Deutsches Institut für Bautechnik
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European Technical Assessment

ETA-11/0190 of 23 July 2018

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General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	Würth self-tapping screws
Product family to which the construction product belongs	Self-tapping screws for use in timber constructions
Manufacturer	Adolf Würth GmbH & Co. KG Reinhold-Würth-Straße 12-17 74653 Künzelsau DEUTSCHLAND
Manufacturing plant	Werk 1, Werk 2, Werk 3, Werk 4, Werk 5, Werk 6, Werk 7, Werk 8, Werk 9, Werk 10, Werk 11, Werk 12, Werk 13, Werk 14, Werk 15, Werk 16, Werk 17, Werk 18, Werk 19, Werk 20
This European Technical Assessment contains	112 pages including 9 annexes which form an integral part of this assessment
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This version replaces	ETA-11/0190 issued on 27 June 2013

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Specific part

1 Technical description of the product

Würth "ASSY", "Jamo", "Amo" and "WG Fix" screws are self-tapping screws made from special carbon or stainless steel. Screws made from carbon steel are hardened, except "ASSY-ISOTOP" screws. They are anti-friction coated and they have a corrosion protection according to Annex A.2.6. The outer thread diameter d is not less than 3.0 mm and not greater than 14.0 mm. The overall length of the screws is ranging from 13 mm to 2000 mm. Further dimensions are shown in Annex 9. The washers are made from carbon or stainless steel, aluminium or copper. The dimensions of the washers are given in Annex 9.

2 Specification of the intended use in accordance with the applicable European Assessment Document

The performances given in Section 3 are only valid if the screws are used in compliance with the specifications and conditions given in Annex 1 and 2.

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the screws of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be 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

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Dimensions	See Annex 9
Characteristic yield moment	See Annex 2
Characteristic withdrawal parameter	See Annex 2
Characteristic head pull-through parameter	See Annex 2
Characteristic tensile strength	See Annex 2
Characteristic yield strength	See Annex 2
Characteristic torsional strength	See Annex 2
Insertion moment	See Annex 2
Spacing, end and edge distances of the screws and minimum thickness of the wood based material	See Annex 2
Slip modulus for mainly axially loaded screws	See Annex 2

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1

3.3 Safety and accessibility in use (BWR 4)

Same as BWR 1

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

In accordance with EAD No. 130118-00-0603 the applicable European legal act is: 97/176/EC.
The system to be applied is: 3

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 with Deutsches Institut für Bautechnik.

Issued in Berlin on 23 July 2018 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Dewitt

Annex 1 Specifications of intended use

A.1.1 Use of the Würth screws only for:

– Static and quasi-static loads

A.1.2 Base materials

The screws are used for connections in load bearing timber structures between wood-based members or between those members and steel members:

– Solid timber (softwood) according to EN 14081-1[1],
– Solid timber of beech, ash or oak according to EN 14081-1,
– Glued laminated timber (softwood) according to EN 14080[2],
– Glued laminated timber made from beech, ash or oak according to European Technical Assessment or national provisions that apply at the installation site,
– Laminated veneer lumber LVL of softwood according to EN 14374[3],
– FST according to ETA-14/0354,
– Glued solid timber (softwood) according to EN 14080 or national provisions that apply at the installation site,
– Cross-laminated timber (softwood) according to European Technical Assessment or national provisions that apply at the installation site,
– Oriented Strand Board, OSB/3 and OSB/4 according to EN 300[4] and EN 13986[5] with $\rho_k \geq 550$ kg/m³,
– Particleboard according to EN 312[6] and EN 13986 with $\rho_k \geq 640$ kg/m³,
– Solid-wood panels according to EN 13353[7] and EN 13986
– Gypsum plasterboards for load-bearing applications according to European Technical Assessment with $\rho \geq 650$ kg/m³,
– fermacell Gypsum fibre boards according to ETA-03/0050.

The screws may be used for connecting the following wood-based panels to the timber members mentioned above:

– Plywood according to EN 636[8] and EN 13986,
– Oriented Strand Board, OSB according to EN 300 and EN 13986,
– Particleboard according to EN 312 and EN 13986,
– Fibreboards according to EN 622-2[9], EN 622-3[10] and EN 13986,
– Cement-bonded particle boards according to EN 634-2[11] and EN 13986,
– Solid-wood panels according to EN 13353 and EN 13986.

Wood-based panels (except OSB, particleboards and solid-wood panels) and steel members shall only be arranged on the side of the screw head.

[1] EN 14081-1:2005+A1:2011 Timber structures – Strength graded structural timber with rectangular cross section – Part 1: General requirements
[2] EN 14080:2013 Timber structures - Glued laminated timber and glued solid timber - Requirements
[3] EN 14374:2004 Timber structures - Structural laminated veneer lumber - Requirements
[4] EN 300:2006 Oriented strand boards (OSB) – Definition, classification and specifications
[5] EN 13986:2004+A1:2015 Wood-based panels for use in construction - Characteristics, evaluation of conformity and marking
[6] EN 312:2010 Particleboards - Specifications
[7] EN 13353:2008+A1:2011 Solid wood panels (SWP) – Requirements
[8] EN 636:2012+A1:2015 Plywood - Specifications
[9] EN 622-2:2004 Fibreboards – Specifications – Part 2: Requirements for hardboards
[10] EN 622-3:2004 Fibreboards - Specifications - Part 3: Requirements for medium boards
[11] EN 634-2:2007 Cement-bonded particleboards – Specifications – Part 2: Requirements for OPC bonded particleboards for use in dry, humid and external conditions

If in a European Technical Assessment according to ETAG 015 screws according to EN 14592 are specified to connect three-dimensional nailing plates, Würth screws according to ETA-11/0190 may be considered equivalent, provided that the assumptions regarding the screws in the ETA according to ETAG 015 are met.

Würth "ASSY plus VG" and "ASSY" screws with full thread may be used for reinforcing of timber structures perpendicular to the grain. Würth "ASSY plus VG" screws and fully threaded "ASSY" screws with an outer thread diameter of d = 8 mm may also be used for shear reinforcement.

Würth screws with an outer thread diameter of at least 6 mm may be used for the fixing of thermal insulation material on top of rafters or on wood-based members in vertical façades.

A.1.3 Use Conditions (environmental conditions)

The corrosion protection of the Würth screws is specified in Annex A.2.6. With regards to the use and the environmental conditions, the national provisions of the place of installation apply.

A.1.4 Installation provisions

EN 1995-1-1[12] in conjunction with the respective national annex applies for the installation.

A minimum of two screws shall be used for connections in load-bearing timber structures. When fixing boards, battens or intermediate connections of wind braces only one screw may be used. This also applies for the fixing of rafters, purlins or similar on main beams or top plates, if the member is fixed with at least two screws in total.

Only one screw may be used in structural connections when the minimum penetration length of the screw is 20 · d and the screw is systematic axially loaded. In the case the screw is used to connect wood-based members the load-bearing capacity of the screw shall be reduced by 50 %. If the screw is used as tensile or compressive reinforcement of timber structures perpendicular to the grain no reduction of the load-bearing capacity of the screw is necessary.

The screws are either driven into the wood-based member made of softwood without pre-drilling or in pre-drilled holes with a diameter according to Table A.1.1.

The screws are driven into wood-based members made of beech, ash or oak except LVL made from beech according to EN 14374 or FST according to ETA-14/0354 in pre-drilled holes with a diameter according to Table A.1.1.

Table A.1.1 Diameter of the pre-drilled holes in softwood and in beech, ash or oak

Outer thread diameter [mm]	Diameter of the pre-drilled hole with a tolerance of ± 0.1 mm [mm]	
	Wood-based member of softwood	Wood-based members made of beech, ash or oak
3.0/ 3.4	1.5	2.0
3.5/ 3.9	2.0	2.5
4.0/ 4.4	2.5	3.0
4.5	2.5	3.5
5.0	3.0	3.5
5.5/ 6.0/ 6.3	4.0	4.0
6.5/ 7.0	4.0	5.0
7.5/ 8.0	5.0	6.0
10.0	6.0	7.0
12.0	7.0	8.0
14.0	8.0	9.0

[12] EN 1995-1-1: 2004+AC:2006+A1:2008+A2:2014 Eurocode 5: Design of timber structures – Part 1-1: General - Common rules and rules for buildings

Würth "ASSY" and "Jamo" screws made from carbon steel may be driven into Beech LVL according to EN 14374 or in FST according to ETA-14/0354 without pre-drilling considering the maximum penetration depth of the screws according to Table A.1.2. Screws made from stainless steel may be driven into members made from softwood with or without pre-drilling.

Table A.1.2 Maximum penetration length of the threaded part of Würth "ASSY" and "Jamo" screws made from carbon steel when driven into Beech LVL according to EN 14374 or in FST according to ETA-14/0354 without pre-drilling

Outer thread diameter [mm]	Maximum penetration length of the threaded part of the screws [mm]	
	"ASSY" and "Jamo" screws with drill tip	"ASSY", "Jamo" or "Amo" screws without drill tip
5.0	-	50
6.0	30	60
7.0	-	70
7.5	-	75
8.0	48	80
10.0	80	100
12.0	96	-

The screw holes in steel members shall be pre-drilled with an adequate diameter greater than the outer thread diameter.

Würth screws with an outer thread diameter of d = 14 mm and a length greater or equal than 800 mm shall be only driven in softwood in a guiding hole with a diameter of 8 mm and a minimum length of 10 percent of the screw length.

If screws with an outer thread diameter d ≥ 8 mm are driven into the wood-based member without pre-drilling, the structural solid or glued laminated timber, laminated veneer lumber and similar glued members shall be from spruce, pine, fir or beech (only LVL or FST).

In the case of fastening battens on thermal insulation material on top of rafters the screws shall be driven in the rafter through the battens and the thermal insulation material without pre-drilling in one sequence.

Screws may be used with appropriate washers according to Annex 9. After inserting the screw the washers shall touch the surface of the wood-based member completely.

By fastening screws in wood-based members the head of the screws shall be flush with the surface of the wood-based member. For pan head, top head, back panel head, Elmo-head, large washer head, joist hanger screw head, kombi hexagonal head, truss head, hexagonal head and hexalobular head the head part remains unconsidered.

ANNEX 2 – Characteristic values of the load-carrying capacities

Table A.2.1 Characteristic load-carrying capacities of Würth self-tapping screws made from carbon steel with d = 3.0 mm to 6.0 mm

Outer thread diameter [mm]		**3.0**	**3.4**	**3.5**	**3.9**	**4.0**	**4.4**	**4.5**	**5.0**	**6.0**
Characteristic yield moment $M_{y,k}$ [Nm]	ASSY plus VG	-	-	-	-	-	-	-	-	10.0
	ASSY 3.0/ plus MDF	-	1.7	-	1.9	-	3.0	-	-	-
	Remaining screws	1.6	-	1.8	-	3.3	-	3.7	5.9	10.0
Characteristic tensile strength $f_{tens,k}$ [kN]	ASSY plus VG	-	-	-	-	-	-	-	-	12.5
	ASSY 3.0/ plus MDF	-	2.8	-	3.9	-	5.0	-	-	-
	Remaining screws	2.8	-	3.0	-	5.0	-	5.3	7.9	12.5
Characteristic torsional strength $f_{tor,k}$ [Nm]	ASSY plus VG	-	-	-	-	-	-	-	-	11.5
	ASSY 3.0/ plus MDF	-	1.5	-	1.9	-	3.0	-	-	-
	Remaining screws	1.5	-	2.0	-	3.0	-	4.3	6.0	10.0

Table A.2.2 Characteristic load-carrying capacities of Würth self-tapping screws made from carbon steel with d = 6.3 mm to 14.0 mm

Outer thread diameter [mm]		**6.3**	**7.0**	**7.5**	**8.0**	**10.0**	**12.0**	**14.0**
Characteristic yield moment $M_{y,k}$ [Nm]	ASSY plus VG	-	-	-	23.0	36.0	58.0	86.0
	ASSY plus VG Hot-dip galvanised	-	-	-	-	-	-	86.0
	ASSY Isotop 8.0/10.0	-	-	-	11.0	-	-	-
	Amo Y	-		21.0				
	WG Fix	6.5		-				
	Remaining screws	-	14.0	-	23.0	36.0	58.0	-
Characteristic tensile strength $f_{tens,k}$ [kN]	ASSY plus VG	-	-	-	22.0	33.0	45.0	62.0
	ASSY plus VG Hot-dip galvanised	-	-	-	-	-	-	47.0
	ASSY Isotop 8.0/10.0	-	-	-	11.0	-	-	-
	Amo Y	-		18.0				
	WG Fix	8.0		-				
	Remaining screws	-	15.0	-	21.5	26.0	41.0	-
Characteristic torsional strength $f_{tor,k}$ [Nm]	ASSY plus VG	-	-	-	25.0	45.0	75.0	115
	ASSY plus VG Hot-dip galvanised	-	-	-	-	-	-	100
	ASSY Isotop 8.0/10.0	-	-	-	20 a) 12 b)	-	-	-
	Amo Y	-		20.0				
	WG Fix	8.0		-				
	Remaining screws	-	15.0	-	23.0	45.0	65.0	-

a) head side
b) point side

Table A.2.3 Characteristic load-carrying capacities of Würth self-tapping screws made from stainless steel

Outer thread diameter [mm]		**3.0**	**3.5**	**4.0**	**4.5**	**5.0**	**5.5**	**6.0**	**6.5**	**8.0**	**10.0**
Characteristic yield moment $M_{y,k}$ [Nm]		0.9	1.4	1.9	2.3	2.8	4.4	5.5	6.8	11.0	20.0
Characteristic tensile strength $f_{tens,k}$ [kN]		1.8	2.4	3.1	3.6	4.2	5.9	7.1	8.3	12.0	19.0
Characteristic torsional strength $f_{tor,k}$ [Nm]	Head side ASSY P screws	-	2.7	-	3.6		6.3	-	-	-	-
	Point side remaining screws	0.85	1.35	2.0	2.6	3.3	5.2	6.4	7.5	16.0	30.0

A.2.1 General

The minimum penetration length of the threaded part of the screw in the wood-based members l_{ef} shall be

$$l_{ef} = \min \begin{cases} \dfrac{4 \cdot d}{\sin\alpha} \\ 20 \cdot d \end{cases} \quad (2.1)$$

where

α angle between screw axis and grain direction

d outer thread diameter of the screw.

When fastening battens on thermal insulation material on top of rafters the minimum penetration length of the threaded part of the screw in the wood-based members l_{ef} shall be 40 mm, in case of flanges made from LVL 39 mm.

The outer thread diameter of screws inserted in cross-laminated timber shall be at least 6 mm. The inner thread diameter d_1 of the screws shall be greater than the maximal width of the gaps in the layer of cross laminated timber.

Reductions in the cross-sectional area caused of wood-based members by Würth screws with a diameter of 10 mm or more shall be taken into account in the member strength verification both, in the tensile and compressive area of members. For screws in pre-drilled holes, the drill hole diameter should be considered in the member strength verification, for screws driven without pre-drilling, the inner thread diameter.

A.2.2 Laterally loaded screws

A.2.2.1 General

The outer thread diameter d shall be used as effective diameter of the screw according to EN 1995-1-1.

The embedding strength for the screws in wood-based members or in wood-based panels shall be taken from EN 1995-1-1 or from national provisions that apply at the installation site unless otherwise specified in the following.

For steel-to-timber connections with screws d = 5 mm with joist hanger screw head, a thick steel plate may be assumed for steel plate thickness t ≥ 1,5 mm.

For laterally loaded screws, the rules for multiple fastener connections in EN 1995-1-1, 8.3.1.1 (8) should be applied, if the timber under each fastener in a connection is not reinforced according to Annex 6.

A.2.2.2 Solid timber, glued laminated timber, glued solid timber and solid wood panels

The embedding strength for screws in non-pre-drilled holes in softwood arranged at an angle between screw axis and grain direction of 0° ≤ α ≤ 90° is:

$$f_{h,k} = \frac{0.082 \cdot \rho_k \cdot d^{-0.3}}{2.5 \cdot \cos^2\alpha + \sin^2\alpha} \quad [\text{N/mm}^2] \quad (2.2)$$

The embedding strength for screws in pre-drilled holes in softwood or in ash, beech or oak hardwood arranged at an angle between screw axis and grain direction of 0° ≤ α ≤ 90° is:

$$f_{h,k} = \frac{0.082 \cdot \rho_k \cdot (1 - 0.01 \cdot d)}{2.5 \cdot \cos^2\alpha + \sin^2\alpha} \quad [\text{N/mm}^2] \quad (2.3)$$

where

ρ_k Characteristic density of the wood-based member [kg/m³], for beech, ash and oak $\rho_k \leq 590$ kg/m³
d Outer thread diameter of the screw [mm]
α Angle between screw axis and grain direction, $0° \leq \alpha \leq 90°$.

A.2.2.3 Laminated veneer lumber

The embedding strength for screws in non-pre-drilled holes in softwood LVL arranged at an angle between screw axis and grain direction, $0° \leq \alpha \leq 90°$ is:

$$f_{h,k} = \frac{0.082 \cdot \rho_k \cdot d^{-0.3}}{(2.5 \cdot \cos^2 \alpha + \sin^2 \alpha)(1.5 \cdot \cos^2 \beta + \sin^2 \beta)} \quad \text{[N/mm}^2\text{]} \qquad (2.4)$$

and accordingly for screws in pre-drilled holes in softwood LVL arranged at an angle between screw axis and grain direction, $0° \leq \alpha \leq 90°$:

$$f_{h,k} = \frac{0.082 \cdot \rho_k \cdot (1 - 0.01 \cdot d)}{(2.5 \cdot \cos^2 \alpha + \sin^2 \alpha)(1.5 \cdot \cos^2 \beta + \sin^2 \beta)} \quad \text{[N/mm}^2\text{]} \qquad (2.5)$$

Where

ρ_k characteristic timber density of the softwood LVL [kg/m³], $\rho_k \leq 500$ kg/m³,
d outer thread diameter of the screw [mm],
α angle between screw axis and grain direction ($0° \leq \alpha \leq 90°$),
β angle between screw axis and the LVL's wide face ($0° \leq \alpha \leq 90°$).

The embedding strength for screws in pre-drilled or non-pre-drilled holes in Beech LVL according to EN 14374 or in FST according to ETA-14/0354 arranged at an angle between screw axis and grain direction, $0° \leq \alpha \leq 90°$ is:

$$f_{h,k} = \frac{0.082 \cdot \rho_k \cdot d^{-0.15}}{(2.5 \cdot \cos^2 \alpha + \sin^2 \alpha) \cdot k_\varepsilon \cdot k_\beta} \quad \text{[N/mm}^2\text{]} \qquad (2.6)$$

Where

ρ_k characteristic density of Beech LVL or FST [kg/m³], $\rho_k \leq 730$ kg/m³
d outer thread diameter of the screw [mm],
α angle between screw axis and grain direction, $0° \leq \alpha \leq 90°$,
$k_\varepsilon = (0.5 + 0.024 \cdot d) \cdot \sin^2 \varepsilon + \cos^2 \varepsilon$, (2.7)
ε angle between load and grain direction, $0° \leq \varepsilon \leq 90°$,
$k_\beta = 1.2 \cdot \cos^2 \beta + \sin^2 \beta$, (2.8)
β angle between screw axis and wide face of LVL or FST member, $0° \leq \beta \leq 90°$.

A.2.2.4 Cross laminated timber

The embedding strengths according to equations (2.2) and (2.3) may be applied for screws within single softwood layers in cross laminated timber, if the single layer is considered as a separate softwood member and the minimum spacing, end and edge distances are observed for the single layer. For inner layers, the edge distance perpendicular to the grain may be reduced to 3 · d.
Alternatively the embedding strength for screws arranged in the edge surfaces parallel to the plane of cross laminated timber may be assumed according to equation (2.9) independent of the angle between screw axis and grain direction, $0° \leq \alpha \leq 90°$:

$$f_{h,k} = 20 \cdot d^{-0.5} \text{ in N/mm}^2 \qquad (2.9)$$

unless otherwise specified in the technical specification of the cross laminated timber.

Where d is the outer thread diameter of the screws in mm.

Equation (2.9) is only valid for softwood layers. The provisions in the European Technical Assessment or in national provisions of the cross laminated timber apply.

The embedding strength for screws in the wide face of cross laminated timber may be assumed as for solid timber based on the characteristic density of the outer layer. Where applicable, the angle between force and grain direction of the outer layer shall be taken into account. The direction of the lateral force shall be perpendicular to the screw axis and parallel to the wide face of the cross laminated timber.

A.2.3 Axially loaded screws

A.2.3.1 Axial slip modulus

The axial slip modulus K_{ser} of the threaded part of a screw for the serviceability limit state shall be taken independent of angle α to the grain as:

$K_{ser} = 25 \cdot d \cdot l_{ef}$ [N/mm] for screws in members made from softwood (2.10)

$K_{ser} = 30 \cdot d \cdot l_{ef}$ [N/mm] for screws in in members made from hardwood (2.11)

Where

d outer thread diameter of the screw [mm]

l_{ef} penetration length of the of the threaded part of the screw in the wood-based member [mm].

A.2.3.2 Axial withdrawal capacit*y*

The characteristic withdrawal capacity in solid timber (softwood or hardwood species beech, ash and oak with $\rho_k \leq 590$ kg/m³), glued laminated timber (softwood or hardwood species beech, ash and oak with $\rho_k \leq 590$ kg/m³), cross laminated timber, solid wood panels or laminated veneer lumber members or FST according to ETA-14/0354 with $\rho_k \leq 750$ kg/m³ at an angle of $0° \leq \alpha \leq 90°$ to the grain shall be calculated as:

$$F_{ax,\alpha,Rk} = \frac{n_{ef} \cdot k_{ax} \cdot f_{ax,k} \cdot d \cdot l_{ef}}{k_\beta} \cdot \left(\frac{\rho_k}{\rho_a}\right)^{0.8} \qquad (2.12)$$

where

$F_{ax,\alpha,Rk}$ characteristic withdrawal capacity of a screw group at an angle a to the grain [N]

n_{ef} effective number of screws according to EN 1995-1-1, clause 8.7.2 (8)

For inclined screws in laterally loaded connections with an angle between shear plane and screw axis $30° \leq \alpha \leq 60°$:

$$n_{ef} = \max\left\{n^{0.9}; 0.9 \cdot n\right\} \qquad (2.13)$$

Alternatively, the effective number of inclined screws with an angle α between shear plane and screw axis of $30° \leq \alpha \leq 60°$ n_{ef} may be determined according to Annex 8.

For screws as compression reinforcement or inclined screws as fasteners in mechanically jointed beams or columns or for the fixing of thermal insulation material, $n_{ef} = n$.

n	number of screws acting together in a connection For inclined screws is n the number of crossed pairs of screws.
k_{ax}	Factor, taking into account the angle α between screw axis and grain direction

$k_{ax} = 1.0$ for $45° \le \alpha \le 90°$

$$k_{ax} = a + \frac{b \cdot \alpha}{45°} \quad \text{for } 0° \le \alpha < 45° \qquad (2.14)$$

$$a = \begin{cases} 0.5 & \text{for LVL} \\ 0.3 & \text{for solid timber, glued solid timber, glued laminated timber, cross laminated timber and solid wood panels} \end{cases}$$

$$b = \begin{cases} 0.5 & \text{for LVL} \\ 0.7 & \text{for solid timber, glued solid timber, glued laminated timber, cross laminated timber and solid wood panels} \end{cases}$$

If $l_{ef} \ge \min \begin{cases} \frac{4 \cdot d}{\sin \alpha} \\ 20 \cdot d \end{cases}$ and $\alpha \ge 15°$ k_{ax} may alternatively be taken as

$$k_{ax} = \frac{1}{1.2 \cdot \cos^2\alpha + \sin^2\alpha} \qquad (2.15)$$

k_β — $k_\beta = 1.0$ for solid timber, glued solid timber, glued laminated timber and solid wood panels

$k_\beta = 1.5 \cdot \cos^2\beta + \sin^2\beta$ for laminated veneer lumber (2.16)

$f_{ax,k}$ — characteristic withdrawal parameter for

- solid timber, glued laminated timber, cross laminated timber, solid wood panels and laminated veneer lumber members with a maximum characteristic density of 590 kg/m³ and ρ_a = 350 kg/m³
  $f_{ax,k}$ = 12.0 N/mm² for screws with 3.0 mm ≤ d ≤ 5.0 mm
  $f_{ax,k}$ = 11.5 N/mm² for screws with 5.5 mm ≤ d ≤ 7.0 mm and "ASSY Isotop" screws
  $f_{ax,k}$ = 11.0 N/mm² for screws with 7.5 mm ≤ d ≤ 10.0 mm and "ASSY plus MDF" screws
  $f_{ax,k}$ = 10.0 N/mm² for screws with d > 10.0 mm and "WG Fix" screws.
- Beech LVL or FST (ETA-14/0354) members with a density of 590 kg/m³ ≤ ρ_k ≤ 750 kg/m³ and ρ_a = 730 kg/m³
  $f_{ax,k}$ = 35.0 N/mm² for screws with 5.0 mm ≤ d ≤ 12.0 mm
- OSB/3, OSB/4 boards with ρ_k ≥ 550 kg/m³ and particleboards with ρ_k ≥ 640 kg/m³ and $\rho_a = \rho_k$
  $f_{ax,k}$ = 7.0 N/mm² for screws with 4.0 mm ≤ d ≤ 6.0 mm
- Gypsum fibre boards (ETA-03/0050) and gypsum plasterboards with ρ_k ≥ 650 kg/m³ and $\rho_a = \rho_k$
  $f_{ax,k}$ = 7.0 N/mm² for "WG Fix" screws in gypsum fibre boards
  $f_{ax,k}$ = 2.0 N/mm² for "WG Fix" screws in gypsum plasterboards

d	outer thread diameter of the screw [mm]
l_{ef}	penetration length of the threaded part of the screw [mm]
α	angle between grain and screw axis ($0° \leq \alpha \leq 90°$)
β	angle between screw axis and the LVL's wide face ($0° \leq \alpha \leq 90°$)
ρ_k	characteristic density of the wood-based member or of the gypsum fibre boards or plasterboards [kg/m³]
ρ_a	associated density for $f_{ax,k}$ [kg/m³]

The characteristic withdrawal parameter is also valid for softwood layers of cross-laminated timber.
For screws penetrating more than one layer of cross laminated timber the different layers may be taken into account proportionally. In the lateral surfaces of the cross laminated timber the screws shall be fully inserted in one layer of cross-laminated timber.

Alternatively, the axial withdrawal capacity for screws arranged parallel to the plane of cross laminated timber, independent of the angle between screw axis and grain direction, $0° \leq \alpha \leq 90°$, may be calculated from:

$$F_{ax,Rk} = 20 \cdot d^{0.8} \cdot l_{ef}^{0.9} \quad \text{[N]} \tag{2.17}$$

Where

d outer thread diameter [mm]
l_{ef} penetration length of the threaded part of the screw [mm]

For beech, ash and oak wood except Beech LVL and FST (ETA-14/0354) a maximum characteristic density of 590 kg/m³ shall be used in equation (8.40a) of EN 1995-1-1 and in equation (2.12) of this ETA.

The axial withdrawal capacity is limited by the head pull-through capacity and the tensile or compressive capacity of the screw.

A.2.3.3 Head pull-through capacity

The characteristic value of the head pull-through parameter for the screws for ρ_a = 350 kg/m³ of the timber and for wood-based panels like

- Plywood according to EN 636 and EN 13986
- Oriented Strand Board, OSB according to EN 300 and EN 13986
- Particleboard according to EN 312 and EN 13986
- Fibreboards according to EN 622-2, EN 622-3 and EN 13986
- Cement-bonded particle boards according to EN 634-2 and EN 13986,
- Solid-wood panels according to EN 13353 and EN 13986

with a thickness of more than 20 mm is

$f_{head,k}$ = 13.0 N/mm²	for Würth screws with a head diameter $d_h \leq$ 19 mm and
$f_{head,k}$ = 10.0 N/mm²	for Würth screws with a head or washer diameter $d_h >$ 19 mm,
$f_{head,k}$ = 15.0 N/mm²	for Würth "JAMO" and "JAMO plus" screws,
$f_{head,k}$ = 23.0 N/mm²	for Würth "ASSY" screws with underhead thread,
$f_{head,k} = 40 - 0.5 \cdot d_h$	for Würth screws with a head or washer diameter $d_h \leq$ 25 mm in Beech LVL or FST (ETA-14/0354) with a characteristic density of 590 kg/m³ $\leq \rho_k \leq$ 750 kg/m³ and with a thickness of at least 40 mm,
$f_{head,k}$ = 16.0 N/mm²	for Würth screws with d = 8 mm with countersunk washers 45° with d_{head} = 25 mm in LVL with $\rho_k \leq$ 590 kg/m³ for ρ_a = 500 kg/m³
$f_{head,k}$ = 32.0 N/mm²	for Würth screws d = 8 mm with countersunk washers 45° with d_{head} = 25 mm in Beech LVL or FST (ETA-14/0354) with $\rho_k \geq$ 680 kg/m³ for ρ_a = 730 kg/m³ and with a thickness of at least 40 mm.

For wood-based panels a maximum characteristic density of 380 kg/m³ and for beech, ash and oak wood and LVL made from softwood a maximum characteristic density of 590 kg/m³ shall be used in equation (8.40b) of EN 1995-1-1. For Beech LVL and FST (ETA-14/0354) a maximum characteristic density of 730 kg/m³ shall be used in equation (8.40b) of EN 1995-1-1.

The head diameter shall be equal to or greater than $1.8 \cdot d_s$, where d_s is the smooth shank or the inner thread diameter. Otherwise the characteristic head pull-through capacity in equation (8.40b) of EN 1995-1-1 is for all wood-based materials: $F_{ax,\alpha,RK} = 0$.

For wood based panels with a thickness 12 mm ≤ t ≤ 20 mm the characteristic value of the head pull-through parameter for the screws is:

$f_{head,k}$ = 8 N/mm²

For wood based panels with a thickness of less than 12 mm the characteristic head pull-through capacity for screws shall be based on a characteristic value of the head pull-through parameter of 8 N/mm², and limited to 400 N complying with the minimum thickness of the wood based panels of 1.2·d, with d as outer thread diameter and the values in Table A.2.4.

Table A.2.4 Minimum thickness of wood based panels

Wood based panel	**Minimum thickness [mm]**
Plywood	6
Fibreboards (hardboards and medium boards)	6
Oriented Strand Boards, OSB	8
Particleboards	8
Cement-bonded particle board	8
Solid wood Panels	12

Outer diameter of washers d_h > 32 mm shall not be considered.

For Würth "ASSY plus VG" screws, "ASSY" screws with a full thread and "ASSY" screws with a thread under the head the withdrawal capacity of the thread in the wood-based member with the screw head may be taken into account instead of the head pull-through capacity.

That also applies for screws with a thread over a part of the screw length. The minimum penetration length of the thread of 4 · d shall be considered in the timber member near the screw head in this case.

In steel-to-timber connections the head pull-through capacity is not governing.

A.2.3.4 Compressive capacity of Würth "ASSY plus VG" screws and fully threaded "ASSY" screws

The design axial capacity $F_{ax,Rd}$ of Würth "ASSY plus VG" screws and fully threaded "ASSY" screws embedded in solid timber, glued solid timber or glued laminated timber made from softwood with an angle between screw axis and grain direction of 30° ≤ α ≤ 90° is the minimum of the axial resistance against pushing-in and the buckling resistance of the screw.

$$F_{ax,Rd} = \min \left\{ f_{ax,d} \cdot d \cdot l_{ef} ; \kappa_c \cdot N_{pl,d} \right\} \tag{2.18}$$

$f_{ax,d}$	design value of the axial withdrawal capacity of the threaded part of the screw [N/mm²]
d	outer thread diameter of the screw [mm]
l_{ef}	penetration length of the threaded part of the screw in the timber member [mm]

$$\kappa_c = 1 \quad \text{for } \bar{\lambda}_k \leq 0.2 \tag{2.19}$$

$$\kappa_c = \frac{1}{k + \sqrt{k^2 - \bar{\lambda}_k^2}} \quad \text{for } \bar{\lambda}_k > 0.2 \tag{2.20}$$

$$k = 0.5 \cdot \left[1 + 0.49 \cdot \left(\bar{\lambda}_k - 0.2 \right) + \bar{\lambda}_k^2 \right] \tag{2.21}$$

and a relative slenderness ratio $\bar{\lambda}_k = \sqrt{\frac{N_{pl,k}}{N_{ki,k}}}$ (2.22)

where:

$N_{pl,k}$ characteristic plastic normal force related to the net cross-section of the inner thread diameter: :

$$N_{pl,k} = \pi \cdot \frac{d_1^2}{4} \cdot f_{y,k} \tag{2.23}$$

$f_{y,k}$ characteristic yield strength,
$f_{y,k}$ = 1000 N/mm² for "ASSY plus VG" and fully threaded "ASSY" screws
$f_{y,k}$ = 800 N/mm² for hot-dip galvanised "ASSY" plus VG screw

d_1 inner thread diameter of the screw [mm]

$$N_{pl,d} = \frac{N_{pl,k}}{\gamma_{M1}} \tag{2.24}$$

γ_{M1} partial factor according to EN 1993-1-1 in conjunction with the particular national annex

characteristic ideal elastic buckling load:

$$N_{ki,k} = \sqrt{c_h \cdot E_S \cdot I_S} \quad [\text{N}] \tag{2.25}$$

elastic foundation of the screw:

$$c_h = \left(0.19 + 0.012 \cdot d\right) \cdot \rho_k \cdot \left(\frac{90° + \alpha}{180°} \right) \quad [\text{N/mm}^2] \tag{2.26}$$

ρ_k characteristic density of the wood-based member [kg/m³],
α angle between screw axis and grain direction,

modulus of elasticity:
E_s = 210.000 N/mm²

second moment of area:

$$I_s \quad \frac{\pi \cdot d_1^4}{64} \quad [\text{mm}^4] \tag{2.27}$$

A.2.4 Spacing, end and edge distances of the screws and minimum thickness of the wood and gypsum based material

A.2.4.1 General

For screws arranged at angles α < 90° between screw axis and grain direction minimum spacing and distances are defined as follows:

Minimum spacing a_1 or a_2 is defined perpendicular to the screw axis, minimum end or edge distances $a_{1,t,CG}$, $a_{1,c,CG}$, $a_{2,c,CG}$ und $a_{2,t,CG}$ parallel or perpendicular to the grain, respectively, are defined between the centre of the threaded screw length (axial loading) or the screw length (lateral loading) in the respective timber member and the member surface as for axially loaded screws in Figure 8.11.a in EN 1995-1-1.

