Deutsches Institut für Bautechnik

Public-law institution jointly founded by the federal states and the Federation

European Technical Assessment Body for construction products

Member of EOTA
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Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment ETA-12/0471 of 7 July 2025

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws
Product family to which the construction product belongs	BM Quick Drill screws for use in timber constructions
Manufacturer	Bi-Mirth Corporation No. 3, Alley 7, Lane 96, Ping Der Road TAI-CHUNG TAIWAN R.O.C
Manufacturing plant	Plant 1
This European Technical Assessment contains	68 pages including 6 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	EAD 130118-01-0603
This version replaces	ETA-12/0471 issued on 16 October 2023

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Specific Part

1 Technical description of the product

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws are self-tapping screws made of special carbon steel. BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III screws with an outer thread diameter of d = 6 mm to d = 10 mm and BM FT Quick Drill screws with d = 10 mm are made of special carbon or stainless steel. The screws made of special carbon steel are hardened. The screws have a corrosion protection according to Annex A.2.6 and an antifriction coating. The outer thread diameter is not less than 3.0 mm and not greater than 14.0 mm. The overall length of the screws is ranging from 16 mm to 1500 mm. Further dimensions are shown in Annex 6.

The washers are made from carbon or stainless steel. The dimensions of the washers are given in Annex 6.

All BM Quick Drill screws achieve a bending angle α of at least $45/d^{0.7} + 20$, where d is the outer thread diameter of the screws.

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 6
Characteristic yield moment	See Annex 2
Bending angle	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
Durability against corrosion	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. 130118-01-0603 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 7 July 2025 by Deutsches Institut für Bautechnik

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Head of Section

beglaubigt:
Stützer

Annex 1 – Specifications of intended use

A.1.1 Use of the BM Quick Drill screws only for:

– Static and quasi-static loads

A.1.2 Connection materials

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

– Solid timber (softwood) in accordance with EN 14081-1[1],
– Glued laminated timber (softwood) in accordance with EN 14080[2],
– Laminated veneer lumber LVL of softwood in accordance with EN 14374[3], arrangement of the screws only perpendicular to the plane of the veneers,
– Glued solid timber (softwood) in accordance with EN 14080,
– Cross-laminated timber (softwood) in accordance with European Technical Assessments.

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

– Plywood in accordance with EN 636[4] and EN 13986[5],
– Oriented Strand Board (OSB) in accordance with EN 300[6] and EN 13986,
– Particleboard in accordance with EN 312[7] and EN 13986,
– Fibreboards in accordance with EN 622-2[8], EN 622-3[9] and EN 13986,
– Cement-bonded particle boards in accordance with EN 634-2[10] and EN 13986,
– Solid-wood panels (SWP) in accordance with EN 13353[11] and EN 13986.

Wood-based panels are only arranged on the side of the screw head.

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws with an outer thread diameter of at least 6 mm are also used for the fixing of thermal insulation material on top of rafters or on wood-based members in vertical façades.

BM FT Quick Drill screws made of carbon steel are used for compression and tension reinforcing of timber structures perpendicular to the grain.

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 636:2012+A1:2015	Plywood - Specifications
5	EN 13986:2004+A1:2015	Wood-based panels for use in construction - Characteristics, evaluation of conformity and marking
6	EN 300:2006	Oriented strand boards (OSB) – Definition, classification and specifications
7	EN 312:2010	Particleboards - Specifications
8	EN 622-2:2004/AC:2005	Fibreboards – Specifications – Part 2: Requirements for hardboards
9	EN 622-3:2004	Fibreboards - Specifications - Part 3: Requirements for medium boards
10	EN 634-2:2007	Cement-bonded particleboards – Specifications – Part 2: Requirements for OPC bonded particleboards for use in dry, humid and external conditions
11	EN 13353:2022	Solid wood panels (SWP) – Requirements

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 1
Specifications of intended use	

A.1.3 Use Conditions (environmental conditions)

The corrosion protection of the BM Quick Drill screws is specified in Annex A.2.6.

A.1.4 Installation provisions

EN 1995-1-1[12] applies for the installation of BM Quick Drill screws.

A minimum of two screws shall be used for connections in load bearing timber structures. When fastening boards, battens or intermediate connections of wind bracing, only one screw may be used. This also applies to the fastening of rafters, purlins or similar to main beams or end plates if the component is fastened with at least two screws in total.

Only one screw may be used in structural connections if the minimum penetration length of the threaded part of the screw is $20 \cdot d$ and the screw is systematically subjected to axial loads. If 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 required.

The screws are driven into the wood-based member made of softwood without pre-drilling. The screw holes in steel members are pre-drilled with an adequate diameter greater than the outer thread diameter.

BM FT Quick Drill screws with an outer thread diameter of 13 mm and 14 mm and a length greater or equal than 800 mm are only driven in a guiding hole with a diameter of 7 mm and a minimum length of 80 mm.

If screws with an outer thread diameter $d \geq 8$ mm are driven into the wood-based member without pre-drilling, the structural solid timber, glued laminated timber, glued solid timber, laminated veneer lumber and cross laminated timber are from spruce, pine or fir.

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

Countersunk head screws may be used with washers in accordance with Annex 6. After inserting the screw, the washers touch the surface of the wood-based member completely.

By fastening screws in wood-based members the head of the screws is flush with the surface of the wood-based member. For cylinder head screws the head part remains unconsidered.

[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

Annex 2 – Characteristic values of the load-carrying capacities

A.2.1 General

All BM Quick Drill screws achieve a bending angle α of at least $45/d^{0.7} + 20$, where d is the outer thread diameter of the screws.

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

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

Where

α angle between screw axis and grain direction

d outer thread diameter of the screw.

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

Table A.2.1 Characteristic load-carrying capacities of BM Quick Drill screws made of carbon steel

Outer thread diameter [mm]	**3.0**	**3.5**	**4.0**	**4.5**	**5.0**	**6.0**	**8.0**	**10.0**	**12.0**	**13.0**	**14.0**
Characteristic yield moment $M_{y,k}$ [Nm]	1.5	1.9	3.1	3.6	6.7	10.0	20.0	30.0	42.0	60.0	68.0
Characteristic tensile strength $f_{tens,k}$ [kN]	3.2	3.6	5.4	5.9	9.0	12.0	21.0	27.0	36.0	55.0	55.0
Characteristic torsional strength $f_{tor,k}$ [Nm]	1.3	1.6	2.9	4.3	7.2	10.0	24.0	39.0	58.0	95.0	102.0

Table A.2.2 Characteristic load-carrying capacities of BM Quick Drill screws made of stainless steel

Steel grade	1.4301, 1.4567	1.4401, 1.4578, 1.4571	1.4301, 1.4567	1.4401, 1.4578, 1.4571	1.4301, 1.4567	1.4401, 1.4578, 1.4571
Outer thread diameter [mm]	**6.0**	**6.0**	**8.0**	**8.0**	**10.0**	**10.0**
Characteristic yield moment $M_{y,k}$ [Nm]	6.0	6.0	16.0	16.0	23.0	25.0
Characteristic tensile strength $f_{tens,k}$ [kN]	7.5	7.5	15.0	15.0	17.0	20.0
Characteristic torsional strength $f_{tor,k}$ [Nm]	7.5	7.5	19.0	19.0	30.0	32.0

A.2.2 Laterally loaded screws

The outer thread diameter d shall be used as effective diameter of the screw in accordance with 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.

A.2.3 Axially loaded screws

A.2.3.1 Slip modulus for mainly axially loaded screws

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:

$$K_{ser} = 25 \cdot d \cdot l_{ef} \quad \text{[N/mm]} \qquad (2.2)$$

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].

2.3.2 Axial withdrawal capacity – Characteristic withdrawal parameter

The characteristic withdrawal parameter of BM Quick Drill screws at an angle α = 90° to the grain based on a associated density of the wood-based member ρ_a of 350 kg/m³ is

$f_{ax,k}$ = 11 N/mm² for screws with 3.0 mm ≤ d ≤ 6 mm and
$f_{ax,k}$ = 10 N/mm² for screws with d ≥ 8 mm.

The characteristic withdrawal parameter is valid for solid timber, glued laminated timber, laminated veneer lumber (ρ_k ≤ 500 kg/m³) and layers of cross laminated timber made of softwood.

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 2
Characteristic values of the load-carrying capacities	

A.2.3.3 Head pull-through capacity – Characteristic head pull-through parameter

The characteristic value of the head pull-through parameter for BM Quick Drill screws for a characteristic density ρ_a of 350 kg/m³ of the timber and for wood-based panels like

- Plywood in accordance with EN 636 and EN 13986
- Oriented Strand Board (OSB) in accordance with EN 300 and EN 13986
- Particleboard in accordance with EN 312 and EN 13986
- Fibreboards in accordance with EN 622-2, EN 622-3 and EN 13986
- Cement-bonded particle boards in accordance with EN 634-2 and EN 13986,
- Solid-wood panels (SWP) in accordance with EN 13353 and EN 13986

with a thickness of more than 20 mm is

$f_{head,k}$ = 9.4 N/mm² for screws with countersunk or wafer head.

For wood-based panels a maximum characteristic density of 380 kg/m³ and for LVL a maximum characteristic density of 500 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 · 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.2.3.

Table A.2.3 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 (SWP)	12

For BM FT Quick Drill and BM DT Quick Drill screws with countersunk or wafer 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:

$$F_{ax,\propto,Rk} = max\left\{\begin{array}{l} f_{head,k} \cdot d_h^2 \cdot \left(\frac{\rho_k}{350}\right)^{0,8} \\ \frac{f_{ax,k} \cdot d \cdot l_{ef,k}}{1,2 \cdot cos^2\,\alpha + sin^2\,\alpha} \cdot \left(\frac{\rho_k}{350}\right)^{0,8} \end{array}\right. \quad (2.3)$$

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 2
Characteristic values of the load-carrying capacities	

For BM FT Quick Drill and BM DT Quick Drill screws with cylinder head the withdrawal capacity of the thread in the wood-based member with the screw head may be taken into account:

$$F_{ax,\propto,Rk} = \frac{f_{ax,k} \cdot d \cdot l_{ef,k}}{1.2 \cdot cos^2\,\alpha + sin^2\,\alpha} \cdot \left(\frac{\rho_k}{350}\right)^{0,8} \quad (2.4)$$

Where

$f_{head,k}$ characteristic value of the head pull-through capacity of the screw [N/mm²]

$f_{ax,k}$ characteristic value of the axial withdrawal capacity of the threaded part of the screw, $f_{ax,k}$ does not apply for wood-based panels [N/mm²],

d_h diameter of the screw head [mm],

ρ_k characteristic density of the wood-based member with the screw head [kg/m³],

$l_{ef,k}$ penetration length of the threaded part of the screw in the wood-based member with the screw head [mm], $l_{ef,k} \geq 4 \cdot d$

α angle α between screw axis and grain direction, $30° \leq \alpha \leq 90°$.

Outer diameter of washer $d_k > 32$ mm shall not be considered.

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

A.2.3.4 Compressive capacity of BM FT Quick Drill screws - Characteristic yield strength

The design axial capacity $F_{ax,Rd}$ of BM FT Quick Drill screws made of carbon steel embedded in solid timber, glued solid timber or glued laminated timber made from softwood with an angle between screw axis and grain direction of $30° \leq \alpha \leq 90°$ is the minimum of the axial resistance against pushing-in and the buckling resistance of the screw.

$$F_{ax,Rd} = min\begin{Bmatrix} f_{ax,d} \cdot d \cdot l_{ef} \\ \kappa_c \cdot N_{pl,d} \end{Bmatrix} \quad (2.5)$$

$f_{ax,d}$ 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]

$\kappa_c = 1.0$ for $\bar{\lambda}_k \leq 0,2$ (2.6)

$$\kappa_c = \frac{1}{k + \sqrt{k^2 - \bar{\lambda}_k^2}} \quad \text{for } \bar{\lambda}_k > 0,2 \quad (2.7)$$

$$k = 0.5 \cdot \left[1 + 0,49 \cdot (\bar{\lambda}_k - 0,2) + \bar{\lambda}_k^2\right] \quad (2.8)$$

and a relative slenderness ratio $\bar{\lambda}_k = \sqrt{\frac{N_{pl,k}}{N_{ki,k}}}$ (2.9)

Where:

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

$$N_{pl,k} = \pi \cdot \frac{d_1^2}{4} \cdot f_{y,k} \quad (2.10)$$

$f_{y,k}$ characteristic yield strength,
$f_{y,k}$ = 900 N/mm² for BM FT Quick Drill screws made of carbon steel with d ≥ 12 mm and
$f_{y,k}$ = 1000 N/mm² for BM FT Quick Drill screws made of carbon steel with 6 mm ≤ d ≤ 10 mm

d_1 inner thread diameter of the screw [mm]

$$N_{pl,d} = \frac{N_{pl,k}}{\gamma_{M1}} \quad (2.11)$$

γ_{M1} partial factor in accordance with EN 1993-1-1

Characteristic ideal elastic buckling load:

$$N_{ki,k} = \sqrt{c_h \cdot E_S \cdot I_S} \text{ [N]} \quad (2.12)$$

Elastic foundation of the screw:

$$c_h = (0{,}19 + 0{,}012 \cdot d) \cdot \rho_k \cdot \left(\frac{90° + \alpha}{180°}\right) \text{ [N/mm²]} \quad (2.13)$$

ρ_k characteristic density of the wood-based member [kg/m³],
α angle between screw axis and grain direction, 30° ≤ α ≤ 90°

Modulus of elasticity:

E_s = 210000 N/mm²

Second moment of area:

$$I_s = \frac{\pi \cdot d_1^4}{64} \text{ [mm⁴]} \quad (2.14)$$

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 2
Characteristic values of the load-carrying capacities	

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

A.2.4.1 Laterally or laterally *and* axially loaded screws

Screws in non pre-drilled holes

For BM Quick Drill screws minimum spacings and end and edge distances as well as the minimum member thickness are given in EN 1995-1-1, clause 8.3.1.2 and Table 8.2 as for nails in non-predrilled holes. Here, the outer thread diameter d shall be considered.

Minimum thickness for structural members made of solid timber, glued laminated timber, glued solid timber, laminated veneer lumber and cross laminated timber is $t = 30$ mm for screws with $d \leq 8$ mm, $t = 40$ mm for screws with $d = 10$ mm and $t = 100$ mm for screws with $d \geq 12$ mm, if the spacings parallel to the grain and the end distance is at least 25 d. In all other cases minimum thicknesses for BM Quick Drill screws in non-predrilled softwood timber members are given in EN 1995-1-1, clause 8.3.1.2 as for nails in non-predrilled holes.

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

Minimum distances from loaded or unloaded ends shall be at least $15 \cdot d$ for screws with outer thread diameter $d \geq 8$ mm and timber thickness $t < 5 \cdot d$.

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

A.2.4.2 Only axially loaded screws

For BM Quick Drill screws the minimum spacings, end and edge distances as well as the minimum member thickness are given in EN 1995-1-1, clause 8.3.1.2 and Table 8.2 as for nails in non-predrilled holes and clause 8.7.2, Table 8.6.

A.2.4.3 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.2.4. The definition of spacing, end and edge distance is shown in Figure A.2.1 and Figure A.2.2. 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: $10 \cdot d$
- Minimum penetration depth in the edge surface: $10 \cdot d$

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

Table A.2.4 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.2.1)	$4 \cdot d$	$6 \cdot d$	$6 \cdot d$	$2.5 \cdot d$	$6 \cdot d$	$2.5 \cdot d$
Edge surface (see Figure A.2.2)	$10 \cdot d$	$12 \cdot d$	$7 \cdot d$	$4 \cdot d$	$6 \cdot d$	$3 \cdot d$

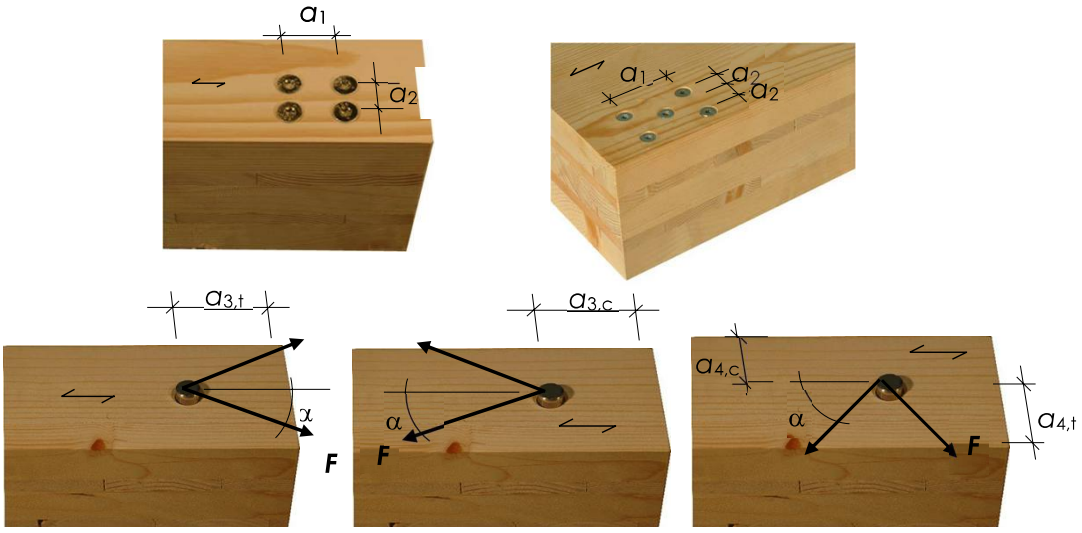


Figure A.2.1 Definition of spacing, end and edge distances in the plane surface of the cross laminated timber:

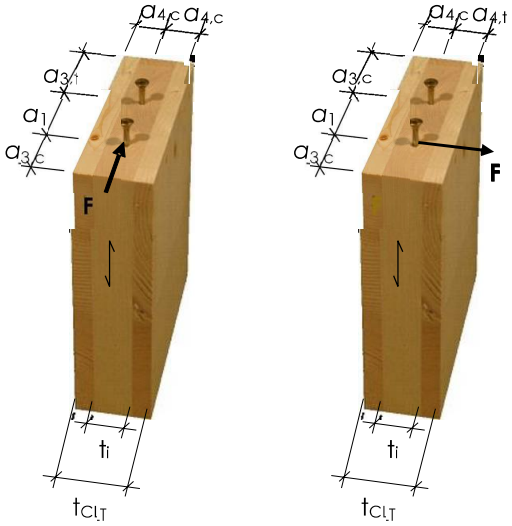


Figure A.2.2 Definition of spacing, end and edge distances in the edge surface of the cross laminated timber. For screws in the edge surface, a_1 and a_3 are parallel to the CLT plane face, a_2 and a_4 perpendicular to CLT plane face.

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.

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 2
Spacings, end and edge distances of the screws and minimum thickness of the wood-based material, insertion moment and durability against corrosion	

A.2.6 Durability against corrosion

Screws and washers made of carbon steel may have the coatings in accordance with Table A.2.5.

Table A.2.5 Coatings of the BM Quick Drill screws

Coating		**Minimum thickness of the coating [µm]**
Electrogalvanized	Yellow chromated	3
	Brown chromated	
	Black chromated	
	Blue passivated	
Nickel-plated		5
Zinc-nickel coating		5
Zinc flake coating		25
VG Coating		25
BM Nanocoating		25

Steel no. 1.4301 (A2), 1.4567 (A2), 1.4401 (A4) and 1.4578 (A4) 1.4571 (A5) are used for screws and washers made of stainless steel. Contact corrosion shall be avoided.

Annex 3 – Compression reinforcement perpendicular to the grain (informative)

A.3.1 General

Only BM FT Quick Drill screws made of carbon steel shall be used for compression reinforcement perpendicular to the grain. The provisions are valid for reinforcing timber members made of solid timber, glued solid timber or glued laminated timber made of 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 shall be flush with the timber surface.

