_{M,T}$	$\gamma_{M,C}$	$\gamma_{M,o}$	$\gamma_{M,2}$

Table B.8 Characteristic load-carrying capacities for post bases – **steel failure** [kN]

Post base Type	F <sub>1</sub> (Compression)		F <sub>1</sub> (Tension)		F <sub>2</sub> /F <sub>3</sub> , F <sub>4</sub> /F <sub>5</sub> (Lateral forces)				
					Inclinable		Rigid only F <sub>2</sub> /F <sub>3</sub>		Rigid B, threaded rod 3)
XS	1)	50,1	19,0	2)	2,4	2)	5,4	2)	2,35
S	1)	50,1	19,0	2)	1,2	2)	3,0	2)	1,8
XM	1)	98,1	38,7	2)	6,5	2)	10,4	2)	5,9
M	1)	98,1	38,7	2)	3,25	2)	8,1	2)	4,0
L	1)	98,1	38,7	2)	1,9	2)	5,2	2)	2,4
XL	1)	98,1	38,7	2)	1,5	2)	4,1	2)	2,2
	$\gamma_{M,o}=1,0$	$\gamma_{M,1}=1,1$	$\gamma_{M,o}=1,0$	$\gamma_{M,2}=1,25$	$\gamma_{M,o}=1,0$	$\gamma_{M,2}$	$\gamma_{M,o}=1,0$	$\gamma_{M,2}=1,25$	$\gamma_{M,2}=1,25$
KI 200	203	183	203	196 <sup>4)</sup>	resistance of welded connection $M_{w,Rk}=2,79$ kNm, $V_{w,Rk}=195$ kN, $\gamma_{M,2}=1,25$				

- 1) failure mode in compression is buckling of the upper part of the circular hollow section
- 2) the failure mode in tension or shear is yielding of the upper part of the circular hollow section, no tensional fracture
- 3) bending of threaded part
- 4) welded connection

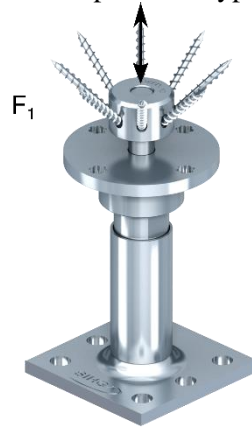
Verification of load-carrying capacities for tension and lateral forces has to be done according the specifications given in Table A.2.

The compression between timber post end-grain and head plate is verified as compression parallel to grain according EC 5. For the post base types Herakulix XS, S, XM, M, L and XL the head plate is circular with a diameter of 95 mm, for KI 200 the diameter is 120 mm.

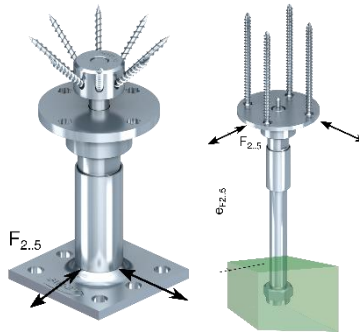
The contact area has to be reduced by the diameter of the fasteners (30 mm or 40 mm) for connections with IdeFix or ZaFix according ETA-14/0160.

### Definitions of forces, their directions and eccentricity

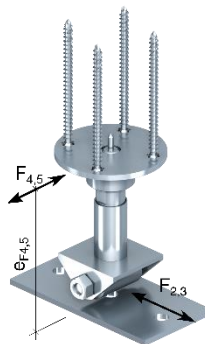
- Force  $F_1$ : tensile or compression load for all post base types



- Force  $F_2/F_3, F_4/F_5$ : the direction of the horizontal loading has no influence for inclinable type and post base embedded in concrete



- Force  $F_4/F_5$ : horizontal load perpendicular to the plane of rotation



#### Acting forces

- $F_1$  axial force (tension or compression) acting along the central axis of the joint
- $F_2 \dots F_5$  horizontal force. Acting with a lever arm  $e_{F_{2..F5}}$  above the foundation, only for types rigidly connected to foundation (embedded in concrete or perpendicular to plan of rotation annex A).

#### Combined forces

If the forces  $F_1$  and  $F_2/F_3$  or  $F_4/F_5$  act at the same time, the following inequality shall be fulfilled:

$$\sum \frac{F_{i,d}}{R_{i,d}} \leq 1$$

The forces  $F_2$  and  $F_3$  or  $F_4$  and  $F_5$  are forces with opposite direction. Therefore only one force  $F_2$  or  $F_3$ , and  $F_4$  or  $F_5$ , respectively, is able to act simultaneously with  $F_1$ .