A.2.4.2 Laterally and/or axially loaded screws

Screws in pre-drilled holes or "ASSY plus", "ASSY plus VG" and "Jamo plus"[13] screws in non-predrilled holes

For Würth screws in pre-drilled holes, for "ASSY plus", "ASSY plus VG" and "Jamo plus"[13] screws also in non pre-drilled holes in softwood, the minimum spacings, end and edge distances are given in EN 1995-1-1, clause 8.3.1.2 and Table 8.2 as for nails in pre-drilled holes. Here, the outer thread diameter d shall be considered.

Minimum thickness for structural members made from solid timber, glued laminated timber, glued solid timber, laminated veneer lumber and cross laminated timber is t = 24 mm for screws with d < 8 mm, t = 30 mm for screws with d = 8 mm, t = 40 mm for screws with d = 10 mm, t = 80 mm for screws with d = 12 mm and t = 100 mm for screws with d = 14 mm.

Minimum thickness for OSB/3, OSB/4 boards is 12 mm and for particle boards 13 mm. The thickness of the boards shall not be greater than 30 mm. The minimum thickness of wood-based panels arranged on the side of the screw head is given in Table A.2.4.

The minimum thickness of gypsum plasterboards is 12.5 mm and for fermacell Gypsum fibre boards 10 mm.

Screws in non pre-drilled holes

For Würth screws except for "ASSY plus" "ASSY plus VG" and "Jamo plus" screws in non pre-drilled holes minimum spacing and distances are given in EN 1995-1-1, clause 8.3.1.2 and Table 8.2 as for nails in non pre-drilled holes. Minimum spacing and distances according to EN 1995-1-1, clause 8.3.1.2 and Table 8.2 for nails in non pre-drilled holes and a characteristic density of 420 kg/m³ ≤ ρ_k ≤ 500 kg/m³ also apply for "ASSY", "Jamo" and "Amo" screws made from carbon steel with 5 mm ≤ d ≤ 12 mm in Beech LVL and FST (ETA-14/0354) for type S with member thickness t ≥ 7 · d and for type Q independent of the member thickness.

For Douglas fir members minimum spacing and distances parallel to the grain shall be increased by 50%.

Minimum distances from the unloaded edge perpendicular to the grain may be reduced to 3·d also for timber thickness t < 5·d, if the spacing parallel to the grain and the end distance is at least 25·d.

For Würth screws in non-predrilled softwood members except "ASSY plus", "ASSY plus VG" and "Jamo plus" the minimum member thickness defined in EN 1995-1-1, clause 8.3.1.2 as for nails in non-predrilled holes is valid. Equation (8.18) in EN 1995-1-1 may be applied for softwood members made of pine or for the fixing of boards, battens or wind braces, if the member is fixed with at least two screws. Otherwise EN 1995-1-1, clause 8.3.1.2 (7) applies.

[13] The spacings and distances given in this paragraph are only valid for "Jamo plus" screws if the screws are inserted only until the end of the smooth shaft. The spacings and distances are not valid for the underhead thread of the "Jamo plus" screws.

If the spacing parallel to the grain and the end distance is at least 25·d or if the timber in the connection area is reinforced according to Annex 8, the minimum thickness for predrilled structural members or for "ASSY plus" and "ASSY plus VG" screws in non-predrilled softwood members may be reduced to t = 24 mm for screws with outer thread diameter d < 8 mm, to t = 30 mm for screws with outer thread diameter d = 8 mm, to t = 40 mm for screws with outer thread diameter d = 10 mm, to t = 80 mm for screws with outer thread diameter d = 12 mm and to t = 100 mm for screws with outer thread diameter d = 14 mm.

These minimum member thicknesses are not valid for wood-based panels and LVL with cross veneers.

A.2.4.3 Only axially loaded screws

For "ASSY plus", "ASSY plus VG" and "Jamo plus"[13] screws loaded only axially, the following minimum spacings, end and edge distances may be used alternatively to paragraph A.2.4.2 for solid timber, glued laminated timber and similar glued products:

Spacing a_1 in a plane parallel to grain:	a_1	$= 5 \cdot d$
Spacing a_2 perpendicular to a plane parallel to grain:	a_2	$= 2.5 \cdot d$
End distance $a_{1,CG}$ of the centre of gravity of the threaded part in the timber member:	$a_{1,CG}$	$= 5 \cdot d$
Edge distance $a_{2,CG}$ of the centre of gravity of the threaded part in the timber member:	$a_{2,CG}$	$= 3 \cdot d$
Product of spacing a_1 and a_2:	$a_1 \cdot a_2$	$= 25 \cdot d^2$

For screws in non pre-drilled holes a minimum timber thickness of 10 d and a minimum width of 8 d or 60 mm, whichever is the greater, are required.

For "ASSY plus" and "ASSY plus VG" and "Jamo plus"[13] screws only loaded axially, the following minimum spacings, end and edge distances apply for laminated veneer lumber (LVL) made from softwood:

Spacing a_1 in a plane parallel to grain:	a_1	$= 5 \cdot d$
Spacing a_2 perpendicular to a plane parallel to grain:	a_2	$= 2.5 \cdot d$
End distance $a_{1,CG}$ of the centre of gravity of the threaded part in the timber member:	$a_{1,CG}$	$= 5 \cdot d$
Edge distance $a_{2,CG}$ of the centre of gravity of the threaded part in the timber member:	$a_{2,CG}$	$= 3 \cdot d$
Product of spacing a_1 and a_2:	$a_1 \cdot a_2$	$= 25 \cdot d^2$

For screws in non pre-drilled holes a minimum LVL (softwood) thickness of 6 d and a minimum width of 8 d or 60 mm, whichever is the greater, are required.

For a crossed screw couple in solid timber, glued laminated timber and similar glued products or in laminated veneer lumber the minimum spacing between the crossing screws is 1.5·d. Appropriate means have to ensure that the crossed screws threads do not touch each other when being inserted in the timber member.

A.2.4.4 Cross laminated timber

The minimum requirements for spacing, end and edge distances of screws in the plane or edge surfaces of cross laminated timber are summarised in Table A.2.5. The definition of spacing, end and edge distance is shown in Figure A.2.2 and Figure A.2.3. The minimum spacing, end and edge distances in the edge surfaces are independent of the angle between screw axis and grain direction. They may be used based on the following conditions:

- Minimum thickness of cross laminated timber: 10 · d
- Minimum penetration depth in the edge surface: 10 · d

Unless a detailed verification is carried out the tensile stresses perpendicular to the grain shall be transferred by reinforcing screws for load components perpendicular to the plane surface (see Figure A.2.1),

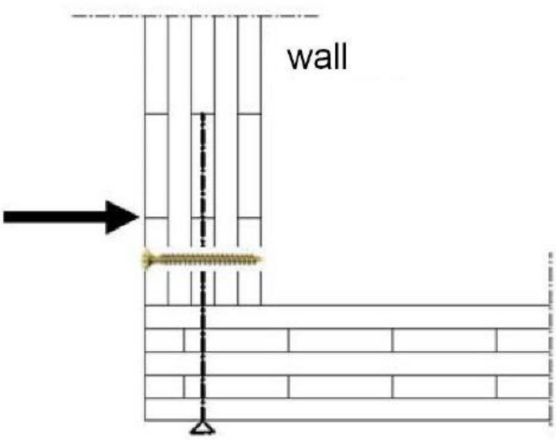


Figure A.2.1: Reinforcing screw in cross-laminated timber loaded by tensile stress perpendicular to the grain

Table A.2.5 Minimum spacing, end and edge distances of screws in the plane or edge surfaces of cross laminated timber

	a_1	$a_{3,t}$	$a_{3,c}$	a_2	$a_{4,t}$	$a_{4,c}$
Plane surface (see Figure A.2.2)	$4 \cdot d$	$6 \cdot d$	$6 \cdot d$	$2.5 \cdot d$	$6 \cdot d$	$2.5 \cdot d$
Edge surface (see Figure A.2.3)	$10 \cdot d$	$12 \cdot d$	$7 \cdot d$	$4 \cdot d$	$6 \cdot d$	$3 \cdot d$

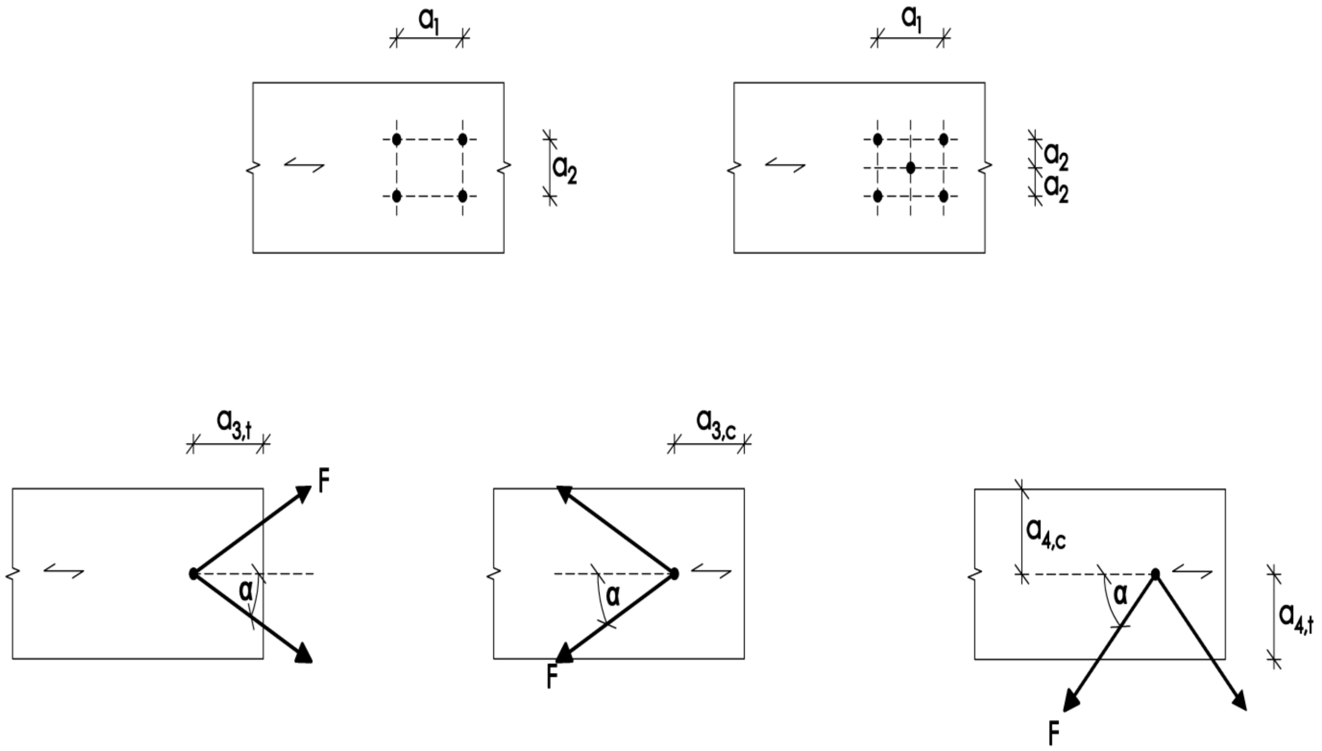


Figure A.2.2: Definition of spacing, end and edge distances in the plane surface

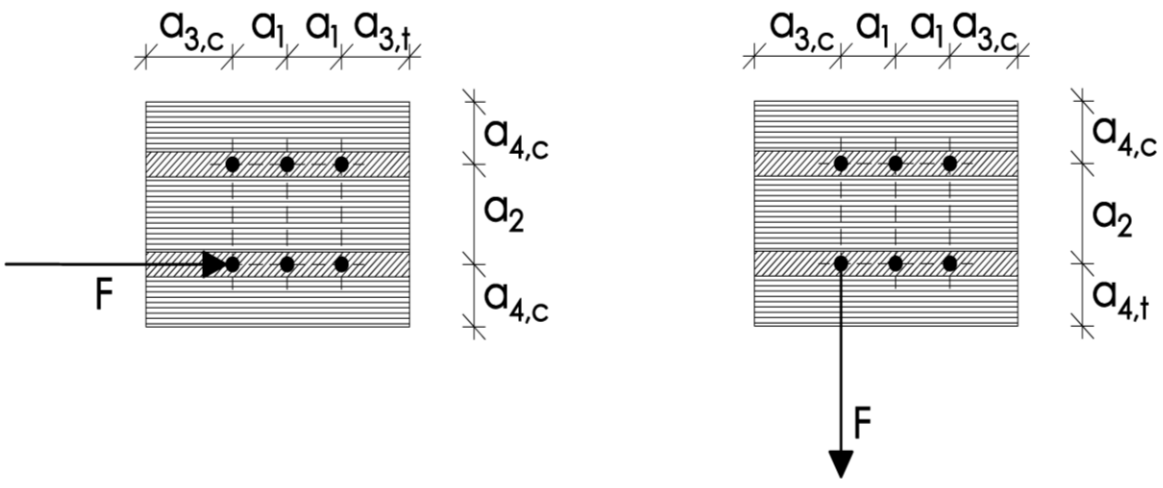


Figure A.2.3: Definition of spacing, end and edge distances in the edge surface

Würth self-tapping screws	Annex 2
Spacing, end and edge distances	

A.2.5 Insertion moment

The ratio between the characteristic torsional strength $f_{tor,k}$ and the mean value of insertion moment $R_{tor,mean}$ fulfills the requirement for all screws.

A.2.6 Durability against corrosion

Screws and washers made from carbon steel may be uncoated, brass-plated; nickel-plated; browned; zinc plated; zinc plated blue passivated, yellow chromated, black chromated; zinc-nickel plated, zinc-nickel plated passivated; zinc flakes; ruspert; completly or partially painted, aluminium coating; phosphated; HCP coated, delta coated - surface coatings may be combined together. Würth ASSY plus VG with d = 14 mm may be hot-dip galvanised.
The minimum thickness of the zinc coating of the screws is 5 μm and of the zinc-nickel coating 4 μm.

Steel no. 1.4006, 1.4009, 1.4021, 1.4301, 1.4401, 1.4529, 1.4571, 1.4567, 1.4578 and 1.4539 is used for screws and washers made from stainless steel.

Contact corrosion shall be avoided.

ANNEX 3 Compression reinforcement perpendicular to the grain

A.3.1 General

Only Würth "ASSY plus VG" and "ASSY" screws with full thread shall be used for compression reinforcement perpendicular to the grain. The provisions are valid for reinforcing timber members made from solid timber, glued solid timber and glued laminated timber made from softwood.
The compression force shall evenly be distributed to the screws used as compression reinforcement.
The screws are driven into the timber member perpendicular to the contact surface under an angle between the screw axis and the grain direction of 45° to 90°. The screw heads must be flush with the timber surface.
Compressive reinforcing screws for wood-based panels and timber members made of hardwood are not covered by this European Technical Assessment.

A.3.2 Design

For the design of reinforced contact areas the following conditions must be met independently of the angle between the screw axis and the grain direction.

The design resistance of a reinforced contact area is:

$$R_{90,d} = \min \left\{ \begin{matrix} k_{c,90} \cdot B \cdot \ell_{ef,1} \cdot f_{c,90,d} + n \cdot \min\left\{R_{ax,d}; \kappa_c \cdot N_{pl,d}\right\} \\ B \cdot \ell_{ef,2} \cdot f_{c,90,d} \end{matrix} \right\} \quad (3.1)$$

where:

$k_{c,90}$ parameter according to EN 1995-1-1, clause 6.1.5

B bearing width [mm]

$\ell_{ef,1}$ effective contact length according to EN 1995-1-1, clause 6.1.5 [mm]

$f_{c,90,d}$ design compressive strength perpendicular to the grain [N/mm²]

n number of reinforcing screws, $n = n_0 \cdot n_{90}$

n_0 number of reinforcing screws arranged in a row parallel to the grain

n_{90} number of reinforcing screws arranged in a row perpendicular to the grain

$$R_{ax,d} = f_{ax,d} \cdot d \cdot \ell_{ef} \quad [N] \quad (3.2)$$

$f_{ax,d}$ design value of the axial withdrawal capacity of the threaded part of the screw [N/mm²]

d outer thread diameter of the screw [mm]

κ_c according to Annex 2, chapter "compressive capacity"

$N_{pl,d}$ according to Annex 2, chapter "compressive capacity" [N]

$\ell_{ef,2}$ effective contact length in the plane of the screw tips (see Figure 3.1) [mm]

$\ell_{ef,2} = \{\ell_{ef} + (n_0 - 1) \cdot a_1 + \min(\ell_{ef} ; a_{1,C})\}$ for end supports (see Figure 3.1 left)

$\ell_{ef,2} = \{2 \cdot \ell_{ef} + (n_0 - 1) \cdot a_1\}$ for intermediate supports (see Figure 3.1 right)

ℓ_{ef} penetration length of the threaded part of the screw in the timber member [mm]

a_1 spacing a_1 in a plane parallel to grain, see chapter A.2.4.3 [mm]

$a_{1,C}$ end distance of the centre of gravity of the threaded part in the timber member, see chapter A.2.4.3 [mm]

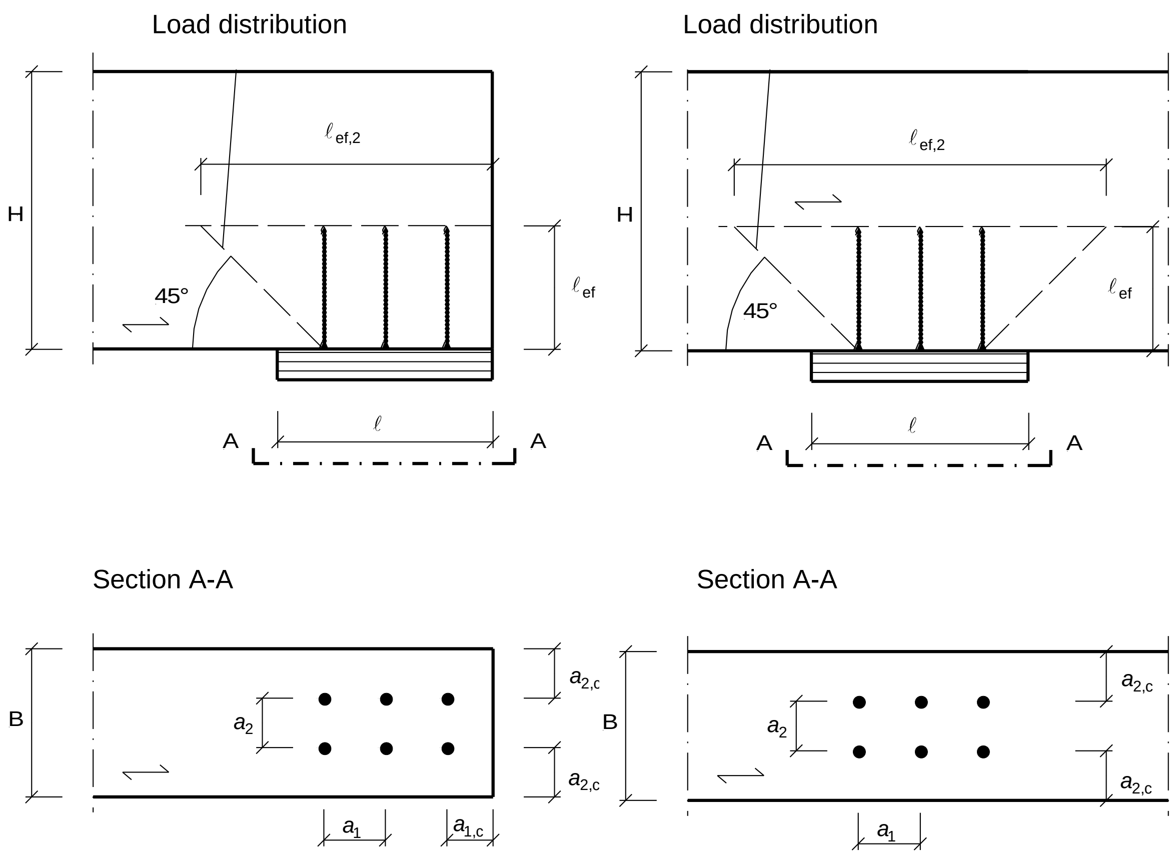


Figure A.3.1 Reinforced end support (left) and reinforced intermediate support (right)

Würth self-tapping screws	Annex 3
Compression reinforcement perpendicular to the grain	

ANNEX 4 Tensile reinforcement perpendicular to grain

A.4.1 General

Only Würth "ASSY plus VG" and "ASSY" screws with full thread shall be used for tensile reinforcement perpendicular to the grain.
The screws are driven into the timber member perpendicular to the contact surface under an angle between the screw axis and the grain direction of 90°.
The provisions regarding tensile reinforcement perpendicular to the grain are valid for the following timber members:

- solid timber of softwood or of the hardwood species beech, ash or oak,
- glued laminated timber made of softwood or of the hardwood species beech, ash or oak,
- glued solid timber made of softwood or of the hardwood species beech, ash or oak,
- laminated veneer lumber made of softwood.

For the design and construction of the tensile reinforcement of timber members perpendicular to the grain, the provisions at the place of installation shall apply. As examples connection forces at an angle to the grain and notched beam supports are given in the following.

Note: For example, in Germany the provisions of standard DIN EN 1995-1-1/NA:2013-08, NCI NA.6.8 and amendments shall be taken into account.

A minimum of two screws shall be used for tensile reinforcement perpendicular to the grain. Only one screw may be used when the minimum penetration depth of the screws below and above the potential crack is 20 · d where d is the outer thread diameter of the screw.

A.4.2 Design

A.4.2.1 Connection forces at an angle to the grain

The axial capacity of a reinforcement of a timber member loaded by a connection force perpendicular to the grain shall fulfil the following condition:

$$\frac{\left[1-3\cdot\alpha^2+2\cdot\alpha^3\right]\cdot F_{90,d}}{F_{ax,Rd}}\leq 1 \qquad (4.1)$$

where

$F_{90,d}$ design value of the force component perpendicular to the grain,
α = a/h
a see Figure A.4.1
h = member depth
$F_{ax,Rd}$ = min $\{f_{ax,d}\cdot d\cdot l_{ef}\,;\,F_{t,Rd}\}$
$f_{ax,d}$ design value of the axial withdrawal capacity of the threaded part of the screw
d outer thread diameter of the screw
l_{ef} smaller value of the penetration depth below or above the potential crack
$F_{t,Rd}$ design value of the tensile resistance of the screw = $f_{tens,d}$

Outside the connection only one screw each in longitudinal direction of the beam shall be taken into account.

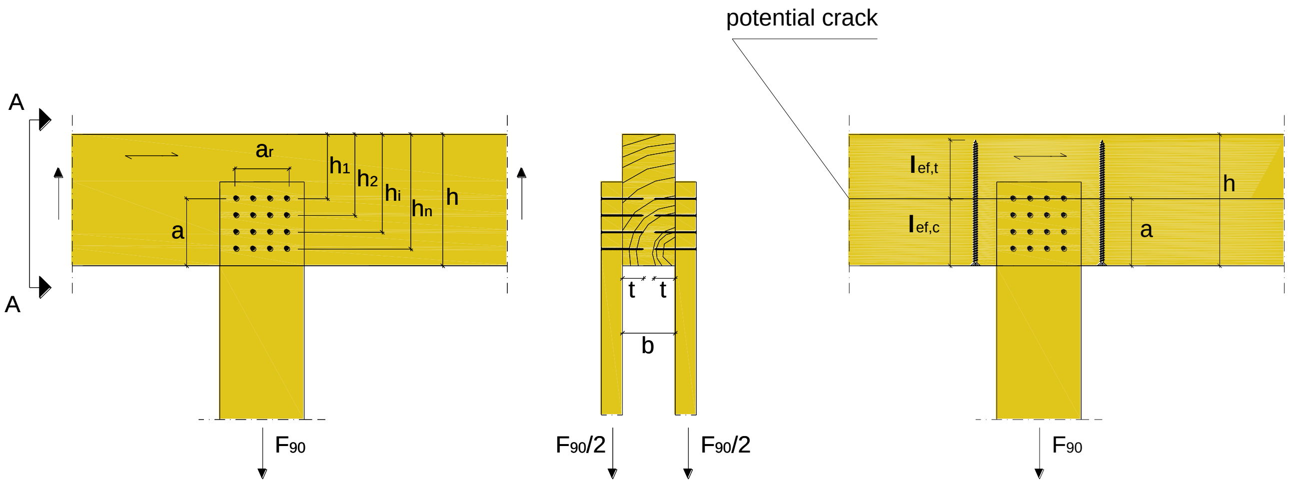


Figure A.4.1: Example for tensile reinforcement of a connection force perpendicular to the grain

Würth self-tapping screws	Annex 4
Tensile reinforcement perpendicular to the grain	

A.4.2.1 Notched beam supports

The axial capacity of a reinforcement of a notched beam support shall fulfil the following condition:

$$\frac{1.3 \cdot V_d \cdot \left[3 \cdot (1-\alpha)^2 - 2 \cdot (1-\alpha)^3\right]}{F_{ax,Rd}} \leq 1 \qquad (4.2)$$

where

V_d design value of the shear force

α $= h_e/h$

h = member depth

$F_{ax,Rd}$ $= \min\{f_{ax,d} \cdot d \cdot l_{ef} ; F_{t,Rd}\}$

$f_{ax,d}$ design value of the axial withdrawal capacity of the threaded part of the screw

d outer thread diameter of the screw

l_{ef} smaller value of the penetration depth below or above the potential crack, the total minimum penetration depth of the screw shall be $2 \cdot l_{ef}$

$F_{t,Rd}$ design value of the tensile resistance of the screws $= f_{tens,d}$

Only one screw in longitudinal direction of the beam shall be taken into account.

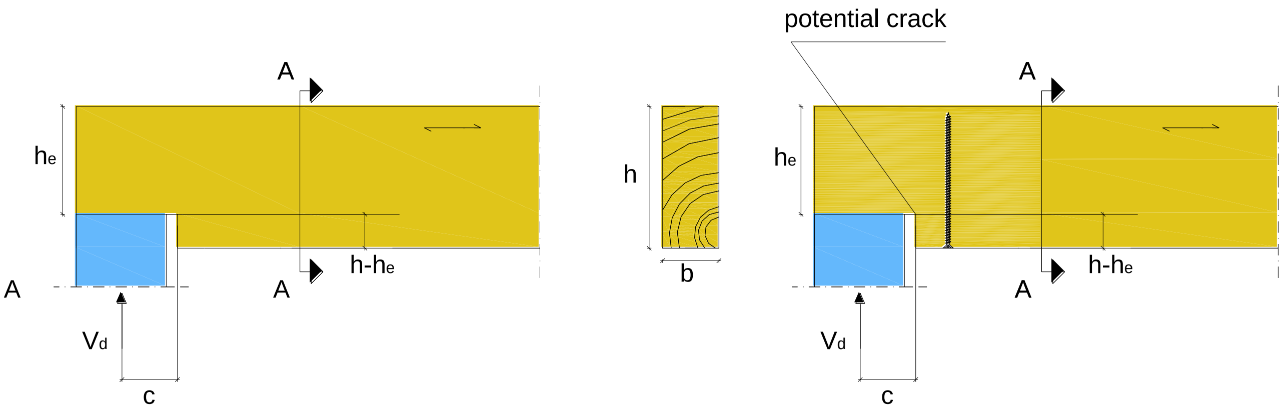


Figure A.4.2: Example for tensile reinforcement of a notched beam support

ANNEX 5 Shear reinforcement

A.5.1 General

Only fully threaded Würth "ASSY" and "ASSY plus VG" screws with d = 8 mm may be used for shear reinforcement of timber members. The provisions are valid for straight beams with constant rectangular cross-section.
The screws shall be driven into the timber member under an angle between the screw axis and the grain direction of 45°.
The provisions regarding shear reinforcement are valid for the following timber members:

- Glued laminated timber made of softwood and
- Glued solid timber made of softwood.

A minimum number of four screws shall be arranged in a line parallel to the grain as shear reinforcement. The spacing between the screws in a line parallel to the grain shall not exceed the depth h of the timber member.
For spacing, end and edge distances of the screws the provisions in Annex A.2.4 apply.
If the screws are arranged in one line parallel to the grain, it shall be done centrically in relation to the beam width.

Outside reinforced areas the shear design shall fulfil the conditions for unreinforced timber members.
For the design and construction of the shear reinforcement of timber members perpendicular to the grain, the provisions at the place of installation shall apply.

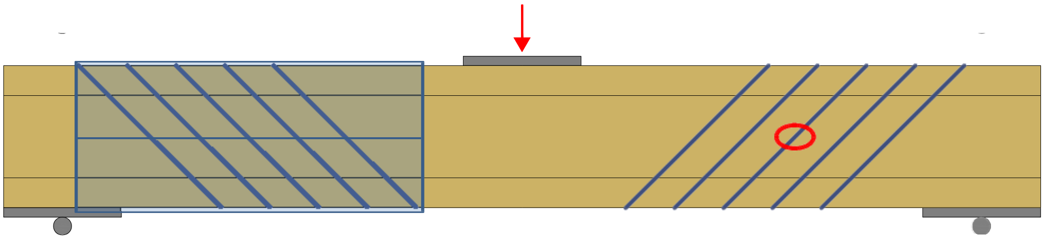


Figure A.5.1: Principle of a shear reinforced beam using screws; marked area is reinforced

A.5.2 Design

The provisions are valid for concentrated and linear loads.

For shear in reinforced areas of timber members specified in Annex A.5.1 with a stress component parallel to the grain, the following expression shall be satisfied:

$$\tau_d \leq f_{v,mod,d} = \frac{f_{v,d} \cdot k_\tau}{\eta_H} \qquad (5.1)$$

where

τ_d design shear stress [N/mm²]

$f_{v,d}$ design shear strength [N/mm²]

k_τ $k_\tau = 1 - 0.46 \cdot \sigma_{90,d} - 0.052 \cdot \sigma_{90,d}^2$ [N/mm²] (5.2)

$\sigma_{90,d}$ design stress perpendicular to the grain (negative value for compression) [N/mm²]

$$\sigma_{90,d} = \frac{F_{ax,d}}{\sqrt{2} \cdot b \cdot a_1} \qquad (5.3)$$

b width of the timber member [mm]

a_1 screw spacing parallel to grain, screws arranged in one row, $a_1 < h$ [mm]

$F_{ax,d}$ $F_{ax,d} = \frac{\sqrt{2} \cdot (1-\eta_H) \cdot V_d \cdot a_1}{h}$ [N/mm²] (5.4)

Würth self-tapping screws	Annex 5
Shear reinforcement	

η_H	$$\eta_H = \frac{G \cdot b \cdot 2 \cdot \sqrt{2}\left(\frac{6}{\pi \cdot d \cdot h \cdot k_{ax}} + \frac{a_1}{E \cdot A_S}\right)}{1 + G \cdot b \cdot 2 \cdot \sqrt{2}\left(\frac{6}{\pi \cdot d \cdot h \cdot k_{ax}} + \frac{a_1}{E \cdot A_S}\right)}$$	(5.5)
V_d	design shear force [N]	
d	outer thread diameter of the screw [mm]	
h	depth of the timber member [mm]	
G	mean value of shear modulus [N/mm²]	
k_{ax}	connection stiffness between screw and timber member k_{ax} = 12.5 N/mm³ for fully threaded "ASSY plus VG" and fully threaded "ASSY" screws with d = 8 mm	
$E \cdot A_S$	Axial stiffness of one screw $$E \cdot A_S = \frac{E \cdot \pi \cdot d_1^2}{4}$$	(5.6)
E	modulus of elasticity, E = 210.000 N/mm²	
d_1	inner thread diameter of the screw [mm]	

The axial capacity of a Würth "ASSY plus VG" screw shall fulfil the following condition:

$$\frac{F_{ax,d}}{F_{ax,Rd}} \leq 1 \qquad (5.7)$$

where

$$F_{ax,Rd} = \min\left\{f_{ax,d} \cdot d \cdot l_{ef}\,;\, f_{tens,d}\right\}$$

$f_{ax,d}$	design value of the axial withdrawal capacity of the threaded part of the screw [N/mm²]
l_{ef}	The effective penetration length is 50 percent of the threaded part length of the screw in the timber member [mm]
$f_{tens,d}$	design tensile strength of the screw [N]

ANNEX 6 Reinforcement of connections with laterally loaded dowel-type fasteners

Unless specified otherwise in national provisions that apply at the installation site, the axial capacity of a reinforcement of a steel-to-timber or timber-to-timber connection with laterally loaded dowel-type fasteners loaded by a connection force parallel to the grain shall fulfil the following condition:

$$\frac{0.3 \cdot F_{v,0,Ed}}{F_{ax,Rd}} \leq 1 \qquad (6.1)$$

Where

$F_{v,0,Ed}$ Design value of the fastener force component parallel to the grain [N],
For outer timber members $F_{v,0,Ed}$ is the load per fastener per shear plane, for inner timber members $F_{v,0,Ed}$ is the accumulated load per fastener for the two shear planes

$F_{ax,Rd}$ Minimum of the design values of the withdrawal capacity and the tensile capacity of the reinforcing full thread screws where l_{ef} is the smaller value of the penetration depth at the screw tip or head (see Fig. A.6.1)

If the timber under each fastener in a connection is reinforced, the effective number n_{ef} according to EN 1995-1-1, equation (8.34) may be taken as n_{ef} = n.

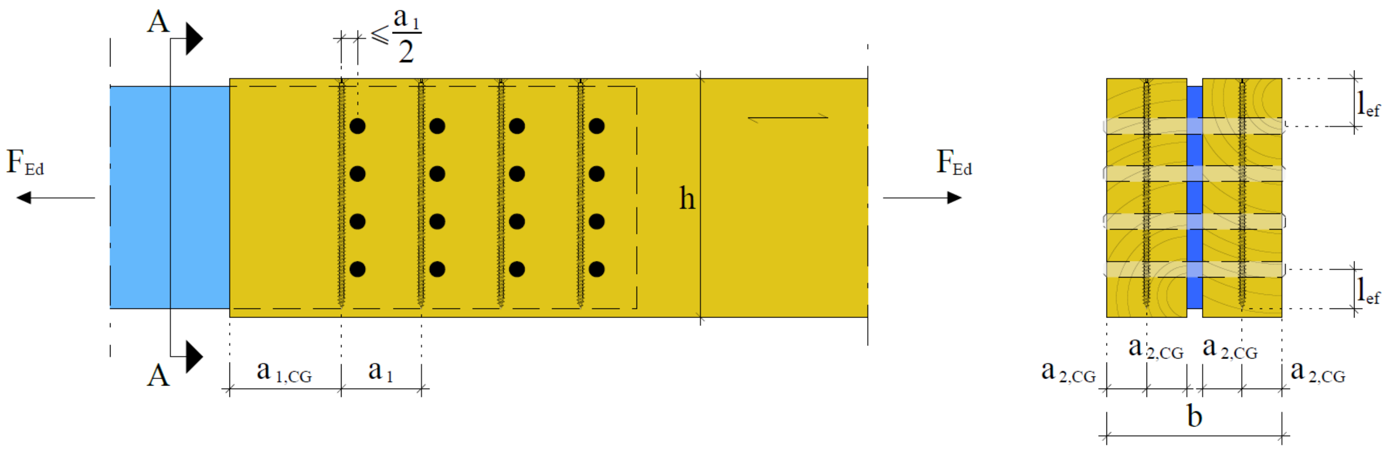


Figure A.6.1: Dowelled steel-to-timber connection with outer timber members and reinforcement;

ANNEX 7 Fastening of thermal insulation material on top of rafters

A.7.1 General

Würth screws with an outer thread diameter of at least 6 mm may be used for the fixing of thermal insulation material on top of rafters or on wood-based members in vertical façades. In the following, the meaning of the word rafter includes wood-based members with inclinations between 0° and 90°.
The thickness of the thermal insulation material may be up to 400 mm. The thermal insulation material shall be applicable as insulation on top of rafters or for façades according to national provisions that apply at the installation site.
The battens have to be from solid timber according to EN 338/EN 14081-1. The minimum thickness t and the minimum width b of the battens are given in Table A.7.1:

Table A.7.1 Minimum thickness and minimum width of the battens

Outer thread diameter [mm]	Minimum thickness t [mm]	Minimum width b [mm]
6, 6.5, 7 and 8	30	50
10	40	60
12	80	100
14	100	100

The minimum width of the rafters shall be 60 mm.