A.3.2 Design

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

The design resistance of a reinforced contact area is:

$$R_{90,d} = min\begin{cases} k_{c,90} \cdot A_{ef} \cdot f_{c,90,d} + n \cdot min\begin{cases} R_{ax,d} \\ \kappa_c \cdot N_{pl,d} \end{cases} \\ B \cdot l_{ef,2} \cdot f_{c,90,d} \end{cases} \quad (3.1)$$

Where

$k_{c,90}$ parameter in accordance with EN 1995-1-1, clause 6.1.5

B bearing width [mm]

A_{ef} effective contact area in accordance with 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

$R_{ax,d}$ $= f_{ax,d} \cdot d \cdot l_{ef}$ [N] (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 in accordance with Annex A.2.3.3

$N_{pl,d}$ in accordance with Annex A.2.3.3 [N]

$l_{ef,2}$ effective contact length in the plane of the screw tips (see Figure A.3.1) [mm]
$l_{ef,2} = \{l_{ef} + (n_0 - 1) \cdot a_1 + \min(l_{ef}; a_{1,CG})\}$ for end supports (see Figure A.3.1 left)
$l_{ef,2} = \{2 \cdot l_{ef} + (n_0 - 1) \cdot a_1\}$ for intermediate supports (see Figure A.3.1 right)

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

a_1 Spacing a_1 in a plane parallel to grain, see chapter A.2.4.2 [mm]

$a_{1,CG}$ End distance of the centre of gravity of the threaded part in the timber member, see chapter A.2.4.2 [mm]

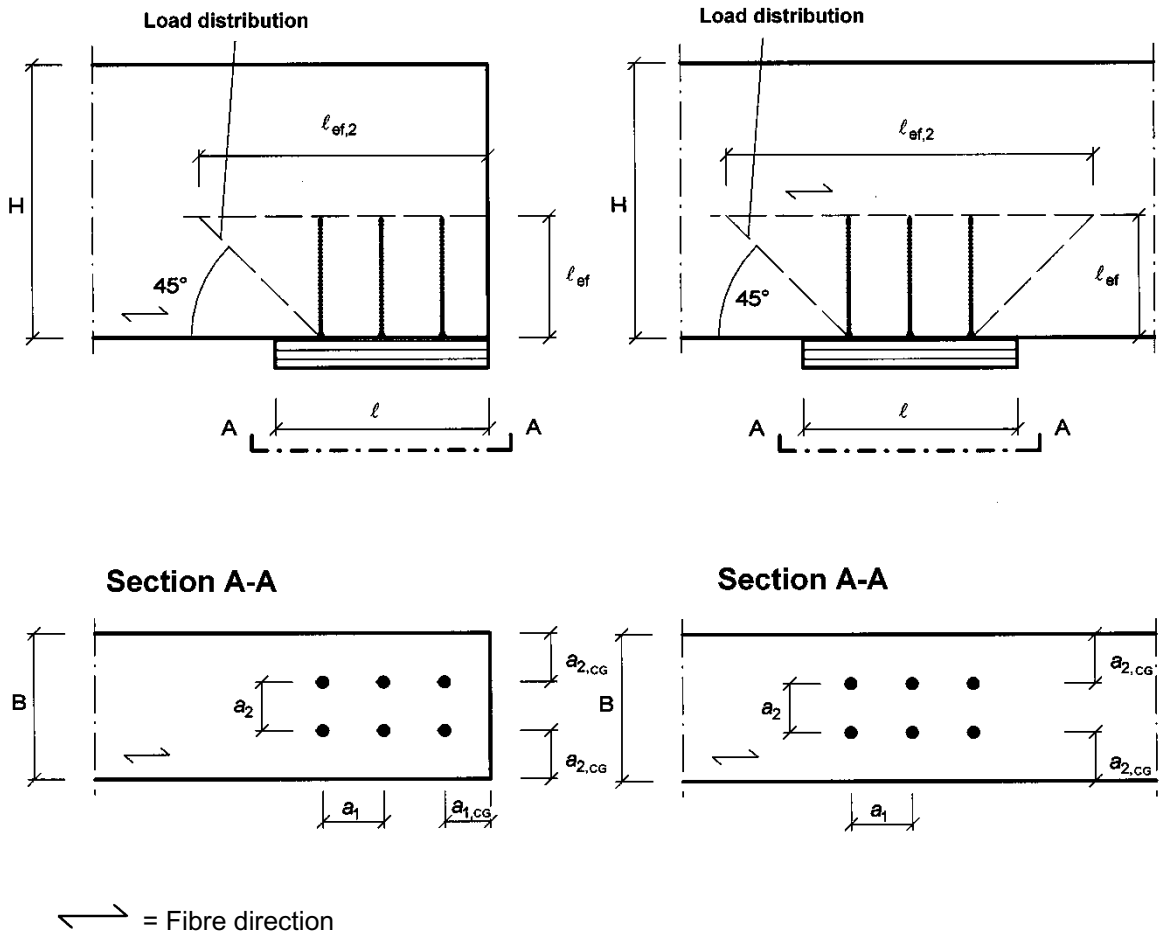


Figure A.3.1: Reinforced end support (left) and reinforced intermediate support (right)

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 3
Compression reinforcement perpendicular to the grain	

ANNEX 4 – Tensile reinforcement perpendicular to grain (informative)

A.4.1 General

Only BM Quickdrill screws fully threaded 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 made of softwood,
- glued laminated timber made of softwood,
- glued solid timber made of softwood,
- 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, notched beam supports, holes in beams, and connections with laterally loaded dowel-type fasteners 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 $\{f_{ax,d} \cdot d \cdot \ _{ef}; F_{t,Rd}\}$
$f_{ax,d}$ 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 of the threaded part 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 considered.

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 4
Tensile reinforcement perpendicular to the grain	

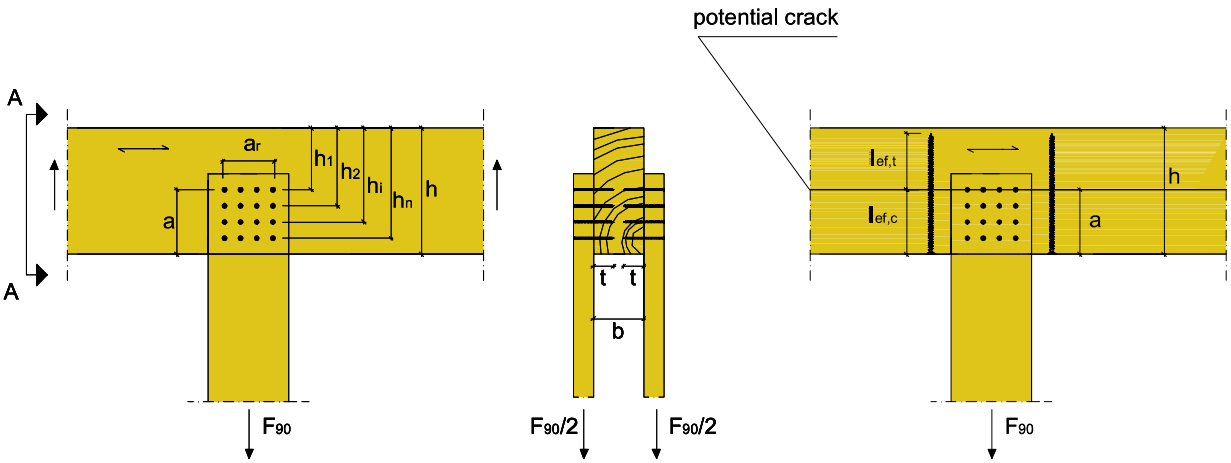


Figure A.4.1: Example for tensile reinforcement of a connection force perpendicular to the grain

A.4.2.2 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

$F_{ax,Rd}$ $= min\left\{ \begin{matrix} f_{ax,d} \cdot d \cdot l_{ef} \\ F_{t,Rd} \end{matrix} \right\}$

$f_{ax,d}$ 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 of the threaded part 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.

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 4
Tensile reinforcement perpendicular to the grain	

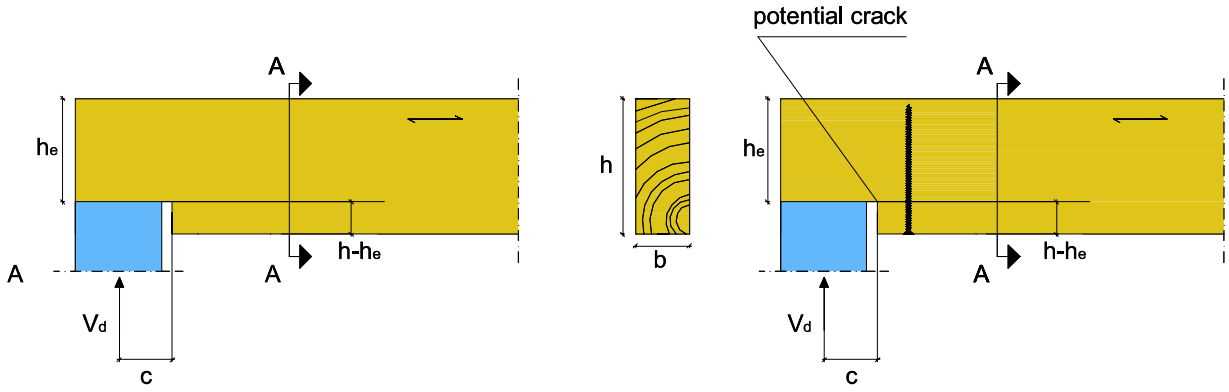


Figure A.4.2: Example for tensile reinforcement of a notched beam support

A.4.2.3 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:

$$\frac{0.3 \cdot F_{v,0,Ed}}{F_{ax,Rd}} \leq 1 \qquad (4.3)$$

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 of the threaded part at the screw tip or head (see Fig. A.4.3)

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 $n_{ef} = n$.

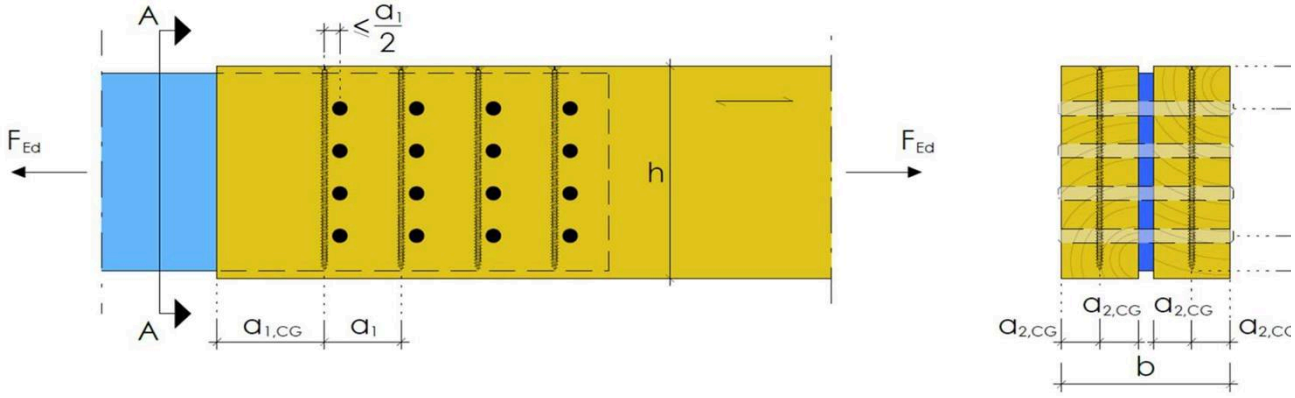


Figure A.4.3: Dowelled steel-to-timber connection with outer timber members and reinforcement

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 4
Tensile reinforcement perpendicular to the grain	

Annex 5 – Fastening of thermal insulation material on top of rafters (informative)

A.5.1 General

BM Quick Drill screws with an outer thread diameter of at least 6 mm are 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 is up to 300 mm. The thermal insulation material is applicable as insulation on top of rafters or for façades.
The counter battens are from solid timber in accordance with EN 14081-1. The minimum thickness t and the minimum width b of the counter battens are given in Table A.5.1:

Table A.5.1 Minimum thickness and minimum width of the counter battens

Outer thread diameter [mm]	Minimum thickness t [mm]	Minimum width b [mm]
6 and 8	30	50
10	40	60
12, 13 and 14	80	100

Instead of battens the wood-based panels specified in chapter A.5.2.1 can be used. Only screws with countersunk head are used for fixing wood-based panels on rafters with thermal insulation material as interlayer.

The minimum width of the rafters is 60 mm.

The spacing between screws is not more than 1.75 m.

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

The anchorage of wind suction forces shall be considered for design. Screws perpendicular to the grain of the rafter may be arranged where required.

A.5.2 Parallel inclined screws and thermal insulation material in compression

A.5.2.1 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 in accordance with EN 826[13], 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 counter battens the following wood-based panels may be used to cover the thermal insulation material if they are suitable for that use:

- Plywood in accordance with EN 636 and EN 13986,
- Oriented Strand Board (OSB) in accordance with EN 300 and EN 13986,
- Particleboard in accordance with EN 312 and EN 13986
- Fibreboards in accordance with EN 622-2, EN 622-3 and EN 13986.

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

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

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

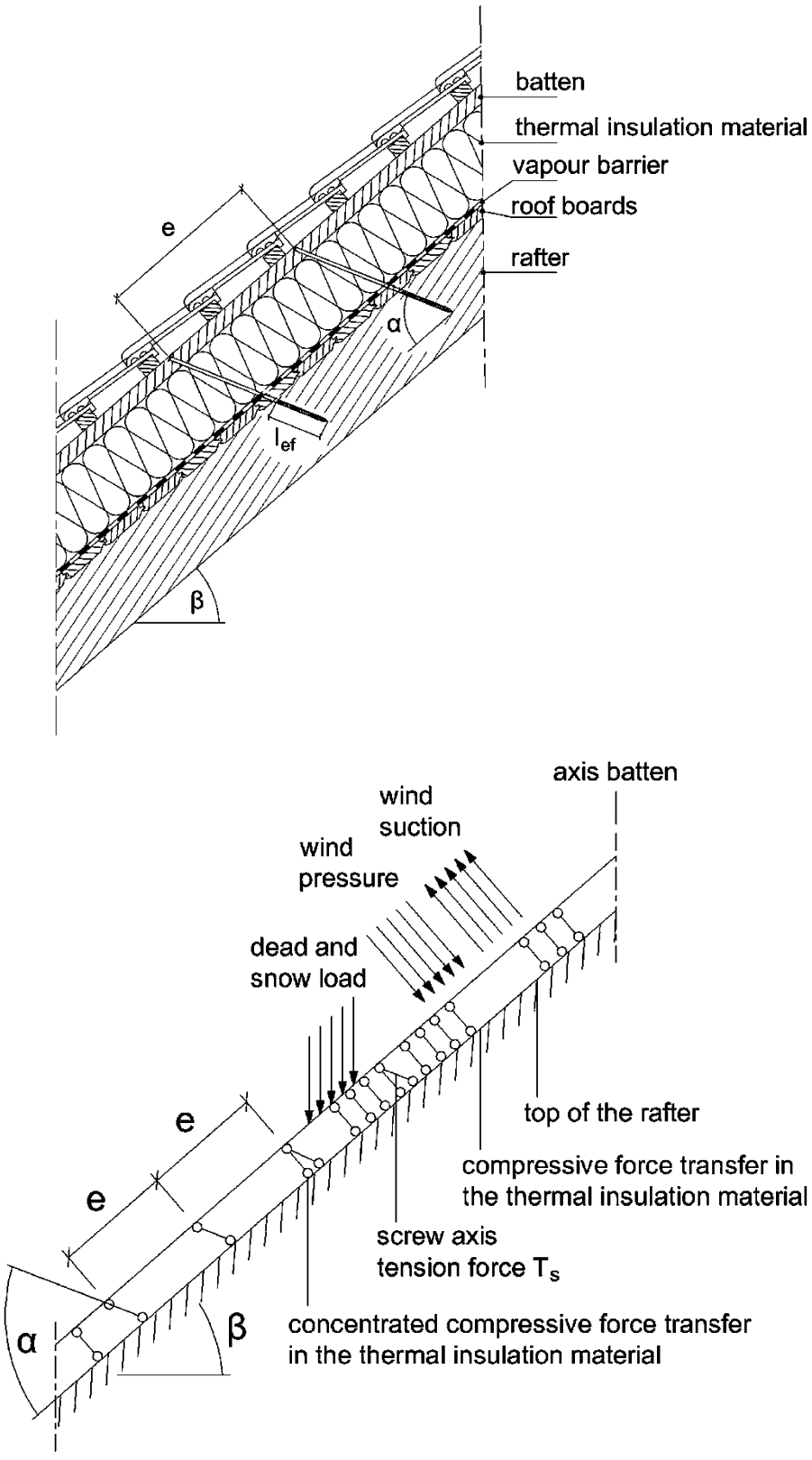


Figure A.5.1 Fastening of the thermal insulation material on top of rafters - structural system

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 5
Fastening of thermal insulation material on top of rafters	

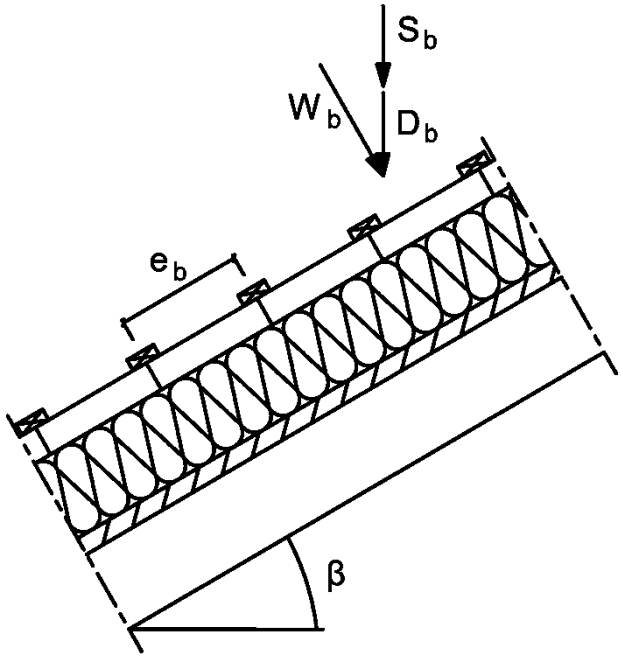


Figure A.5.2 Point loads F_b perpendicular to the battens

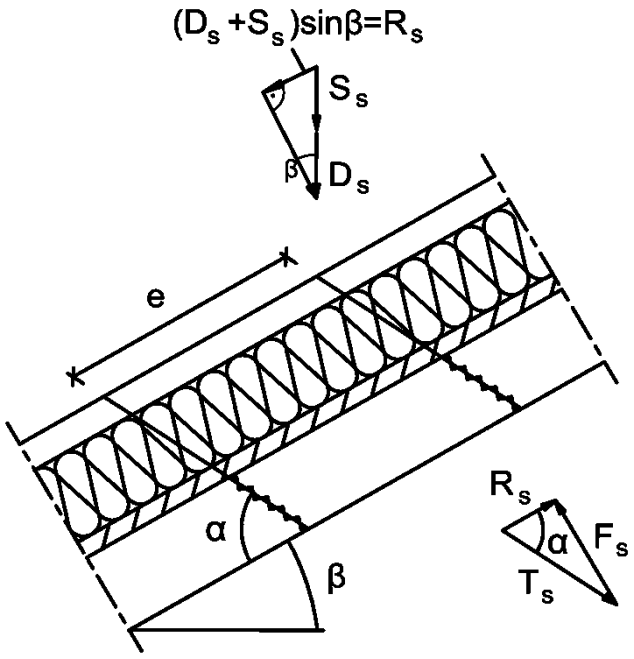


Figure A.5.3 Point loads F_s perpendicular to the battens, load application in the area of the screw heads

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 5
Fastening of thermal insulation material on top of rafters	

A.5.2.2 Design of the counter 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:

$$M_k = \frac{(F_{b,k} + F_{s,k}) \cdot l_{char}}{4} \tag{5.1}$$

where

l_{char} = characteristic length $l_{char} = \sqrt[4]{\frac{4 \cdot EI}{w_{ef} \cdot K}}$ (5.2)
EI = bending stiffness of the counter batten
K = coefficient of subgrade
w_{ef} = effective width of the thermal insulation material
$F_{b,k}$ = point loads perpendicular to the counter battens
$F_{s,k}$ = point loads perpendicular to the counter 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 counter batten or rafter, respectively. For further calculations, the effective width w_{ef} of the thermal insulation material may be determined in accordance with:

$$w_{ef} = w + t_{HI}/2 \tag{5.3}$$

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

$$K = \frac{E_{HI}}{t_{HI}} \tag{5.4}$$

The following condition shall be satisfied:

$$\frac{\sigma_{m,d}}{f_{m,d}} = \frac{M_d}{W \cdot f_{m,d}} \leq 1 \tag{5.5}$$

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 in accordance with:

$$V_k = \frac{(F_{b,k} + F_{S,k})}{2} \tag{5.6}$$

The following condition need to be satisfied:

$$\frac{\tau_d}{f_{v,d}} = \frac{1.5 \cdot V_d}{A \cdot f_{v,d}} \leq 1 \tag{5.7}$$

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

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 5
Fastening of thermal insulation material on top of rafters	

A.5.2.3 Design of the thermal insulation material

The characteristic value of the compressive stresses in the thermal insulation material shall be calculated in accordance with:

$$\sigma_k = \frac{1.5 \cdot F_{b,k} + F_{s,k}}{2 \cdot l_{char} \cdot w} \tag{5.8}$$

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

A.5.2.4 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:

$$T_{S,k} = \frac{R_{S,k}}{cos\ \alpha} \tag{5.9}$$

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 in accordance with 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:

$$F_{ax,\alpha,Rd} = min \begin{cases} \frac{f_{ax,d} \cdot d \cdot l_{ef} \cdot k_1 \cdot k_2}{1{,}2 \cdot cos^2\ \alpha + sin^2\ \alpha} \cdot \left(\frac{\rho_k}{350}\right)^{0.8} \\ f_{head,d} \cdot d_h^2 \cdot \left(\frac{\rho_k}{350}\right)^{0.8} \\ \frac{f_{tens,k}}{\gamma_{M2}} \end{cases} \tag{5.10}$$

Where

$f_{ax,d}$	design value of the axial withdrawal parameter 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 rafter [mm], $l_{ef} \geq 40$ mm
ρ_k	characteristic density of the wood-based member [kg/m³], for LVL $\rho_k \leq 500$ 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 in accordance with Annex 2 [N]
γ_{M2}	partial factor in accordance with EN 1993-1-1
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]

If equation (5.10) is fulfilled, the deflection of the counter battens does not need to be considered when designing the load-carrying capacity of the screws.