The spacing between screws shall be not more than 1.75 m.

Friction forces shall not be considered for the design of the characteristic axial load of the screws.

The anchorage of wind suction forces as well as the bending stresses of the battens shall be considered for design. Screws perpendicular to the grain of the rafter (angle $\alpha = 90$ °) may be arranged where required considering the design of the battens.

A.7.2 Parallel inclined screws and thermal insulation material in compression

A.7.2.1 Mechanical model

The system of rafter, thermal insulation material on top of rafter and counter battens parallel to the rafter may be considered as a beam on elastic foundation. The counter batten represents the beam, and the thermal insulation material on top of the rafter the elastic foundation. The minimum compressive stress of the thermal insulation material at 10 % deformation, measured according to EN 826[1], shall be $\sigma_{(10\,\%)} = 0.05$ N/mm². The counter batten is loaded perpendicular to the axis by point loads F_b transferred by regularly spaced battens. Further point loads F_s are caused by the shear load of the roof due to dead and snow load, which are transferred from the screw heads into the counter battens.

Instead of battens the following wood-based panels may be used to cover the thermal insulation material if they are suitable for that use:

- Plywood according to EN 636 and EN 13986,
- Oriented Strand Board, OSB according to EN 300 and EN 13986,
- Particleboard according to EN 312 and EN 13986
- Fibreboards according to EN 622-2, EN 622-3 and EN 13986.

Only screws with countersunk head, 75 ° head, FBS head or woodwork head shall be used for fixing wood-based panels on rafters with thermal insulation material as interlayer.

The minimum thickness of the wood-based panels shall be 22 mm.

The word batten includes the meaning of the above mentioned wood-based panels in the following.

[1] EN 826:2013 Thermal insulating products for building applications - Determination of compression behaviour

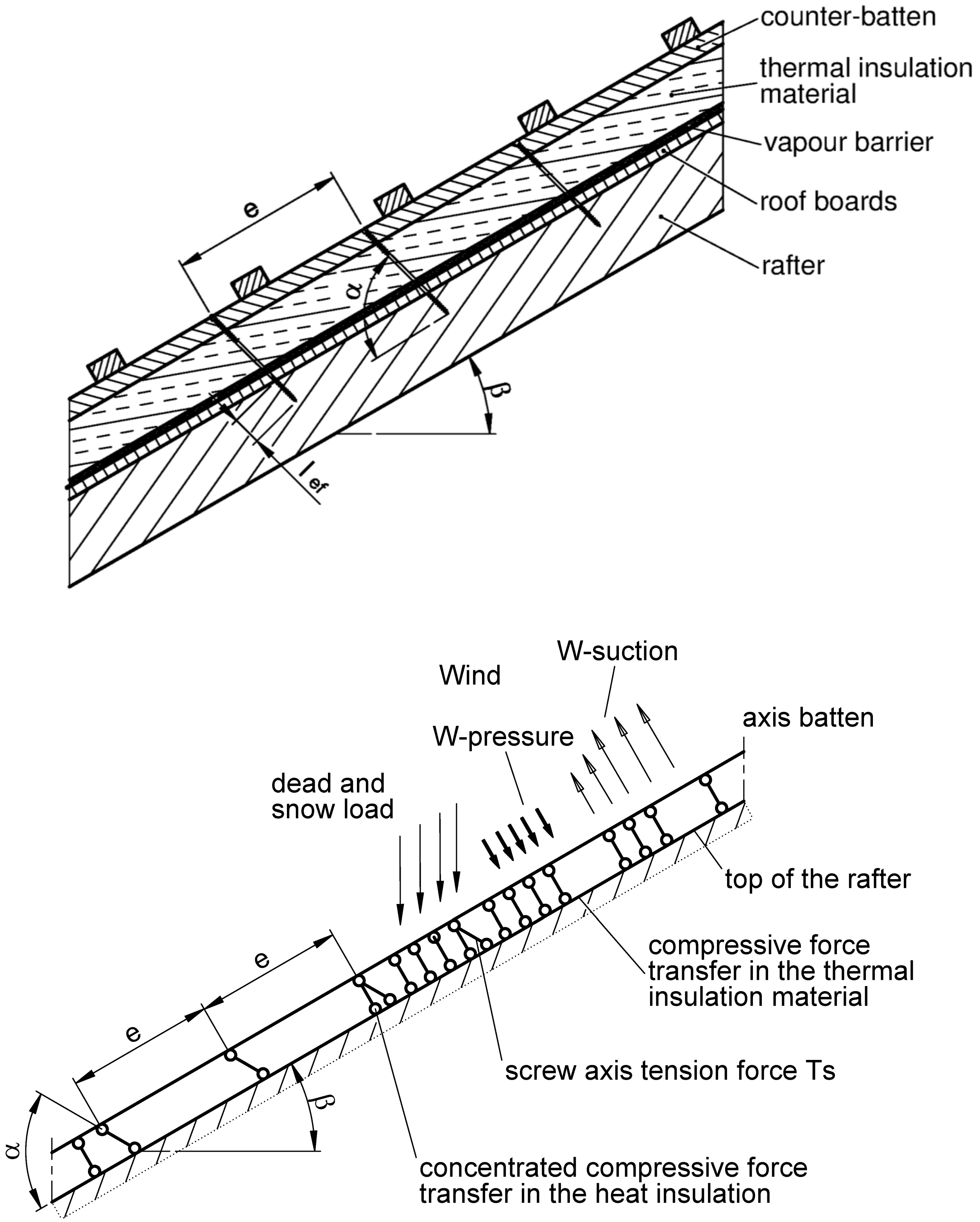


Figure A.7.1 Fastening of the thermal insulation material on top of rafters - structural system

Würth self-tapping screws	Annex 7
Fastening of thermal insulation material on top of rafters	

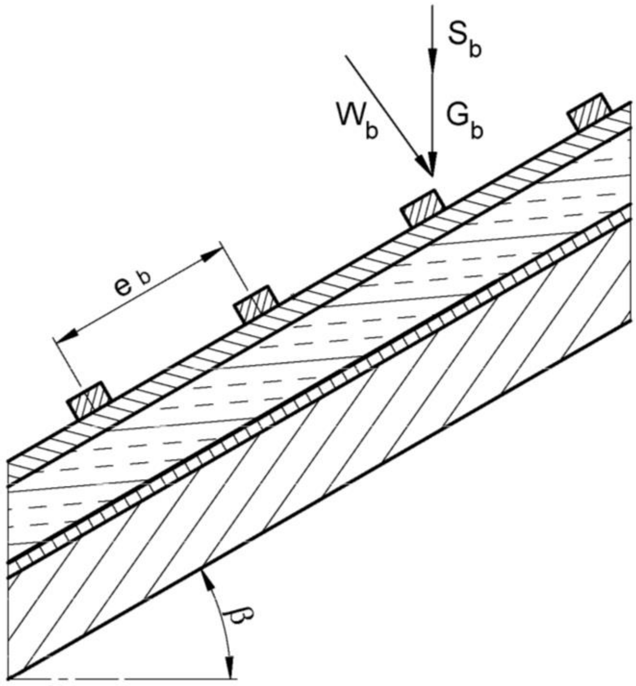


Figure A.7.2 Point loads F_b perpendicular to the battens

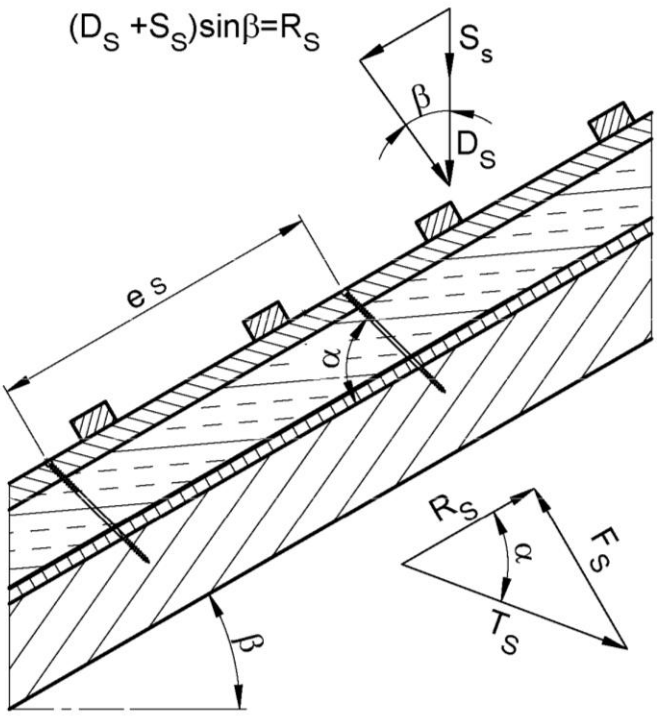


Figure A.7.3 Point loads F_s perpendicular to the battens, load application in the area of the screw heads

Würth self-tapping screws	Annex 7
Fastening of thermal insulation material on top of rafters	

A.7.2.2 Design of the battens

It's assumed that the spacing between the counter battens exceeds the characteristic length l_{char}.

The characteristic values of the bending stresses are calculated as:

$$M_k = \frac{(F_{b,k} + F_{s,k}) \cdot l_{char}}{4} \tag{7.1}$$

where

$$l_{char} = \text{characteristic length } l_{char} = \sqrt[4]{\frac{4 \cdot EI}{w_{ef} \cdot K}} \tag{7.2}$$

EI = bending stiffness of the batten
K = coefficient of subgrade
w_{ef} = effective width of the thermal insulation material
$F_{b,k}$ = point loads perpendicular to the battens
$F_{s,k}$ = point loads perpendicular to the battens, load application in the area of the screw heads

The coefficient of subgrade K may be calculated from the modulus of elasticity E_{HI} and the thickness t_{HI} of the thermal insulation material if the effective width w_{ef} of the thermal insulation material under compression is known. Due to the load extension in the thermal insulation material the effective width w_{ef} is greater than the width of the batten or rafter, respectively. For further calculations, the effective width w_{ef} of the thermal insulation material may be determined according to:

$$w_{ef} = w + t_{HI} / 2 \tag{7.3}$$

where
w = minimum from width of the batten or rafter, respectively
t_{HI} = thickness of the thermal insulation material

$$K = \frac{E_{HI}}{t_{HI}} \tag{7.4}$$

The following condition shall be satisfied:

$$\frac{\sigma_{m,d}}{f_{m,d}} = \frac{M_d}{W \cdot f_{m,d}} \leq 1 \tag{7.5}$$

For the calculation of the section modulus W the net cross section shall be considered.

The characteristic values of the shear stresses shall be calculated according to:

$$V_k = \frac{(F_{b,k} + F_{s,k})}{2} \tag{7.6}$$

The following condition need to be satisfied:

$$\frac{\tau_d}{f_{v,d}} = \frac{1.5 \cdot V_d}{A \cdot f_{v,d}} \leq 1 \tag{7.7}$$

For the calculation of the cross section area the net cross section shall be considered.

A.7.2.3 Design of the thermal insulation material

The characteristic value of the compressive stresses in the thermal insulation material shall be calculated according to:

$$\sigma_k = \frac{1.5 \cdot F_{b,k} + F_{S,k}}{2 \cdot l_{char} \cdot w} \qquad (7.8)$$

The design value of the compressive stress shall not be greater than 110 % of the compressive strength at 10 % deformation calculated according to EN 826.

A.7.2.4 Design of the screws

The screws are loaded predominantly axial. The characteristic value of the axial tension force in the screw may be calculated from the shear loads of the roof R_s:

$$T_{S,k} = \frac{R_{S,k}}{\cos\alpha} \qquad (7.9)$$

The load-carrying capacity of axially loaded screws is the minimum design value of the axial withdrawal capacity of the threaded part of the screw, the head pull-through capacity of the screw and the tensile capacity of the screw according to Annex 2.

In order to limit the deformation of the screw head for thermal insulation material with thickness over 220 mm or with compressive strength below 0.12 N/mm², respectively, the axial withdrawal capacity of the screws shall be reduced by the factors k_1 and k_2:

$$F_{ax,\alpha,Rd} = \min\left\{\frac{k_{ax} \cdot f_{ax,d} \cdot d \cdot l_{ef} \cdot k_1 \ k_2}{k_\beta} \cdot \left(\frac{\rho_k}{350}\right)^{0.8}; f_{head,d} \cdot d_h^2 \cdot \left(\frac{\rho_k}{350}\right)^{0.8}; \frac{f_{tens,k}}{\gamma_{M2}}\right\} \qquad (7.10)$$

where:

k_{ax}	Factor according to Annex A.2.3.2, taking into account the angle α between screw axis and grain direction
$f_{ax,d}$	design value of the axial withdrawal parameter of the threaded part of the screw in the rafter [N/mm²]
d	outer thread diameter of the screw [mm]
l_{ef}	penetration length of the threaded part of the screw in the rafter [mm], $l_{ef} \geq 40$ mm
ρ_k	characteristic density of the wood-based member [kg/m³], for beech, ash and oak $\rho_k \leq 590$ kg/m³ and for LVL (softwood) $\rho_k \leq 500$ kg/m³
α	angle α between screw axis and grain direction, $30° \leq \alpha \leq 90°$
$f_{head,d}$	design value of the head pull-through parameter of the screw [N/mm²]
d_h	head diameter of the screw [mm]
$f_{tens,k}$	characteristic tensile capacity of the screw according to Annex 2 [N]
γ_{M2}	partial factor according to EN 1993-1-1 in conjunction with the particular national annex
k_1	min {1; 220/t_{HI}}
k_2	min {1; $\sigma_{10\%}$/0.12}
t_{HI}	thickness of the thermal insulation material [mm]
$\sigma_{10\%}$	compressive stress of the thermal insulation material under 10 % deformation [N/mm²]
k_β	Factor according to Annex A.2.3.2

If equation (7.10) is fulfilled, the deflection of the battens does not need to be considered when designing the load-carrying capacity of the screws.

A.7.3 Alternatively inclined screws and thermal insulation material non in compression

A.7.3.1 Mechanical model

Depending on the screw spacing and the arrangement of tensile and compressive screws with different inclinations the battens are loaded by significant bending moments. The bending moments are derived based on the following assumptions:

- The tensile and compressive loads in the screws are determined based on equilibrium conditions from the actions parallel and perpendicular to the roof plane. These actions are constant line loads $q_{\perp}$ and $q_{||}$.
- The screws act as hinged columns supported 10 mm within the batten or rafter, respectively. The effective column length consequently equals the length of the screw between batten and rafter plus 20 mm.

The batten is considered as a continuous beam with a constant span ℓ = A + B. The compressive screws constitute the supports of the continuous beam while the tensile screws transfer concentrated loads perpendicular to the batten axis.

The screws are predominantly loaded in withdrawal or compression, respectively. The characteristic values of the screw's normal forces are determined based on the loads parallel and perpendicular to the roof plane:

Compressive screw: $$N_{c,k} = (A+B)\cdot\left(-\frac{q_{II,k}}{\cos\alpha_1+\sin\alpha_1/\tan\alpha_2}-\frac{q_{\perp,k}\cdot\sin(90^\circ-\alpha_2)}{\sin(\alpha_1+\alpha_2)}\right) \quad (7.11)$$

Tensile screw: $$N_{t,k} = (A+B)\cdot\left(\frac{q_{II,k}}{\cos\alpha_2+\sin\alpha_2/\tan\alpha_1}-\frac{q_{\perp,k}\cdot\sin(90^\circ-\alpha_1)}{\sin(\alpha_1+\alpha_2)}\right) \quad (7.12)$$

A	distance of the screws according to Figure A.7.5
B	distance of the alternatively inclined screws according to Figure A.7.5
$q_{II,k}$	characteristic value of the loads parallel to the roof plane
$q_{\perp,k}$	characteristic value of the loads perpendicular to the roof plane
α	angle a_1 and a_2 between screw axis and grain direction, 30° ≤ α_1 ≤ 90°, 30° ≤ α_2 ≤ 90°

Only screws with full thread or a thread below the head and in the area of the drill tip shall be used.

The bending moments in the batten follow from the constant line load $q_{\perp}$ and the load components perpendicular to the batten from the tensile screws. The span of the continuous beam is (A + B). The characteristic value of the load component perpendicular to the batten from the tensile screw is:

$$F_{ZS,k} = (A+B)\cdot\left(\frac{q_{II,k}}{1/\tan\alpha_1+1/\tan\alpha_2}-\frac{q_{\perp,k}\cdot\sin(90^\circ-\alpha_1)\cdot\sin\alpha_2}{\sin(\alpha_1+\alpha_2)}\right) \quad (7.13)$$

A positive value for $F_{ZS,k}$ means a load towards the rafter, a negative value a load away from the rafter. The system of the continuous beam is shown in Figure A.7.5.

The battens or wood-based panels fixed on the rafter shall be supported perpendicular to the load-bearing plane.

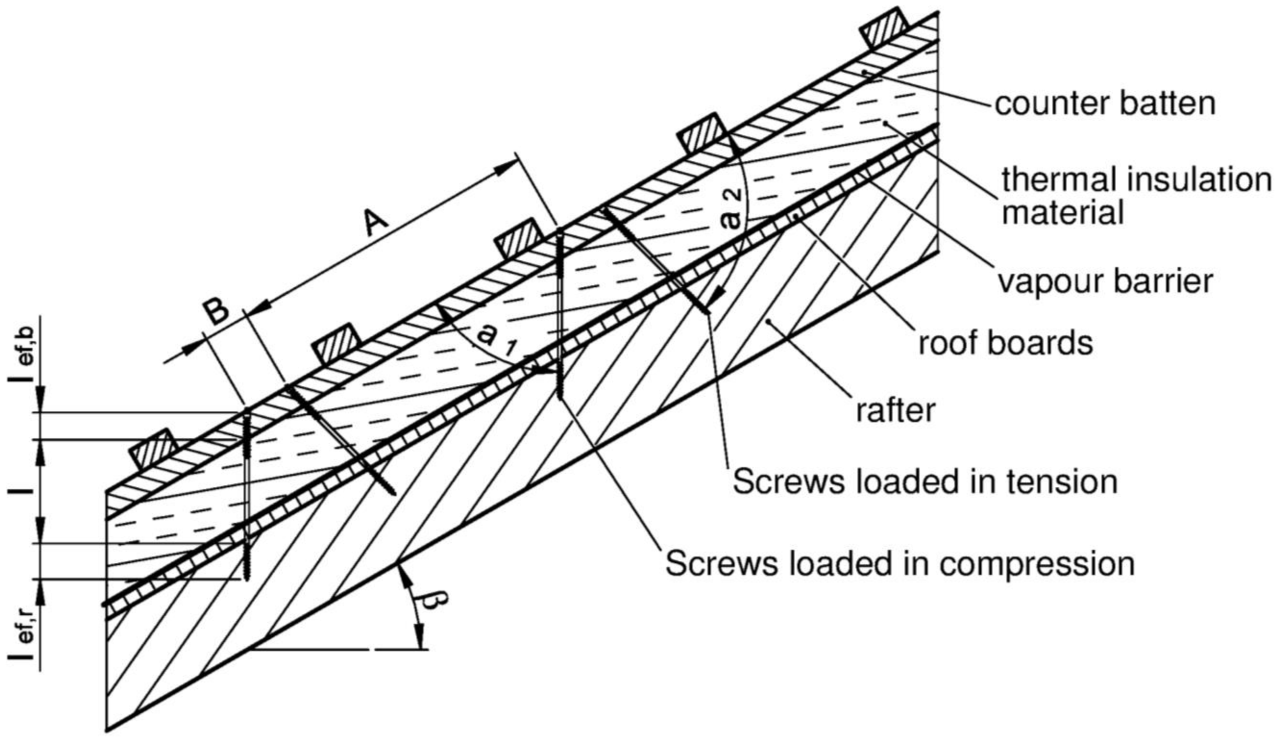


Figure A.7.4 Fastening of thermal insulation material on top of rafters - structural system for alternatively inclined screws

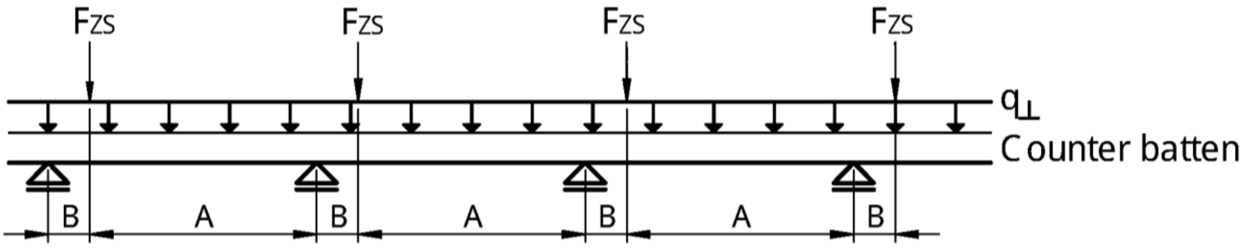


Figure A.7.5: Continuous batten under constant line loads from actions on the roof plane $q_{\perp}$ and concentrated loads from tensile screws F_{ZS}

A.7.3.2 Design of the screws

The design value of the load-carrying capacity of the screws shall be calculated according to equations (7.14) and (7.15).

Screws loaded in tension:

$$F_{ax,\alpha,Rd} = \min\left\{\frac{k_{ax} \cdot f_{ax,d} \cdot d \cdot l_{ef,b}}{k_{\beta}} \cdot \left(\frac{\rho_{b,k}}{350}\right)^{0.8}; \frac{k_{ax} \cdot f_{ax,d} \cdot d \cdot l_{ef,r}}{k_{\beta}} \cdot \left(\frac{\rho_{r,k}}{350}\right)^{0.8}; \frac{f_{tens,k}}{\gamma_{M2}}\right\} \quad (7.14)$$

Screws loaded in compression:

$$F_{ax,\alpha,Rd} = \min\left\{\frac{k_{ax} \cdot f_{ax,d} \cdot d \cdot l_{ef,b}}{k_\beta} \cdot \left(\frac{\rho_{b,k}}{350}\right)^{0.8}; \frac{k_{ax} \cdot f_{ax,d} \cdot d \cdot l_{ef,r}}{k_\beta} \cdot \left(\frac{\rho_{r,k}}{350}\right)^{0.8}; \frac{\kappa_c \cdot N_{pl,k}}{\gamma_{M1}}\right\} \quad (7.15)$$

where:

k_{ax}	Factor according to Annex A.2.3.2, taking into account the angle α between screw axis and grain direction
$f_{ax,d}$	design value of the axial withdrawal capacity of the threaded part of the screw [N/mm²]
d	outer thread diameter of the screw [mm]
$l_{ef,b}$	penetration length of the threaded part of the screw in the batten [mm]
$l_{ef,r}$	penetration length of the threaded part of the screw in the rafter, $l_{ef} \geq 40$ mm
k_β	Factor according to Annex A.2.3.2
$\rho_{b,k}$	characteristic density of the batten [kg/m³], for beech, ash and oak $\rho_k \leq 590$ kg/m³ and for LVL (softwood) $\rho_k \leq 500$ kg/m³
$\rho_{r,k}$	characteristic density of the rafter [kg/m³], for beech, ash and oak $\rho_k \leq 590$ kg/m³ and for LVL (softwood) $\rho_k \leq 500$ kg/m³
α	angle α_1 or α_2 between screw axis and grain direction, $30° \leq \alpha_1 \leq 90°$, $30° \leq \alpha_2 \leq 90°$
$f_{tens,k}$	characteristic tensile capacity of the screw according to Annex 2 [N]
γ_{M1}, γ_{M2}	partial factor according to EN 1993-1-1 in conjunction with the particular national Annex
$\kappa_c \cdot N_{pl,k}$	Buckling capacity of the screw according to table A.7.2 [N]

Table A.7.2 Characteristic load-carrying capacity of the screws $\kappa_c \cdot N_{pl,k}$ in kN

Free screw length l between batten and rafter [mm]	**ASSY plus VG**					**ASSY Isotop**
	Outer thread diameter d [mm]					
	6.0	**8.0**	**10.0**	**12.0**	**14.0**	**8.0/ 10.0**
	$\kappa_c \cdot N_{pl,k}$ **[kN]**					
≤ 100	1.12	3.26	8.24	13.30	21.8	10.1
120	0.85	2.48	6.37	10.40	17.4	8.30
140	0.66	1.95	5.06	8.32	14.1	6.84
160	0.53	1.57	4.10	6.78	11.6	5.70
180	0.43	1.17	3.39	5.63	9.61	4.79
200	-	1.08	2.86	4.74	8.14	4.08
220	-	0.91	2.43	4.05	6.96	3.51
240	-	0.78	2.09	3.50	6.03	3.04
260	-	0.68	1.81	3.05	5.25	2.67
280	-	0.59	1.60	2.68	4.65	2.35
300	-	0.53	1.40	2.37	4.11	2.10
320	-	0.47	1.25	2.10	3.67	1.88
340	-	0.42	1.12	1.90	3.30	1.69
360	-	0.37	1.01	1.71	2.98	1.53
380	-	0.34	0.92	1.55	2.70	1.45
400	-	0.31	0.83	1.42	2.46	1.26
420	-	0.28	0.77	1.30	2.25	1.16
440	-	0.26	0.70	1.18	2.06	1.06
460	-	0.24	0.65	1.10	1.91	0.99
480	-	0.22	0.59	1.01	1.77	0.91

ANNEX 8 Effective number of screws n_{ef} arranged under an angle 30° ≤ α ≤ 60° between the shear plane and the screw axis

Alternatively to clause A.2.3.2, the load-carrying capacity may be calculated using the effective number of fasteners n_{ef} for one row of n inclined screws or crossed screw couples in timber-to-timber or steel-to-timber single shear connections parallel to the load, where the screws are arranged under an angle 30° ≤ α ≤ 60° between the shear plane and the screw axis:

$$n_{ef} = \frac{1}{\max(\delta_1;\delta_2)} \tag{8.1}$$

Where:

$$\delta_1 = 1 - m_1 \cdot (1+\mu) + \mu + \frac{m_1 - m_2}{m_1^n - m_2^n} \cdot (m_1^n \cdot (1+\mu) - \mu) \tag{8.2}$$

$$\delta_2 = -\mu + m_1^{n-1} \cdot (1+\mu) - \frac{m_1^{n-1} - m_2^{n-1}}{m_1^n - m_2^n} \cdot (m_1^n \cdot (1+\mu) - \mu) \tag{8.3}$$

$$\mu = -\frac{1}{1 + \frac{E_1 A_1}{E_2 A_2}} \tag{8.4}$$

E_1A_1	Axial stiffness of side member 1
E_2A_2	Axial stiffness of side or middle member 2. If member 2 is a middle member, A_2 is only half of the member cross-section
E_1, E_2	Mean value of modulus of elasticity of member 1 and member 2
A_1, A_2	Cross-sectional area of member 1 and member 2
K_u	Slip modulus parallel to the shear plane per screw (inclined screws) or per screw couple (crossed screws) for the ultimate limit state
n	Number of inclined screws or crossed screw couples per row
m	Number of rows of inclined screws or crossed screw couples per shear plane

$$m_1 = 0.5 \cdot \left(\omega + \sqrt{\omega^2 - 4}\right) \tag{8.5}$$

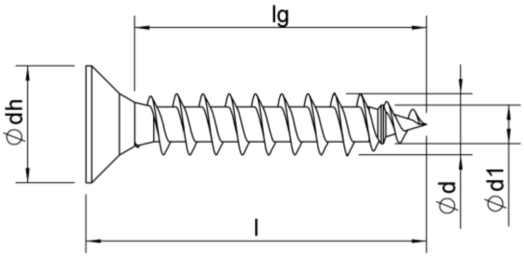
$$m_1 = 0.5 \cdot \left(\omega - \sqrt{\omega^2 - 4}\right) \tag{8.6}$$

$$\omega = 2 + K_u \cdot a_1 \left(\frac{m}{E_1 A_1} + \frac{m}{E_2 A_2}\right) \tag{8.7}$$

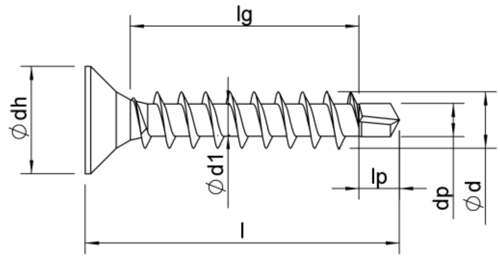
a_1 Screw spacing parallel to grain

Drawings, surface, adjustment

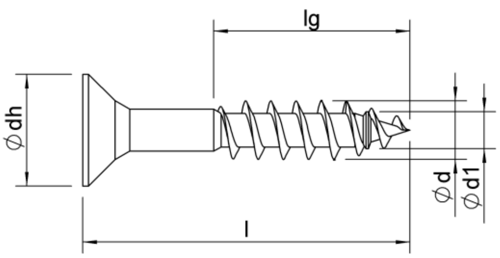
1) ASSY, AMO, JAMO (all kinds without ASSY plus VG and Isotop)



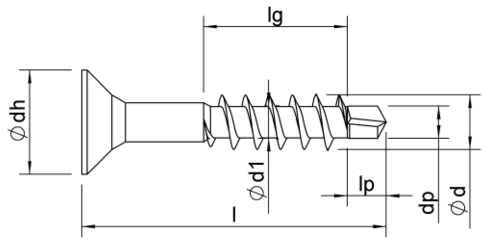
Full thread without drilling tip



Full thread with drilling tip



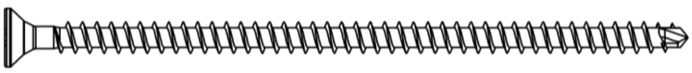
Partial thread without drilling tip



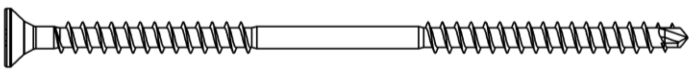
Partial thread with drilling

2) All ASSY, AMO and JAMO screws can be like on the drawing (I) or without thread in the middle of screw (II) or without thread below head (III) or in combination (IV). The thread can be manufactured to customer specific within 4 x d and lg max.

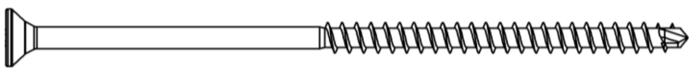
(I)



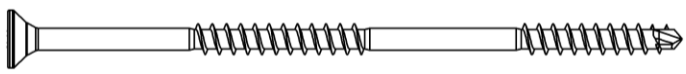
(II)



(III)



(IV)

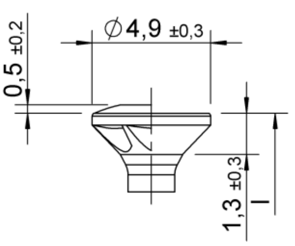


3) For the attachment of insulation materials, wood or other things on insulation materials, metal, wood or wooden materials in distance to the wood or wooden materials the screw is screwed into, at the use in dowels, the length and thread of screw can be extended arbitrarily up to the maximum thread and screw length given in the following annexes.

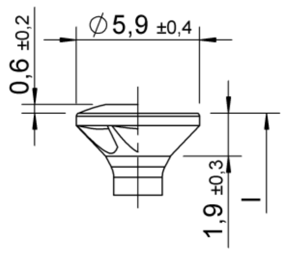
Possible surface coatings: blank; brass-plated; nickel-plated; browned; zinc plated; zinc plated blue passivated, yellow chromated, black chromated; zinc-nickel plated, zinc-nickel plated passivated; zinc flakes; ruspert; completly or partially painted, hot tip galvanized; aluminium coating; phosphated; HCP coated, delta coated - surface coatings can be combined together. The minimum thickness of the zinc coating of the screws is 5 µm and of the zinc-nickel coating 4 µm.