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 5
Fastening of thermal insulation material on top of rafters	

A.5.3 Alternatively inclined screws and thermal insulation material not in compression

A.5.3.1 Mechanical model

Depending on the screw spacing and the arrangement of tensile and compressive screws with different inclinations the counter 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 counter batten or rafter, respectively. The effective column length consequently equals the length of the screw between counter batten and rafter plus 20 mm.
- The counter batten is considered as a continuous beam with a constant span ● = A + B. The compressive screws constitute the supports of the continuous beam while the tensile screws transfer concentrated loads perpendicular to the counter 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:

For long battens the screw normal forces from a constant line load $q_{\perp}$ perpendicular to the roof plane are (compression is negative):

Compressive screw:
$$N_c = \frac{q_{\perp,k} \cdot (A+B) \cdot sin\,(90° - \alpha_2)}{sin\,(\alpha_1 + \alpha_2)} \tag{5.11}$$

Tensile screw:
$$N_t = \frac{q_{\perp,k} \cdot (A+B) \cdot sin\,(90° - \alpha_1)}{sin\,(\alpha_1 + \alpha_2)} \tag{5.12}$$

For long battens the screw normal forces from a constant line load $q_{||}$ parallel to the roof plane are (compression is negative):

Compressive screw:
$$N_c = \frac{q_{\parallel,k} \cdot (A+B)}{cos\,\alpha_1 + \frac{sin\,\alpha_1}{tan\,\alpha_2}} \tag{5.13}$$

Tensile screw:
$$N_t = \frac{q_{\parallel,k} \cdot (A+B)}{cos\,\alpha_2 + \frac{sin\,\alpha_2}{tan\,\alpha_1}} \tag{5.14}$$

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 5
Fastening of thermal insulation material	

The resulting normal forces are:

Compressive screw:
$$N_{c,k} = (A + B) \cdot \left(- \frac{q_{\parallel,k}}{\cos \alpha_1 + \sin \alpha_1 / \tan \alpha_2} - \frac{q_{\perp,k} \cdot \sin (90° - \alpha_2)}{\sin (\alpha_1 + \alpha_2)} \right) \quad (5.15)$$

Tensile screw:
$$N_{t,k} = (A + B) \cdot \left(\frac{q_{\parallel,k}}{\cos \alpha_2 + \sin \alpha_2 / \tan \alpha_1} - \frac{q_{\perp,k} \cdot \sin (90° - \alpha_1)}{\sin (\alpha_1 + \alpha_2)} \right) \quad (5.16)$$

Where

A, B distances of the screws in accordance with Figure A.5.4,

$q_{II,k}$ 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 α_1 and α_2 between screw axis and grain direction, $30° \le \alpha_1 \le 90°$, $30° \le \alpha_2 \le 90°$.

Only screws with full or double thread are used.

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

$$F_{ZS,k} = (A + B) \cdot \left(\frac{q_{\parallel,k}}{1/\tan \alpha_1 + 1/\tan \alpha_2} - \frac{q_{\perp,k} \cdot \sin (90° - \alpha_1) \cdot \sin \alpha_2}{\sin (\alpha_1 + \alpha_2)} \right) \quad (5.17)$$

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.5.5.

The counter battens fixed on the rafter shall be supported perpendicular to the load-bearing plane.

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 5
Fastening of thermal insulation material on top of rafters	

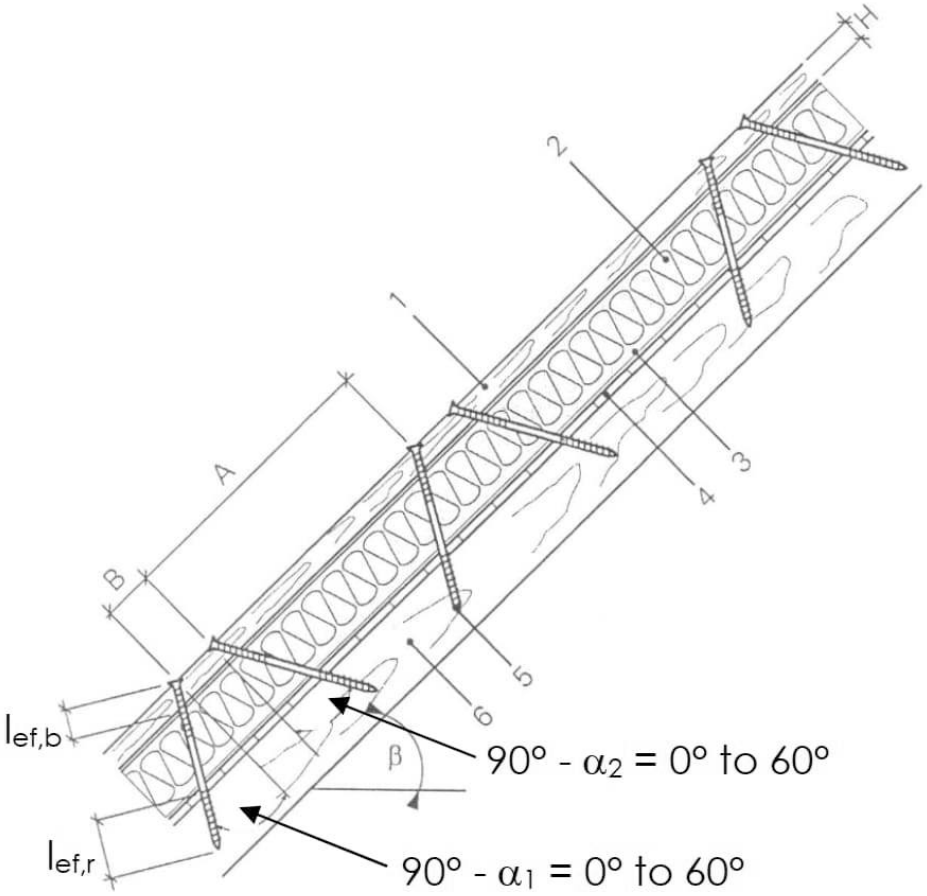


Figure A.5.4 Fastening of thermal insulation material on top of rafters – Structural system for alternatively inclined screws

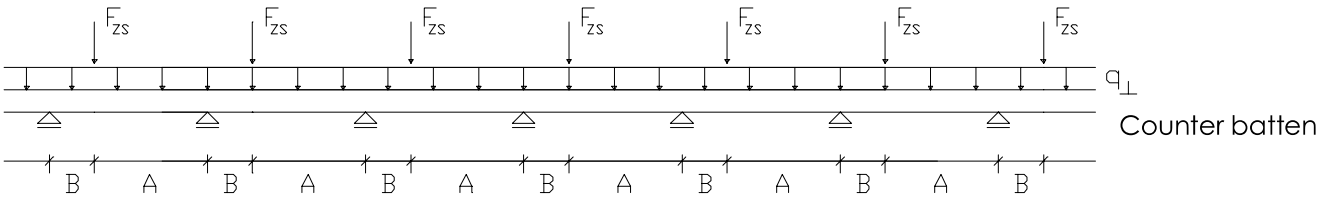


Figure A.5.5 Continuous counter batten under constant line loads from actions on the roof plane $q_\perp$ and concentrated loads from tensile screws F_{zs}

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 5
Fastening of thermal insulation material on top of rafters	

A.5.3.2 Design of the screws

The characteristic value of the withdrawal capacity a screw loaded in tension or compression may be calculated as given in equation (5.18).

$$F_{ax,\alpha,Rk} = min\begin{cases} \dfrac{f_{ax,d} \cdot d \cdot l_{ef,b}}{1{,}2 \cdot cos^2\,\alpha + sin^2\,\alpha} \cdot \left(\dfrac{\rho_{b,k}}{350}\right)^{0.8} \\ \dfrac{f_{ax,d} \cdot d \cdot l_{ef,r}}{1{,}2 \cdot cos^2\,\alpha + sin^2\,\alpha} \cdot \left(\dfrac{\rho_{r,k}}{350}\right)^{0.8} \end{cases} \quad (5.18)$$

Where

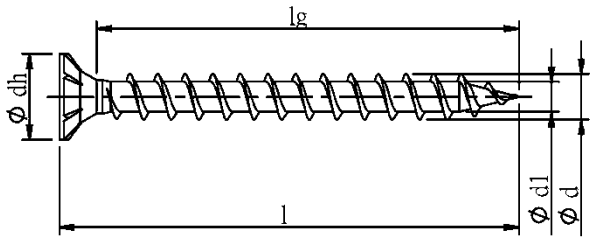
$f_{ax,k}$	withdrawal parameter [N/mm²],
d	outer thread diameter of the screw [mm],
$l_{ef,b}$	penetration depth of the threaded part in the batten [mm],
$l_{ef,r}$	penetration depth of the threaded part in the rafter [mm],
$\rho_{b,k}$	characteristic density of the batten [kg/m³],
$\rho_{r,k}$	characteristic density of the rafter in [kg/m³],
α	angle α_1 or α_2 between screw axis and grain direction, 30° ≤ α_1 ≤ 90°; 30° ≤ α_2 ≤ 90°,

The load-carrying capacity of the BM Quick Drill screw itself has to be checked additionally. For screws loaded in tension the characteristic tensile capacity is given in section A.2.3.2, for screws in compression, the load-carrying capacity is limited by the buckling capacity of the screw according to Table A.5.2 depending on the free screw length between batten and rafter.

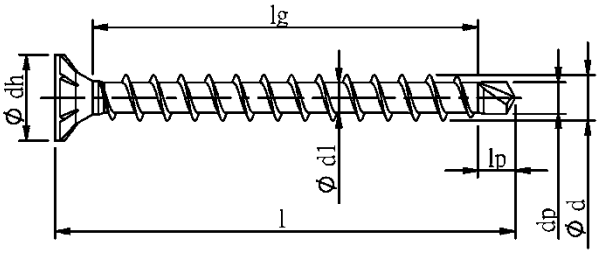
Table A.5.2 Characteristic load-carrying capacity of screws $\kappa_c \cdot N_{pl,k}$ in kN

Free screw length [mm]	BM FT Quick Drill screws						BM DT Quick Drill screws		
	6 mm	8 mm	10 mm	12 mm	13 mm	14 mm	6 mm	8 mm	10 mm
≤ 100	1.51	4.07	7.78	11.7	18.6	22.7	1.91	5.72	12.0
120	1.15	3.11	6.01	9.22	14.9	18.4	1.44	4.39	9.39
140	0.89	2.44	4.76	7.38	12.0	15.0	1.13	3.46	7.50
160	0.72	1.98	3.86	6.03	9.90	12.4	0.91	2.80	6.10
180	0.59	1.62	3.19	5.00	8.27	10.4	0.74	2.32	5.06
200	0.49	1.36	2.68	4.22	7.00	8.79	0.62	1.94	4.26
220	0.41	1.15	2.28	3.60	5.99	7.54	0.52	1.65	3.65
240		0.99	1.96	3.12	5.18	6.53		1.42	3.14
260		0.86	1.71	2.72	4.53	5.71		1.23	2.73
280		0.75	1.50	2.39	4.00	5.03		1.08	2.40
300		0.67	1.32	2.11	3.55	4.49		0.95	2.13
320		0.59	1.18	1.88	3.17	4.01		0.85	1.90
340		0.53	1.06	1.69	2.84	3.60		0.76	1.70
360		0.48	0.95	1.53	2.57	3.25		0.69	1.53
380		0.43	0.86	1.38	2.33	2.95		0.62	1.39
400		0.39	0.79	1.26	2.12	2.69		0.57	1.27
420		0.36	0.72	1.15	1.94	2.46		0.52	1.16
440			0.66	1.06	1.79	2.26			1.06
460			0.61	0.98	1.65	2.09			0.98
480			0.56	0.90	1.52	1.93			0.91
500			0.52	0.84	1.41	1.79			0.84
520			0.48	0.78	1.31	1.67			0.78
540				0.73	1.23	1.55			
560				0.68	1.15	1.45			

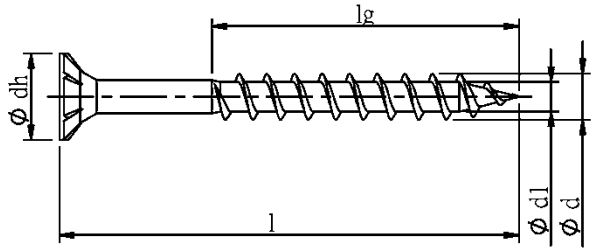
1) BM Quickdrill



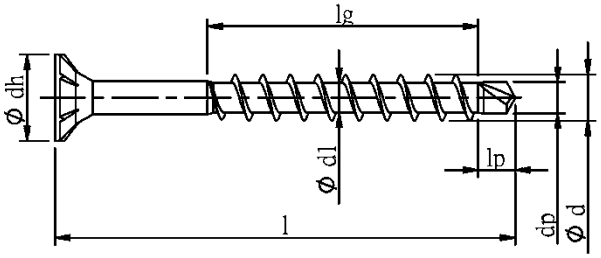
Full thread without drilling tip



Full thread with drilling tip

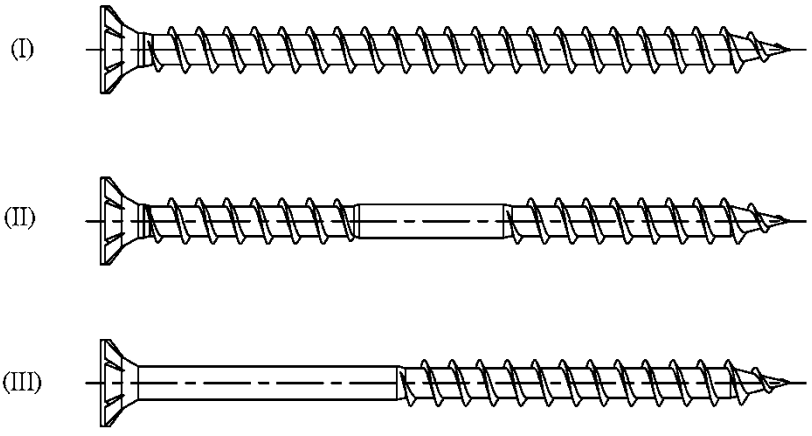


Partial thread without drilling tip



Partial thread with drilling tip

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



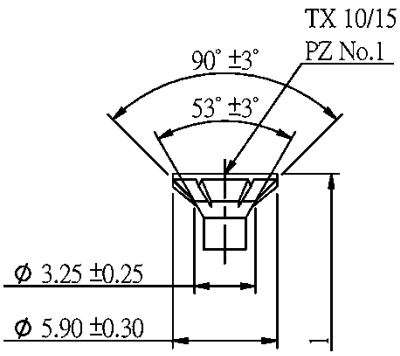
Screws made of carbon steel

Possible Surface Coatings: Blank, Nickel-Plated, Browned, Black Zinc Chromated, Yellow Zinc Chromated, Blue Passivated Zinc-Nickel Coating, Zinc Flake, VG Coating, BM Nanocoating.

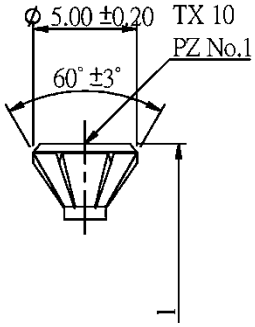
BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.1
General description	

Deutsches Institut für Bautechnik DIBt

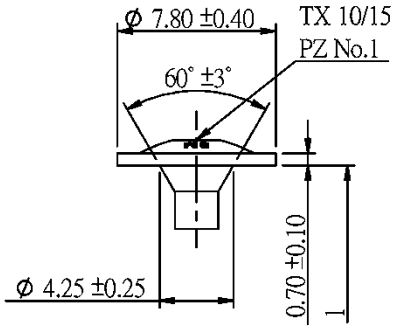
Head Types for d=3.0 mm



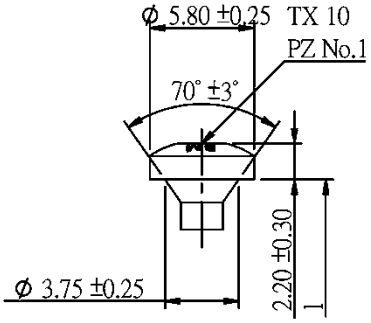
Countersunk Head with cutter ribs - design with and without raise



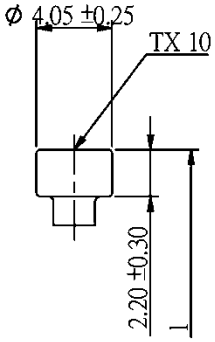
Single Countersunk Head design with and without raise



Wafer Head



Pan Head

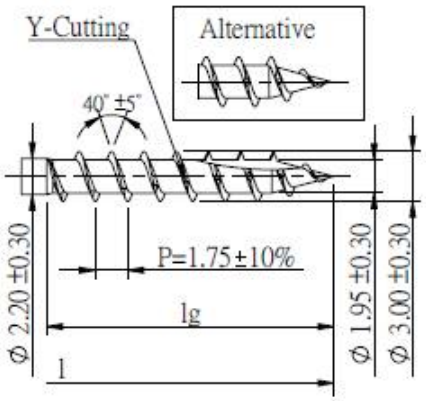


Cylinder Head

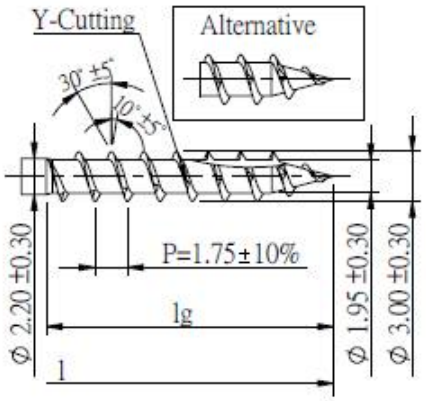
BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.2
Screws with d = 3 mm made of carbon steel	

Deutsches Institut für Bautechnik DIBt

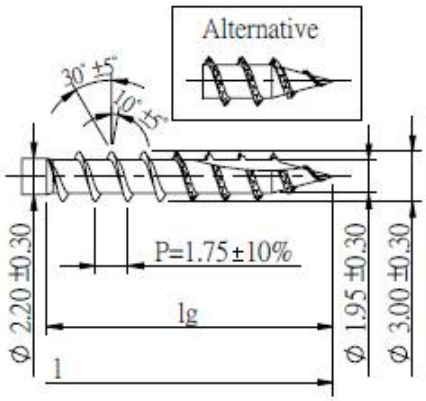
Thread Types d=3.0 mm



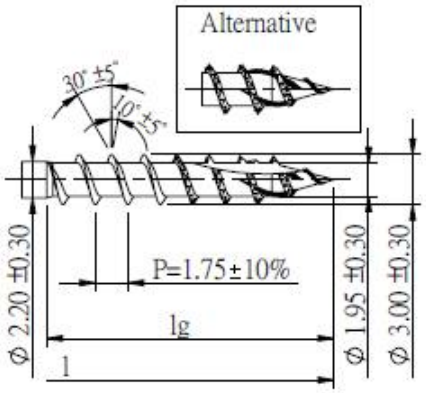
Quickdrill



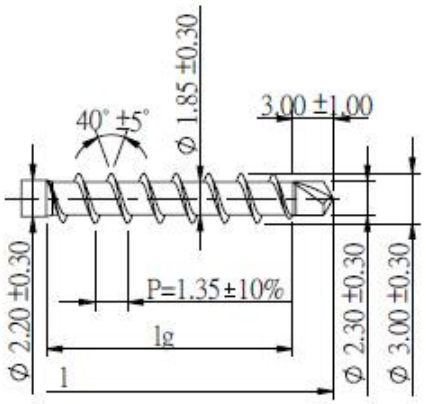
Quickdrill +



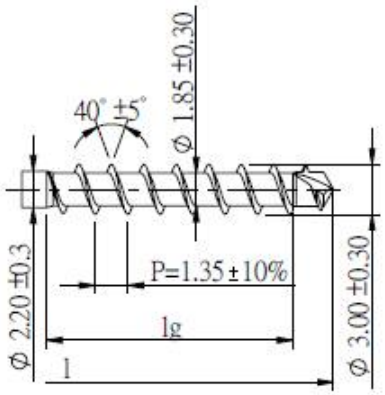
Quickdrill II



Quickdrill III



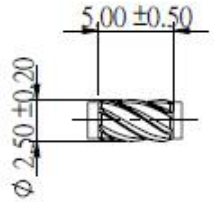
Quickdrill DP



Quickdrill DP+

Length for d = 3.0 mm

l	lg	Shank cutter at partial thread
16~30 (±1.5 mm)	12~20 (±1.5 mm)	over all lengths optional
30~50 (±2.0 mm)		



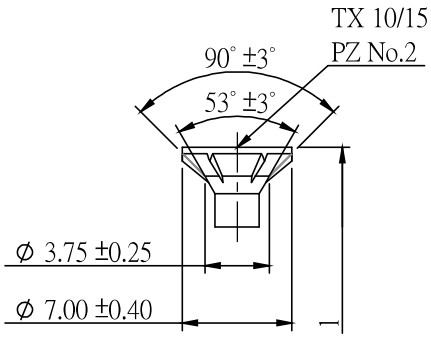
Shank cutter

The thread lengths can be manufactured to customer specific within lg min and lg max.
All dimensions in mm.

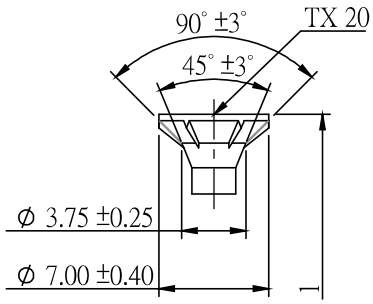
BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.3
Screws with d = 3 mm made of carbon steel	

Deutsches Institut für Bautechnik DIBt

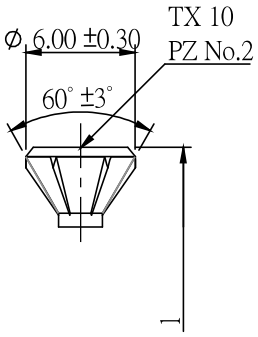
Head Types for d=3.5 mm



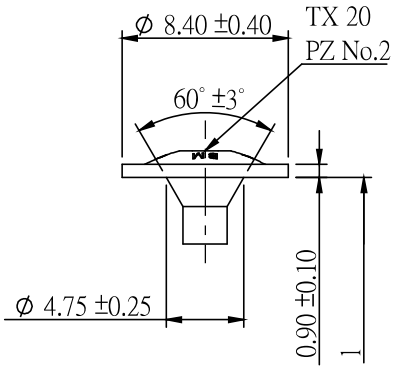
Countersunk Head with cutter ribs - design with and without raise



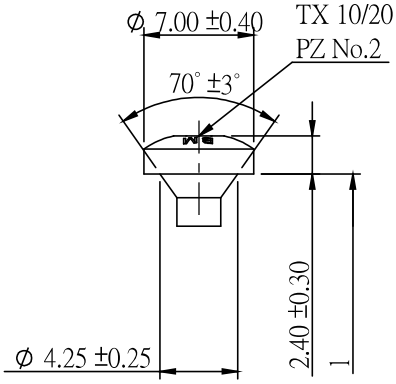
S Countersunk Head with cutter ribs



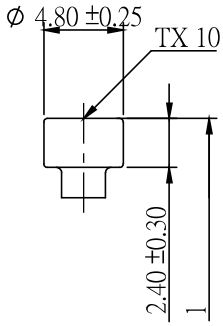
Single Countersunk Head design with and without raise



Wafer Head



Pan Head



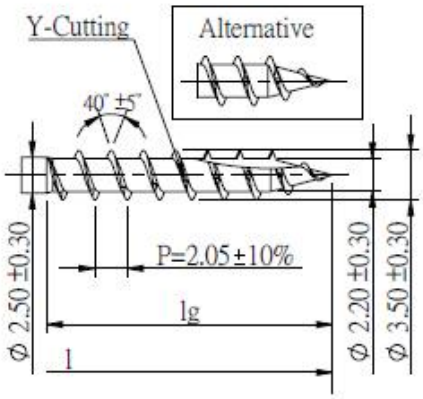
Cylinder Head

All dimensions in mm.

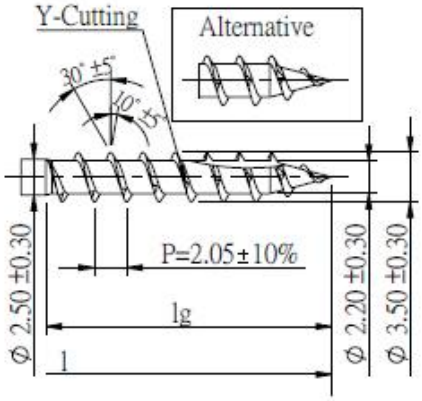
BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.4
Screws with d = 3.5 mm made of carbon steel	

Deutsches Institut für Bautechnik DIBt

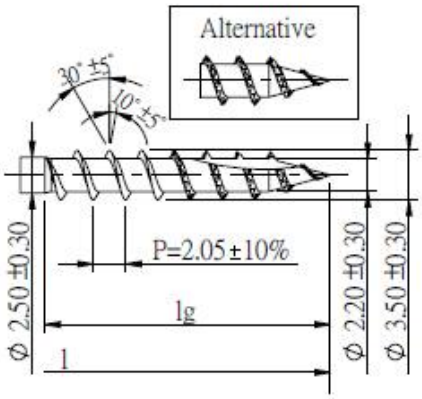
Thread Types d=3.5 mm



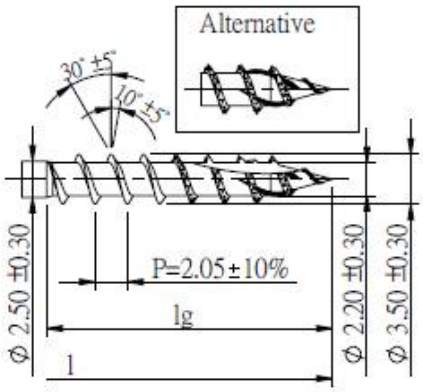
Quickdrill



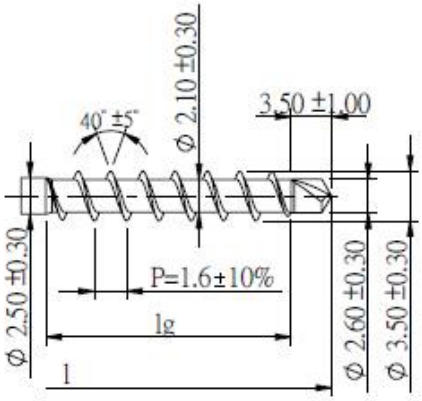
Quickdrill +



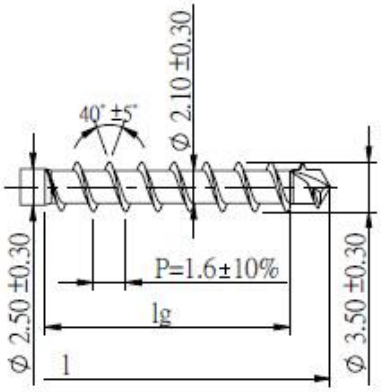
Quickdrill II



Quickdrill III



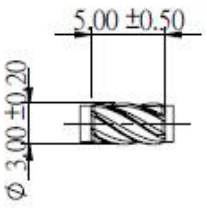
Quickdrill DP



Quickdrill DP+

Length for d = 3.5 mm

l	lg	Shank cutter at partial thread
18~30 (±1.5 mm)	14~30 (±1.5 mm)	over all lengths optional
30~50 (±2.0 mm)		



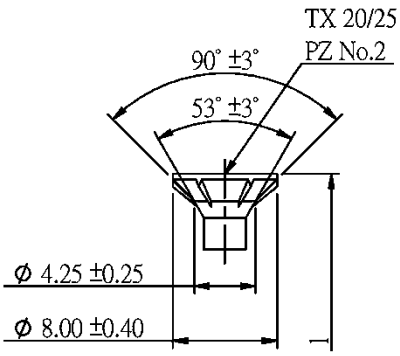
Shank cutter

The thread lengths can be manufactured to customer specific within lg min and lg max.
All dimensions in mm.

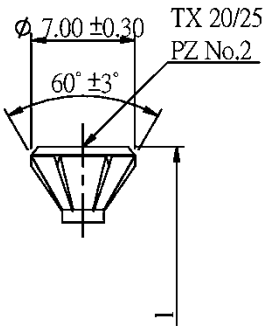
BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.5
Screws with d = 3.5 mm made of carbon steel	

Deutsches Institut für Bautechnik DIBt

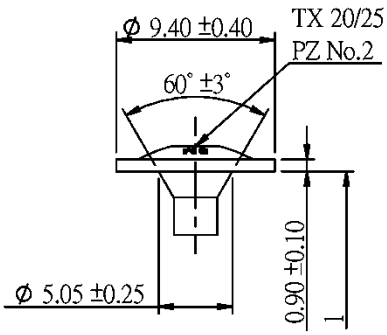
Head Types for d=4.0 mm



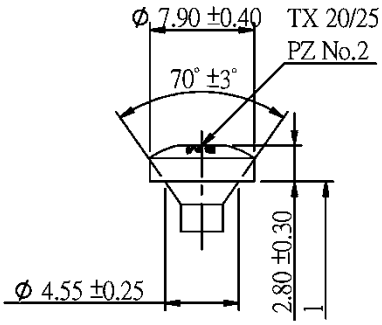
Countersunk Head with cutter ribs - design with and without raise



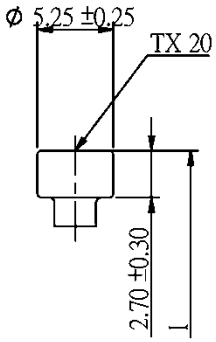
Single Countersunk Head design with and without raise



Wafer Head



Pan Head

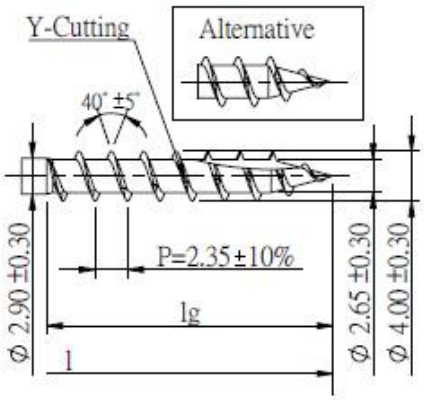


Cylinder Head

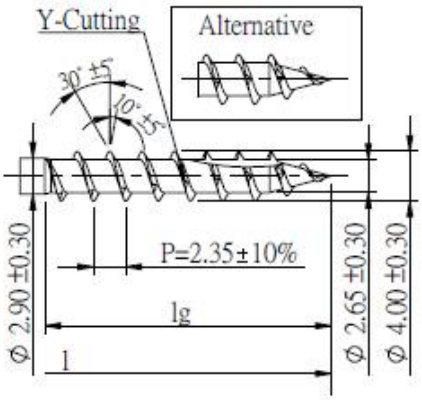
BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.6
Screws with d = 4 mm made of carbon steel	

Deutsches Institut für Bautechnik DIBt

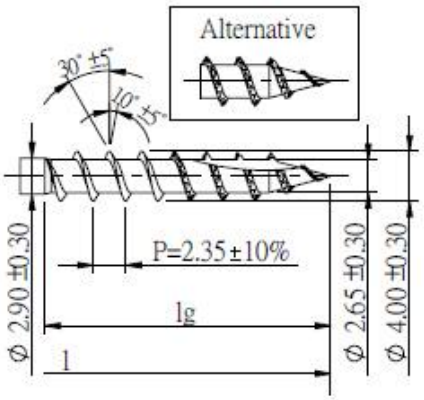
Thread Types d=4.0 mm



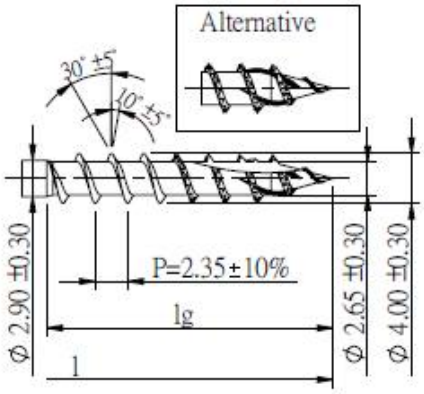
Quickdrill



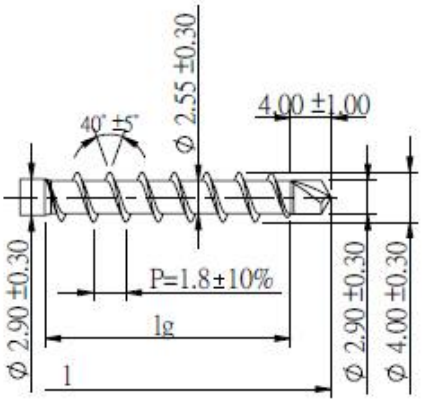
Quickdrill +



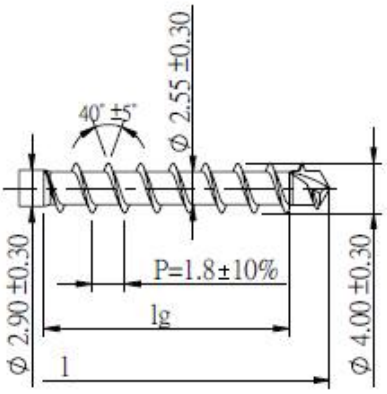
Quickdrill II



Quickdrill III



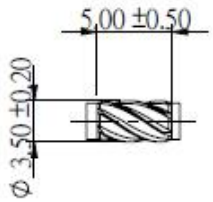
Quickdrill DP



Quickdrill DP+

Length for d = 4.0 mm

l	lg	Shank cutter at partial thread
20~30 (±1.5 mm)	16~35 (±1.5 mm)	over all lengths optional
30~50 (±2.0 mm)		
50~80 (±2.3 mm)		



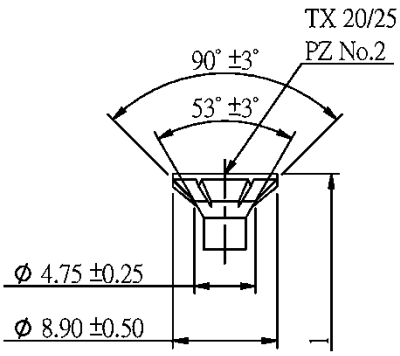
Shank cutter

The thread lengths can be manufactured to customer specific within lg min and lg max.
All dimensions in mm.