WÜRTH self-tapping screws	Annex 9.1
Drawings of ASSY, JAMO and AMO screws	

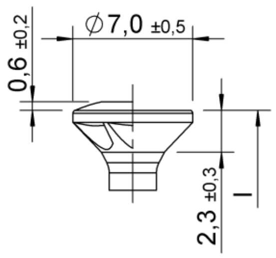
Head types for d = 3.0 mm and d = 3.4 mm, all materials



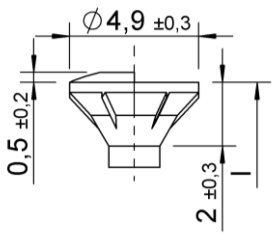
Piano hinge head – design with and without raise, with and without milling pockets



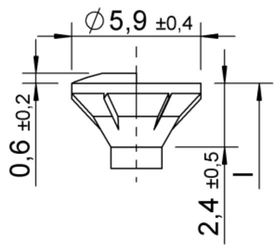
Countersunk head – design with and without raise, with and without milling pockets



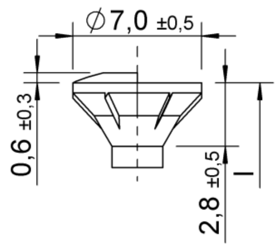
Countersunk head – design with and without raise, with and without milling pockets



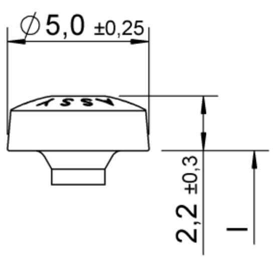
Countersunk head with cutter ribs – design with and without raise



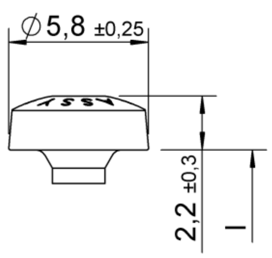
Countersunk head with cutter ribs – design with and without raise



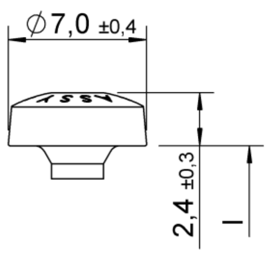
Countersunk head with cutter ribs – design with and without raise



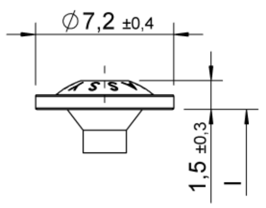
Pan head



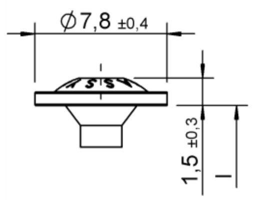
Pan head



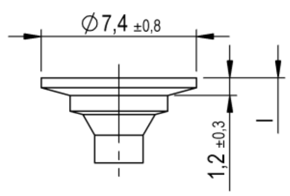
Pan head



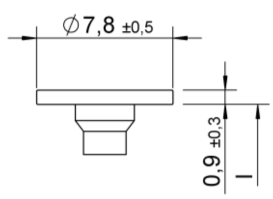
Back panel screw head



Back panel screw head



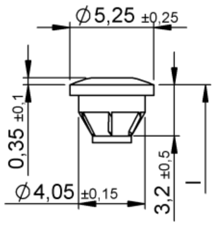
Large washer head II – design with and without cutter ribs



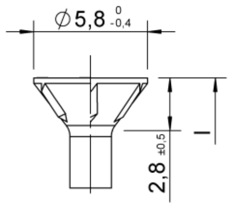
Large washer head III – design with and without cutter ribs

WÜRTH self-tapping screws	Annex 9.2
ASSY, ASSY plus, Jamo, Jamo plus - d = 3.0 mm and d = 3.4 mm	

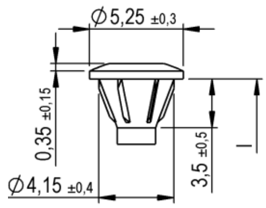
Head types d = 3.0 mm and d = 3.4 mm, all materials



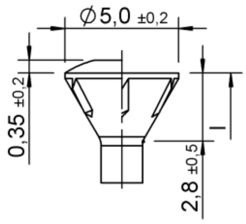
Top head –
design with and without
raise



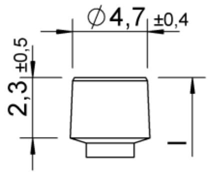
Countersunk head 75°–
design with and without
raise, with and without
milling ribs or raise



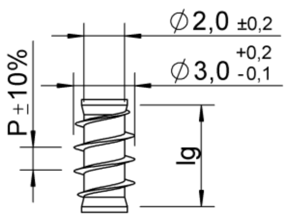
Top head II –
design with and without
raise



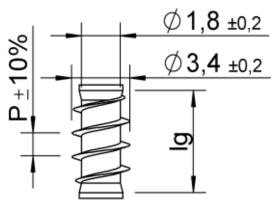
Woodwork head –
design with and without
raise



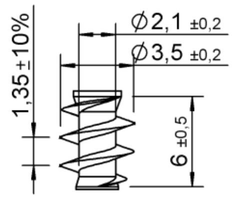
Cylinder head



Underhead thread -
Lg2 < 4 x d
p = 1.35, 1.9, 2.7



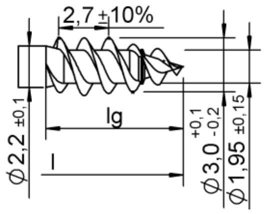
Underhead thread -
Lg2 < 4 x d
p = 1.35, 1.8, 1.9, 2.7



Underhead thread
type P

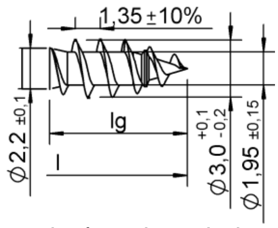
WÜRTH self-tapping screws	Annex 9.3
ASSY, ASSY plus, Jamo, Jamo plus - d = 3.0 mm and d = 3.4 mm	

Thread types d = 3.0 mm, carbon steel



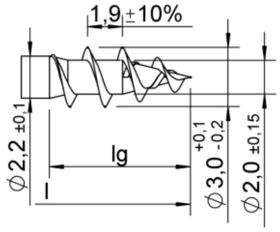
double – threaded

Design with and without ring respectively mating thread



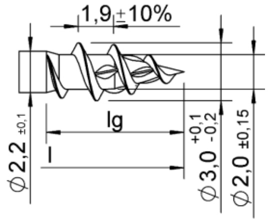
single – threaded

Design with and without ring respectively mating thread



coarse thread I

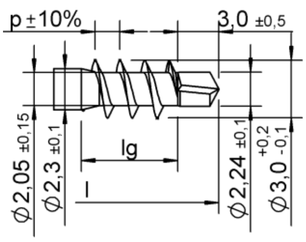
Design with and without ring respectively mating thread



coarse thread II

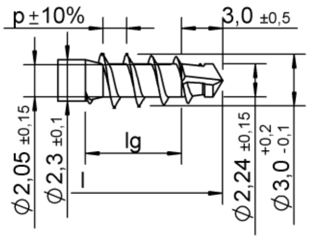
Design with and without pre cut. Pre cut can be tilt, too

Ring, mating thread, pre cut and crossing cut can be combined with double or single threaded or coarse thread



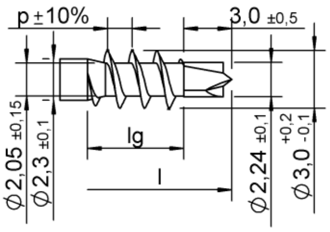
plus

Design with p = 1.35 and 1.9



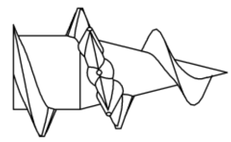
plus special

Design with p = 1.35 and 1.9



plus 3.0

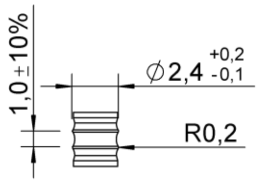
Design with p = 1.35 and 1.9



Crossing cut

Design: Same height like flange or higher;
1-10 pieces, can be placed all over the thread

Rings on the shank for d = 3.0 mm, carbon steel



Rings on the shank can also be formed as a thread.
Rings or thread with the same shape can be all over the shank or only on parts of it.

All dimensions in mm.

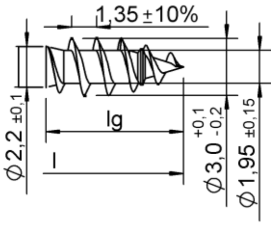
Lengths for d = 3.0 mm, carbon steel

l +1.0 -2.0	lg +1.0 -2.0
13	12
…	…
50	49

Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max.

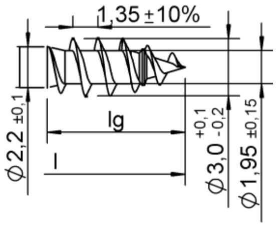
All dimensions in mm.

Thread types d = 3.0 mm, stainless steel



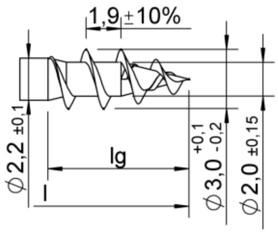
single – threaded

Design with and without ring respectively mating thread



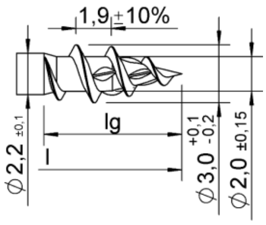
single – threaded

Design with and without ring respectively mating thread



coarse thread I

Design with and without ring respectively mating thread



coarse thread II

Design with and without pre cut. Pre cut can be tilt, too

Ring, mating thread, pre cut and crossing cut can be combined with double or single threaded or coarse thread

Lengths for d = 3.0 mm, stainless steel

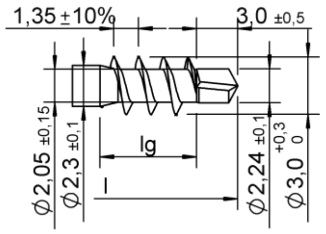
l +1.0 -2.0	lg +1.0 -2.0
13	12
…	…
50	49

Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max.

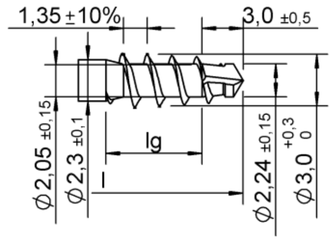
All dimensions in mm.

WÜRTH self-tapping screws	Annex 9.5
ASSY, ASSY plus, Jamo, Jamo plus - d = 3.0 mm and d = 3.4 mm, stainless steel	

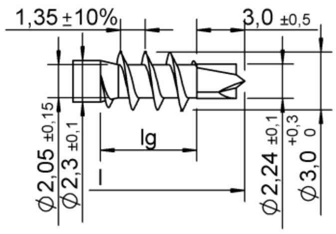
Thread types plus d = 3.0 mm, stainless steel



plus

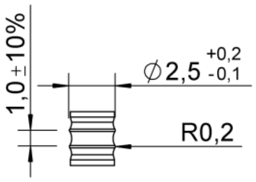


plus special



plus 3.0

Rings on the shank for plus d = 3.0 mm, stainless steel



Rings on the shank can also be formed as a thread.
Rings or thread with the same shape can be all over the shank or only on parts of it.

All dimensions in mm.

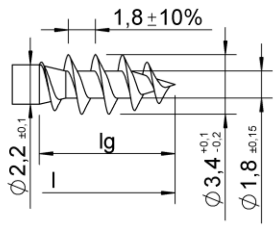
Lengths for d = 3.0 mm, stainless steel

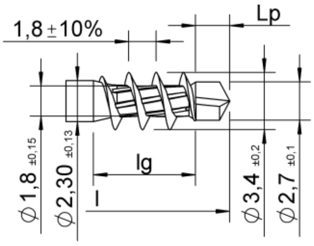
l +1.0 -2.0	lg +1.0 -2.0
16	12
…	…
50	46

Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max.

All dimensions in mm.

Thread types d = 3.4 mm, all materials

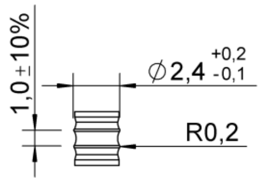




MDF

plus MDF – design with and without cutter ribs

Rings on the shank for d = 3.4 mm, all materials



Rings on the shank can also be formed as a thread.
Rings or thread with the same shape can be all over the shank or only on parts of it.

All dimensions in mm.

Lengths for d = 3.4 mm, all materials

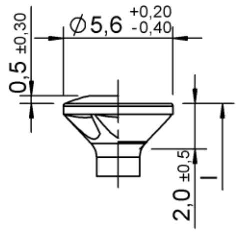
l +1.0 -2.0	lg +1.0 -2.0
16	12
…	…
60	46

Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max.

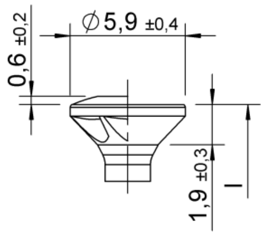
All dimensions in mm.

WÜRTH self-tapping screws	Annex 9.7
ASSY, ASSY plus, Jamo, Jamo plus - d = 3.0 mm and d = 3.4 mm	

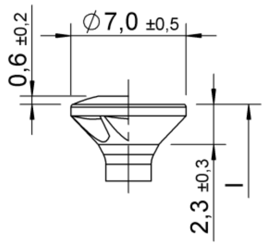
Head types for d = 3.5 mm and d = 3.9 mm, all materials



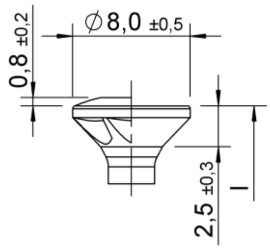
Countersunk head – design with and without raise, with and without milling pockets



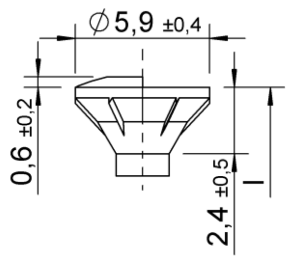
Countersunk head – design with and without raise, with and without milling pockets



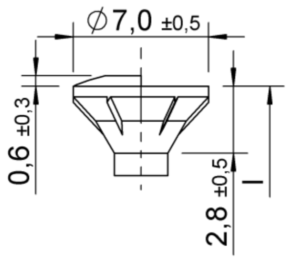
Countersunk head – design with and without raise, with and without milling pockets



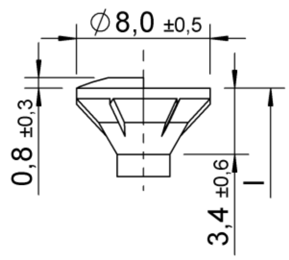
Countersunk head – design with and without raise, with and without milling pockets



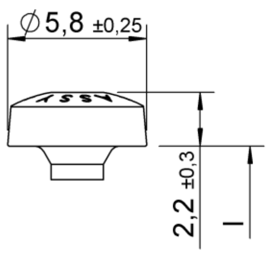
Countersunk head with cutter ribs – design with and without raise



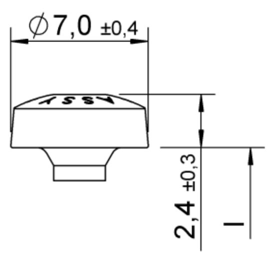
Countersunk head with cutter ribs – design with and without raise



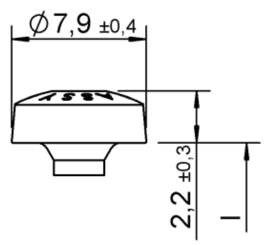
Countersunk head with cutter ribs – design with and without raise



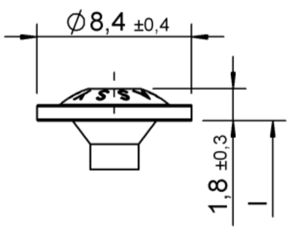
Pan Head



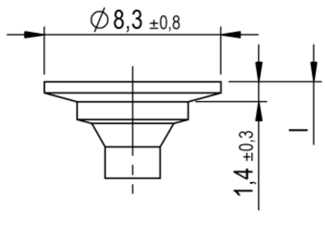
Pan Head



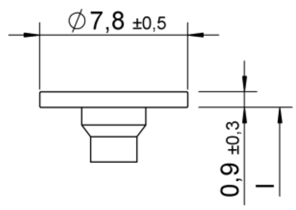
Pan Head



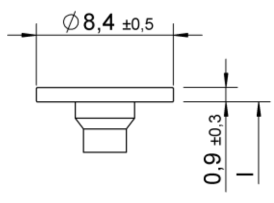
Back panel screw head



Large washer head II – design with and without cutter ribs



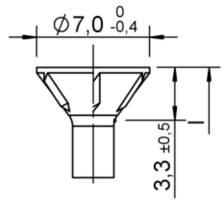
Large washer head III – design with and without cutter ribs



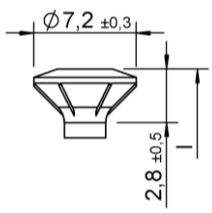
Large washer head III – design with and without cutter ribs

WÜRTH self-tapping screws	Annex 9.8
ASSY, ASSY plus, Jamo, Jamo plus - d = 3.5 mm and d = 3.9 mm	

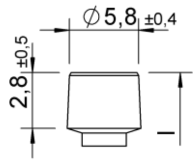
Head types for d = 3.5 mm and d = 3.9 mm, all materials



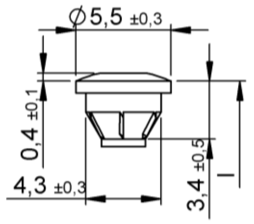
Countersunk head 75°– design with and without raise, with and without milling ribs or raise



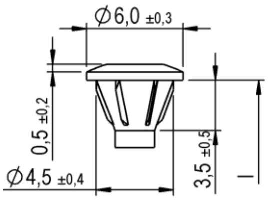
FBS-head



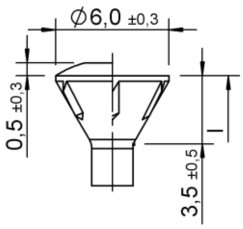
Cylinder head



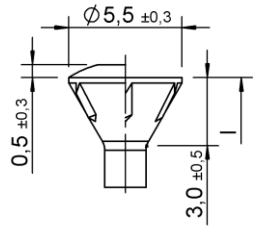
Top head – design with and without raise



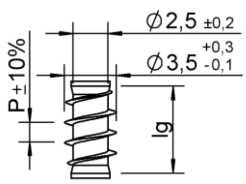
Top head II – design with and without raise



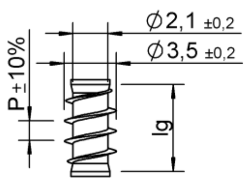
Woodwork head – design with and without raise



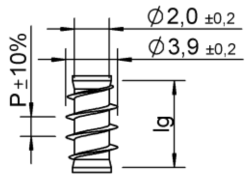
Woodwork head – design with and without raise



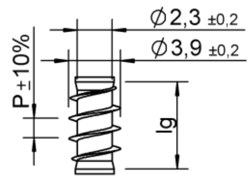
Underhead thread
Lg2 < 4 x d,
P= 1.6



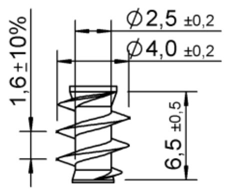
Underhead thread
Lg2 < 4 x d,
P= 1.6, 2.2, 3.2



Underhead thread
Lg2 < 4 x d,
P= 1.6, 2.0, 2.2, 3.2



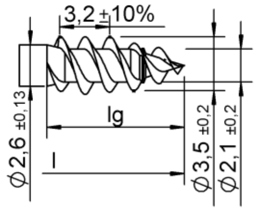
Underhead thread
Lg2 < 4 x d,
P= 1.6, 2.0



Underhead thread type P

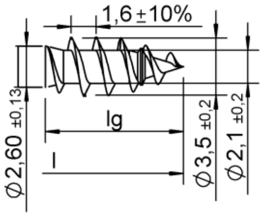
WÜRTH self-tapping screws	Annex 9.9
ASSY, ASSY plus, Jamo, Jamo plus - d = 3.5 mm and d = 3.9 mm	

Thread types d = 3.5 mm, carbon steel



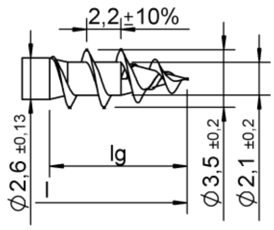
double – threaded

Design with and without ring respectively mating thread



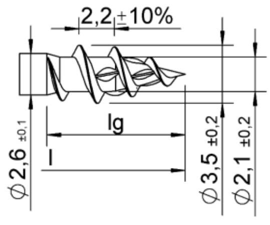
single – threaded

Design with and without ring respectively mating thread



coarse thread I

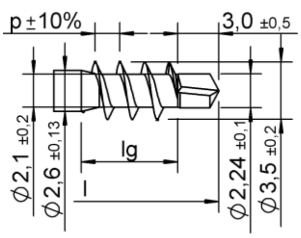
Design with and without ring respectively mating thread



coarse thread II

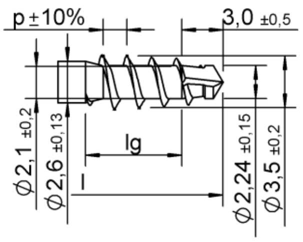
Design with and without pre cut. Pre cut can be tilt, too

Ring, mating thread, pre cut, cut and crossing cut can be combined with double or single threaded or coarse thread



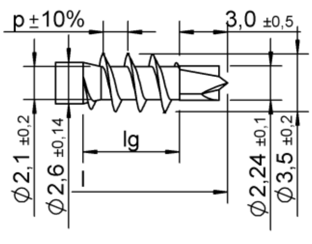
plus

Design with p = 1.35 and 1.9



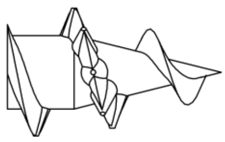
plus special

Design with p = 1.35 and 1.9



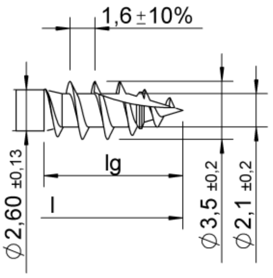
plus 3.0

Design with p = 1.35 and 1.9



crossing cut

Design: Same height like flange or higher;
1-10 pieces, can be placed all over the thread

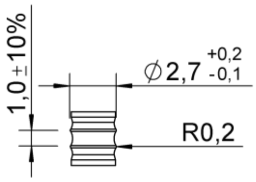


cut

Design with and without ring respectively mating thread

WÜRTH self-tapping screws	Annex 9.10
ASSY, ASSY plus, Jamo, Jamo plus - d = 3.5 mm and d = 3.9 mm, carbon steel	

Rings on the shank for d = 3.5 mm, carbon steel



Rings on the shank can also be formed as a thread.
Rings or thread with the same shape can be all over the shank or only on parts of it.

All dimensions in mm.

Lengths for d = 3.5 mm, carbon steel

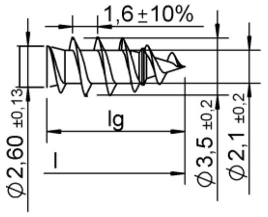
l +1.0 -2.0	lg +1.0 -2.0
16	14
…	…
50	48

Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max.

All dimensions in mm.

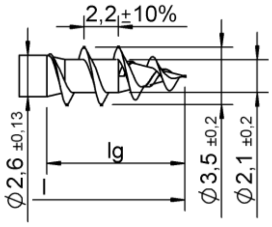
WÜRTH self-tapping screws	Annex 9.11
ASSY, ASSY plus, Jamo, Jamo plus - d = 3.5 mm and d = 3.9 mm, carbon steel	

Thread types d = 3.5 mm, stainless steel



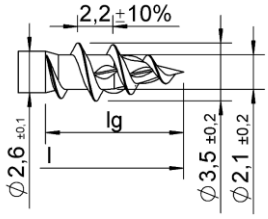
single – threaded

Design with and without ring respectively mating thread



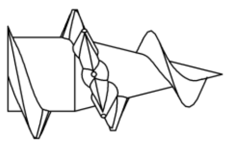
coarse thread I

Design with and without ring respectively mating thread



coarse thread II

Design with and without pre cut. Pre cut can be tilt, too

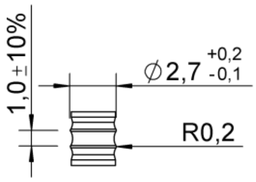


crossing cut

Design: Same height like flange or higher;
1-10 pieces, can be placed all over the thread

Ring, mating thread, pre cut and crossing cut can be combined with double or single threaded or coarse thread

Rings on the shank for d = 3.5 mm, stainless steel



Rings on the shank can also be formed as a thread.
Rings or thread with the same shape can be all over the shank or only on parts of it.

All dimensions in mm.

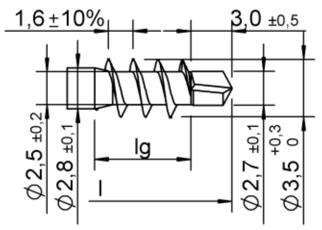
Lengths for d = 3.5 mm, stainless steel

l +1.0 -2.0	lg +1.0 -2.0
16	14
…	…
50	48

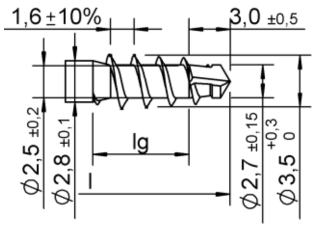
Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max. All dimensions in mm.

WÜRTH self-tapping screws	Annex 9.12
ASSY, ASSY plus, Jamo, Jamo plus - d = 3.5 mm and d = 3.9 mm, stainless steel	

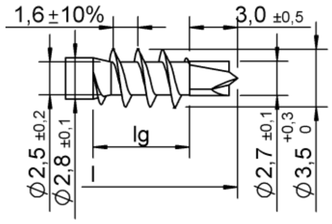
Thread types plus d = 3.5 mm, stainless steel



plus

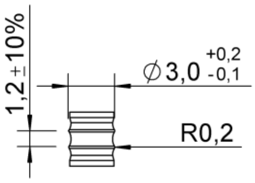


plus special



plus 3.0

Rings on the shank for plus d = 3.5 mm, stainless steel



Rings on the shank can also be formed as a thread.
Rings or thread with the same shape can be all over the shank or only on parts of it.

All dimensions in mm.

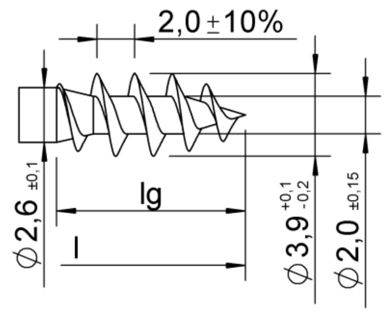
Lengths for plus d = 3.5 mm, stainless steel

l +1.0 -2.0	lg +1.0 -2.0
19	14
…	…
60	45

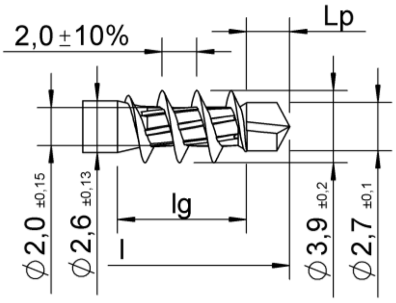
Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max.

All dimensions in mm.

Thread types d = 3.9 mm, all materials

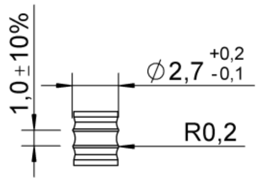


MDF



plus MDF – design with and without cutter ribs

Rings on the shank for d = 3.9 mm, all materials



Rings on the shank can also be formed as a thread.
Rings or thread with the same shape can be all over the shank or only on parts of it.

All dimensions in mm.

Lengths for d = 3.9 mm, all materials

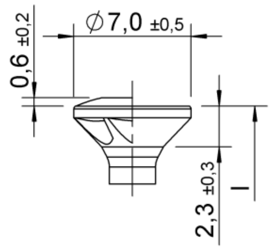
l +1.0 -2.0	lg +1.0 -2.0
16	12
…	…
60	46

Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max.

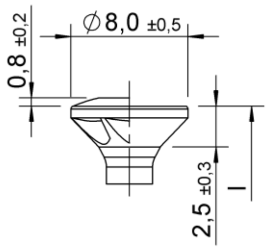
All dimensions in mm.

WÜRTH self-tapping screws	Annex 9.14
ASSY, ASSY plus, Jamo, Jamo plus - d = 3.5 mm and d = 3.9 mm	

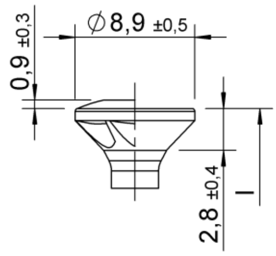
Head types for d = 4.0 mm and d = 4,4 mm, all materials



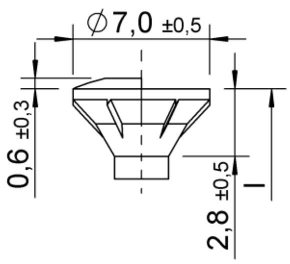
Countersunk head – design with and without raise, with and without milling pockets



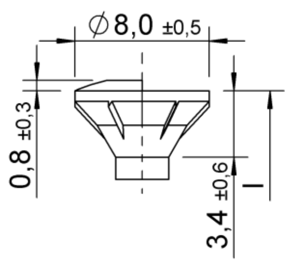
Countersunk head – design with and without raise, with and without milling pockets



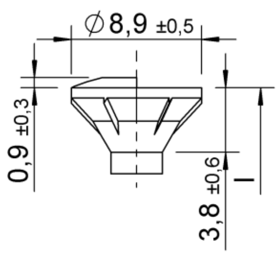
Countersunk head – design with and without raise, with and without milling pockets



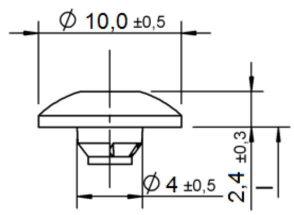
Countersunk head with cutter ribs – design with and without raise



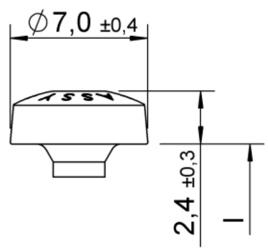
Countersunk head with cutter ribs – design with and without raise



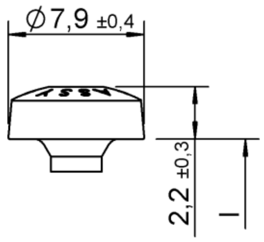
Countersunk head with cutter ribs – design with and without raise



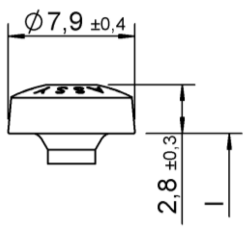
Truss head – design with and without cutter ribs and with and without flange



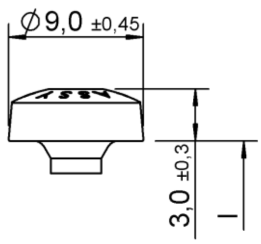
Pan Head



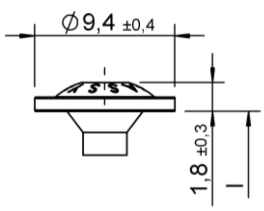
Pan Head



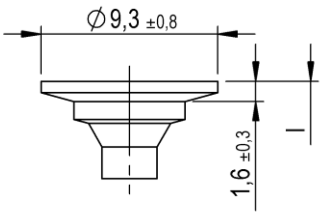
Pan Head



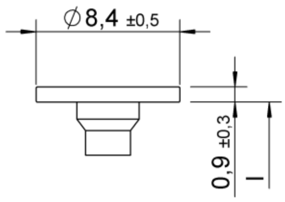
Pan Head



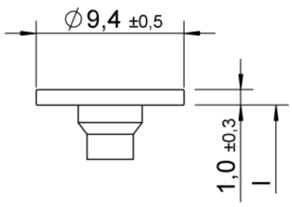
Back panel screw head



Large washer head II – design with and without cutter ribs



Large washer head III – design with and without cutter ribs



Large washer head III – design with and without cutter ribs

WÜRTH self-tapping screws	Annex 9.15
ASSY, ASSY plus, Jamo, Jamo plus - d = 4.0 mm and d = 4.4 mm	

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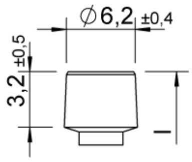
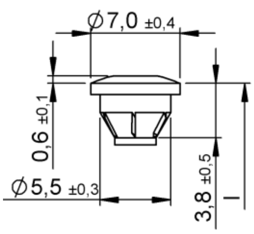
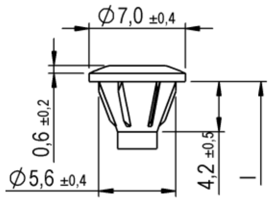
Head types for d = 4.0 mm and d = 4,4 mm, all materials



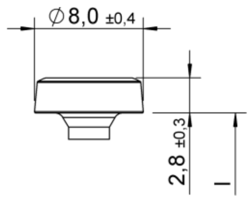
Cylinder head



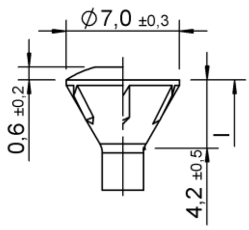
Top head –
design with and without
raise



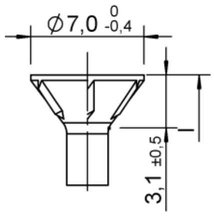
Top head II –
design with and without
raise



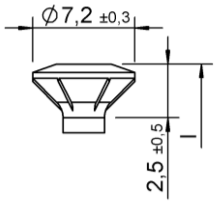
Elmo head



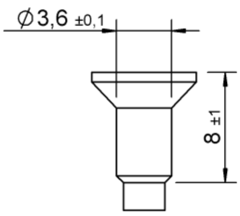
Woodwork head –
design with and without
raise



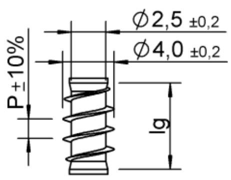
Countersunk head 75°–
design with and without
raise and with and without
milling pockets



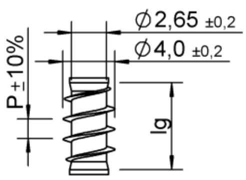
FBS-head



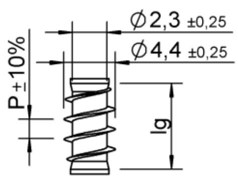
Alternatively at
countersunk heads:
modification of the shank
at drilled head



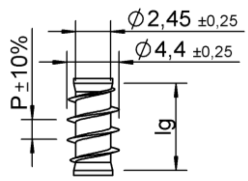
Underhead thread
Lg2 < 4 x d,
P= 1.8, 2.6, 3.6



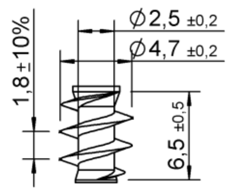
Underhead thread
Lg2 < 4 x d,
P= 1.8



Underhead thread
Lg2 < 4 x d,
P= 1.8, 2.2, 2.6, 3.6



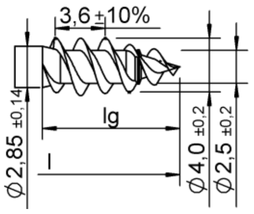
Underhead thread
Lg2 < 4 x d,
P= 1.8, 2.2



Underhead thread –
Type P

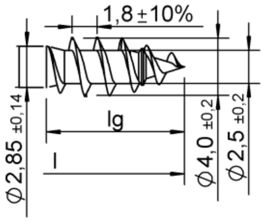
WÜRTH self-tapping screws	Annex 9.16
ASSY, ASSY plus, Jamo, Jamo plus - d = 4.0 mm and d = 4.4 mm	

Thread types d = 4.0 mm, carbon steel



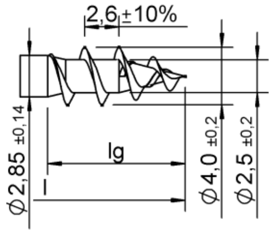
double – threaded

Design with and without ring respectively mating thread



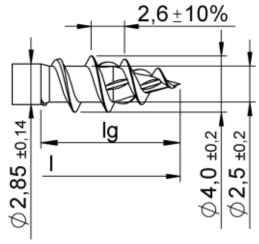
single – threaded

Design with and without ring respectively mating thread



coarse thread I

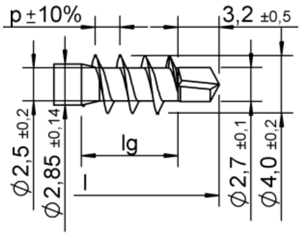
Design with and without ring respectively mating thread



coarse thread II

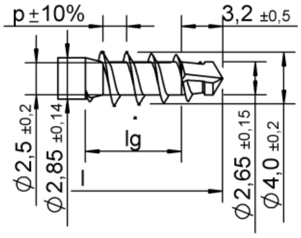
Design with and without pre cut. Pre cut can be tilt, too

Ring, mating thread, pre cut, cut and crossing cut can be combined with double or single threaded or coarse thread



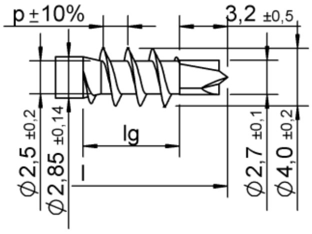
plus

Design with p = 1.35 and 1.9



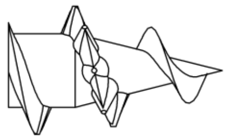
plus special

Design with p = 1.35 and 1.9



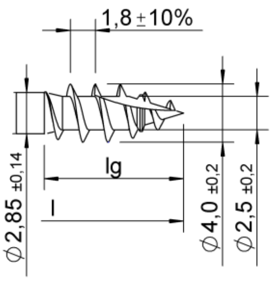
plus 3.0

Design with p = 1.35 and 1.9



crossing cut

Design: Same height like flange or higher; 1-10 pieces, can be placed all over the thread

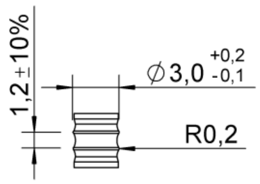


cut

Design with and without ring respectively mating thread

WÜRTH self-tapping screws	Annex 9.17
ASSY, ASSY plus, Jamo, Jamo plus - d = 4.0 mm and d = 4.4 mm, carbon steel	

Rings on the shank for d = 4.0 mm, carbon steel



Rings on the shank can also be formed as a thread.
Rings or thread with the same shape can be all over the shank or only on parts of it.

All dimensions in mm.

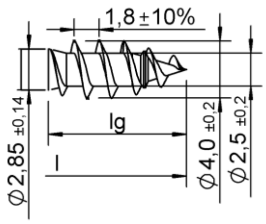
Lengths for d = 4.0 mm, carbon steel

l +1.0 -2.0	lg +1.0 -2.0
18	16
…	…
70	68

Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max.

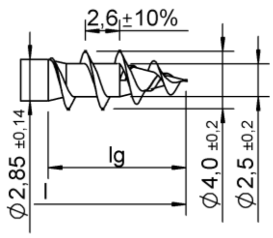
All dimensions in mm.

Thread types d = 4.0 mm, stainless steel



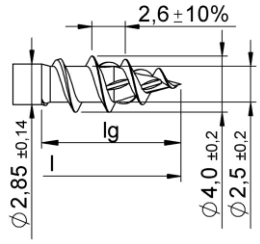
single – threaded

Design with and without ring respectively mating thread



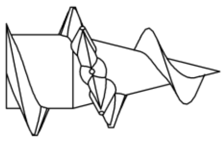
coarse thread I

Design with and without ring respectively mating thread



coarse thread II

Design with and without pre cut. Pre cut can be tilt, too

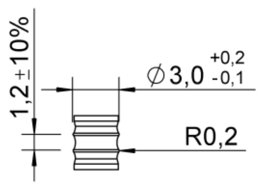


crossing cut

Design: Same height like flange or higher;
1-10 pieces, can be placed all over the thread

Ring, mating thread, pre cut and crossing cut can be combined with double or single threaded or coarse thread

Rings on the shank for d = 4.0 mm, for the above threads



Rings on the shank can also be formed as a thread.
Rings or thread with the same shape can be all over the shank or only on parts of it.

All dimensions in mm.

Lengths for d = 4.0 mm, for the above threads

l +1.0 -2.0	lg +1.0 -2.0
18	16
…	…
70	55

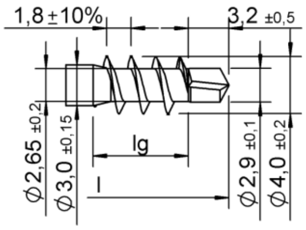
Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max. All dimensions in mm.

WÜRTH self-tapping screws

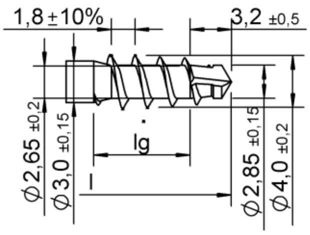
ASSY, ASSY plus, Jamo, Jamo plus - d = 4.0 mm and d = 4.4 mm, stainless steel

Annex 9.19

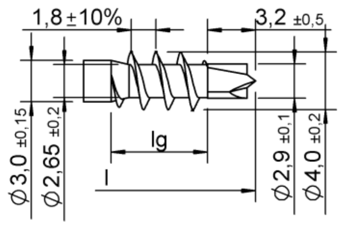
Thread types plus d = 4.0 mm, stainless steel



plus

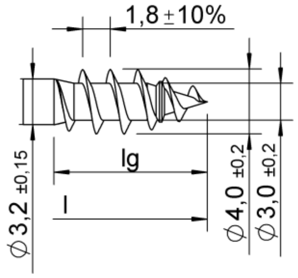


plus special



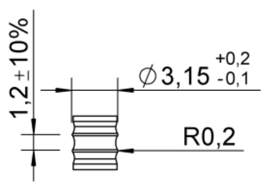
plus 3.0

Thread type hard wood d = 4.0 mm, stainless steel



Hard wood screw

Rings on the shank for d = 4.0 mm, stainless steel, for the above threads



Rings on the shank can also be formed as a thread.
Rings or thread with the same shape can be all over the shank or only on parts of it.

All dimensions in mm.

Lengths for d = 4.0 mm, stainless steel, for the above threads

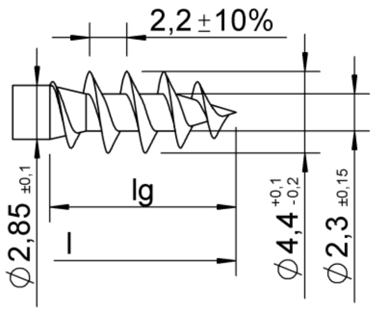
l +1.0 -2.0	lg +1.0 -2.0
23	16
…	…
70	64

Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max.

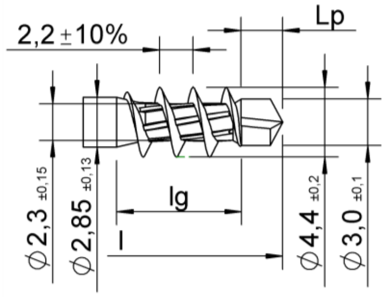
All dimensions in mm.

WÜRTH self-tapping screws	Annex 9.20
ASSY, ASSY plus, Jamo, Jamo plus - d = 4.0 mm and d = 4.4 mm, stainless steel	

Thread types d = 4,4 mm, all materials

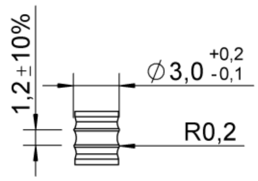


MDF



plus MDF – design with and without cutter ribs

Rings on the shank for d = 4,4 mm, all materials



Rings on the shank can also be formed as a thread.
Rings or thread with the same shape can be all over the shank or only on parts of it.

All dimensions in mm.

Lengths for d = 4.4 mm, all materials

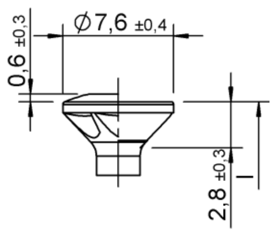
l +1.0 -2.0	lg +1.0 -2.0
16	14
…	…
80	66

Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max.

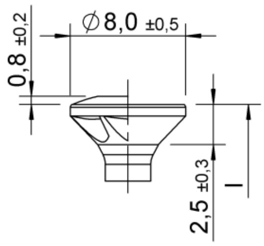
All dimensions in mm.

WÜRTH self-tapping screws	Annex 9.21
ASSY, ASSY plus, Jamo, Jamo plus - d = 4.0 mm and d = 4.4 mm	

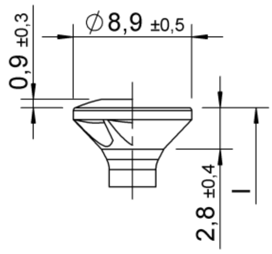
Head types for d = 4.5 mm, all materials



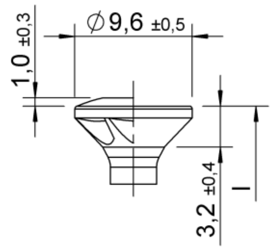
Countersunk head – design with and without raise, with and without milling pockets



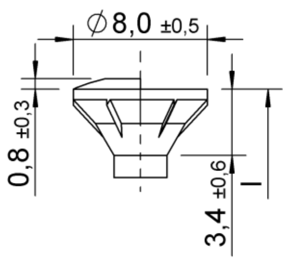
Countersunk head – design with and without raise, with and without milling pockets



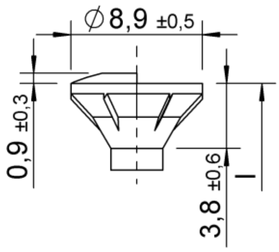
Countersunk head – design with and without raise, with and without milling pockets



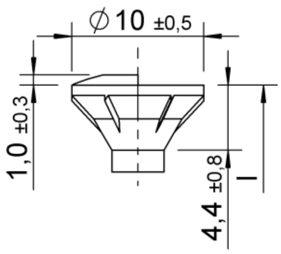
Countersunk head – design with and without raise, with and without milling pockets



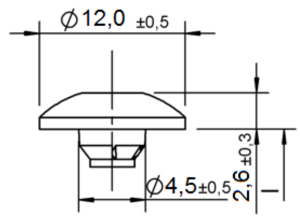
Countersunk head with cutter ribs – design with and without raise



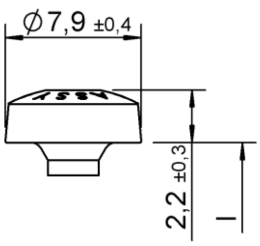
Countersunk head with cutter ribs – design with and without raise



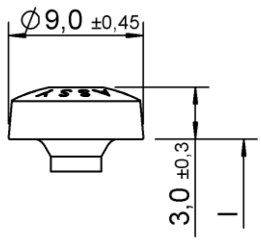
Countersunk head with cutter ribs – design with and without raise



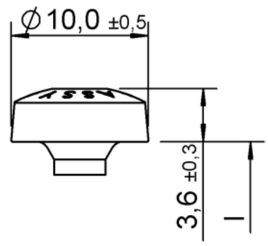
Truss head – design with and without cutter ribs and with and without flange



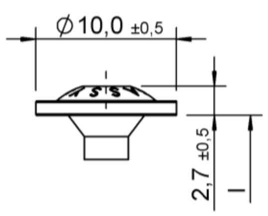
Pan Head



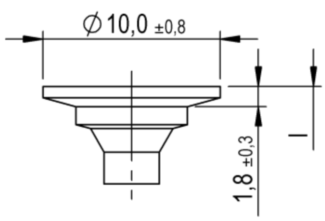
Pan Head



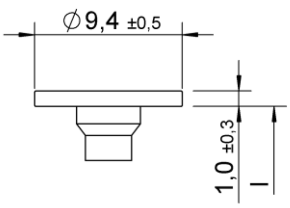
Pan Head



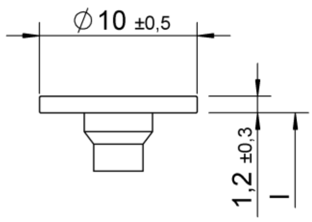
Back panel screw head



Large washer head II – design with and without cutter ribs



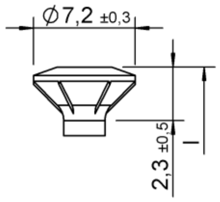
Large washer head III – design with and without cutter ribs



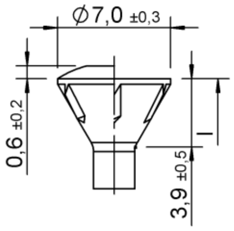
Large washer head III – design with and without cutter ribs

WÜRTH self-tapping screws	Annex 9.22
ASSY, ASSY plus, Jamo, Jamo plus - d = 4.0 mm and d = 4.4 mm	

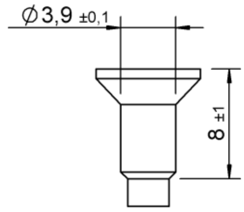
Head types for d = 4.5 mm, all materials



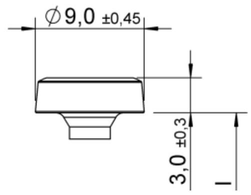
FBS-head



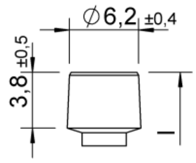
60° Woodwork head – design with and without raise



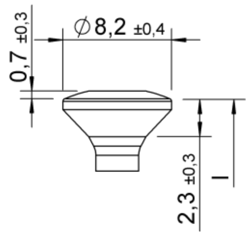
Alternatively at countersunk heads: modification of the shank at drilled head



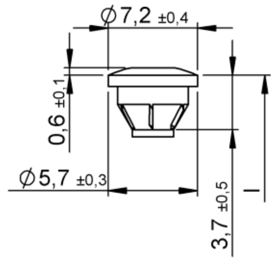
Elmo head



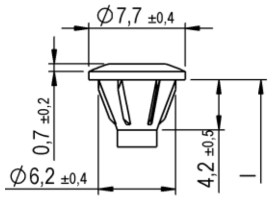
Cylinder head



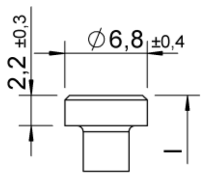
Tinner head design with and without raise



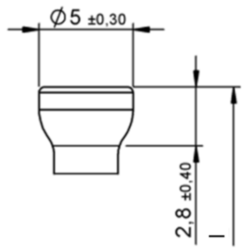
Top head – design with and without raise



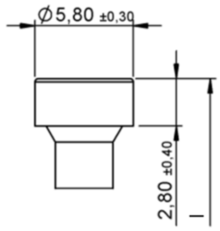
Top head II – design with and without raise



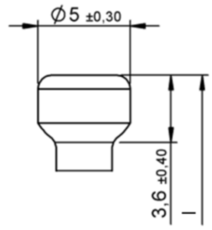
Cylinder head



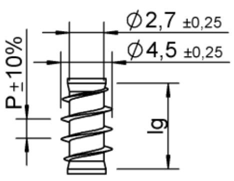
Tulip head



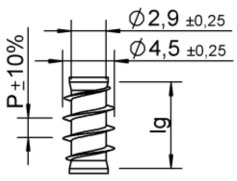
Cylinder head



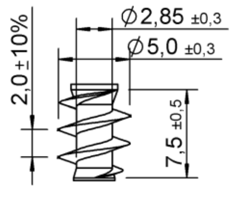
Small cylinder head



Underhead thread
lg2 < 4 x d,
P= 2.0, 2.8, 4.0



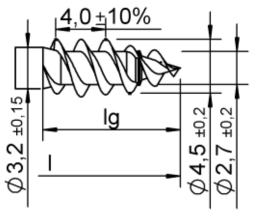
Underhead thread
lg2 < 4 x d,
P= 2.0



Underhead thread – Type P

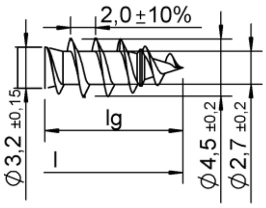
WÜRTH self-tapping screws	Annex 9.23
ASSY, ASSY plus, Jamo, Jamo plus - d = 4.5 mm	

Thread types d = 4.5 mm, carbon steel



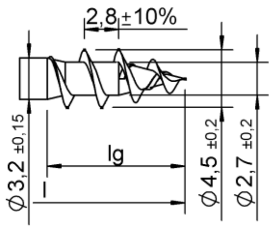
double – threaded

Design with and without ring respectively mating thread



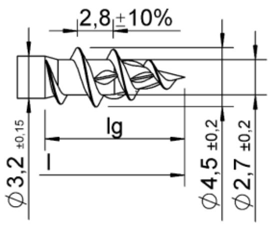
single – threaded

Design with and without ring respectively mating thread



coarse thread I

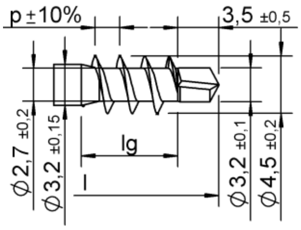
Design with and without ring respectively mating thread



coarse thread II

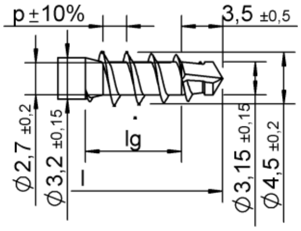
Design with and without pre cut. Pre cut can be tilt, too

Ring, mating thread, pre cut, Cut and crossing cut can be combined with double or single threaded or coarse thread



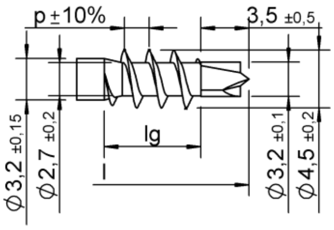
plus

Design with p = 1.35 and 1.9



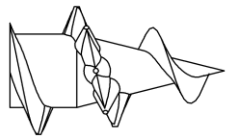
plus special

Design with p = 1.35 and 1.9



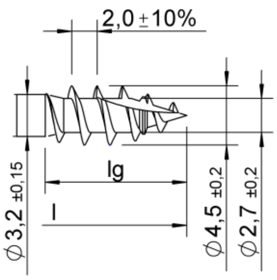
plus 3.0

Design with p = 1.35 and 1.9



crossing cut

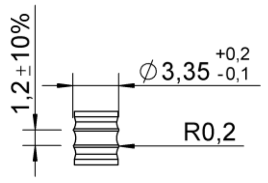
Design: Same height like flange or higher;
1-10 pieces, can be placed all over the thread



cut
Design with and without ring respectively mating thread

WÜRTH self-tapping screws	Annex 9.24
ASSY, ASSY plus, Jamo, Jamo plus - d = 4.5 mm, carbon steel	

Rings on the shank for d = 4.5 mm, carbon steel



Rings on the shank can also be formed as a thread.
Rings or thread with the same shape can be all over the shank or only on parts of it.

All dimensions in mm.

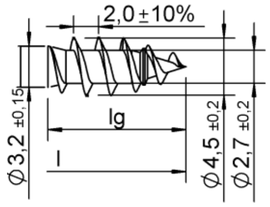
Lengths for d = 4.5 mm, carbon steel

l +1.0 -2.0	lg +1.0 -2.0
20	18
…	…
100	78

Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max.

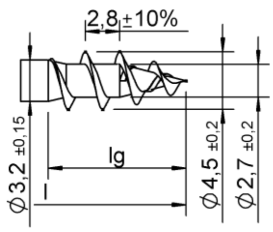
All dimensions in mm.

Thread types d = 4.5 mm, stainless steel



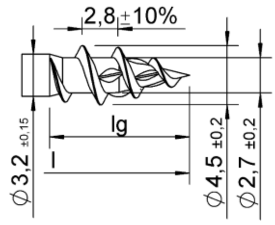
single – threaded

Design with and without ring respectively mating thread



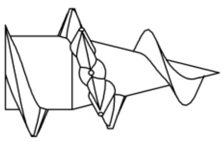
coarse thread I

Design with and without ring respectively mating thread



coarse thread II

Design with and without pre cut. Pre cut can be tilt, too

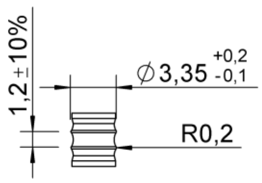


crossing cut

Design: Same height like flange or higher;
1-10 pieces, can be placed all over the thread

Ring, mating thread, pre cut and crossing cut can be combined with double or single threaded or coarse thread

Rings on the shank for d = 4.5 mm, stainless steel, for the above threads



Rings on the shank can also be formed as a thread.
Rings or thread with the same shape can be all over the shank or only on parts of it.

All dimensions in mm.

Lengths for d = 4.5 mm, stainless steel

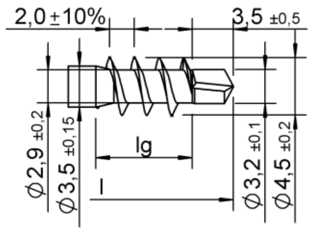
l +1.0 -2.0	lg +1.0 -2.0
20	18
…	…
80 (140*)	78

*see Drawings, surface, adjustment point 3)

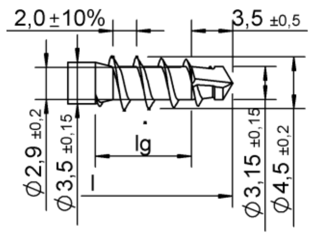
Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max. All dimensions in mm.

WÜRTH self-tapping screws	Annex 9.26
ASSY, ASSY plus, Jamo, Jamo plus - d = 4.5 mm, stainless steel	

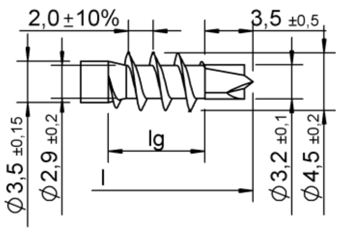
Thread types plus d = 4.5 mm, stainless steel



plus

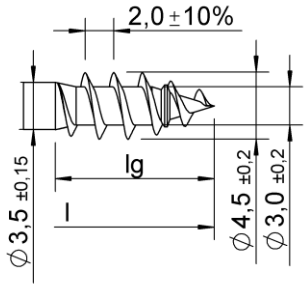


plus special



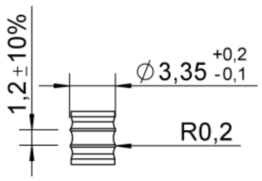
plus 3.0

Thread type hard wood/tinner d = 4.5 mm, stainless steel



Hard wood/tinner

Rings on the shank for d = 4.5 mm, stainless steel, for the above threads



Rings on the shank can also be formed as a thread.
Rings or thread with the same shape can be all over the shank or only on parts of it.

All dimensions in mm.

Lengths for d = 4.5 mm, stainless steel, for the above threads

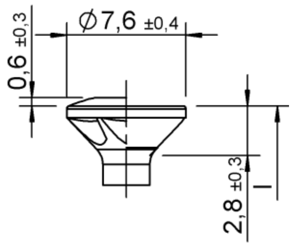
l +1.0 -2.0	lg +1.0 -2.0
23	18
…	…
80	79

Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max.

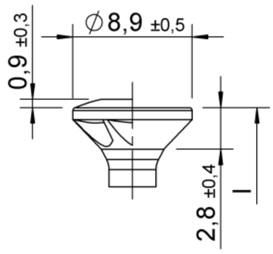
All dimensions in mm.

WÜRTH self-tapping screws	Annex 9.27
ASSY, ASSY plus, Jamo, Jamo plus - d = 4.5 mm, stainless steel	

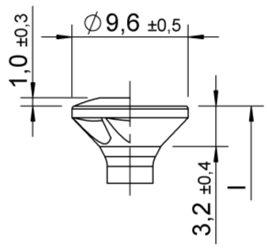
Head types for d = 5.0 mm and d = 5.5 mm, all materials



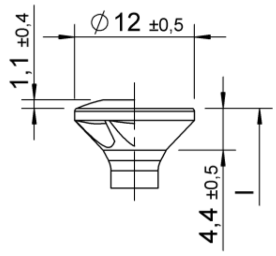
Countersunk head – design with and without raise, with and without milling pockets



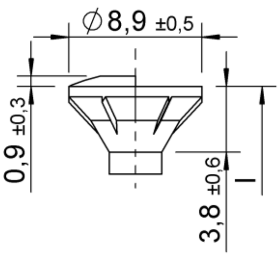
Countersunk head – design with and without raise, with and without milling pockets



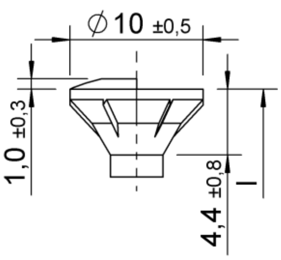
Countersunk head – design with and without raise, with and without milling pockets



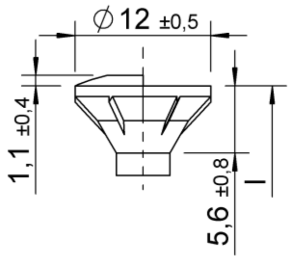
Countersunk head – design with and without raise, with and without milling pockets



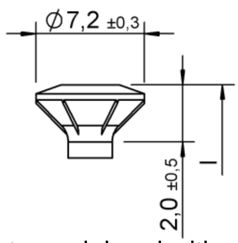
Countersunk head with cutter ribs – design with and without raise



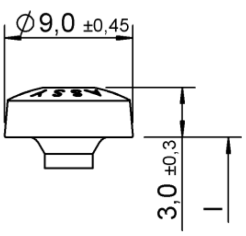
Countersunk head with cutter ribs – design with and without raise



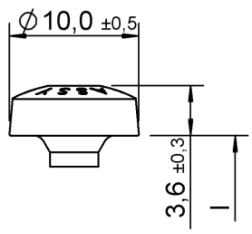
Countersunk head with cutter ribs – design with and without raise



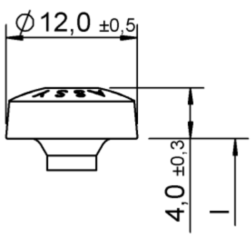
Countersunk head with cutter ribs – design with and without raise



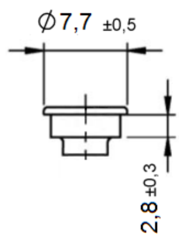
Pan Head



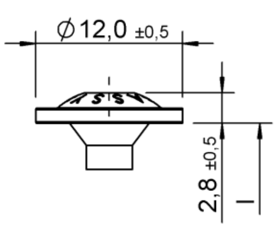
Pan Head



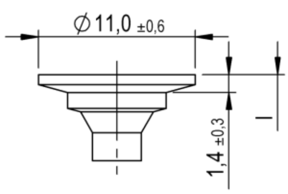
Pan Head



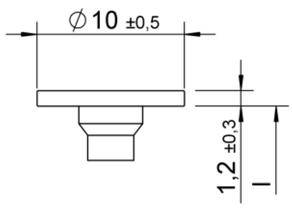
Step Head



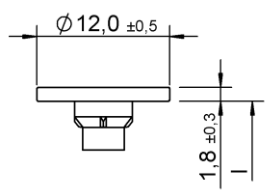
Large washer head I



Large washer head II – design with and without cutter ribs



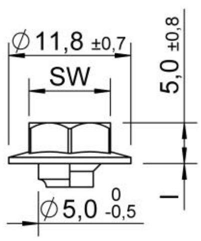
Large washer head III – design with and without cutter ribs



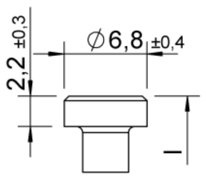
Large washer head III – design with and without cutter ribs

WÜRTH self-tapping screws	Annex 9.28
ASSY, ASSY plus, Jamo, Jamo plus - d = 5.0 mm and d = 5.5 mm	

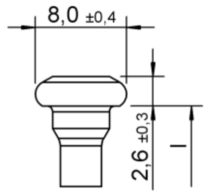
Head types for d = 5.0 mm and d = 5.5 mm, all materials



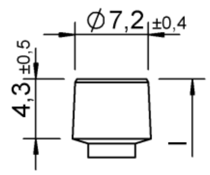
Hexagonal head with and without flange



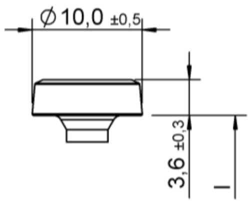
Cylinder head



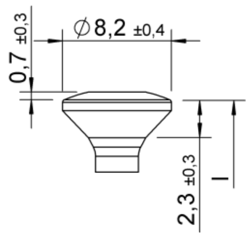
Joist hanger screw head



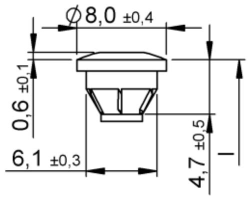
Cylinder head



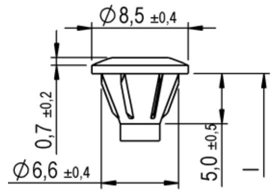
Elmo head



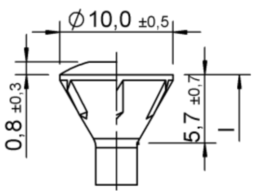
Tinner head – design with and without raise



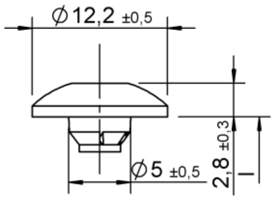
Top head – design with and without raise



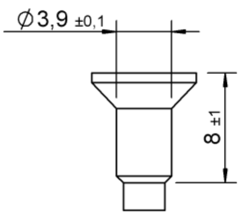
Top head II – design with and without raise



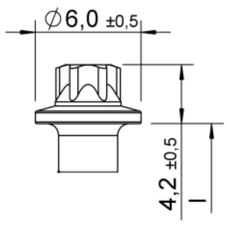
Woodwork head – design with and without raise



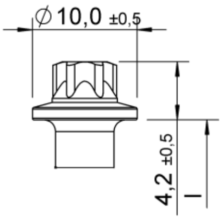
Truss head – design with and without cutter ribs and with and without flange



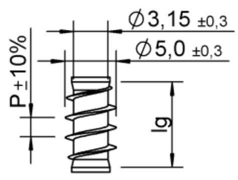
Alternatively at countersunk heads: modification of the shank at drilled head



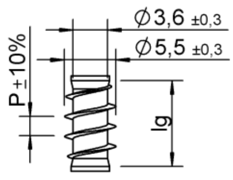
Hexalobular head – design with and without collar



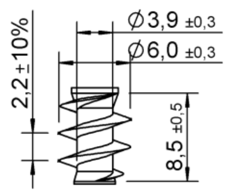
Hexalobular head – design with and without collar



Underhead thread
Lg2 < 4 x d
P= 2.2, 3.1, 4.4



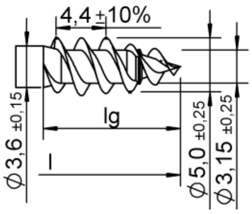
Underhead thread
Lg2 < 4 x d
P= 1.8



Underhead thread – Type P

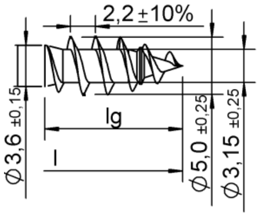
WÜRTH self-tapping screws	Annex 9.29
ASSY, ASSY plus, Jamo, Jamo plus - d = 5.0 mm and d = 5.5 mm	

Thread types d = 5.0 mm, carbon steel



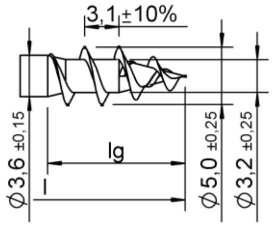
double – threaded

Design with and without ring respectively mating thread



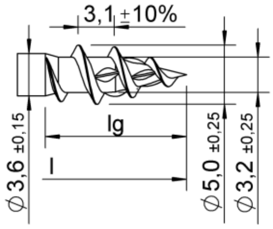
single – threaded

Design with and without ring respectively mating thread



coarse thread I

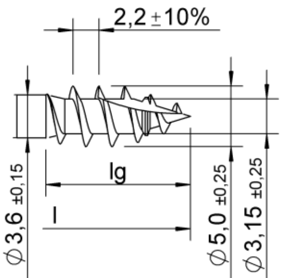
Design with and without ring respectively mating thread



coarse thread II

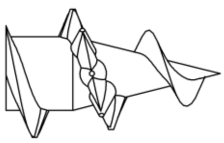
Design with and without pre cut. Pre cut can be tilt, too

Ring, mating thread, pre cut, cut and crossing cut can be combined with double or single threaded or coarse thread.



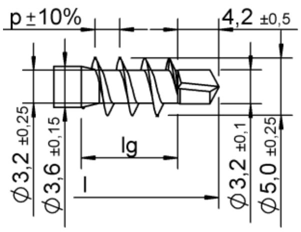
cut

Design with and without ring respectively mating thread



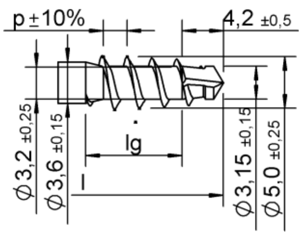
crossing cut

Design: Same height like flange or higher;
1-10 pieces, can be placed all over the thread



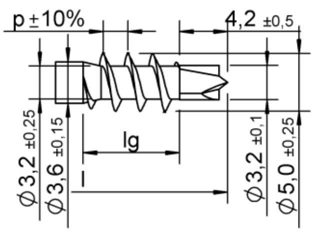
plus

Design with p = 1.35 and 1.9



plus special

Design with p = 1.35 and 1.9

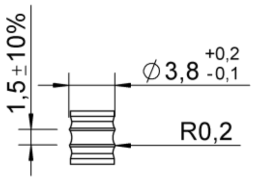


plus 3.0

Design with p = 1.35 and 1.9

WÜRTH self-tapping screws	Annex 9.30
ASSY, ASSY plus, Jamo, Jamo plus - d = 5.0 mm and d = 5.5 mm	

Rings on the shank for thread types d = 5.0 mm, carbon steel



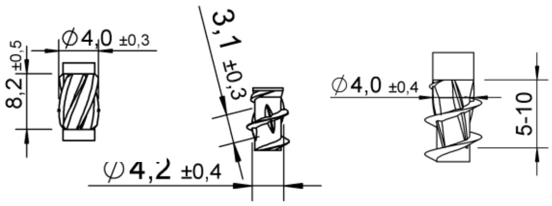
Rings on the shank can also be formed as a thread.
Rings or thread with the same shape can be all over the shank or only on parts of it.

All dimensions in mm.

Lengths for d = 5.0 mm, carbon steel

l +1.0 -2.5	lg +1.0 -2.0	Shank cutter at partial thread	Shank cutter at plus/ plus 3.0/ plus special partial thread
22	20	up to L = 90: optional	over all lengths optional
…	…	over L = 90 yes	
120	90		

Shank cutter

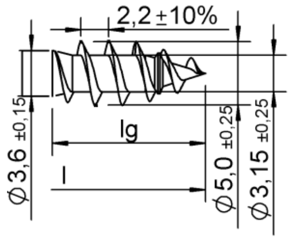


Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max.

All dimensions in mm.