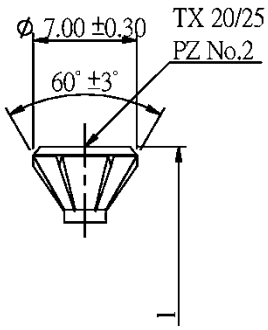
BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.7
Screws with d = 4 mm made of carbon steel	

Deutsches Institut für Bautechnik DIBt

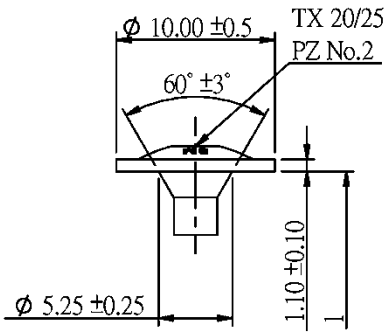
Head Types for d=4.5 mm



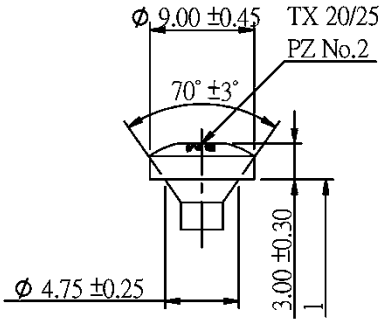
Countersunk Head with cutter ribs - design with and without raise



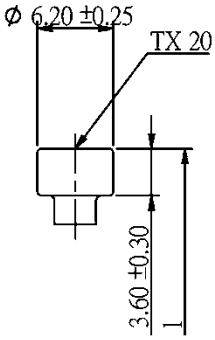
Single Countersunk Head design with and without raise



Wafer Head



Pan Head

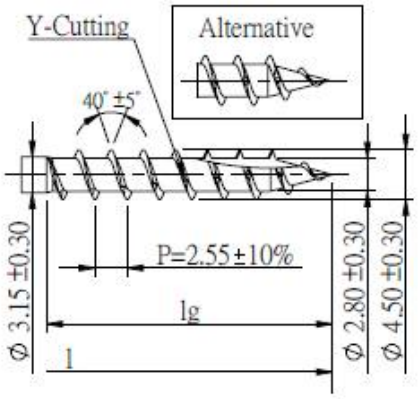


Cylinder Head

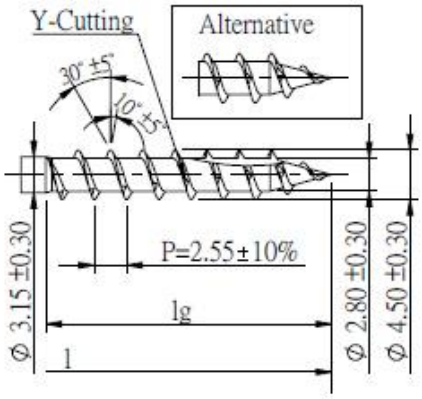
BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.8
Screws with d = 4.5 mm made of carbon steel	

Deutsches Institut für Bautechnik DIBt

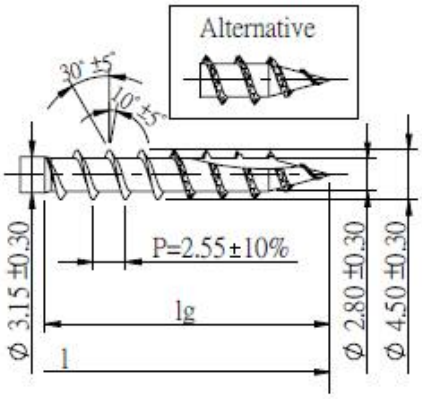
Thread Types d=4.5 mm



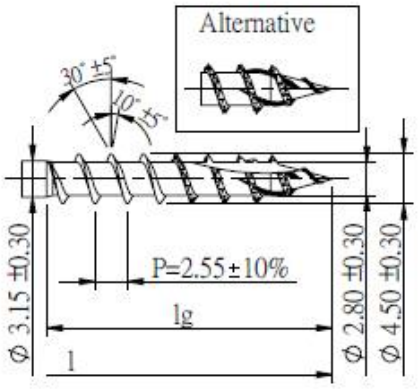
Quickdrill



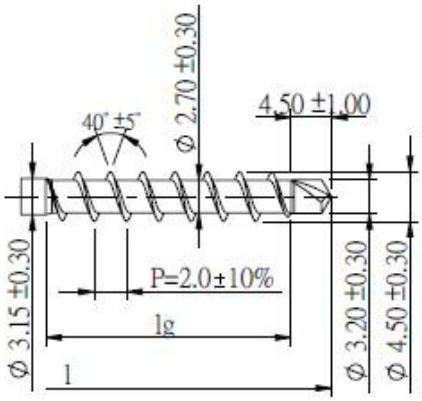
Quickdrill +



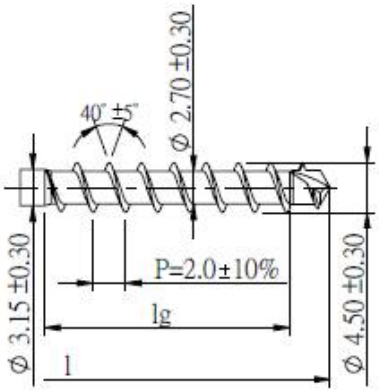
Quickdrill II



Quickdrill III



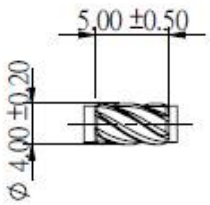
Quickdrill DP



Quickdrill DP+

Length for d = 4.5 mm

l	lg	Shank cutter at partial thread
22~30 (±1.5 mm)	18~47 (±1.5 mm)	over all lengths optional
30~50 (±2.0 mm)		
50~100 (±2.3 mm)		



Shank cutter

The thread lengths can be manufactured to customer specific within lg min and lg max.
All dimensions in mm.

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.9
Screws with d = 4.5 mm made of carbon steel	

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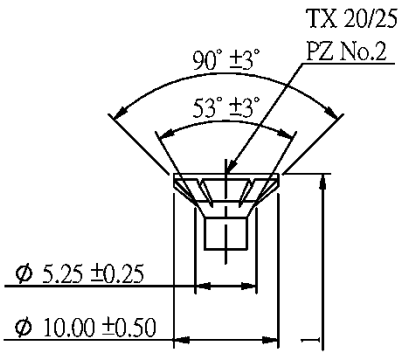
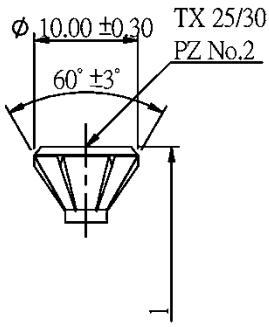
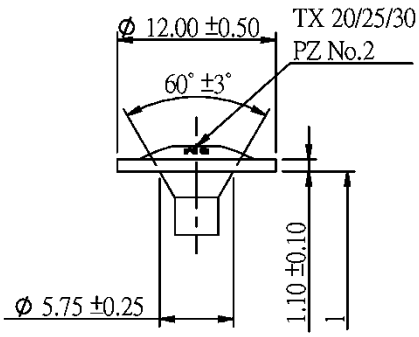
Head Types for d=5.0 mm



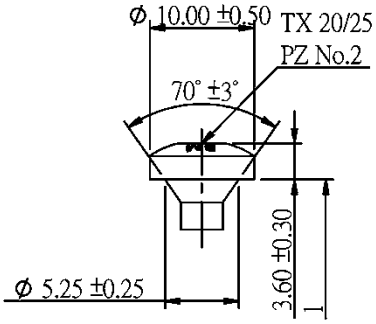
Countersunk Head with cutter ribs - design with and without raise



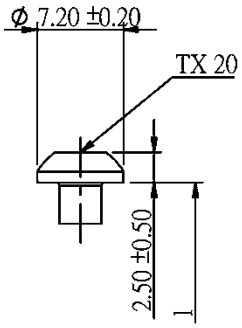
Single Countersunk Head design with and without raise



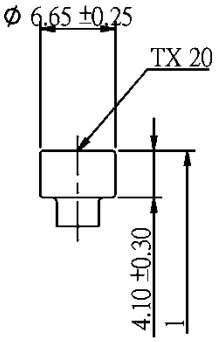
Wafer Head



Pan Head



Angle Bracket Head

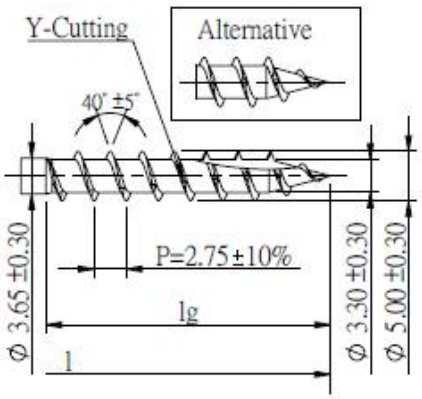


Cylinder Head

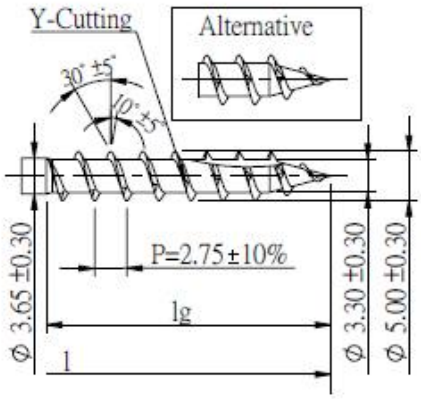
BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.10
Screws with d = 5 mm made of carbon steel	

Deutsches Institut für Bautechnik DIBt

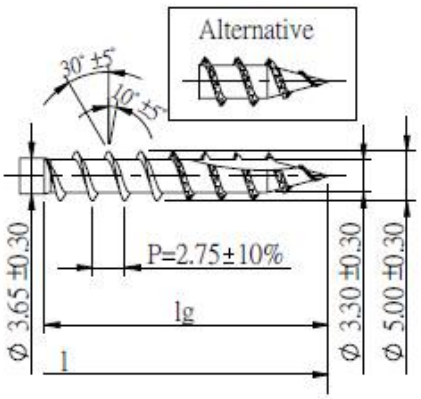
Thread Types d=5.0 mm



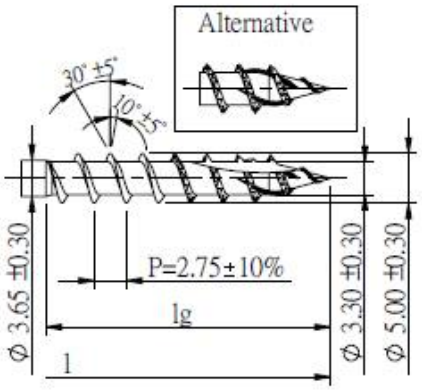
Quickdrill



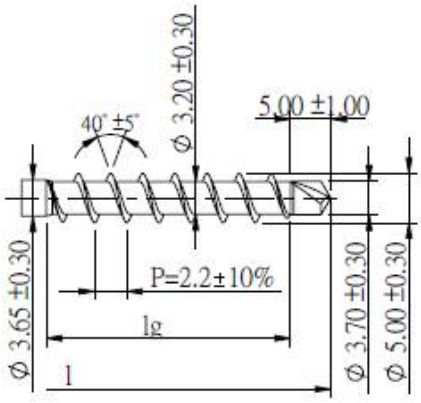
Quickdrill +



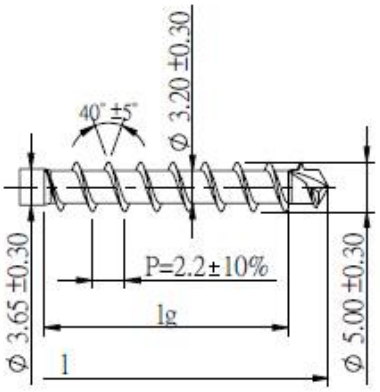
Quickdrill II



Quickdrill III



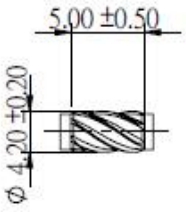
Quickdrill DP



Quickdrill DP+

Length for d = 5.0 mm

l	lg	Shank cutter at partial thread	Shank cutter at Quickdrill DP/DP+
30~50 (±2.0 mm)	20~70 (±1.5 mm)	up to L=40: optional	over all lengths optional
50~80 (±2.3 mm)		over L=40 : yes	
80~120 (±2.7 mm)			



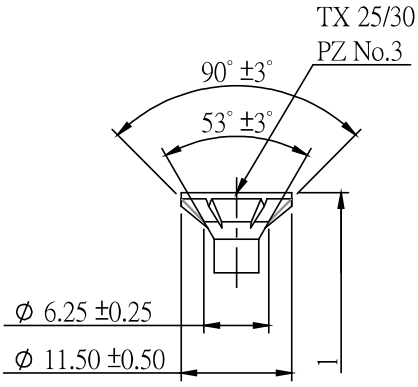
Shank cutter

The thread lengths can be manufactured to customer specific within lg min and lg max.
All dimensions in mm.

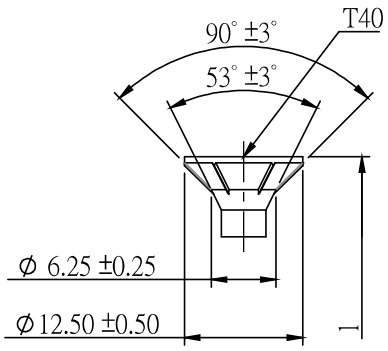
BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.11
Screws with d = 5 mm made of carbon steel	

Deutsches Institut für Bautechnik DIBt

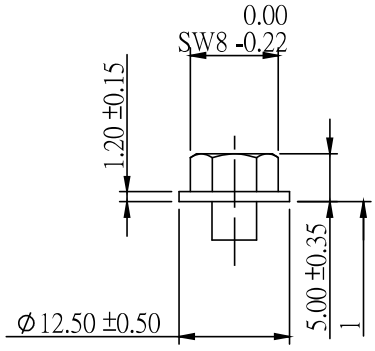
Head Types for d=6.0 mm



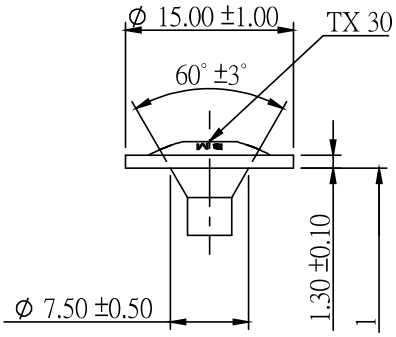
Countersunk Head with cutter ribs - design with and without raise



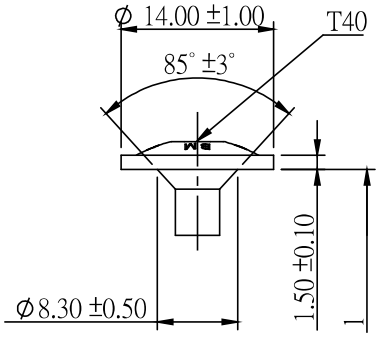
S Countersunk Head with Cutter Ribs



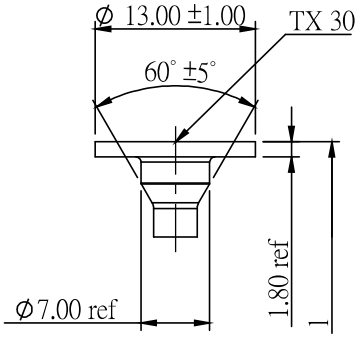
Hex Washer Head



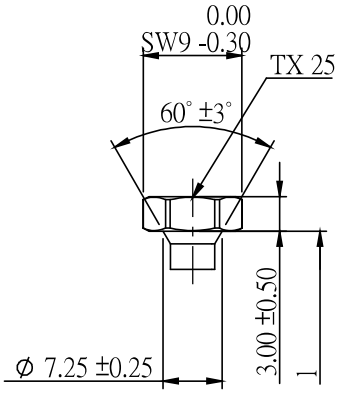
Wafer Head



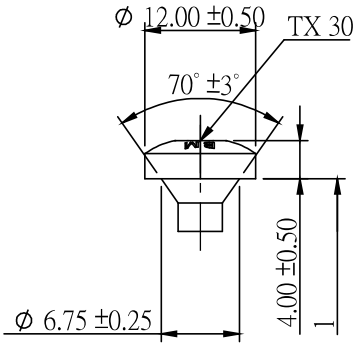
S Wafer Head



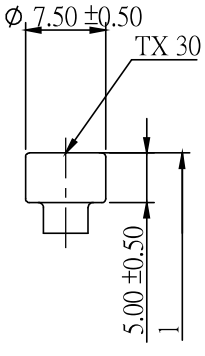
Flat Washer Head



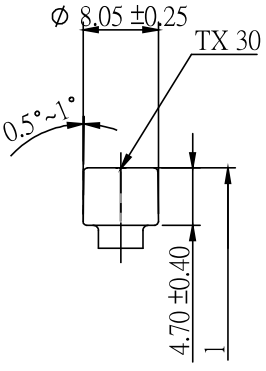
Hexagonal Torx Head



Pan Head



Cylinder Head



Wide Cylinder Head

All dimensions in mm.

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.12
Screws with d = 6 mm made of carbon or stainless steel	

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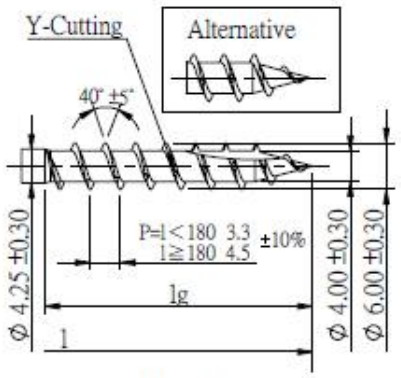
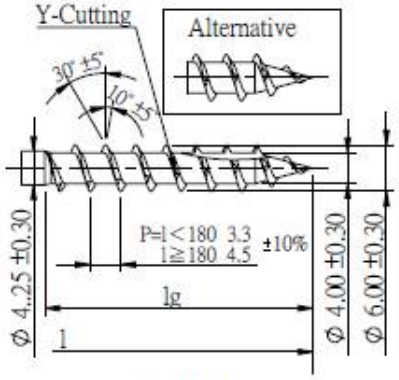
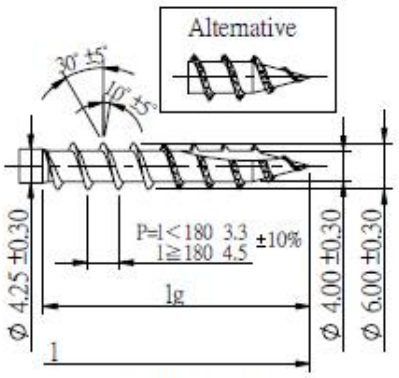
Thread Types d=6.0 mm



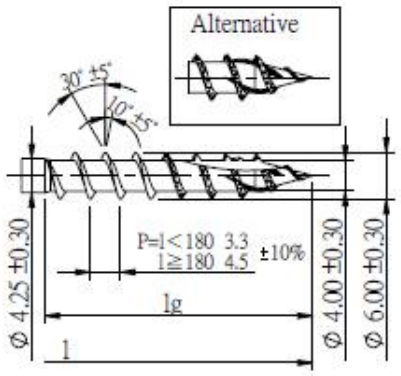
Quickdrill



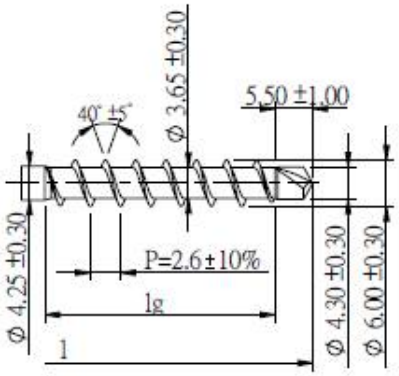
Quickdrill +



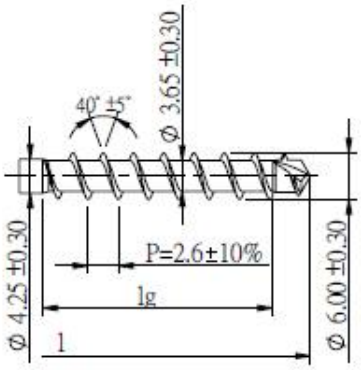
Quickdrill II



Quickdrill III



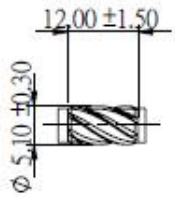
Quickdrill DP



Quickdrill DP+

Length for d = 6.0 mm

l	lg	Shank cutter at partial thread	Shank cutter at Quickdrill DP/DP+
40~80 (±2.0 mm)	32~75 (±2.3 mm)	up to L=80: optional	over all lengths optional
80~120 (±2.7 mm)		over L=80 : yes	
120~180 (±3.2mm)			
180~250 (±3.6mm)			
250~300 (±4.1mm)			



Shank cutter

The thread lengths can be manufactured to customer specific within lg min and lg max.
All dimensions in mm.