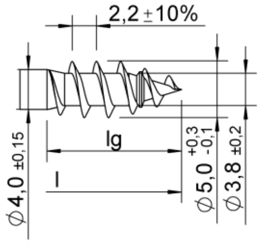
WÜRTH self-tapping screws	Annex 9.31
ASSY, ASSY plus, Jamo, Jamo plus - d = 5.0 mm and d = 5.5 mm, carbon steel	

Thread types d = 5.0 mm, stainless steel

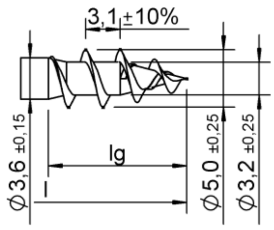


single – threaded

Design with and without ring respectively mating thread

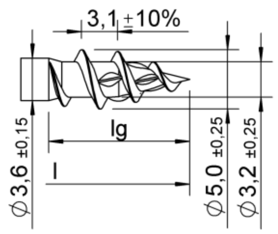


hard wood



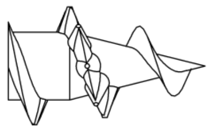
coarse thread I

Design with and without ring respectively mating thread



coarse thread II

Design with and without pre cut. Pre cut can be tilt, too

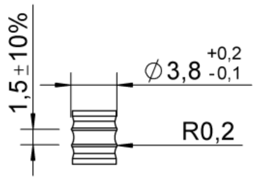


crossing cut

Design: Same height like flange or higher;
1-10 pieces, can be placed all over the thread

Ring, mating thread, pre cut and crossing cut can be combined with double or single threaded or coarse thread

Rings on the shank for thread types d = 5.0 mm, stainless steel



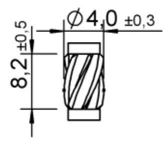
Rings on the shank can also be formed as a thread.
Rings or thread with the same shape can be all over the shank or only on parts of it.

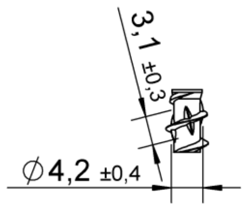
All dimensions in mm.

Lengths for d = 5.0 mm, stainless steel

l +1.0 -2.5	lg +1.0 -2.0	Shank cutter at partial thread
22	20	over all lengths optional
…	…	
120 (300*)	80	

Shank cutters



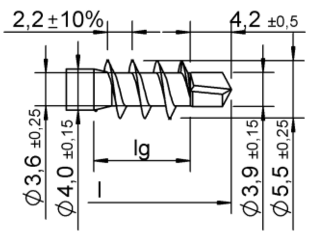


Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max. All dimensions in mm.

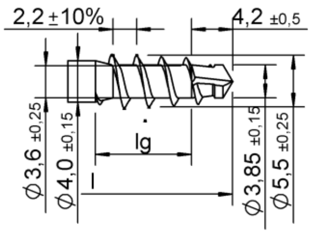
*see Drawings, surface, adjustment point 3)

WÜRTH self-tapping screws ASSY, ASSY plus, Jamo, Jamo plus - d = 5.0 mm and d = 5.5 mm, stainless steel	Annex 9.32

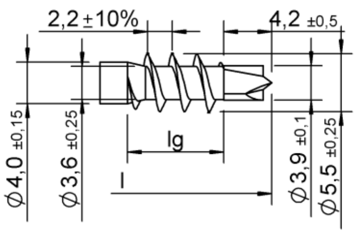
Thread types plus d = 5.5 mm, stainless steel



plus

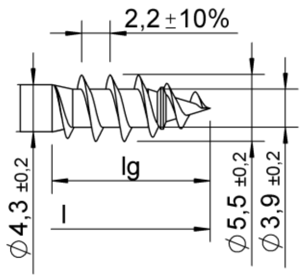


plus special



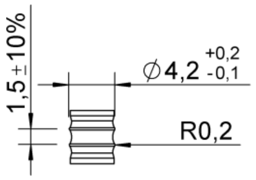
plus 3.0

Thread type hardwood/ tinner screw d = 5.5 mm, stainless steel



hard wood/tinner

Rings on the shank for d = 5.5 mm, stainless steel, for above threads

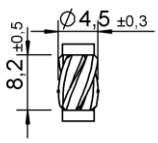


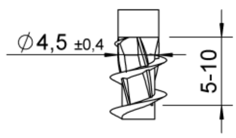
Rings on the shank can also be formed as a thread.
Rings or thread with the same shape can be all over the shank or only on parts of it.
All dimensions in mm.

Lengths for d = 5.5 mm, stainless steel

l +1.0 -5.0	lg +1.0 -2.5	Shank cutter at plus/ plus 3.0/ plus special partial thread
45	40	over all lengths optional
…	…	
120	90	

Shank cutters





Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max. All dimensions in mm.

WÜRTH self-tapping screws	Annex 9.33
ASSY, ASSY plus, Jamo, Jamo plus - d = 5.0 mm and d = 5.5 mm, stainless steel	

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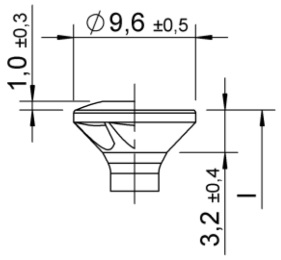
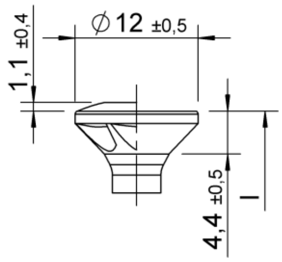
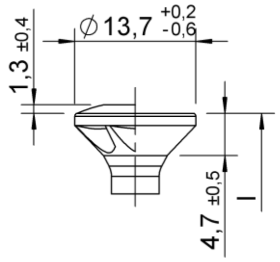
Head types for d = 6.0 mm, d = 6.3 mm and d = 6.5 mm, all materials



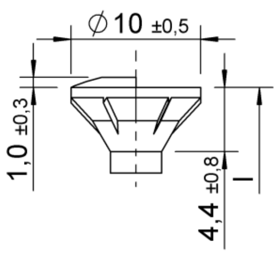
Countersunk head – design with and without raise, with and without milling pockets



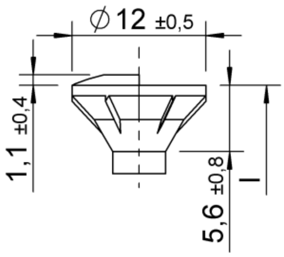
Countersunk head – design with and without raise, with and without milling pockets



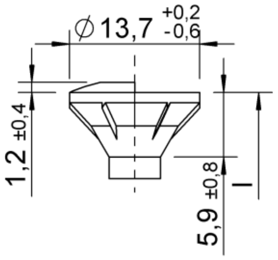
Countersunk head – design with and without raise, with and without milling pockets



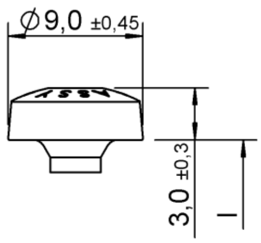
Countersunk head with cutter ribs – design with and without raise



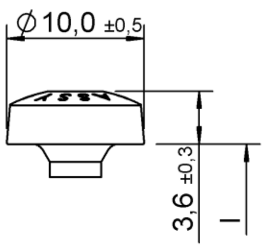
Countersunk head with cutter ribs – design with and without raise



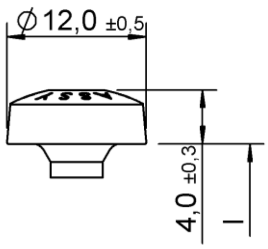
Countersunk head with cutter ribs – design with and without raise



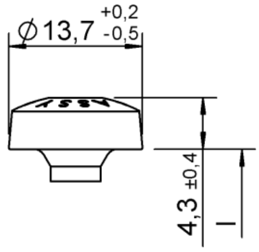
Pan Head



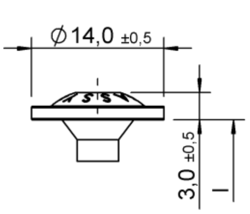
Pan Head



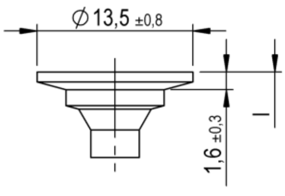
Pan Head



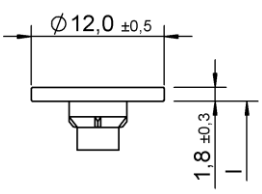
Pan Head



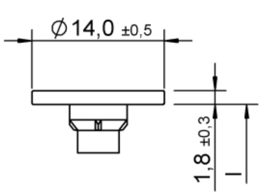
Large washer head



Large washer head II – design with and without cutter ribs



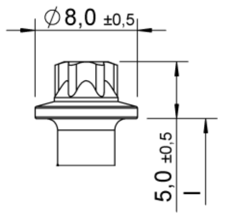
Large washer head III – design with and without cutter ribs



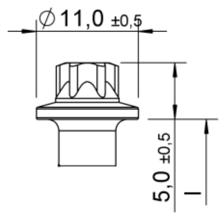
Large washer head III – design with and without cutter ribs

WÜRTH self-tapping screws	Annex 9.34
ASSY, ASSY plus, Jamo, Jamo plus - d = 6.0 mm, d = 6.3 mm and d = 6.5 mm	

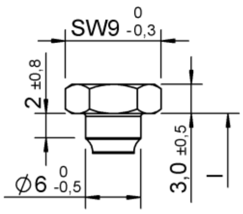
Head types for d = 6.0 mm, d = 6.3 mm and d = 6.5 mm, all materials



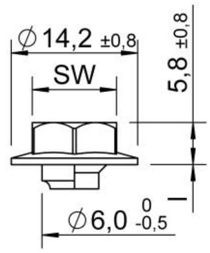
Hexalobular head – design with and without collar



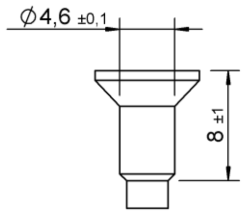
Hexalobular head – design with and without collar



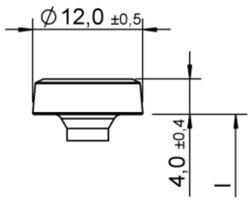
Kombi hexagonal head



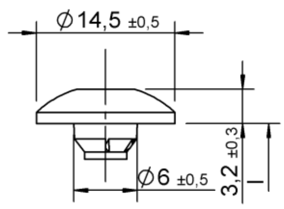
Hexagonal head with and without collar



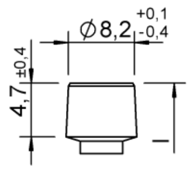
Alternatively at countersunk heads: modification of the shank at drilled head I



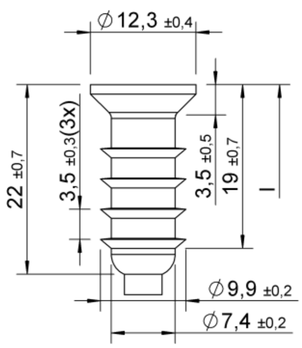
Elmo head



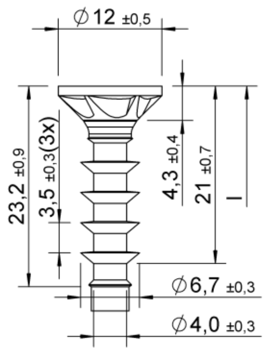
Truss head – design with and without cutter ribs or flange



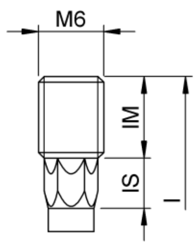
Cylinder head



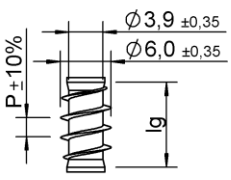
Jamo head I



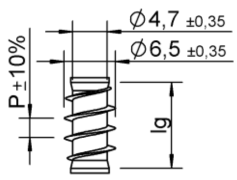
Jamo head II – design with and without milling pockets



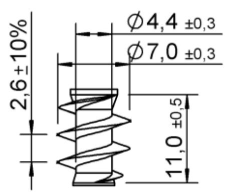
Stud head
Design with and without hexagonal part



Underhead thread
Lg2 < 4 x d,
P= 2.6, 3.6, 5.2



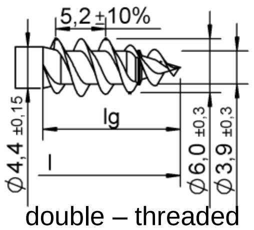
Underhead thread
Lg2 < 4 x d,
P= 2.6



Underhead thread – Type P

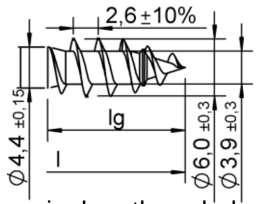
WÜRTH self-tapping screws	Annex 9.35
ASSY, ASSY plus, Jamo, Jamo plus - d = 6.0 mm, d = 6.3 mm and d = 6.5 mm	

Thread types d = 6.0 mm, carbon steel



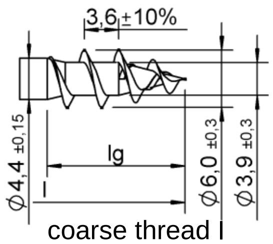
double – threaded

Design with and without ring respectively mating thread



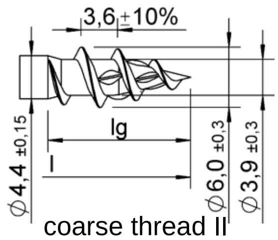
single – threaded

Design with and without ring respectively mating thread



coarse thread I

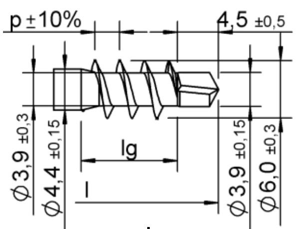
Design with and without ring respectively mating thread



coarse thread II

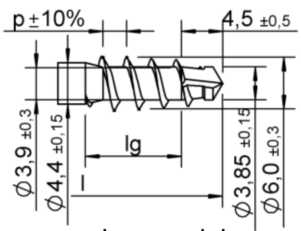
Design with and without pre cut. Pre cut can be tilt, too

Ring, mating thread, pre cut and crossing cut can be combined with double or single threaded or coarse thread



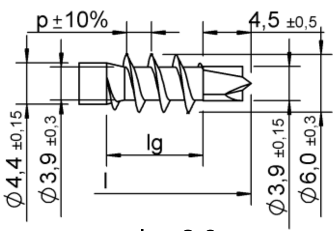
plus

Design with p = 2.6, 3.2 and 3.6



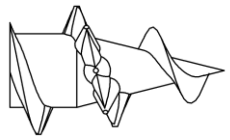
plus special

Design with p = 2.6, 3.2 and 3.6



plus 3.0

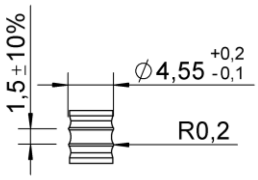
Design with p 2.6, 3.2 and 3.6



Crossing cut

Design: Same height like flange or higher; 1-10 pieces, can be placed all over the thread

Rings on the shank for d = 6.0 mm, carbon steel

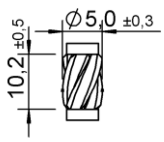


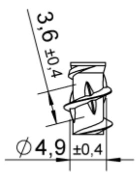
Rings on the shank can also be formed as a thread.
Rings or thread with the same shape can be all over the shank or only on parts of it.
All dimensions in mm.

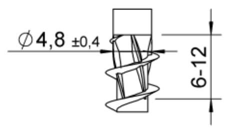
Lengths for d = 6.0 mm, carbon steel, for above threads

l +1.0 -2.0	lg +1.0 -2.0	Shank cutter at partial thread	Shank cutter at plus/ plus 3.0/ plus special partial thread
25	24	up to L = 120: optional	over all lengths optional
…	…	over L = 120 yes	
300	180		

Shank cutters







Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max. All dimensions in mm.

WÜRTH self-tapping screws	Annex 9.36
ASSY, ASSY plus, Jamo, Jamo plus - d = 6.0 mm, d = 6.3 mm and d = 6.5 mm, carbon steel	

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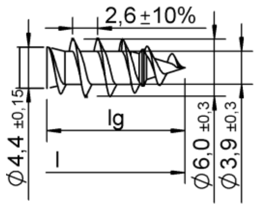
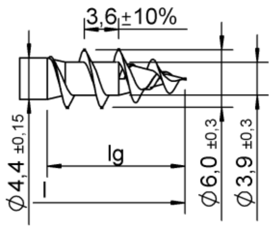
Thread types d = 6.0 mm, stainless steel



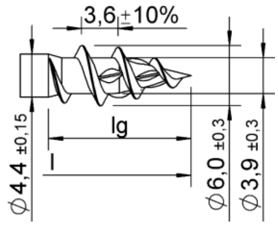
single – threaded

Design with and without ring respectively mating thread



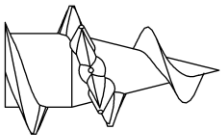
coarse thread I

Design with and without ring respectively mating thread



coarse thread II

Design with and without pre cut. Pre cut can be tilt, too

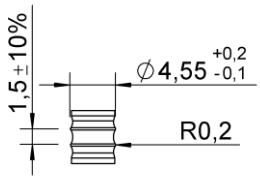


Crossing cut

Design: Same height like flange or higher;
1-10 pieces, can be placed all over the thread

Ring, mating thread, pre cut and crossing cut can be combined with double or single threaded or coarse thread

Rings on the shank for d = 6.0 mm, stainless steel



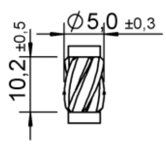
Rings on the shank can also be formed as a thread.
Rings or thread with the same shape can be all over the shank or only on parts of it.

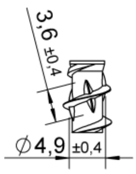
All dimensions in mm.

Lengths for d = 6.0 mm, stainless steel, for above threads

l +1.0 -3.5	lg +1.0 -2.5	Shank cutter at partial thread
22	20	over all lengths optional
…	…	
200	120	

Shank cutters

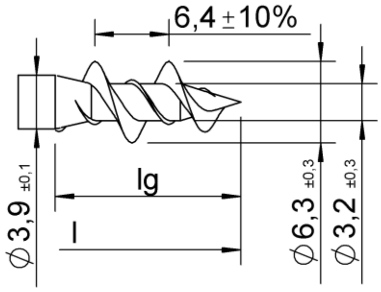




Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max. All dimensions in mm.

WÜRTH self-tapping screws	Annex 9.37
ASSY, ASSY plus, Jamo, Jamo plus - d = 6.0 mm, d = 6.3 mm and d = 6.5 mm, stainless steel	

Thread types d = 6.3 mm, all materials



WG-Fix

Lengths for d = 6.3 mm, all materials

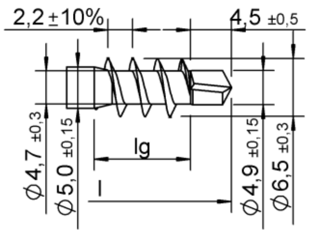
l +1.0 -2.0	lg +1.0 -2.0
27	25,2
…	…
300	60

Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max.

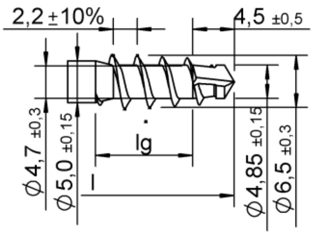
All dimensions in mm.

WÜRTH self-tapping screws	Annex 9.38
ASSY WG-Fix d = 6.3 mm	

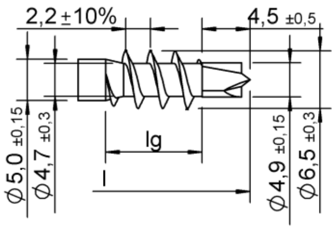
Thread types plus d = 6.5 mm, stainless steel



plus

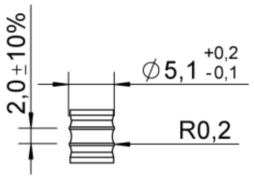


plus special



plus 3.0

Rings on the shank for plus d = 6.5 mm, stainless steel, for above screws



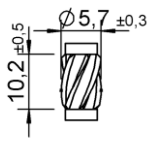
Rings on the shank can also be formed as a thread.
Rings or thread with the same shape can be all over the shank or only on parts of it.

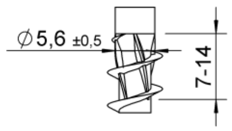
All dimensions in mm.

Lengths for d = 6.5 mm, stainless steel, for above screws

l +1.0 -5.0	lg +1.0 -2.5	Shank cutter at plus/ plus 3.0/ plus special partial thread
45	40	over all lengths optional
…	…	
400	200	

Shank cutter



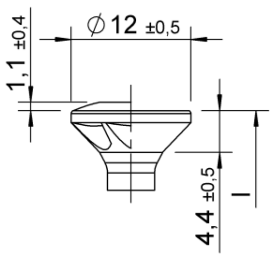


Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max.

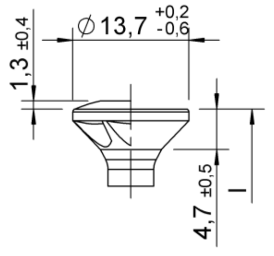
All dimensions in mm.

WÜRTH self-tapping screws	Annex 9.39
ASSY, ASSY plus, Jamo, Jamo plus - d = 6.0 mm, d = 6.3 mm and d = 6.5 mm, stainless steel	

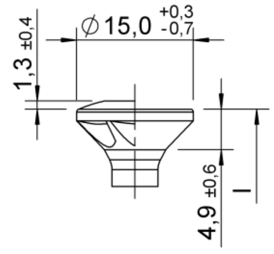
Head types for d = 7.0mm, all materials



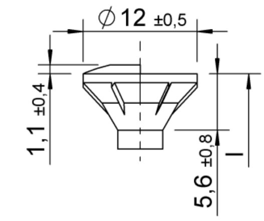
Countersunk head – design with and without raise, with and without milling pockets



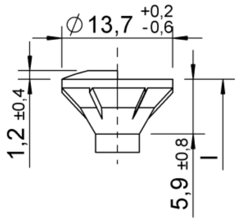
Countersunk head – design with and without raise, with and without milling pockets



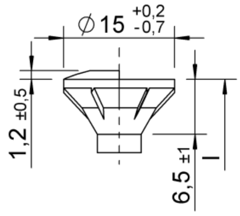
Countersunk head – design with and without raise, with and without milling pockets



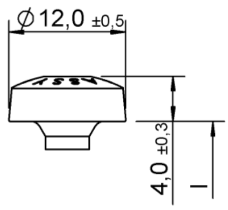
Countersunk head with cutter ribs – design with and without raise



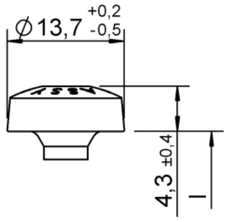
Countersunk head with cutter ribs – design with and without raise



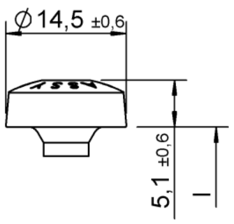
Countersunk head with cutter ribs – design with and without raise



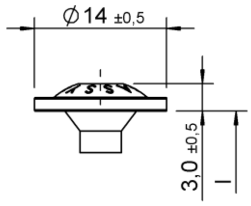
Pan Head



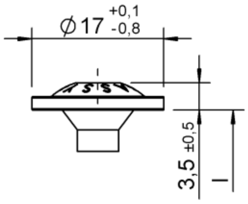
Pan Head



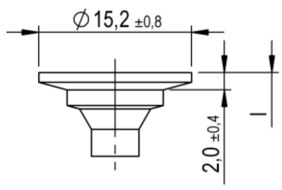
Pan Head



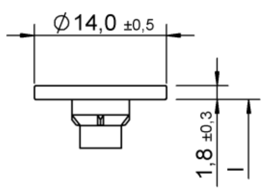
Large washer head I



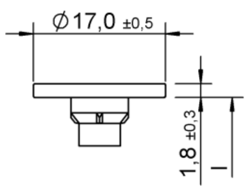
Large washer head I



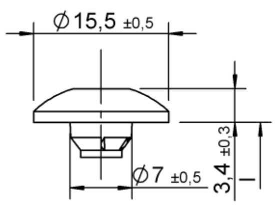
Large washer head II – design with and without raise



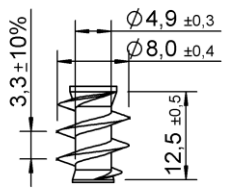
Large washer head III – design with and without raise



Large washer head III – design with and without cutter ribs



Truss head – design with and without cutter ribs or flange



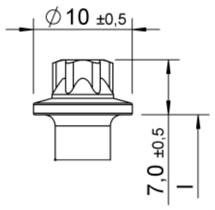
Underhead thread - TypeP

WÜRTH self-tapping screws

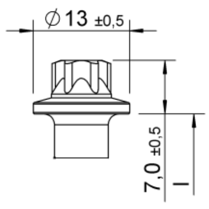
ASSY, ASSY plus, Jamo, Jamo plus - d = 7.0 mm

Annex 9.40

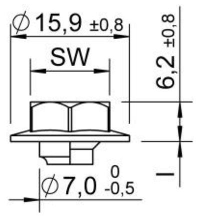
Head types for d = 7.0mm, all materials



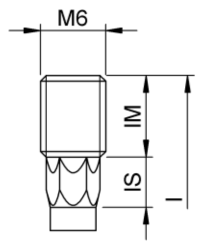
Hexalobular head – design with and without collar



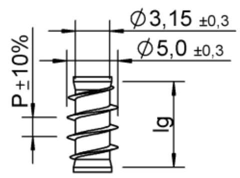
Hexalobular head – design with and without collar



Hexagonal head with and without collar or flange



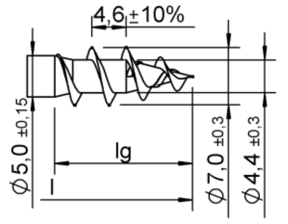
Stud head
Design with and without hexagonal part



Underhead thread
Lg2 < 4 x d,
P= 4.6

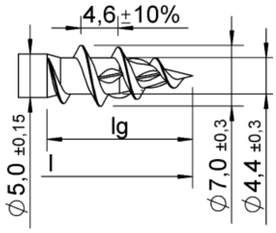
WÜRTH self-tapping screws	Annex 9.41
ASSY, ASSY plus, Jamo, Jamo plus - d = 7.0 mm	

Thread types d = 7.0 mm, carbon steel



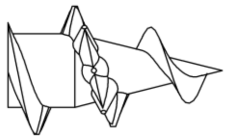
coarse thread I

Design with and without ring respectively mating thread



coarse thread II

Design with and without pre cut. Pre cut can be tilt, too

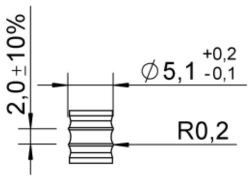


Crossing cut

Design: Same height like flange or higher;
1-10 pieces, can be placed all over the thread

Pre cut and crossing cut can be combined with double or single threaded or coarse thread

Rings on the shank for d = 7.0 mm, carbon steel



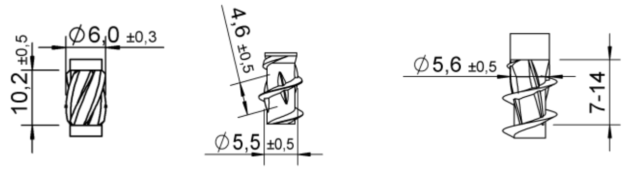
Rings on the shank can also be formed as a thread.
Rings or thread with the same shape can be all over the shank or only on parts of it.

All dimensions in mm.

Lengths for d = 7.0 mm, carbon steel

l +1.0 -3.5	lg +1.0 -2.5	Shank cutter at partial thread
30	28	L ≤ 120: optional
…	…	L > 120: yes
300	210	
301 - 600	85	

Shank cutters

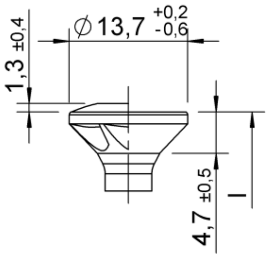


Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max.

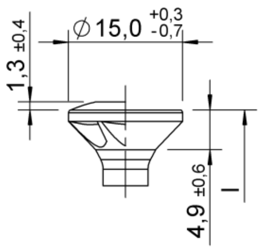
All dimensions in mm.

WÜRTH self-tapping screws	Annex 9.42
ASSY, ASSY plus, Jamo, Jamo plus - d = 7.0 mm, carbon steel	

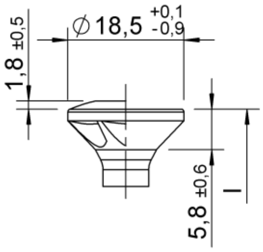
Head types for d = 7.5 mm and d = 8.0 mm, all materials



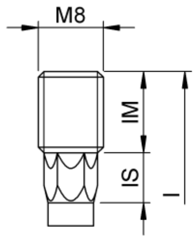
Countersunk head – design with and without raise, with and without milling pockets



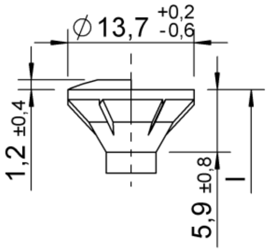
Countersunk head – design with and without raise, with and without milling pockets



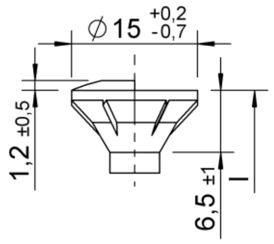
Countersunk head – design with and without raise, with and without milling pockets



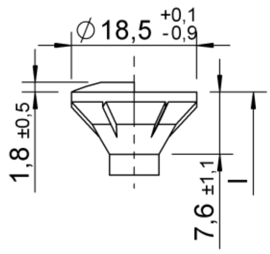
Stud head
Design with and without hexagonal part



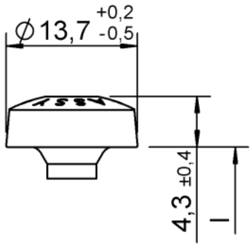
Countersunk head with cutter ribs – design with and without raise



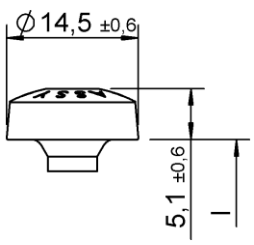
Countersunk head with cutter ribs – design with and without raise



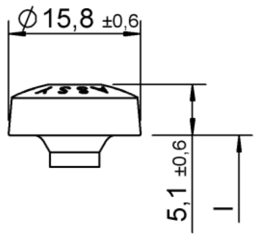
Countersunk head with cutter ribs – design with and without raise



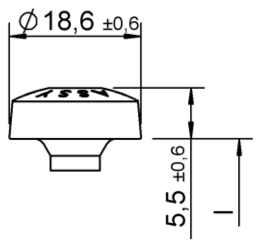
Pan Head



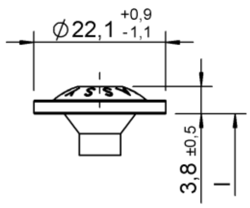
Pan Head



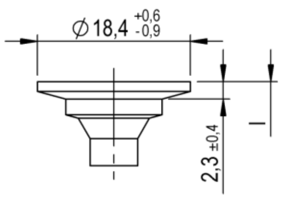
Pan Head



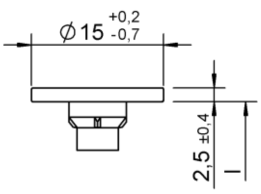
Pan Head



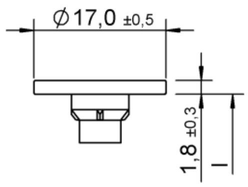
Large washer head I



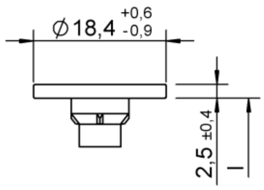
Large washer head II – design with and without cutter ribs



Large washer head III – design with and without cutter ribs



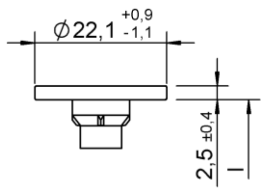
Large washer head III – design with and without cutter ribs



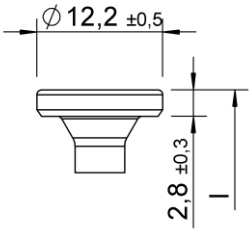
Large washer head III design with and without cutter ribs

WÜRTH self-tapping screws	Annex 9.43
ASSY, ASSY plus, Jamo, Jamo plus, Amo - d = 7.5 and 8.0 mm	

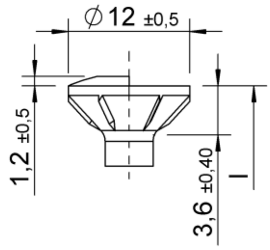
Head types for d = 7.5 mm and d = 8.0 mm, all materials



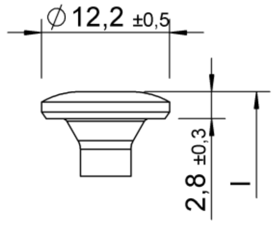
Large washer head III – design with and without cutter ribs



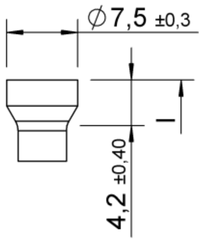
Flat head



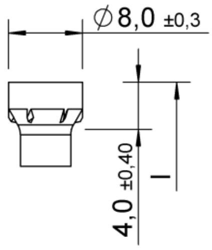
Countersunk head with cutter ribs – design with and without raise



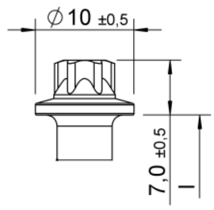
Pan Head



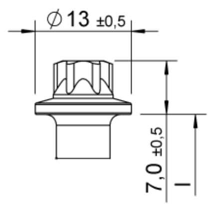
small cylinder head



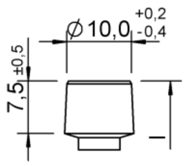
small cylinder head – design with and without ribs



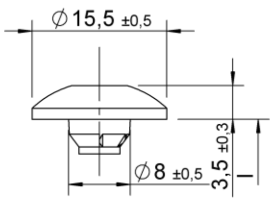
Hexalobular head – design with and without collar



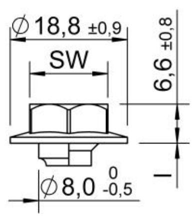
Hexalobular head – design with and without collar



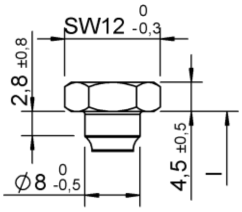
Cylinder head



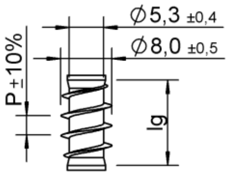
Truss head – design with and without cutter ribs or flange



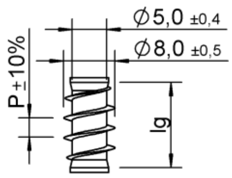
hexagonal head with and without collar



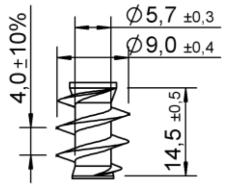
Kombi hexagonal head with and without collar



Underhead thread
Lg2 < 4 x d,
P= 5.6



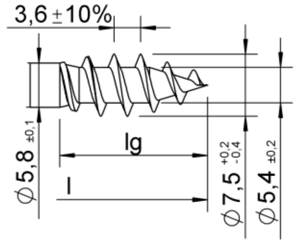
Underhead thread
Lg2 < 4 x d,
P= 3.6



Underhead thread – Type P

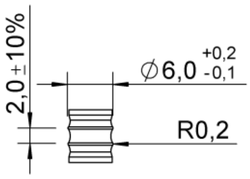
WÜRTH self-tapping screws	Annex 9.44
ASSY, ASSY plus, Jamo, Jamo plus, Amo - d = 7.5 mm and 8.0 mm	

Thread types d = 7.5 mm, all materials



AMO Y thread

Rings on the shank for d = 7.5 mm, all materials



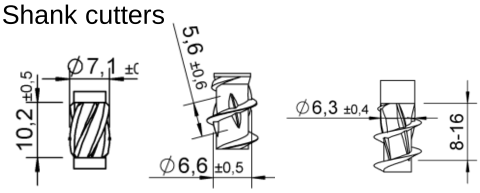
Rings on the shank can also be formed as a thread.
Rings or thread with the same shape can be all over the shank or only on parts of it.