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.13
Screws with d = 6 mm made of carbon or stainless steel	

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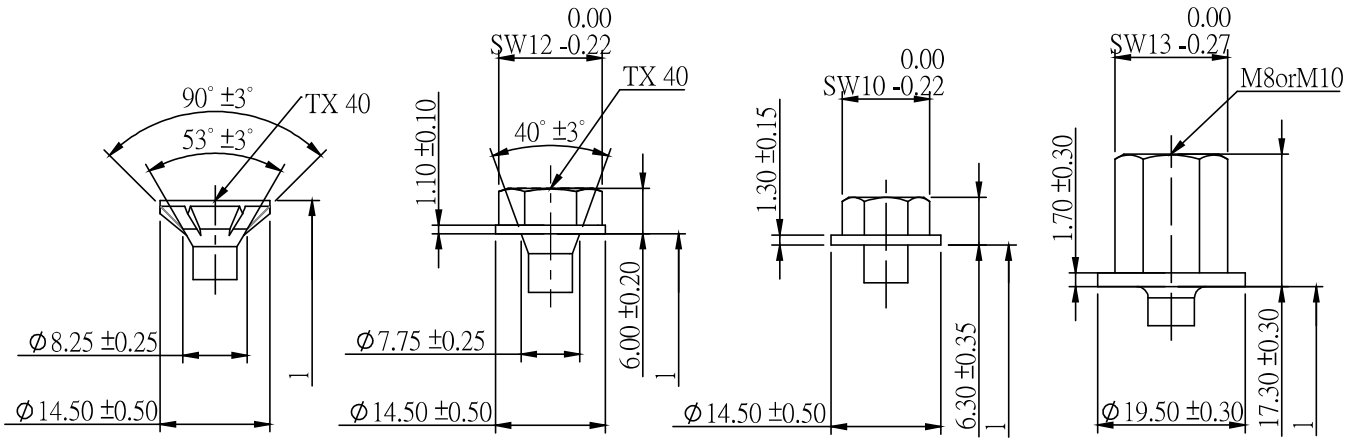
Head Types for d=8.0 mm

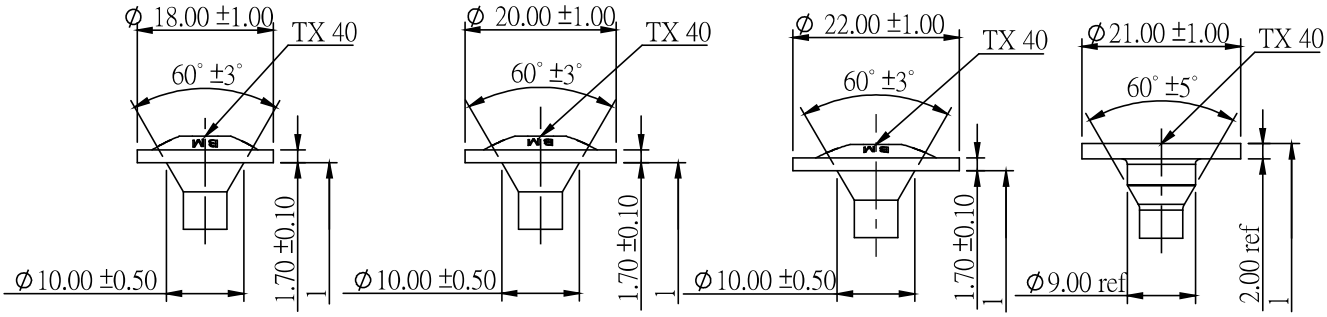


Countersunk Head with cutter ribs - design with and without raise

Hex Washer Torx Head

Hex Washer Head

Coupler Head

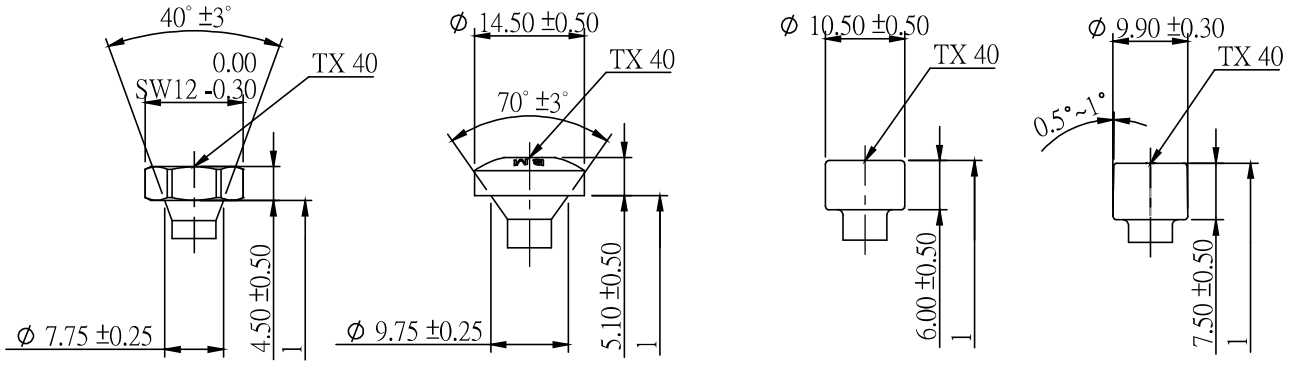


Small Wafer Head

Medium Wafer Head

Large Wafer Head

Flat Washer Head



Hexagonal Torx Head

Pan Head

Cylinder Head

Long Cylinder Head

All dimensions in mm.

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.14
Screws with d = 8 mm made of carbon or stainless steel	

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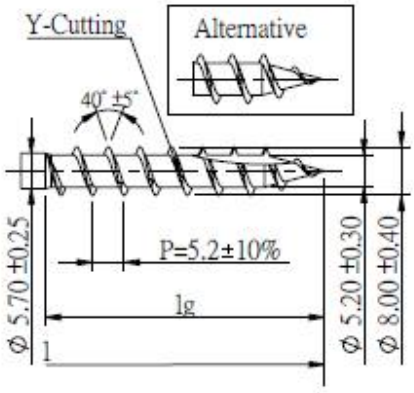
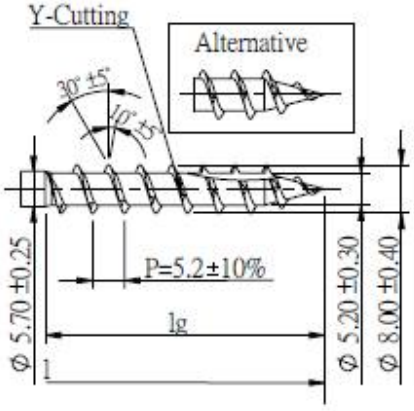
I

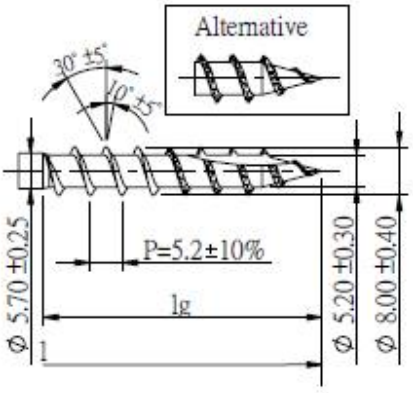
Thread Types d=8.0 mm



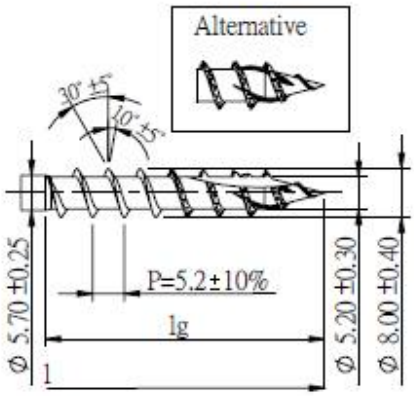
Quickdrill



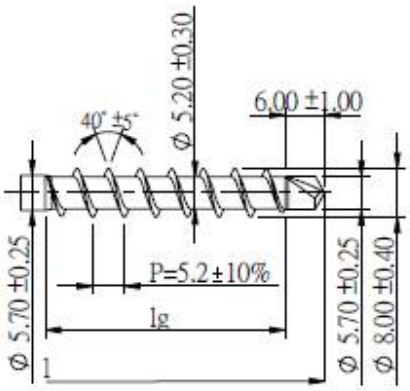
Quickdrill +



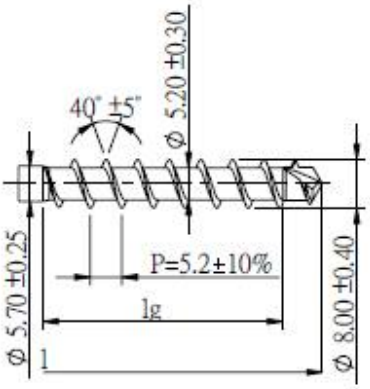
Quickdrill II



Quickdrill III



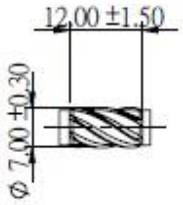
Quickdrill DP



Quickdrill DP+

Length for d = 8.0 mm

l	lg	Shank cutter at partial thread	Shank cutter at Quickdrill DP/DP+
40~80 (±2.0 mm)	32~100 (±2.0 mm)	up to L=80: optional	over all lengths optional
80~120 (±2.7 mm)		over L=80 : yes	
120~180 (±3.2 mm)			
180~250 (±3.6 mm)			
250~315 (±4.1 mm)			
315~400 (±4.5 mm)			
400~500 (±4.9 mm)			
500~600 (±5.5 mm)			



Shank cutter

The thread lengths can be manufactured to customer specific within lg min and lg max.
All dimensions in mm.

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.15
Screws with d = 8 mm made of carbon or stainless steel	

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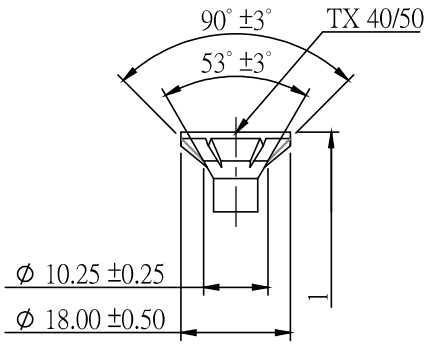
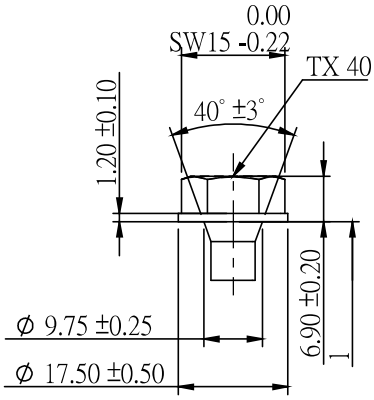
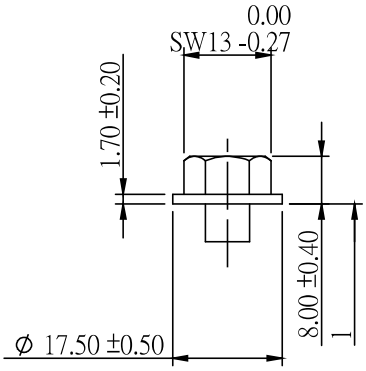
Head Types for d=10.0 mm



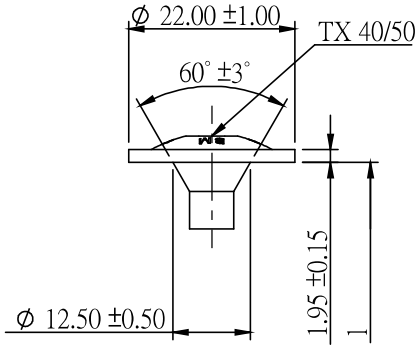
Countersunk Head with cutter ribs - design with and without raise



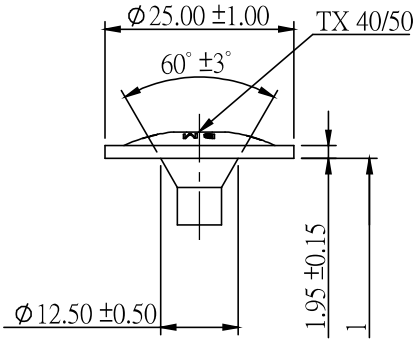
Hex Washer Torx Head



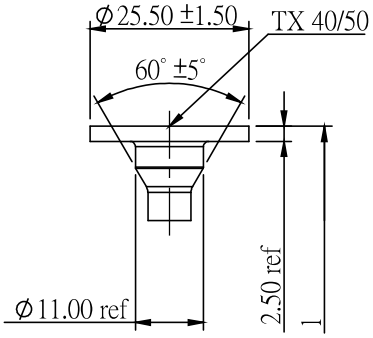
Hex Washer Head



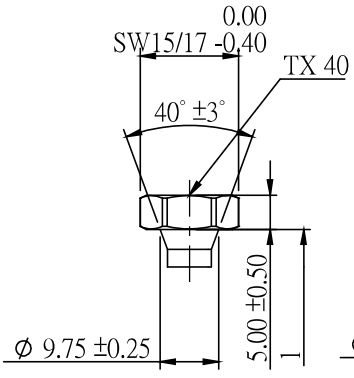
Wafer Head



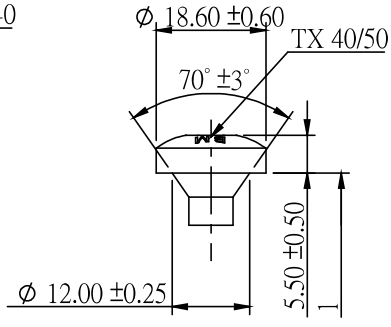
Large Wafer Head



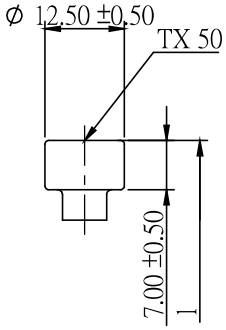
Flat Washer Head



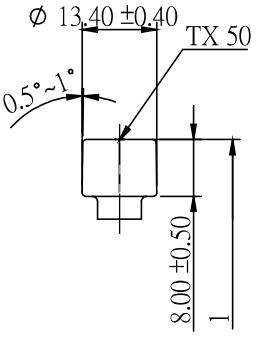
Hexagonal Torx Head



Pan Head



Cylinder Head



Long Cylinder Head

All dimensions in mm.

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.16
Screws with d = 10 mm made of carbon or stainless steel	

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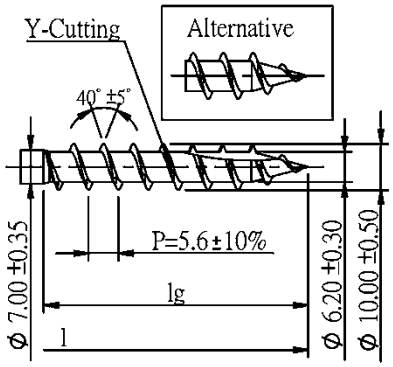
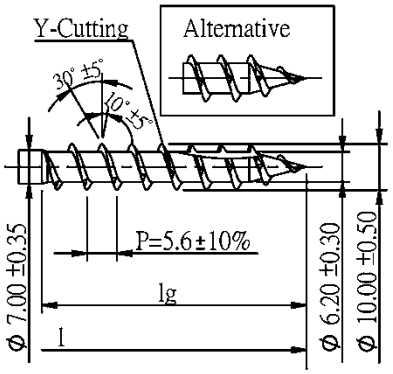
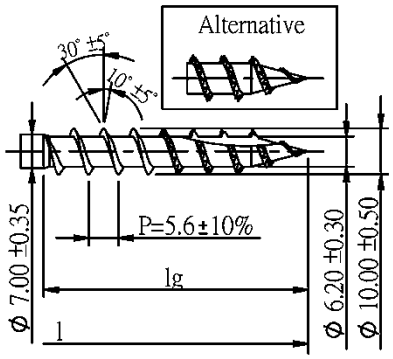
Thread Types d=10.0 mm



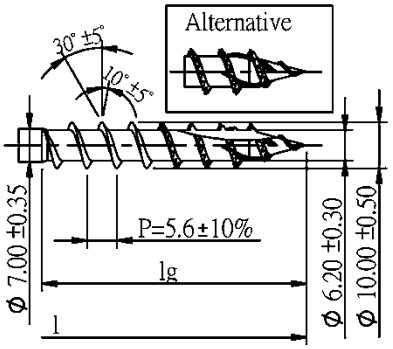
Quickdrill



Quickdrill +



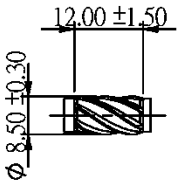
Quickdrill II



Quickdrill III

Length for d = 10.0 mm

l	lg	Shank cutter at partial thread	Shank cutter at Quickdrill DP/DP+
80~120 (±2.7 mm)	52~100 mm (±2.0 mm)	up to L=80: optional	over all lengths optional
120~180 (±3.2 mm)		over L=80 : yes	
180~250 (±3.6 mm)			
250~315 (±4.1 mm)			
315~400 (±4.5 mm)			
400~500 (±4.9 mm)			
500~600 (±5.5 mm)			



Shank cutter

The thread lengths can be manufactured to customer specific within lg min and lg max.
All dimensions in mm.

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.17
Screws with d = 10 mm made of carbon or stainless steel	

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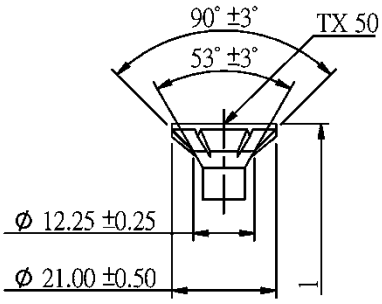
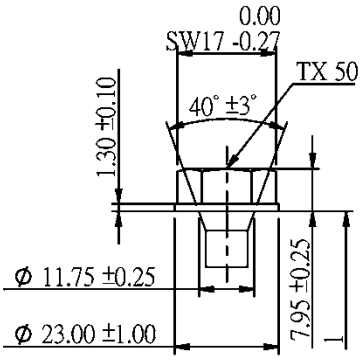
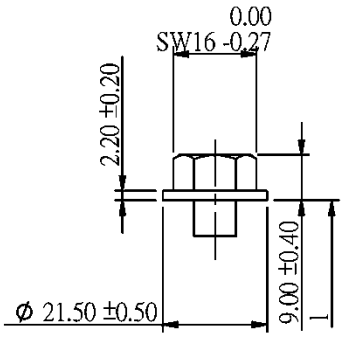
Head Types for d=12.0 mm



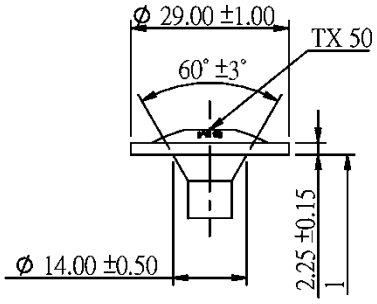
Countersunk Head with cutter ribs - design with and without raise



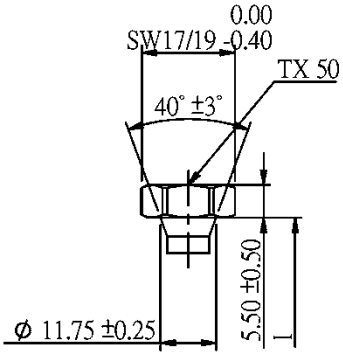
Hex Washer Torx Head



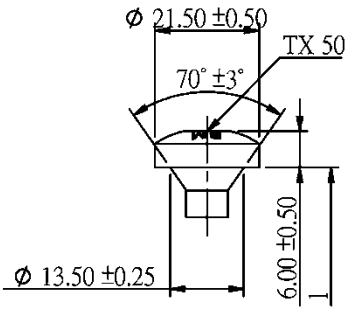
Hex Washer Head



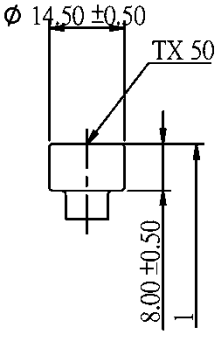
Wafer Head



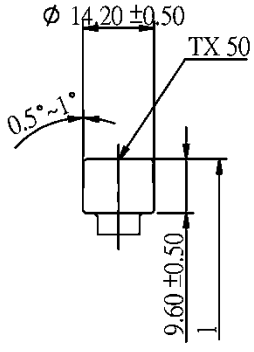
Hexagonal Torx Head



Pan Head



Cylinder Head



Long Cylinder Head

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.18
Screws with d = 12 mm made of carbon steel	

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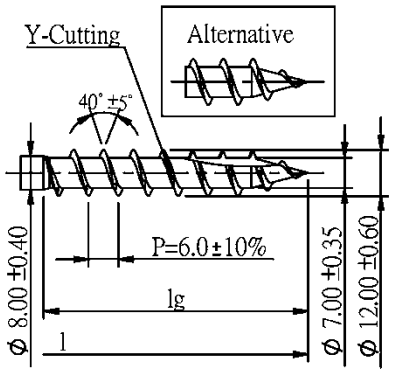
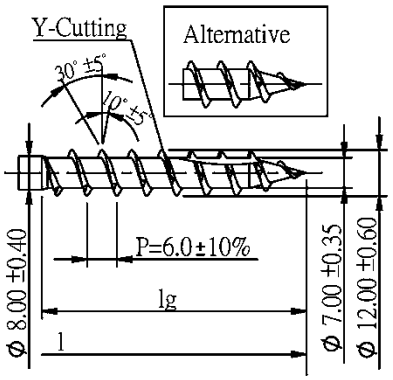
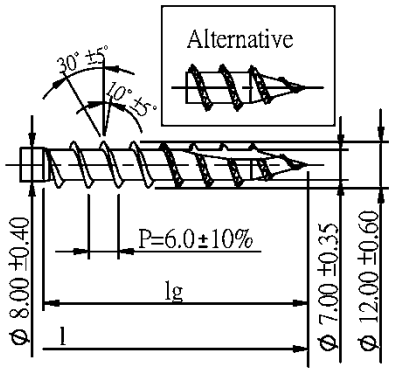
Thread Types d=12.0 mm



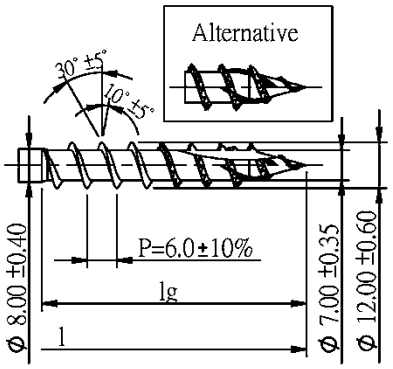
Quickdrill



Quickdrill +



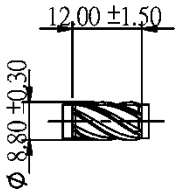
Quickdrill II



Quickdrill III

Length for d = 12.0 mm

l	lg	Shank cutter at partial thread	Shank cutter at Quickdrill DP/DP+
120~180 (±3.2 mm)	80~120 mm (±2.0 mm)	up to L=120: optional	over all lengths optional
180~250 (±3.6 mm)		over L=120 : yes	
250~315 (±4.1 mm)			
315~400 (±4.5 mm)			
400~500 (±4.9 mm)			
500~600 (±5.5 mm)			



Shank cutter

The thread lengths can be manufactured to customer specific within lg min and lg max.
All dimensions in mm.