All dimensions in mm.

Lengths for d = 7.5 mm, all materials

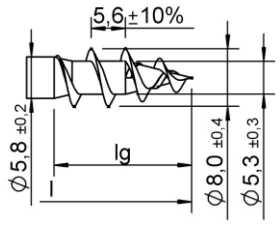
l +1.0 -5.0	lg +1.0 -2.5	Shank cutter at partial thread
35	32	up to l = 150: optional
…	…	over l = 150: yes
400	160	

Shank cutters



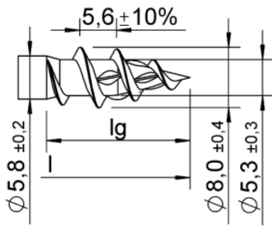
WÜRTH self-tapping screws	Annex 9.45
ASSY, ASSY plus, Jamo, Jamo plus, Amo - d = 7.5 mm and 8.0 mm	

Thread types d = 8.0 mm, carbon steel



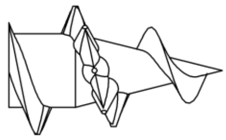
coarse thread I

Design with and without ring respectively mating thread



coarse thread II

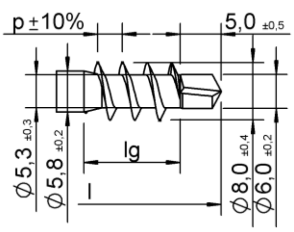
Design with and without pre cut. Pre cut can be tilt, too



Crossing cut

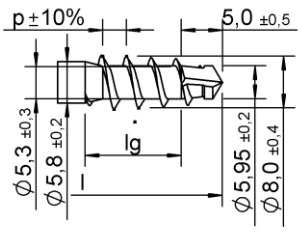
Design: Same height like flange or higher;
1-10 pieces, can be placed all over the thread

Pre cut and crossing cut can be combined with double or single threaded or coarse thread



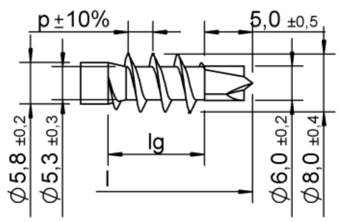
plus

Design with p = 5.6



plus special

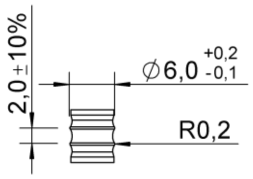
Design with p = 5.6



plus 3.0

Design with p = 5.6

Rings on the shank for d = 8.0 mm, carbon steel



Rings on the shank can also be formed as a thread.
Rings or thread with the same shape can be all over the shank or only on parts of it.

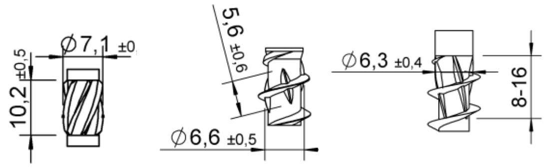
All dimensions in mm.

WÜRTH self-tapping screws	Annex 9.46
ASSY, ASSY plus, Jamo, Jamo plus - d = 7.5 mm and 8.0 mm, carbon steel	

Lengths for d = 8.0 mm, carbon steel

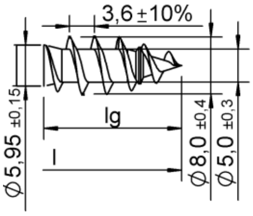
l +1.0 -5.0	lg +1.0 -2.5	Shank cutter at partial thread	Shank cutter at plus / plus 3.0 / plus special partial thread
35	32	up to L = 200: optional	over all lengths optional
…	…	over L = 200 yes	
800	240		

Shank cutters



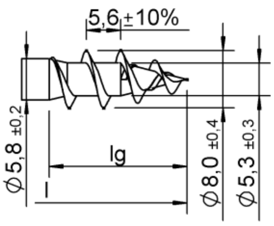
Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max. All dimensions in mm.

Thread types d = 8.0 mm, stainless steel



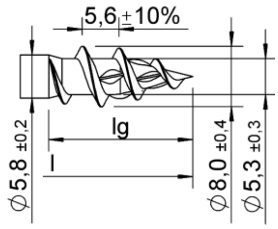
single – threaded

Design with and without ring respectively mating thread



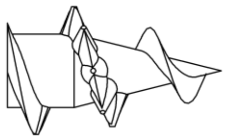
coarse thread I

Design with and without ring respectively mating thread



coarse thread II

Design with and without pre cut. Pre cut can be tilt, too

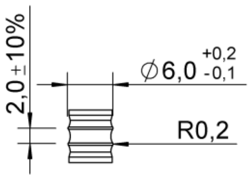


Crossing cut

Design: Same height like flange or higher;
1-10 pieces, can be placed all over the thread

Ring, mating thread, pre cut and crossing cut can be combined with double or single threaded or coarse thread

Rings on the shank for d = 8.0 mm, stainless steel



Rings on the shank can also be formed as a thread.
Rings or thread with the same shape can be all over the shank or only on parts of it.

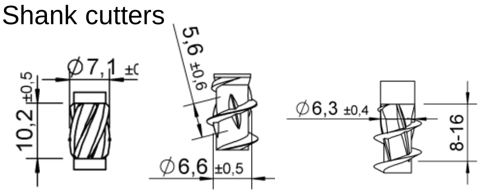
All dimensions in mm.

WÜRTH self-tapping screws	Annex 9.47
ASSY, ASSY plus, Jamo, Jamo plus - d = 7.5 mm and 8.0 mm, carbon steel	

Lengths for d = 8.0 mm, stainless steel, for above threads

l +1.0 -5.0	lg +1.0 -2.5	Shank cutter at partial thread
35	32	up to l = 150: optional
…	…	over l = 150: yes
400	160	

Shank cutters



Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max. All dimensions in mm.

WÜRTH self-tapping screws	Annex 9.48
ASSY, ASSY plus, Jamo, Jamo plus - d = 7.5 mm and 8.0 mm	

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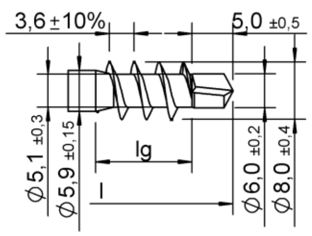
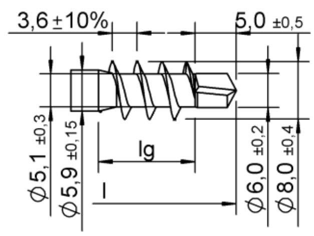
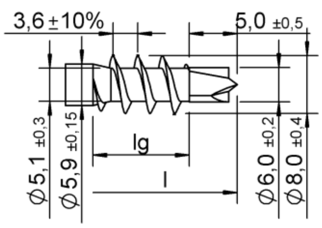
Thread types plus d = 8.0 mm, stainless steel



plus

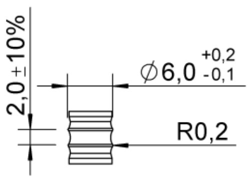


plus special



plus 3.0

Rings on the shank for plus d = 8.0 mm, stainless steel



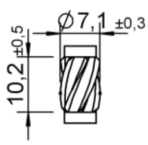
Rings on the shank can also be formed as a thread.
Rings or thread with the same shape can be all over the shank or only on parts of it.

All dimensions in mm.

Lengths for plus d = 8.0 mm, stainless steel, for above threads

l +1.0 -5.0	lg +1.0 -2.5	Shank cutter at plus/ plus 3.0/ plus special partial thread
45	40	over all lengths optional
…	…	
400	200	

Shank cutter

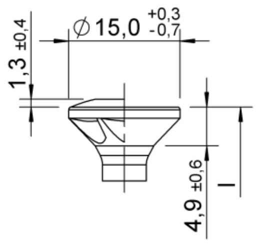


Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max.

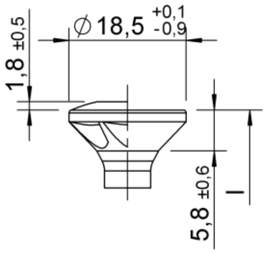
All dimensions in mm.

WÜRTH self-tapping screws	Annex 9.49
ASSY, ASSY plus, Jamo, Jamo plus – d = 7.5 mm and 8.0 mm, stainless steel	

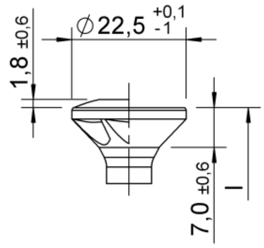
Head types for d = 10.0 mm, all materials



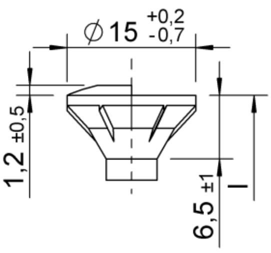
Countersunk head – design with and without raise, with and without milling pockets



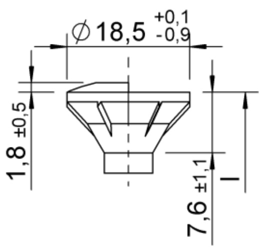
Countersunk head – design with and without raise, with and without milling pockets



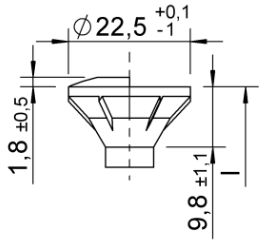
Countersunk head – design with and without raise, with and without milling pockets



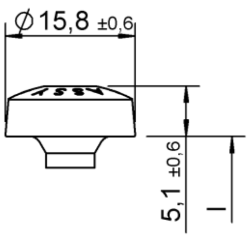
Countersunk head with cutter ribs – design with and without raise



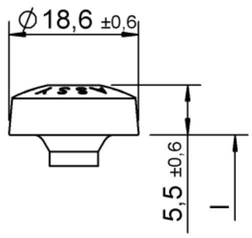
Countersunk head with cutter ribs – design with and without raise



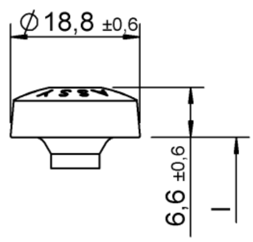
Countersunk head with cutter ribs – design with and without raise



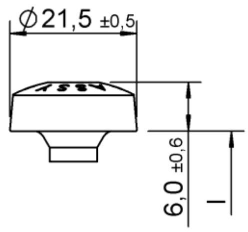
Pan Head



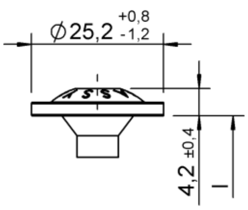
Pan Head



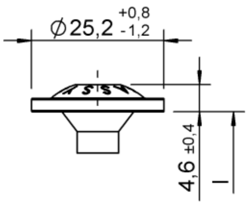
Pan Head



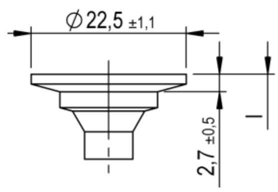
Pan Head



Large washer head I



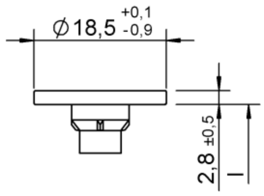
Large washer head I



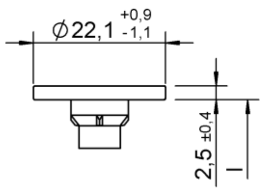
Large washer head II design with and without cutter ribs

WÜRTH self-tapping screws	Annex 9.50
ASSY, ASSY plus, Jamo, Jamo plus - d = 10.0 mm	

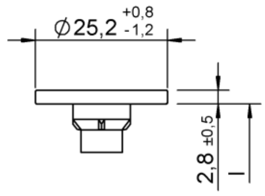
Head types for d = 10.0 mm, all materials



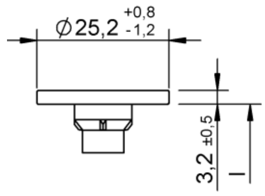
Large washer head III design with and without cutter ribs



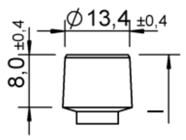
Large washer head III – design with and without cutter ribs



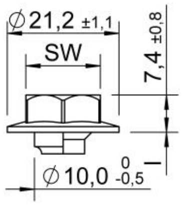
Large washer head III – design with and without cutter ribs



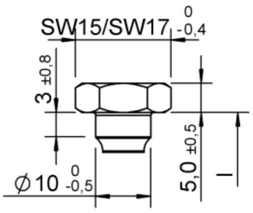
Large washer head III – design with and without cutter ribs



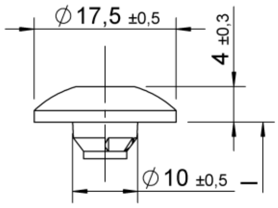
Cylinder head



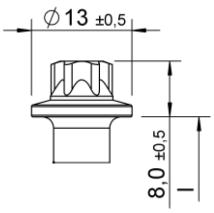
Hexagonal head with and without collar



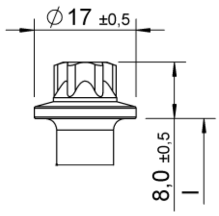
Kombi hexagonal head with and without collar



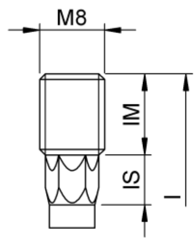
Truss head – design with and without cutter ribs or flange



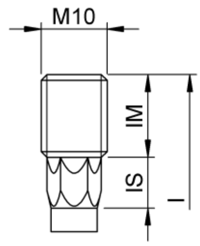
Hexalobular head – design with and without collar



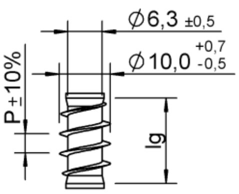
Hexalobular head – design with and without collar



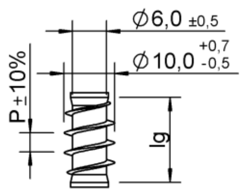
Stud head
Design with and without hexagonal part



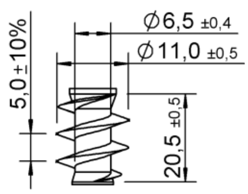
Stud head
Design with and without hexagonal part



Underhead thread
Lg2 < 4 x d,
P= 6.6



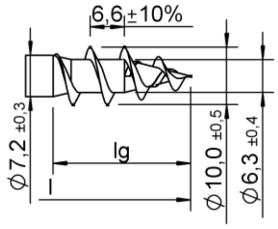
Underhead thread
Lg2 < 4 x d,
P= 4.4



Underhead thread – Type P

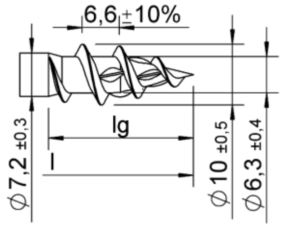
WÜRTH self-tapping screws	Annex 9.51
ASSY, ASSY plus, Jamo, Jamo plus - d = 10.0 mm	

Thread types d = 10.0 mm, carbon steel



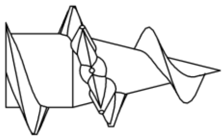
coarse thread I

Design with and without ring respectively mating thread



coarse thread II

Design with and without pre cut. Pre cut can be tilt, too

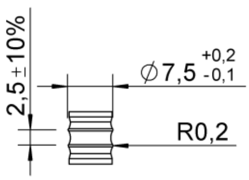


crossing cut

Design: Same height like flange or higher;
1-10 pieces, can be placed all over the thread

Pre cut and crossing cut can be combined with double or single threaded or coarse thread

Rings on the shank for d = 10.0 mm, carbon steel



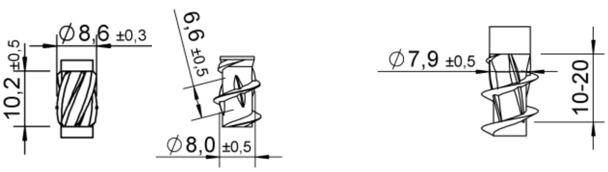
Rings on the shank can also be formed as a thread.
Rings or thread with the same shape can be all over the shank or only on parts of it.

All dimensions in mm.

Lengths for d = 10.0 mm, carbon steel

l +1.0 -5.0	lg +1.0 -3.0	Shank cutter at partial thread
45	40	up to L = 200: optional
…	…	over L = 200: yes
1000	300	

Shank cutters

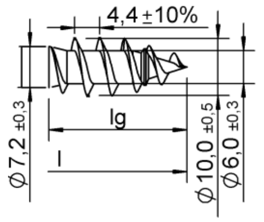


Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max.

All dimensions in mm.

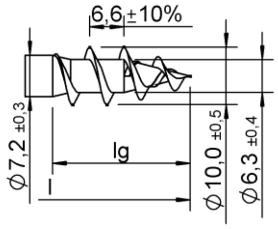
WÜRTH self-tapping screws	Annex 9.52
ASSY, ASSY plus, Jamo, Jamo plus - d = 10.0 mm, carbon steel	

Thread types d = 10.0 mm, stainless steel



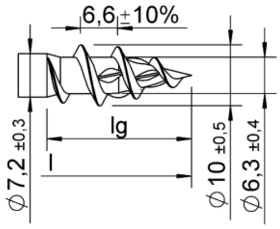
single – threaded

Design with and without ring respectively mating thread



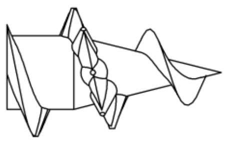
coarse thread I

Design with and without ring respectively mating thread



coarse thread II

Design with and without pre cut. Pre cut can be tilt, too

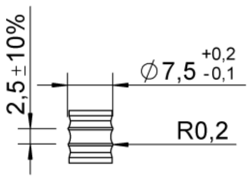


crossing cut

Design: Same height like flange or higher;
1-10 pieces, can be placed all over the thread

Ring, mating thread, pre cut and crossing cut can be combined with double or single threaded or coarse thread

Rings on the shank for d = 10.0 mm, stainless steel



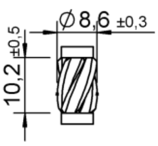
Rings on the shank can also be formed as a thread.
Rings or thread with the same shape can be all over the shank or only on parts of it.

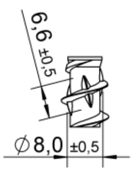
All dimensions in mm.

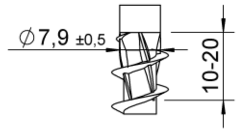
Lengths for d = 10.0 mm, stainless steel

l +1.0 -5.0	lg +1.0 -2.5	Shank cutter at partial thread
45	40	up to l = 150: optional
…	…	over l = 150: yes
400	200	

Shank cutters







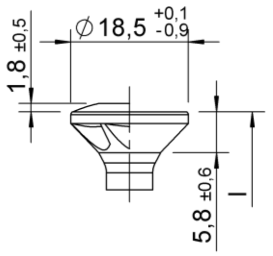
Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max.

All dimensions in mm.

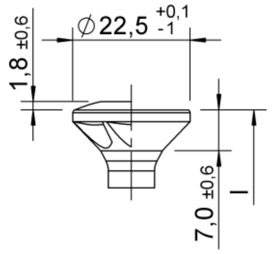
WÜRTH self-tapping screws	Annex 9.53
ASSY, ASSY plus, Jamo, Jamo plus - d = 10.0 mm, stainless steel	

Deutsches Institut für Bautechnik

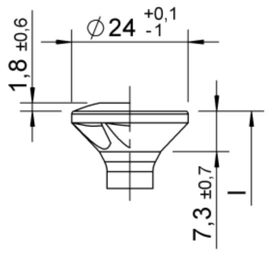
Head types for d = 12.0 mm, all materials



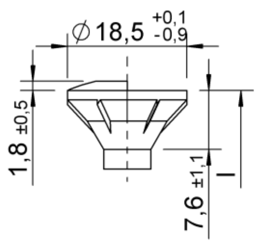
Countersunk head – design with and without raise, with and without milling pockets



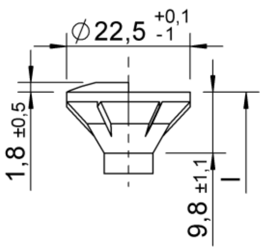
Countersunk head – design with and without raise, with and without milling pockets



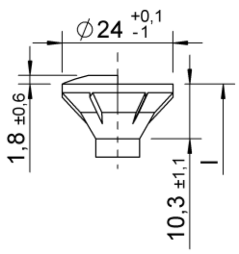
Countersunk head – design with and without raise, with and without milling pockets



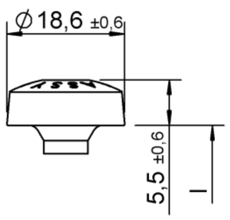
Countersunk head with cutter ribs – design with and without raise



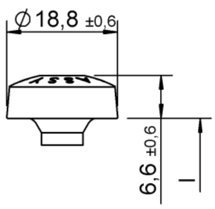
Countersunk head with cutter ribs – design with and without raise



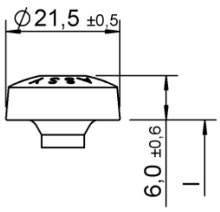
Countersunk head with cutter ribs – design with and without raise



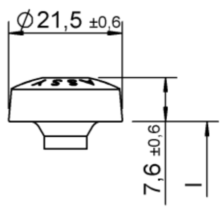
Pan Head



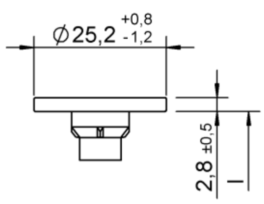
Pan Head



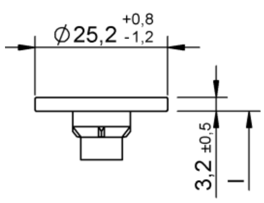
Pan Head



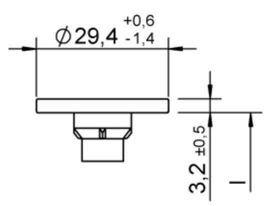
Pan Head



Large washer head III – design with and without cutter ribs



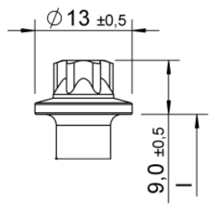
Large washer head III – design with and without cutter ribs



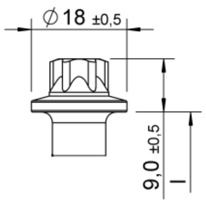
Large washer head III design with and without cutter ribs

WÜRTH self-tapping screws	Annex 9.54
ASSY, ASSY plus, Jamo, Jamo plus - d = 12.0 mm	

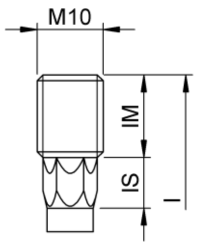
Head types for d = 12.0 mm, all materials



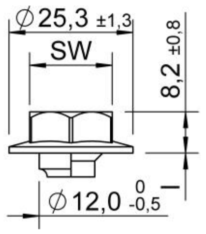
Hexalobular head – design with and without collar



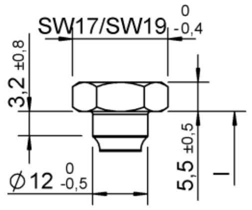
Hexalobular head – design with and without collar



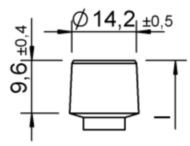
Stud head
Design with and without hexagonal part



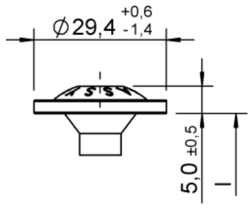
Hexagonal head with and without collar



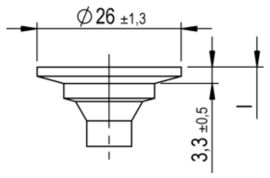
Kombi hexagonal head



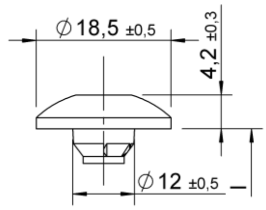
Cylinder head



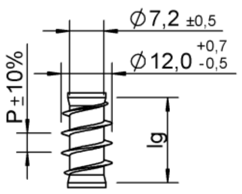
Large washer head I



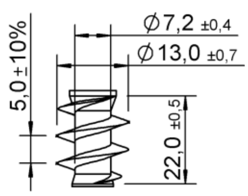
Large washer head II design with and without cutter ribs



Truss head – design with and without cutter ribs or flange



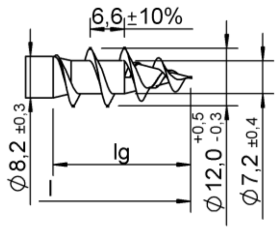
Underhead thread
Lg2 < 4 x d,
P= 6.6



Underhead thread – Type P

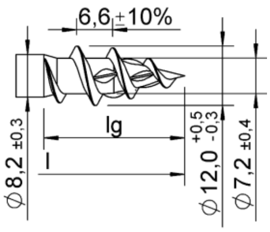
WÜRTH self-tapping screws	Annex 9.55
ASSY, ASSY plus, Jamo, Jamo plus - d = 12.0 mm	

Thread types d = 12.0 mm, carbon steel



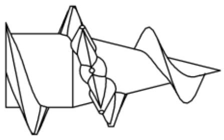
coarse thread I

Design with and without ring respectively mating thread



coarse thread II

Design with and without pre cut. Pre cut can be tilt, too

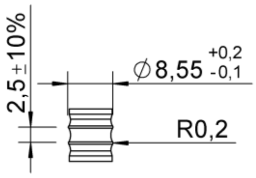


crossing cut

Design: Same height like flange or higher;
1-10 pieces, can be placed all over the thread

Pre cut and crossing cut can be combined with double or single threaded or coarse thread

Rings on the shank for d = 12.0 mm, carbon steel



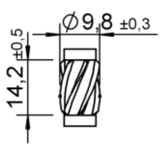
Rings on the shank can also be formed as a thread.
Rings or thread with the same shape can be all over the shank or only on parts of it.

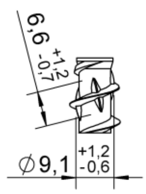
All dimensions in mm.

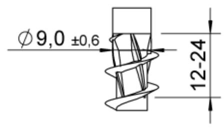
Lengths for d = 12.0 mm, carbon steel

l +1.0 -5.0	lg +1.0 -3.0	Shank cutter at partial thread
60	50	up to L = 2000: optional
…	…	over L = 200: yes
520	360	

Shank cutters





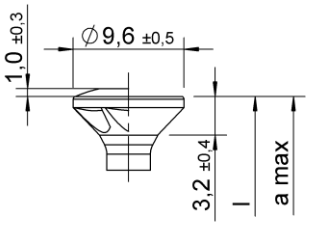


Screws without thread in the middle of screw or without thread below head or in combination of both are possible (see Annex 9.1). The thread lengths can be manufactured to costumer specific within lg min and lg max.

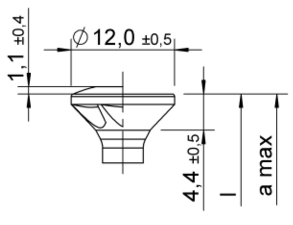
All dimensions in mm.

WÜRTH self-tapping screws	Annex 9.56
ASSY, ASSY plus, Jamo, Jamo plus - d = 12.0 mm, carbon steel	

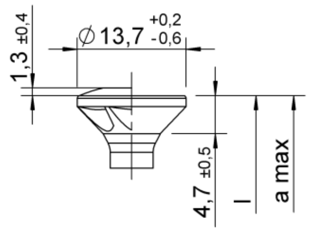
Head types for ASSY plus VG d = 6.0 mm, carbon steel



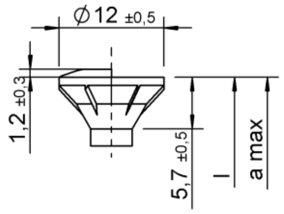
Countersunk head – design with and without raise, with and without milling pockets



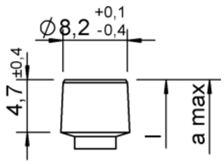
Countersunk head – design with and without raise, with and without milling pockets



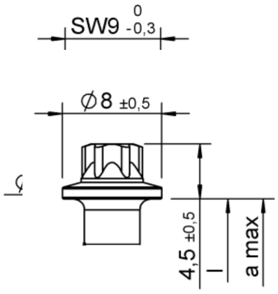
Countersunk head – design with and without raise, with and without milling pockets



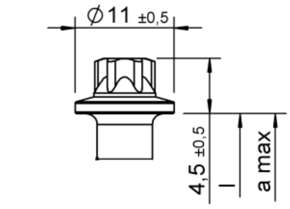
Countersunk head with cutter ribs – design with and without raise



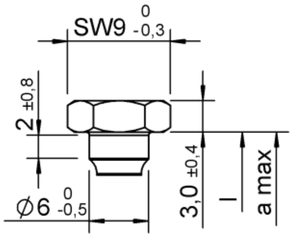
Cylinder head



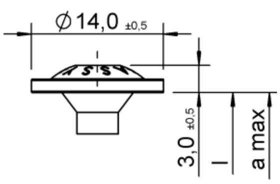
Hexalobular head with and without collar



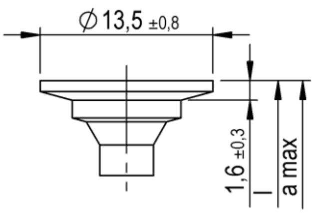
Hexalobular head with and without collar



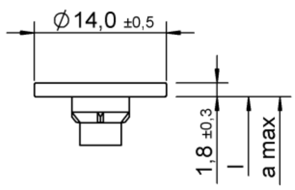
Kombi hexagonal head with and without collar



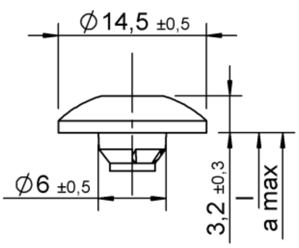
Large washer head I



Large washer head II



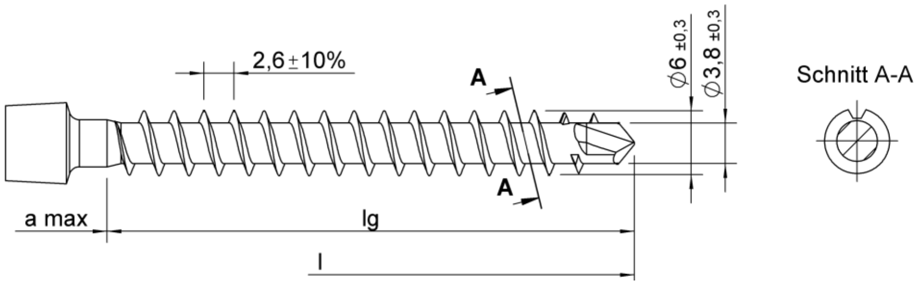
Large washer head III – design with and without cutter ribs



Truss head – design with and without cutter ribs or flange

WÜRTH self-tapping screws	Annex 9.57
ASSY plusVG screws, carbon steel – d = 6 mm	

Thread types ASSY plus VG d = 6.0 mm, carbon steel



Design with and without cutting edges (see section (Schnitt) A-A), Design of drilling tip can be according to plus 3.0

Lengths ASSY plus VG for d = 6.0 mm, carbon steel

Countersunk and Cylinder head

l +1,0 -3,0	lg +2,0 -6,0	a max
70	63	10.0
…	…	
120	113	10.0

l +1.0 -5.0	lg +2.0 -10.0	a max
130	123	12.0
…	…	
260	253	12.0

Large washer-, Hexagonal, Truss and Hexalobular head

l +1,0 -3,0	lg +6.0 -2.0	a max
70	63	6.0
…	…	
120	113	6.0

l +1.0 -5.0	lg +6.0 -6.0	a max
130	123	8.0
…	…	
260	253	8.0

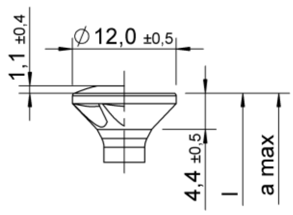
For non-standard use (optional, see Annex 9.1): Part without thread in the middle of screw/ Part without thread below head/ Combination of both.

All dimensions in mm.

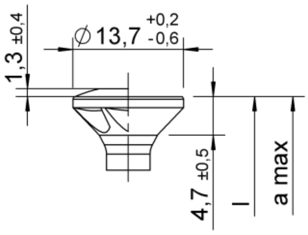
Lg can be reduced down to min 4xd.