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.19
Screws with d = 12 mm made of carbon steel	

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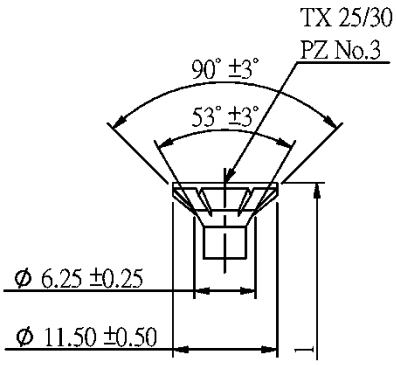
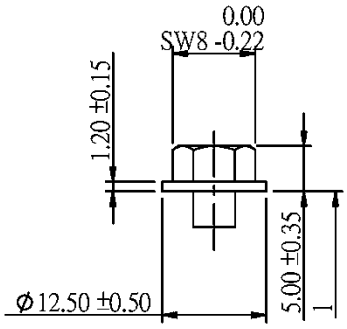
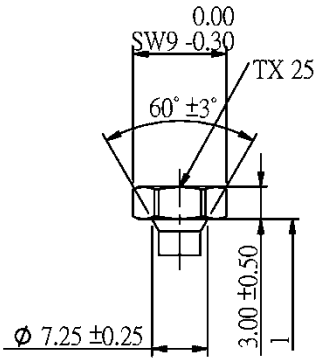
Head Types for d=6.0 mm



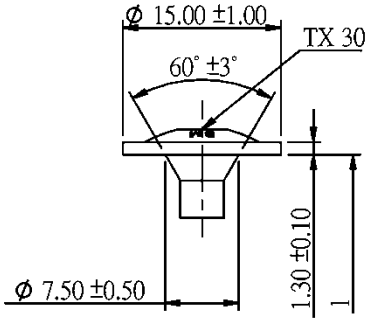
Countersunk head with cutter ribs - design with and without raise



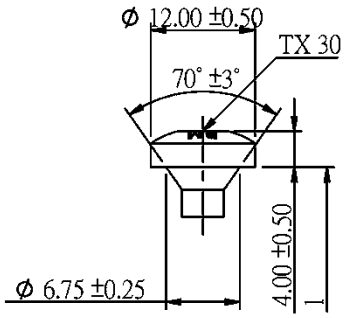
Hex Washer Head



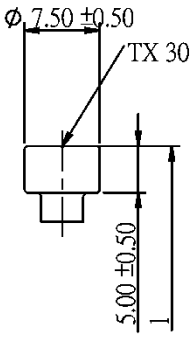
Hexagonal Torx Head



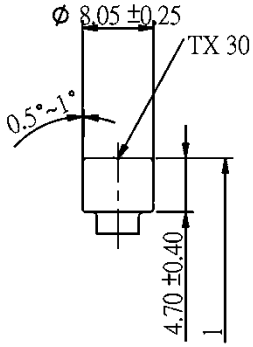
Wafer Head



Pan Head



Cylinder Head



Wide Cylinder Head

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.20
BM FT Quick Drill screws made of carbon steel d = 6 mm	

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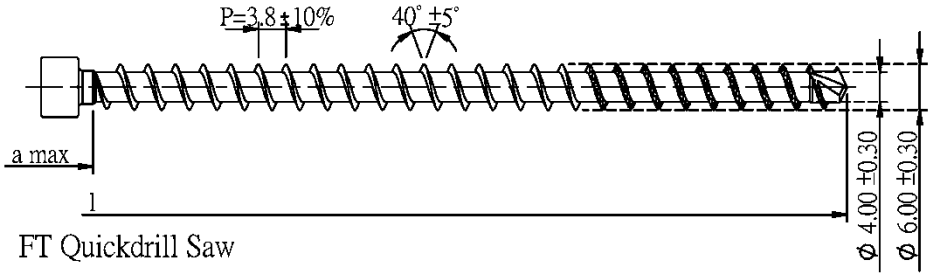
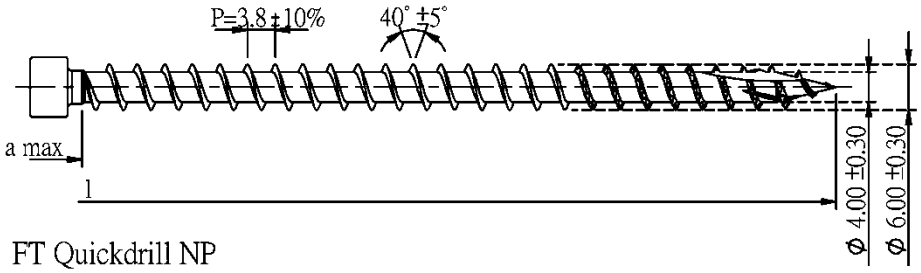
Thread Types d=6.0 mm

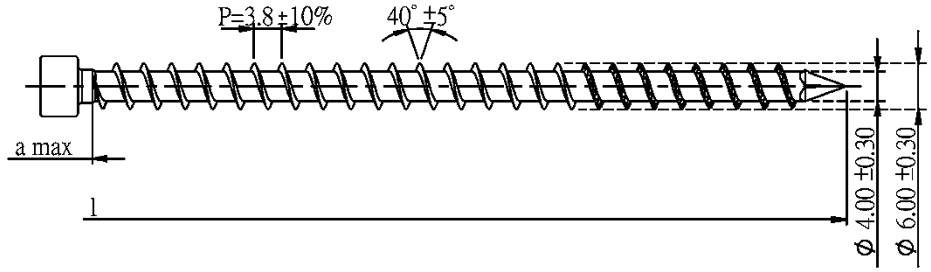
FT Quickdrill SDP



FT Quickdrill Saw



FT Quickdrill NP



Lengths for d = 6.0 mm

Countersunk-and Cylinder head, Wafer, Hexagonal and Hex washer head

l	a max
100~120 (±2.7mm)	max.12 mm
120~180 (±3.2mm)	max.12 mm
180~250 (±3.6mm)	max.12 mm
250~300 (±4.1mm)	max.12 mm

All dimensions in mm.

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.21
BM FT Quick Drill screws made of carbon steel d = 6 mm	

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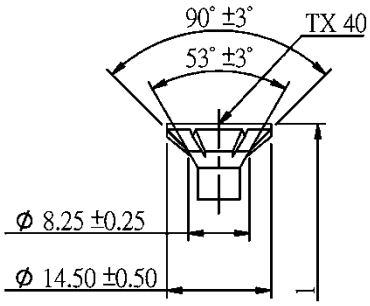
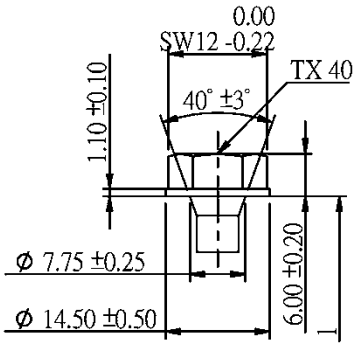
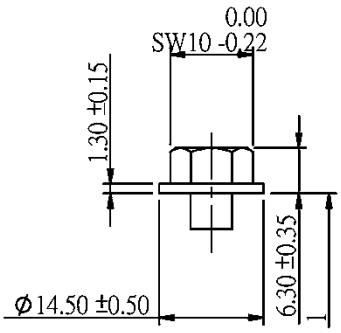
Head Types for d=8.0 mm



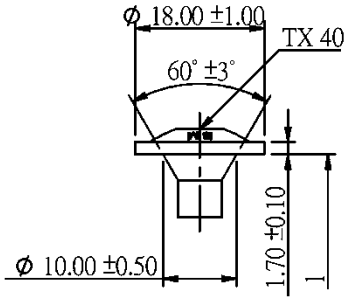
Countersunk head with cutter ribs - design with and without raise



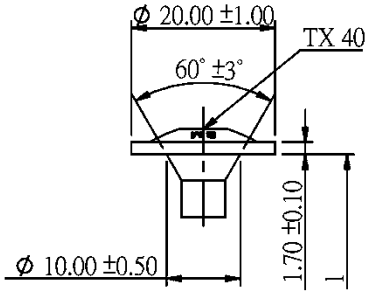
Hex Washer Torx Head



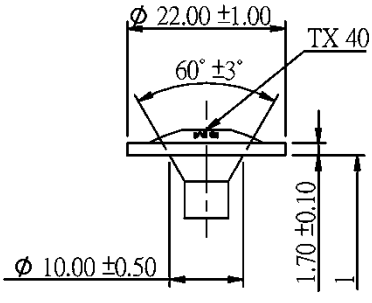
Hex Washer Head



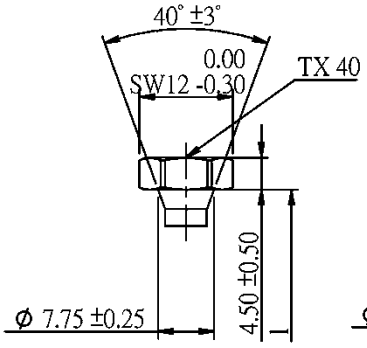
Small Wafer Head



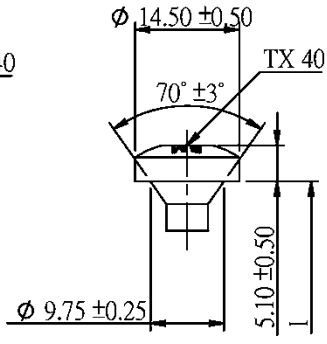
Medium Wafer Head



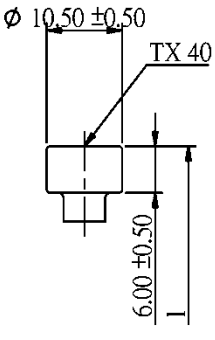
Large Wafer Head



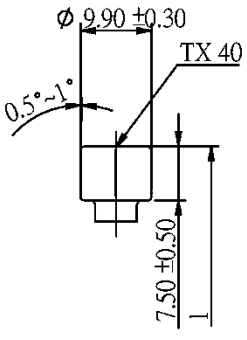
Hexagonal Torx Head



Pan Head



Cylinder Head



Long Cylinder Head

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.22
BM FT Quick Drill screws made of carbon steel d = 8 mm	

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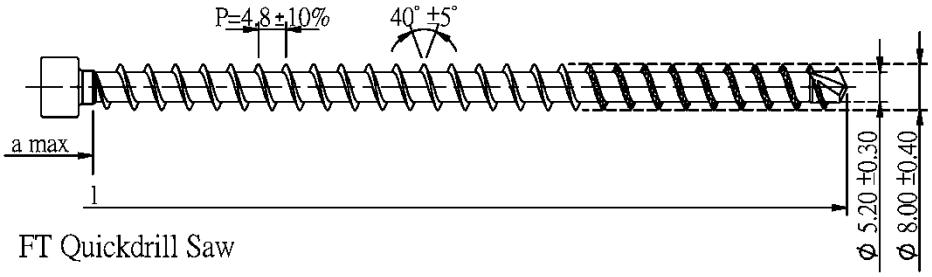
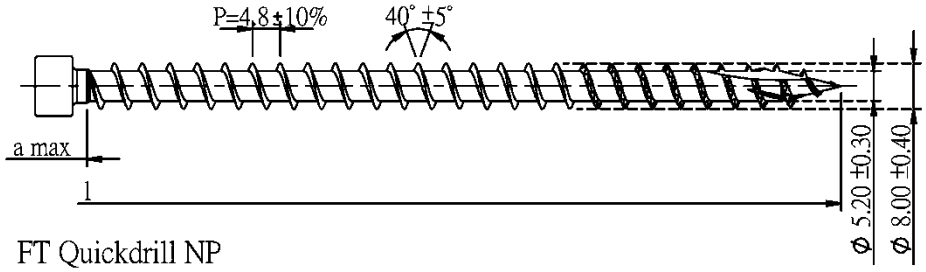
Thread Types d=8.0 mm

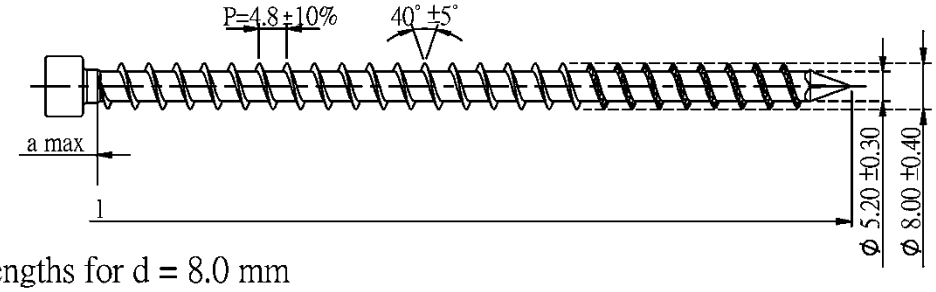
FT Quickdrill SDP



FT Quickdrill Saw



FT Quickdrill NP



Lengths for d = 8.0 mm

Countersunk-and Cylinder head, Wafer, Hexagonal and Hex washer head

l	a max
100~120 (±2.7mm)	max.19 mm
120~180 (±3.2mm)	max.19 mm
180~250 (±3.6mm)	max.19 mm
250~315 (±4.1mm)	max.19 mm
315~400 (±4.5mm)	max.19 mm
400~500 (±4.9mm)	max.19 mm

All dimensions in mm.

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.23
BM FT Quick Drill screws made of carbon steel d = 8 mm	

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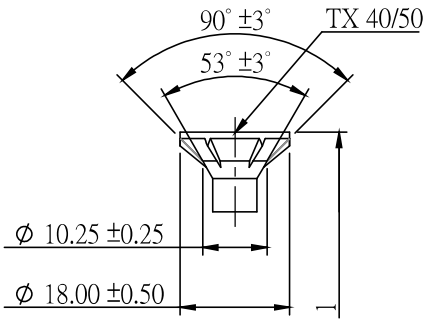
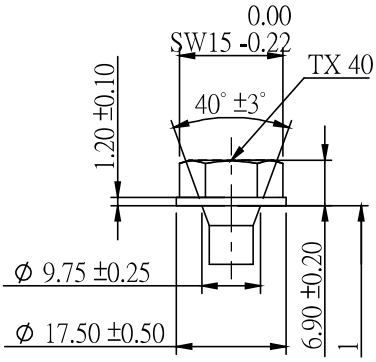
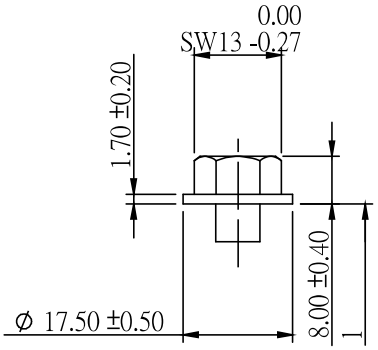
Head Types for d=10.0 mm



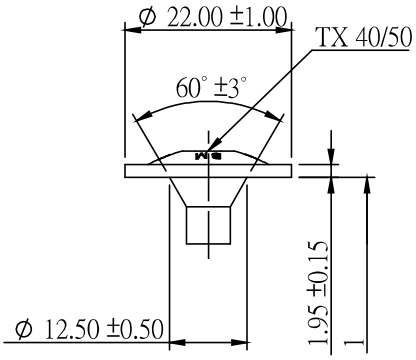
Countersunk head with cutter ribs - design with and without raise



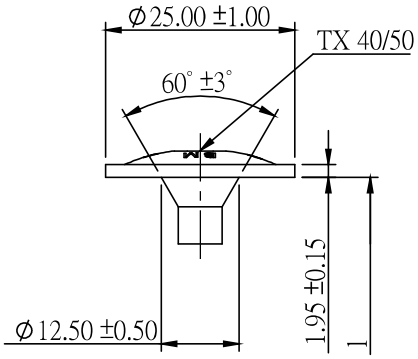
Hex Washer Torx Head



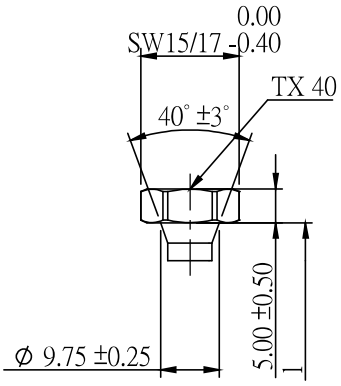
Hex Washer Head



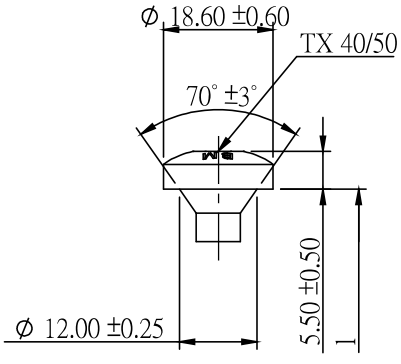
Wafer Head



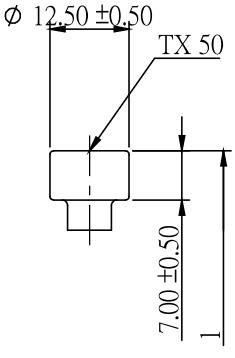
Large Wafer Head



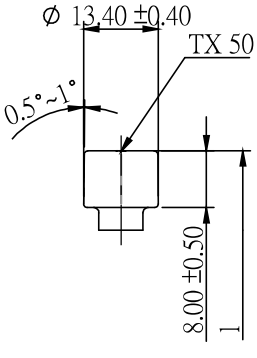
Hexagonal Torx Head



Pan Head



Cylinder Head



Long Cylinder Head

All dimensions in mm.