WÜRTH self-tapping screws	Annex 9.58
ASSY plus VG screws, carbon steel – d = 6 mm	

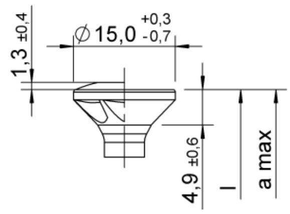
Head types for ASSY plus VG d = 8.0 mm, carbon steel



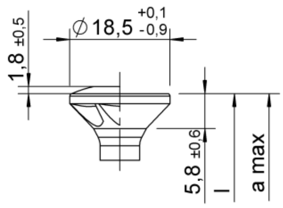
Countersunk head – design with and without raise, with and without milling pockets



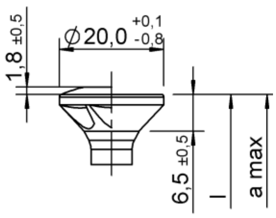
Countersunk head – design with and without raise, with and without milling pockets



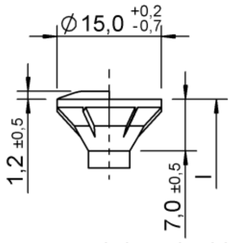
Countersunk head – design with and without raise, with and without milling pockets



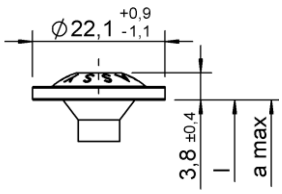
Countersunk head – design with and without raise, with and without milling pockets



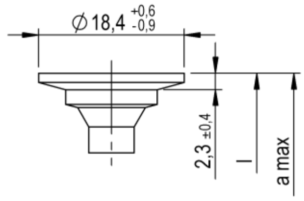
Countersunk head – design with and without raise, with and without milling pockets



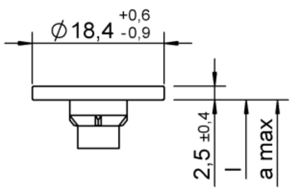
Countersunk head with cutter ribs – design with and without raise



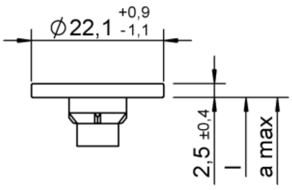
Large washer head I



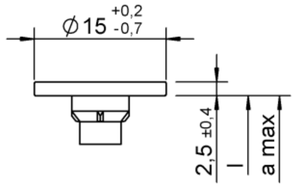
Large washer head II – design with and without cutter ribs



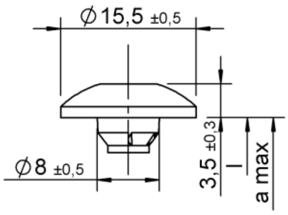
Large washer head III – design with and without cutter ribs



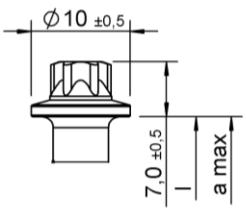
Large washer head III – design with and without cutter ribs



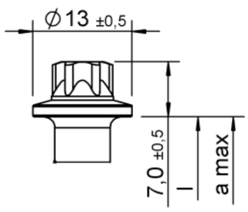
Large washer head III – design with and without cutter ribs



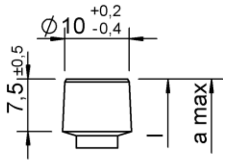
Truss head – design with and without cutter ribs or flange



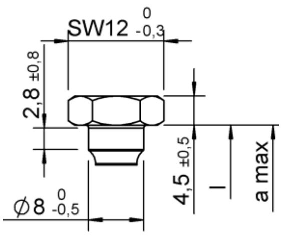
Hexalobular head



Hexalobular head



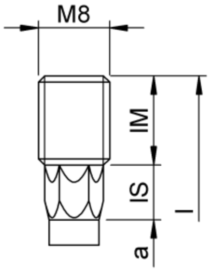
Cylinder head



Kombi hexagonal head with and without collar

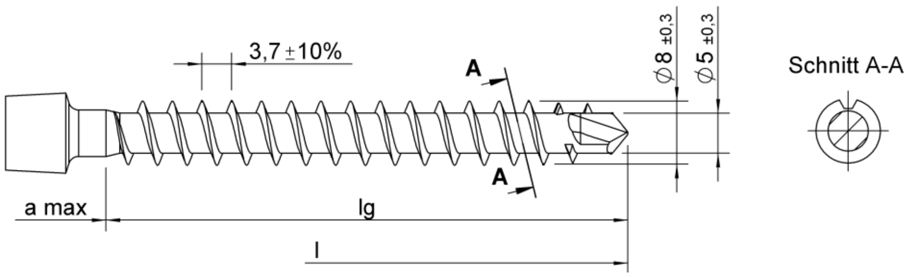
WÜRTH self-tapping screws	Annex 9.59
ASSY plus VG screws, carbon steel – d = 8 mm	

Head types for ASSY plus VG d = 8.0 mm, carbon steel



Stud head
Design with and without
hexagonal part

Thread types ASSY plus VG d = 8.0 mm, carbon steel



Design with and without cutting edges (see section (model) A-A), Design of drilling tip can be according to plus 3.0

Lengths for ASSY plus VG d = 8.0 mm, carbon steel

Countersunk and Cylinder head

l +1,0 -5,0	lg +4,0 -8,0	a max
70	59	14.0
…	…	
280	269	14.0

l +1.0 -10.0	lg +4.0 -14.0	a max
290	279	15.0
…	…	
450	439	15.0

l +5.0 -15.0	lg +11.0 -21.0	a max
460	446	20.0
…	…	
600	586	20.0

Stud-, large washer-, Hexagonal, Truss and Hexalobular head

l +1,0 -5,0	lg +10.0 -2.0	a max
70	59	8.0
…	…	
280	269	8.0

l +1.0 -5.0	lg +6.0 -6.0	a max
290	279	8.0
…	…	
450	439	8.0

l +5.0 -15.0	lg +17.0 -15.0	
460	446	14.0
…	...	
600	586	14.0

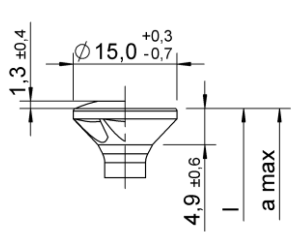
For non-standard use (optional, see Annex 9.1): Part without thread in the middle of screw/ Part without thread below head/ Combination of both.

All dimensions in mm.

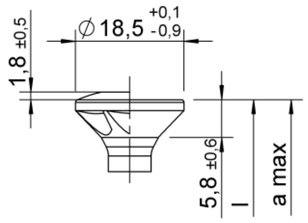
Lg can be reduced down to min 4xd.

WÜRTH self-tapping screws	Annex 9.61
ASSY plus VG screws, carbon steel – d = 8 mm	

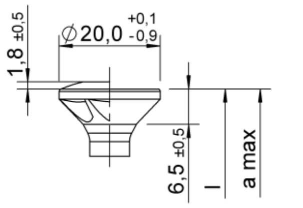
Head types for ASSY plus VG d = 10.0 mm, carbon steel



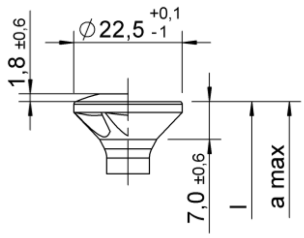
Countersunk head – design with and without raise, with and without milling pockets



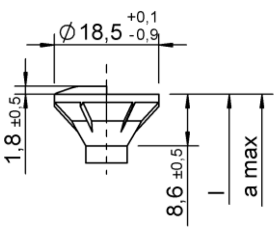
Countersunk head – design with and without raise, with and without milling pockets



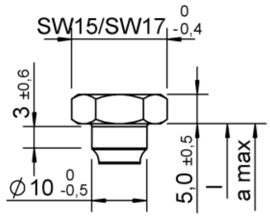
Countersunk head – design with and without raise, with and without milling pockets



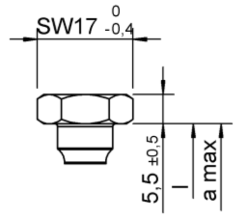
Countersunk head – design with and without raise, with and without milling pockets



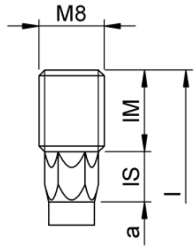
Countersunk head with cutter ribs – design with and without raise



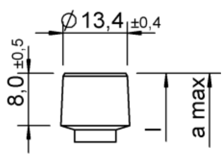
Kombi hexagonal head with and without collar



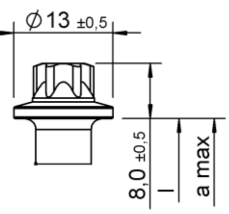
Kombi hexagonal head with and without collar



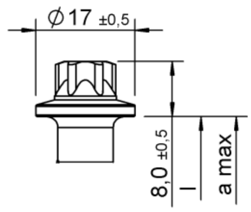
Stud head
Design with and without hexagonal part



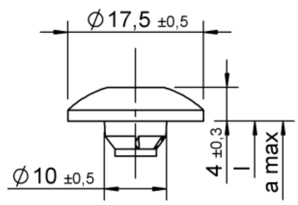
Cylinder head



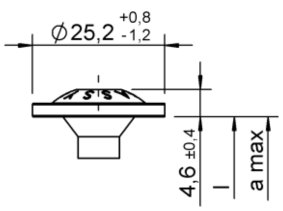
Hexalobular head with and without collar



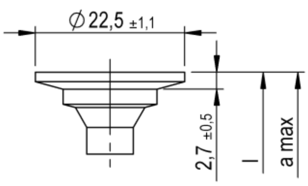
Hexalobular head with and without collar



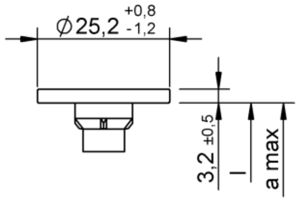
Truss head – design with and without cutter ribs or flange



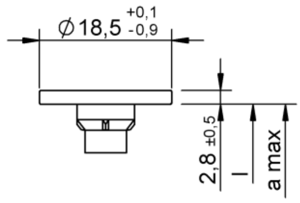
Large washer head I



Large washer head II – design with and without cutter ribs



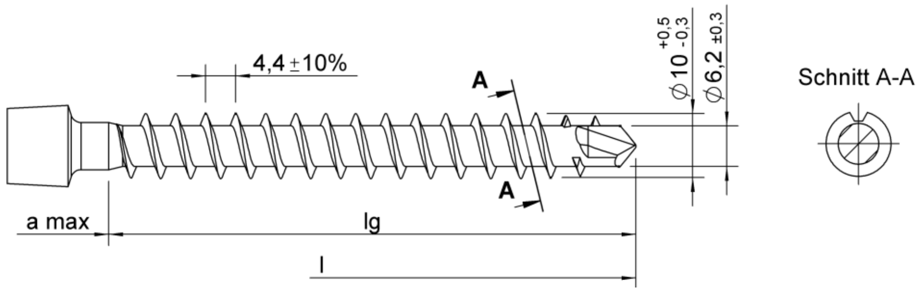
Large washer head III – design with and without cutter ribs



Large washer head III – design with and without cutter ribs

WÜRTH self-tapping screws	Annex 9.62
ASSY plus VG screws, carbon steel – d = 10 mm	

Thread types ASSY plus VG d = 10.0 mm, carbon steel



Design with and without cutting edges (see section (Schnitt) A-A), Design of drilling tip can be according to plus 3.0

Lengths for ASSY plus VG d = 10.0 mm, carbon steel

Countersunk and Cylinder head

l +1.0 -5.0	lg +5.0 -11.0	a max
100	88	18.0
…	…	
280	268	18.0

l +1.0 -10.0	lg +4.0 -14.0	a max
290	278	18.0
…	…	
450	438	18.0

l +5.0 -15.0	lg +12.0 -23.0	a max
460	445	20.0
…	…	
800	785	20.0

Stud-, large washer-, Hexagonal, Truss and Hexalobular head

l +1.0 -5.0	lg +8.0 -8.0	a max
100	88	15.0
…	…	
280	268	15.0

l +1.0 -5.0	lg +6.0 -6.0	a max
290	278	15.0
…	…	
450	438	15.0

l +5.0 -15.0	lg +15.0 -20.0	
460	445	20.0
…	...	
800	785	20.0

For non-standard use (optional, see Annex 9.1): Part without thread in the middle of screw/Part without thread below head/ Combination of both.

All dimensions in mm.
Lg can be reduced down to min 4 x d.

WÜRTH self-tapping screws	Annex 9.63
ASSY plus VG screws, carbon steel – d = 10 mm	

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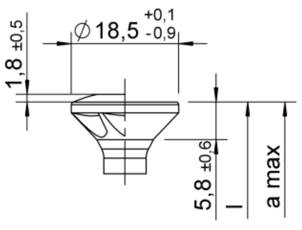
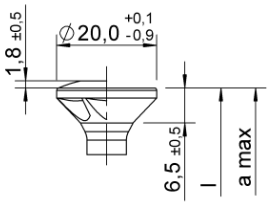
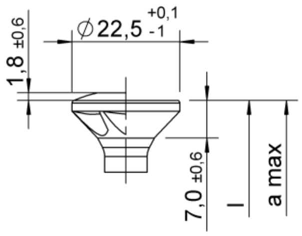
Head types for ASSY plus VG d = 12.0 mm, carbon steel



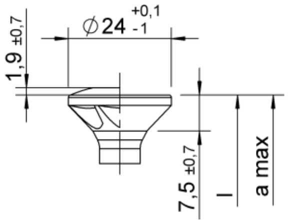
Countersunk head – design with and without raise, with and without milling pockets



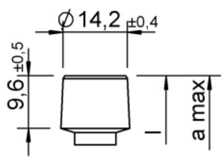
Countersunk head – design with and without raise, with and without milling pockets



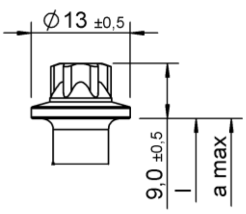
Countersunk head – design with and without raise, with and without milling pockets



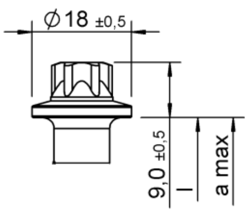
Countersunk head – design with and without raise, with and without milling pockets



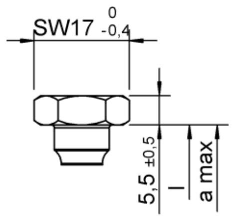
Cylinder head



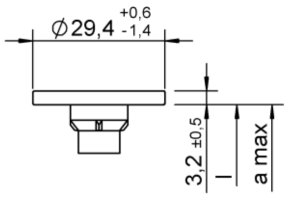
Hexalobular head with or without collar



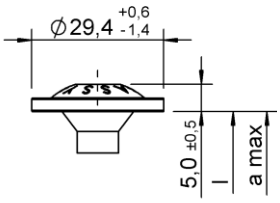
Hexalobular head with or without collar



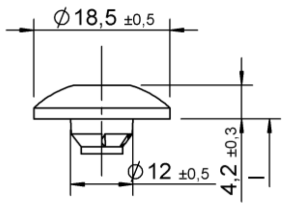
Kombi hexagonal head with and without collar



Large washer head III – design with and without cutter ribs



Large washer head I



Truss head – design with and without cutter ribs or flange

WÜRTH self-tapping screws	Annex 9.64
ASSY plus VG screws, carbon steel – d = 12 mm	

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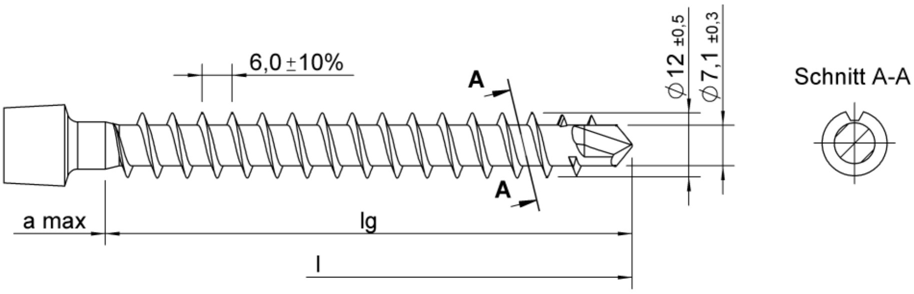
Thread types ASSY plus VG d = 12.0 mm, carbon steel



Design with and without cutting edges (see section (Schnitt) A-A), Design of drilling tip can be according to plus 3.0

Lengths for ASSY plus VG d = 12.0 mm, carbon steel

Countersunk and Cylinder head

l +1.0 -5.0	lg +6.0 -11.0	a max
120	105	21.0
…	…	
240	225	21.0

l +1.0 -10.0	lg +6.0 -16.0	
250	235	
…	…	
350	335	

l +1.0 -10.0	lg +4.0 -14.0	a max
360	233	26.0
…	…	
600	583	26.0

Large washer-, Hexagonal, Truss and Hexalobular head

l +1.0 -5.0	lg +10.0 -7.0	a max
120	105	17.0
…	…	
340	225	17.0

l +1.0 -10.0	lg +16.0 -20.0	a max
250	235	21
…	…	…
350	335	21

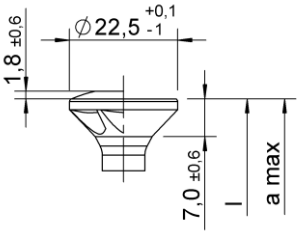
l +5.0 -15.0	lg +16.0 -20.0	a max
360	233	22.0
…	…	
600	583	22.0

For non-standard use (optional, see Annex 9.1): Part without thread in the middle of screw/ Part without thread below head/ Combination of both.

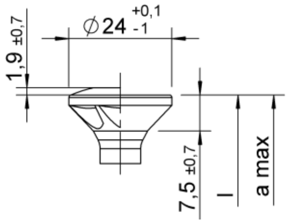
All dimensions in mm.
Lg can be reduced down to min 4 x d.

WÜRTH self-tapping screws	Annex 9.65
ASSY plus VG screws, carbon steel – d = 12 mm	

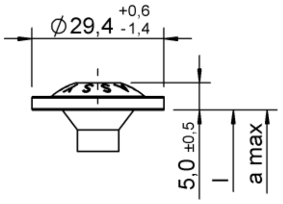
Head types for ASSY plus VG d = 14.0 mm, carbon steel



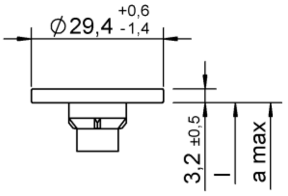
Countersunk head – design with and without raise, with and without milling pockets



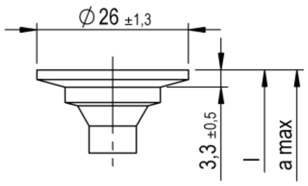
Countersunk head – design with and without raise, with and without milling pockets



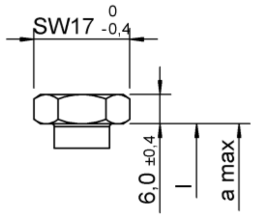
Large washer head I



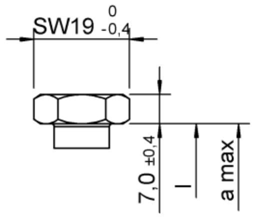
Large washer head III – design with and without cutter ribs



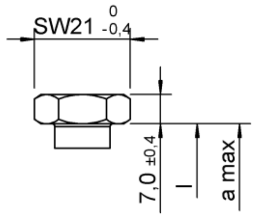
Large washer head II – design with and without cutter ribs



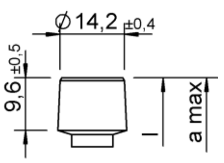
Kombi hexagonal head with or without collar



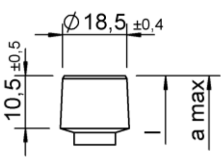
Kombi hexagonal head with or without collar



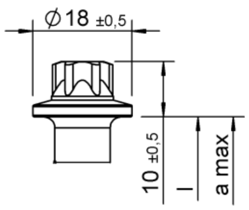
Kombi hexagonal head with or without collar



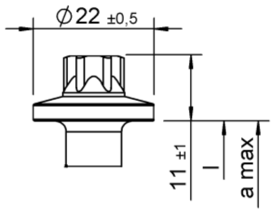
Cylinder head



Cylinder head



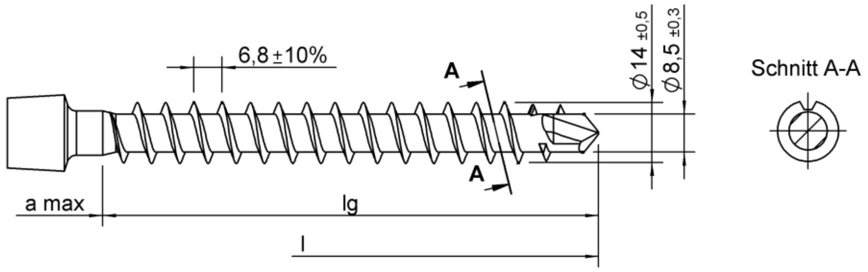
Hexalobular head with or without collar



Hexalobular head with or without collar

WÜRTH self-tapping screws	Annex 9.66
ASSY plus VG screws, carbon steel – d = 14 mm	

Thread types ASSY plus VG d = 14.0 mm, carbon steel



Design with and without cutting edges (see section (Schnitt) A-A), Design of drilling tip can be according to plus 3.0

Lengths for ASSY plus VG d = 14.0 mm, carbon steel

Countersunk and Cylinder head

l +1.0 -5.0	lg +5.0 -12.0	a max
120	105	22.0
…	…	
200	185	22.0

l +10.0 -20.0	lg +14.0 -32.0	a max
210	195	27.0
…	…	
800	785	27.0

l +10.0 -20.0	lg +14.0 -32.0	a max
810	795	27.0
…	…	
2000	1985	27.0

Large washer-, Hexagonal and Hexalobular head

l +1.0 -5.0	lg +10.0 -7.0	a max
120	105	17.0
…	…	
200	185	17.0

l +5.0 -15.0	lg +14.0 -22.0	a max
210	195	22.0
…	…	
800	785	22.0

l +10.0 -20.0	lg +19.0 -27.0	a max
810	795	22.0
…	…	
2000	1985	22.0

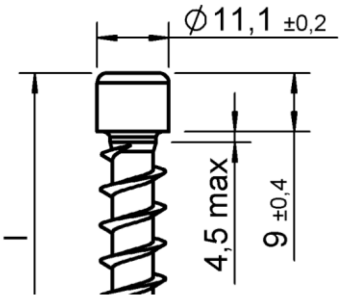
For non-standard use (optional, see Annex 9.1): Part without thread in the middle of screw/ Part without thread below head/ Combination of both.

All dimensions in mm.

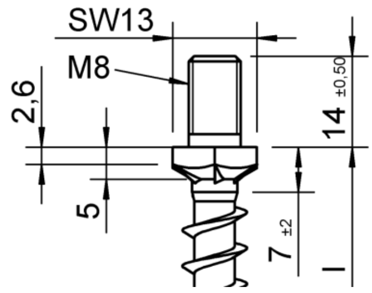
Lg can be reduced down to min 4xd.

WÜRTH self-tapping screws	Annex 9.67
ASSY plus VG screws, carbon steel – d = 14 mm	

Head types for ASSY Isotop, carbon steel

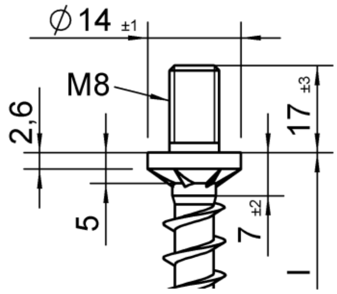


Cylinder head



Hexagon countersunk head with connection thread

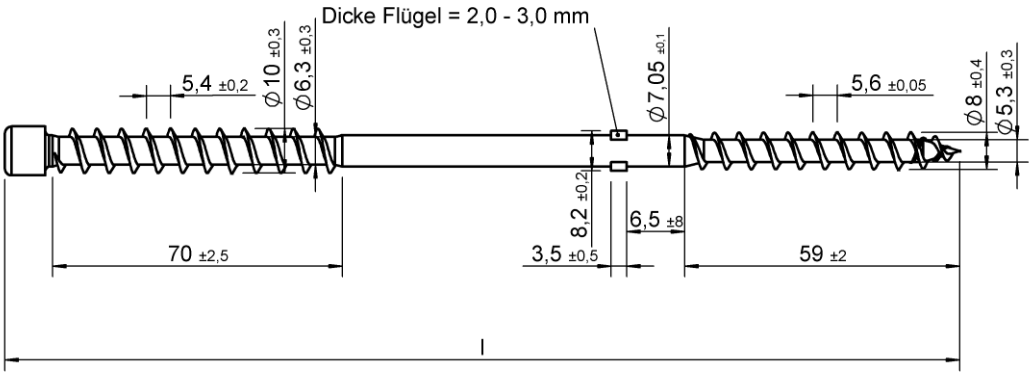
with or without cutter ribs



Round countersunk with connection thread

with or without cutter ribs

Thread types for ASSY Isotop, carbon steel



coarse thread –
Design with and without mating thread in thread d = 8 mm; with and without wings (Flügel)

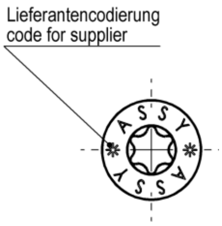
Lengths for ASSY Isotop, carbon steel

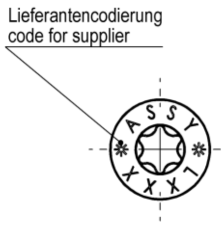
l +1.0 -3.0
160
…
1000

All dimensions in mm.

WÜRTH self-tapping screws	Annex 9.68
ASSY Isotop, carbon steel	

Head Marking



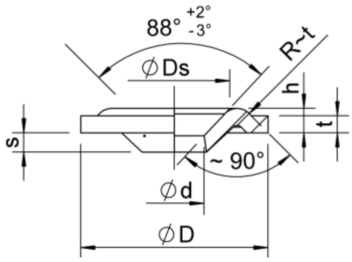


Marking at ASSY d = 3-6 mm of designs:
Countersunk heads, Kombi, Pan head and Large Washer head.
Named head types are possible without marking, too.

Marking at ASSY d = 7-14 mm of designs:
Countersunk heads, Truss head, Kombi, Pan head and Large washer head.
Named head types are possible without marking, too.

WÜRTH self-tapping screws	Annex 9.69
Head marking	

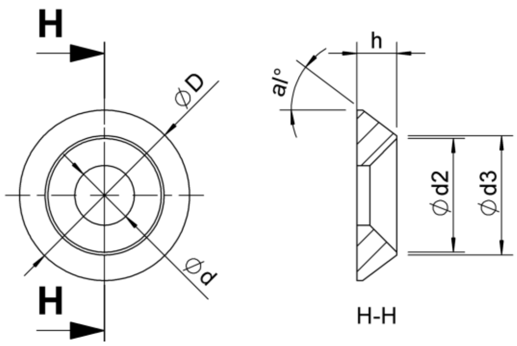
Countersunk washers pressed, material steel, aluminum and stainless steel



Dimensions (all dimensions in mm):

Size	t ±0.4	D ±0.5	d +0.5	h +0.5	Ds ±1	s ±0.75
6	2.5	22	6.5	3.0	13.0	2.4
8	3.0	28	8.5	3.5	16.0	3.3
10	3.0	33	10.5	4.3	19.5	3.4
12	4.0	42	12.5	5.0	23.0	3.0

Countersunk washers turned, material steel, aluminum and stainless steel



Dimensions steel and aluminum (all dimensions in mm):

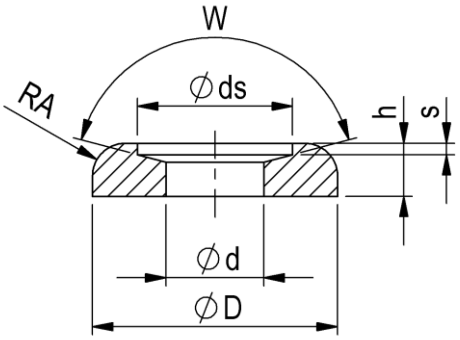
Size	d ±0.2	D ±0.5	h +0.3	al (°)	d2 ±0.3	d3 ±0.3
6	6.4	22.0	4.5	45	14.0	15.0
8	8.4	25.0	5.0	41	17.0	18.0
10	10.4	30.0	7.0	37	20.0	21.0
12	12.4	40.0	8.5	47	23.0	24.0

Dimensions stainless steel (all dimensions in mm):

Size	d1 ±0.2	D ±0.5	h +0.3	al (°)	d2 ±0.3	d3 ±0.3
6	6.4	22.0	3.8	45	14.0	14.5
8	8.4	25.0	5.0	45	18.4	19.0
10	10.4	30.0	7.0	37	20.0	21.0

WÜRTH self-tapping screws	Annex 9.70
Washers	

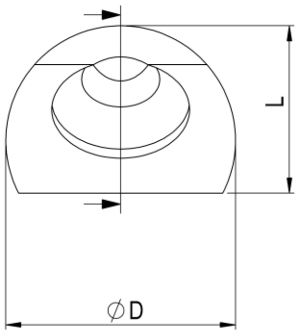
Washers for large washer head II, material steel and stainless steel, turned

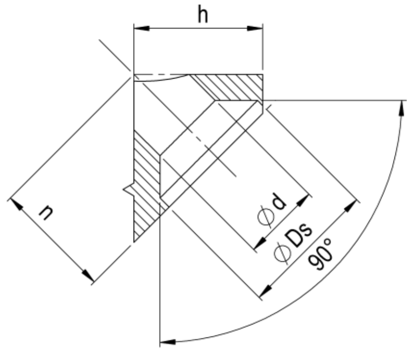


Dimensions (all dimensions in mm):

Size	d +0.4	D ±0.5	h ±0.3	s ±0.2	ds +0.5	RA ±0.1	W ±3°
5	9	15	3,5	1,0	11,7	2	150
6	11	22	5	1,1	14,5	3	150
7	12	25	5,5	1,4	16,2	3	150
8	12	30	6,5	1,4	19,0	4	150
12	17	42	8,5	1,9	27,5	5	150

Countersunk washers 45°, material steel and stainless steel, turned, used in wood-wood constructions



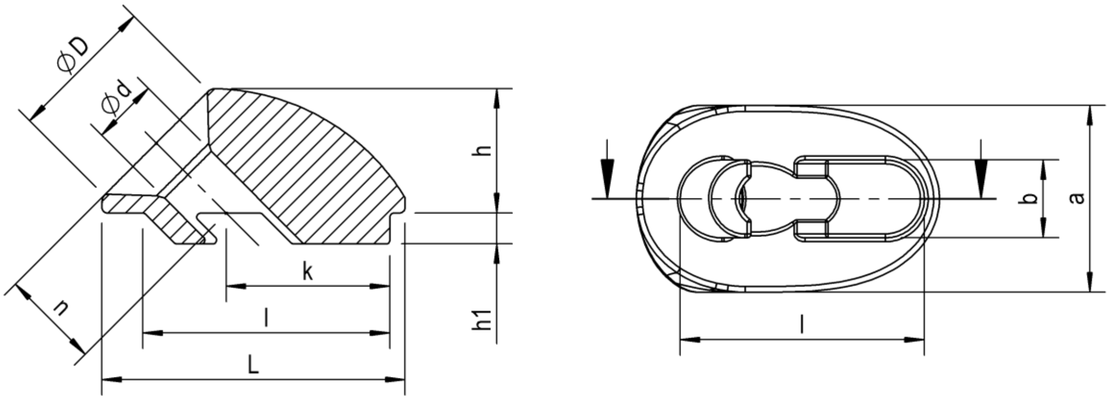


Dimensions (all dimensions in mm):

Size	d ±0.3	D ±0.5	Ds ±0.3	h ±0.5	L ±0.5	n ±0.5
8	8.5	25	15.9	14	18.2	12.9

WÜRTH self-tapping screws	Annex 9.71
Washers	

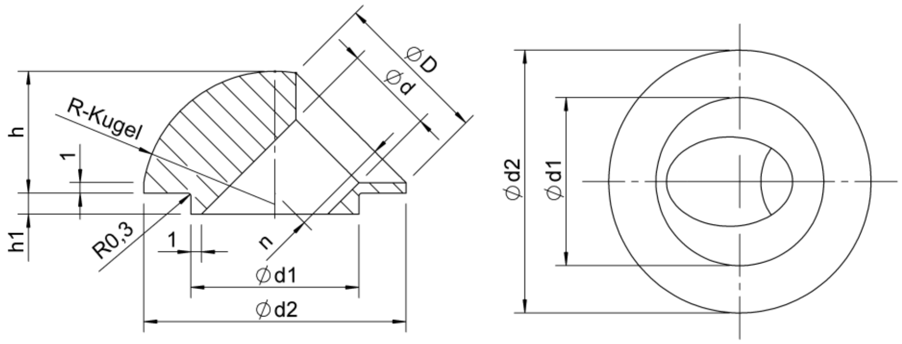
Countersunk washers 45°, material steel cast and stainless steel cast



Dimensions (all dimensions in mm):

Size	d ±0.3	D ±0.5	L ±1	a ±0.5	h ±0.8	h1 ±0.4	b ±0.2	l ±0.3	k ±0.3	n ±0.5
6	6.5	14.5	20.5	17.0	13.5	2.7	6.9	22.7	13.5	10.7
8	8.5	19.0	39.0	24.0	16.0	3.7	9.9	31.7	21.0	12.7
10	10.7	24.0	52.0	29.0	21.4	4.7	10.8	43.7	28.7	18.4
12	12.7	26.0	59.0	30.0	23.5	5.6	12.8	49.7	34.0	19.8

Countersunk washers 45°, material carbon steel and stainless steel, turned, used in steel-wood constructions



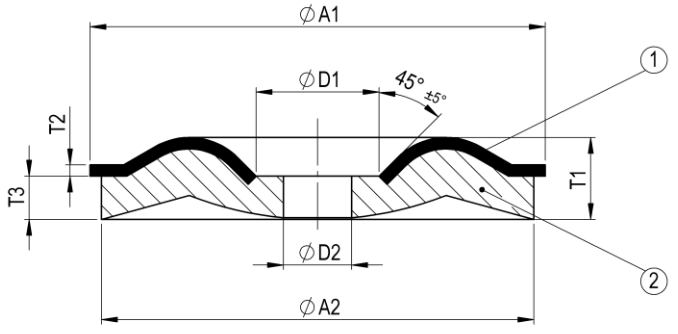
Dimensions (all dimensions in mm):

Size	d ±0.3	D ±0.5	d1 ±0.2	d2 ±0.5	h ±0.8	h1 ±0.3	n ±0.5	R-Sphere ±0.5
6	6.5	12	12.9	20.0	10.0	1.9	8.0	10
8	8.5	15	15.9	25.0	11.6	1.9	9.5	12.5

Washers: Galvanized steel and stainless steel material according to DIN 436, DIN 440, EN 7093 and EN 9021 with the following possible surface coatings: blank; brass-plated; nickel-plated; browned; zinc plated; zinc plated blue passivated, yellow chromated, black chromated; zinc-nickel plated, zinc-nickel plated passivated; zinc flakes; ruspert; HCP, completly or partially painted, hot tip galvanized; aluminium coating phosphated; delta coated - surface coatings can be combined

WÜRTH self-tapping screws	Annex 9.72
Washers	

Washer for tinner screws, material 1: stainless steel or copper, material 2: EPDM sealent (is not part of the ETA)



Dimensions (all dimensions in mm)

Size	øA1	øA2	øD1	øD2	T1	T2	T3
15	15 ±0.50	14 ±0.6	5.4 ±0.6	3.0 ±0.5	3.0 ±0.6	0.5 ±0.2	1.9 ±0.5
20	20 ±0.50	19 ±0.6	5.4 ±0.6	3.0 ±0.5	3.4 ±0.6	0.5 ±0.2	1.9 ±0.5
25	25 ±0.50	24 ±0.6	5.4 ±0.6	3.0 ±0.5	3.8 ±0.6	0.5 ±0.2	1.9 ±0.5

WÜRTH self-tapping screws

Washers

Annex 9.73