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.24
BM FT Quick Drill screws made of carbon or stainless steel d = 10 mm	

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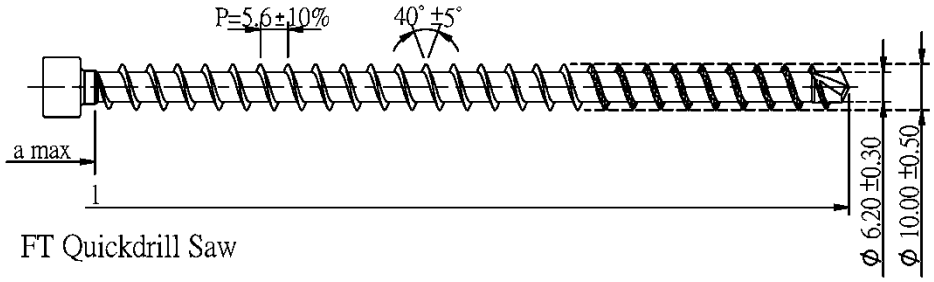
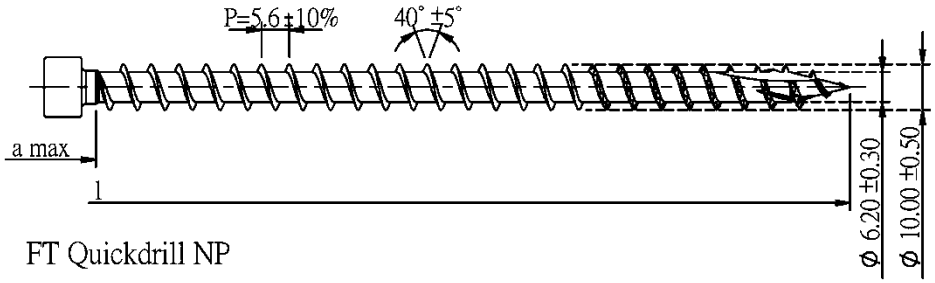
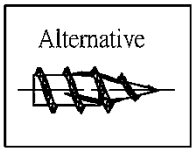
Thread Types d=10.0 mm

FT Quickdrill SDP

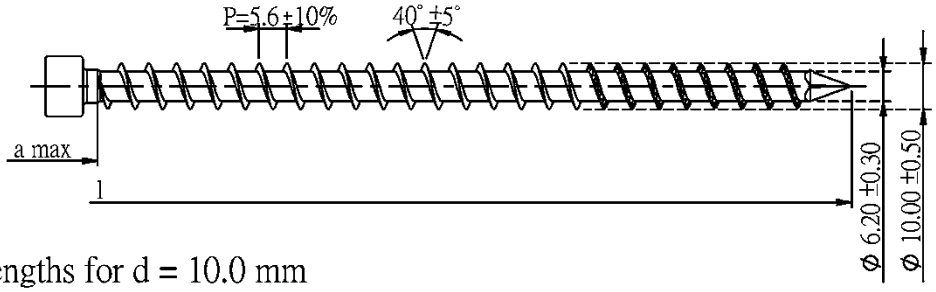


FT Quickdrill Saw





FT Quickdrill NP



Lengths for d = 10.0 mm

Countersunk-and Cylinder head, Wafer, Hexagonal and Hex washer head

l	a max
100~120 (±2.7mm)	max.20 mm
120~180 (±3.2mm)	max.20 mm
180~250 (±3.6mm)	max.20 mm
250~315 (±4.1mm)	max.20 mm
315~400 (±4.5mm)	max.20 mm
400~500 (±4.9mm)	max.20 mm
500~600 (±5.5mm)	max.20 mm

All dimensions in mm.

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.25
BM FT Quick Drill screws made of carbon or stainless steel d = 10 mm	

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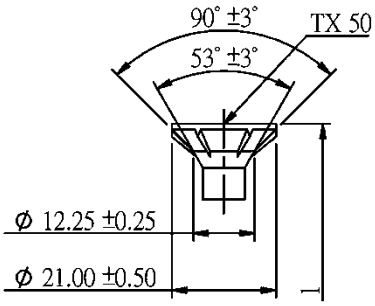
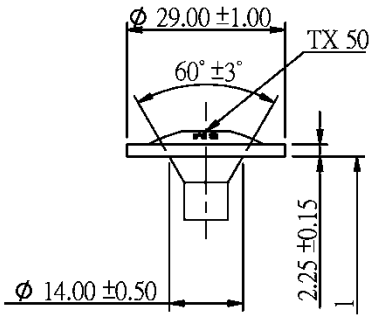
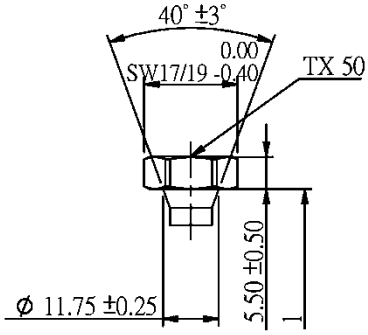
Head Types for d=12.0 mm



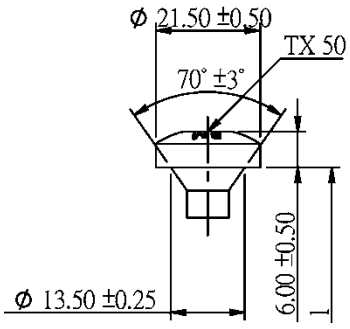
Countersunk head with cutter ribs - design with and without raise



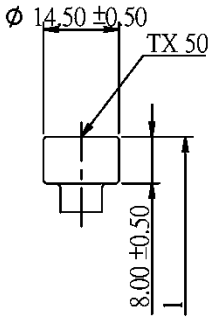
Wafer Head



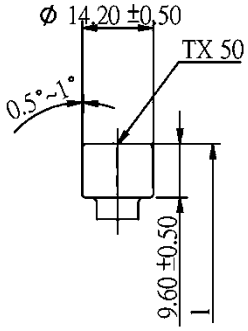
Hexagonal Torx Head



Pan Head



Cylinder Head



Long Cylinder Head

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.26
BM FT Quick Drill screws made of carbon steel d = 12 mm	

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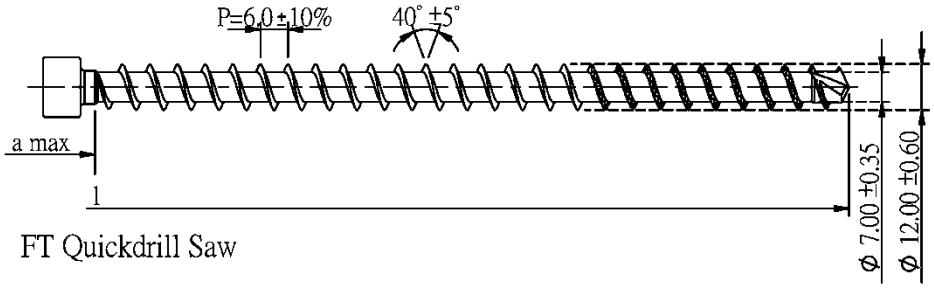
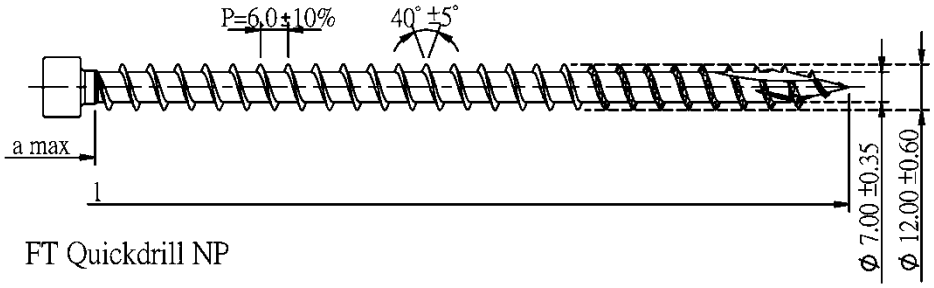
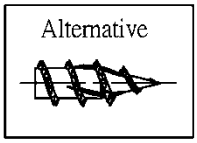
Thread Types d=12.0 mm

FT Quickdrill SDP

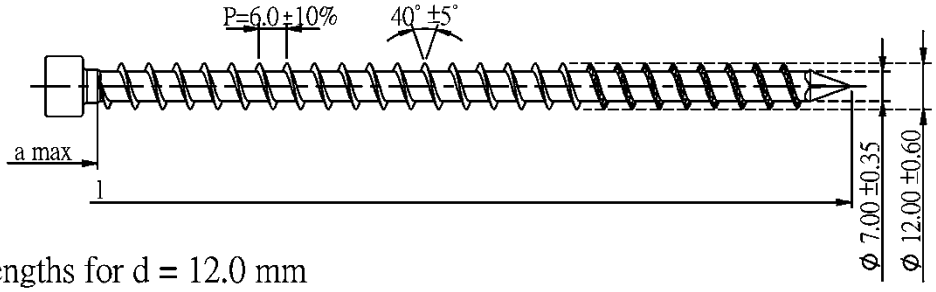


FT Quickdrill Saw





FT Quickdrill NP



Lengths for d = 12.0 mm

Countersunk-and Cylinder head, Wafer, Hexagonal head

l	a max
100~120 (±2.7mm)	max.20.5mm
120~180 (±3.2mm)	max.20.5mm
180~250 (±3.6mm)	max.20.5mm
250~315 (±4.1mm)	max.20.5mm
315~400 (±4.5mm)	max.20.5mm
400~500 (±4.9mm)	max.20.5mm
500~630 (±5.5mm)	max.20.5mm
630~800 (±6.3mm)	max.20.5mm
800~1000 (±7.0mm)	max.20.5mm

All dimensions in mm.

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.27
BM FT Quick Drill screws made of carbon steel d = 12 mm	

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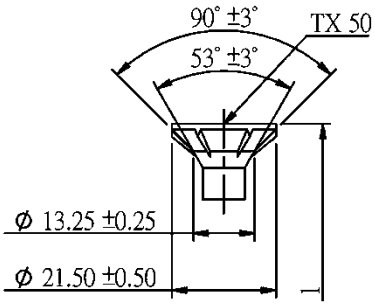
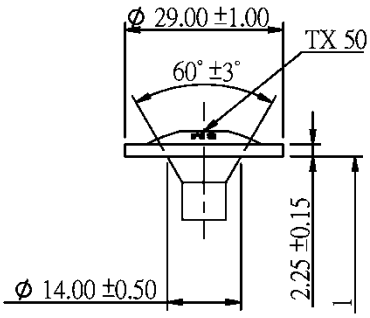
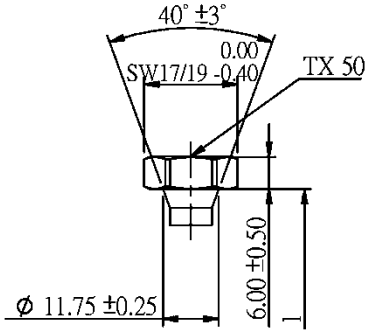
Head Types for d=13.0 mm



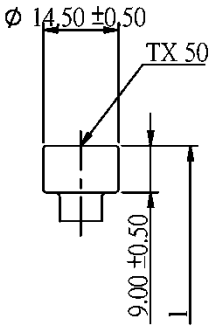
Countersunk head with cutter ribs - design with and without raise



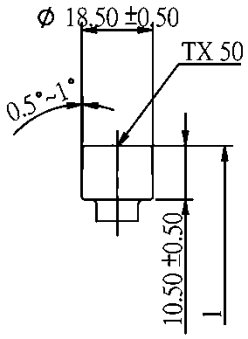
Wafer Head



Hexagonal Torx Head



Cylinder Head



Wide Cylinder Head

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.28
BM FT Quick Drill screws made of carbon steel d = 13 mm	

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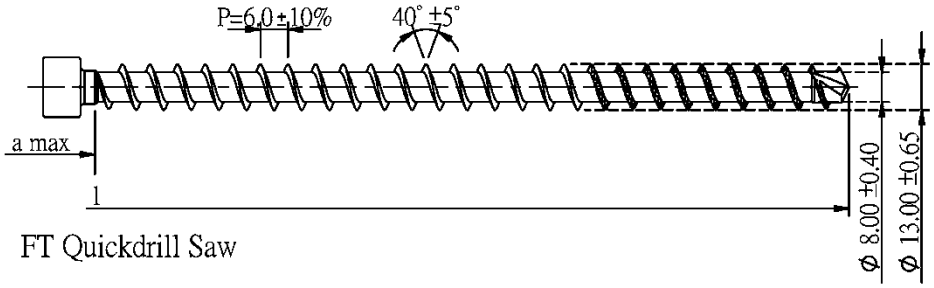
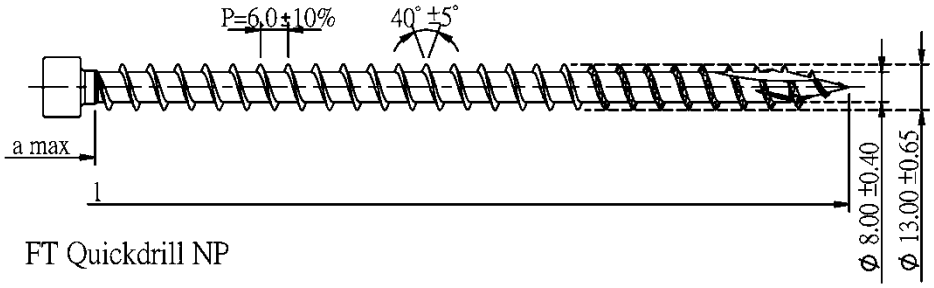
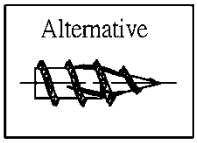
Thread Types d=13.0 mm

FT Quickdrill SDP

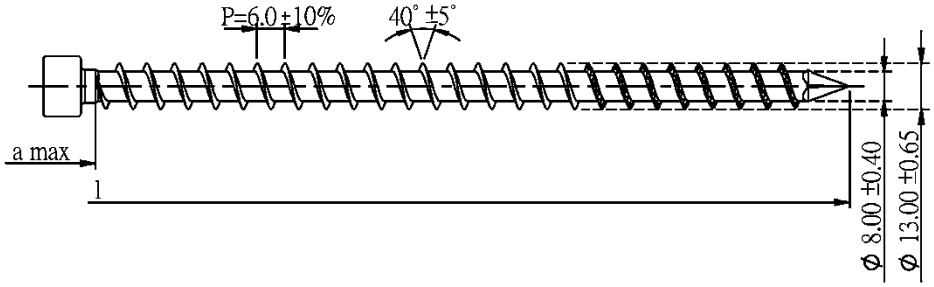


FT Quickdrill Saw





FT Quickdrill NP



Lengths for d = 13.0 mm

Countersunk-and Cylinder head, Wafer, Hexagonal head

l	a max
200~250 (±3.6mm)	max.21.0mm
250~315 (±4.1mm)	max.21.0mm
315~400 (±4.5mm)	max.21.0mm
400~500 (±4.9mm)	max.21.0mm
500~630 (±5.5mm)	max.21.0mm
630~800 (±6.3mm)	max.21.0mm
800~1000 (±7.0mm)	max.21.0mm
1000~1200 (±8.3mm)	max.21.0mm

All dimensions in mm.

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.29
BM FT Quick Drill screws made of carbon steel d = 13 mm	

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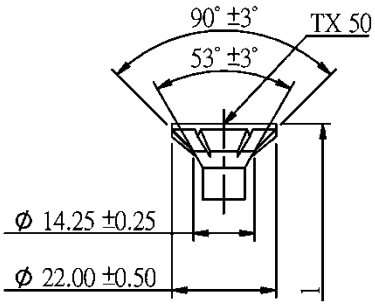
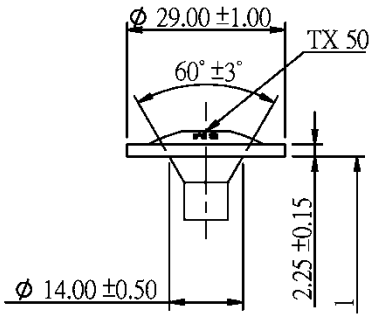
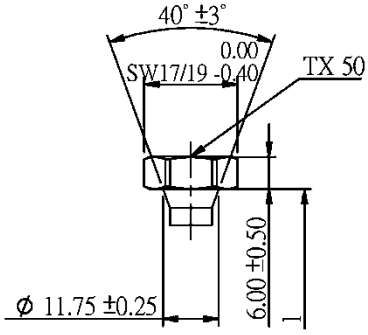
Head Types for d=14.0 mm



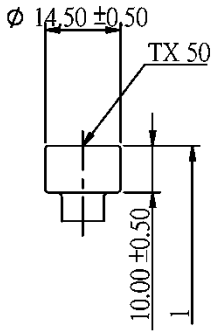
Countersunk head with cutter ribs - design with and without raise



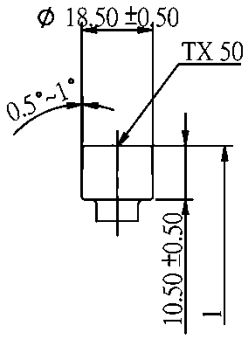
Wafer Head



Hexagonal Torx Head



Cylinder Head



Wide Cylinder Head

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.30
BM FT Quick Drill screws made of carbon steel d = 14 mm	

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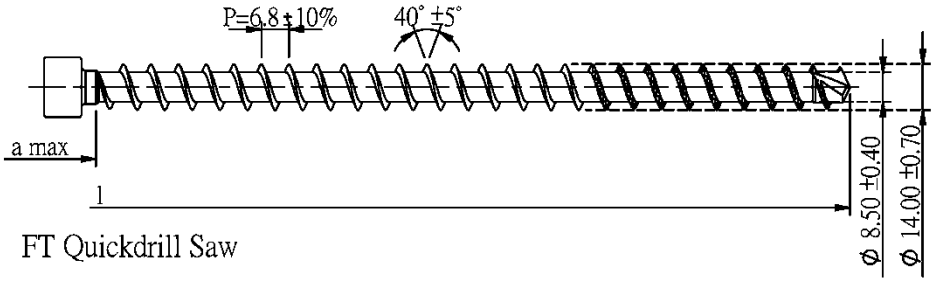
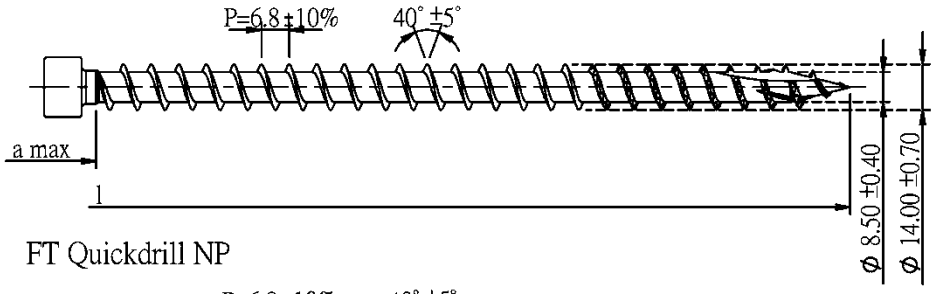
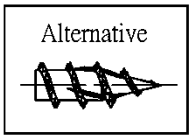
Thread Types d=14.0 mm

FT Quickdrill SDP

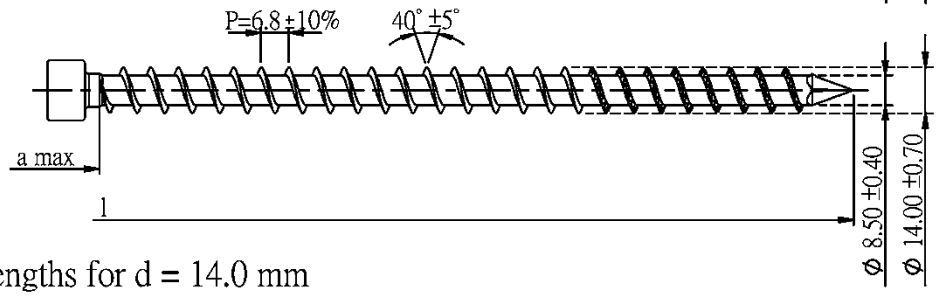


FT Quickdrill Saw





FT Quickdrill NP



Lengths for d = 14.0 mm

Countersunk-and Cylinder head, Wafer, Hexagonal head

Above	a max
200~250 (±3.6mm)	max.22 mm
250~315 (±4.1mm)	max.22 mm
315~400 (±4.5mm)	max.22 mm
400~500 (±4.9mm)	max.22 mm
500~630 (±5.5mm)	max.22 mm
630~800 (±6.3mm)	max.22 mm
800~1000 (±7.0mm)	max.22 mm
1000~1250 (±8.3mm)	max.22 mm
1250~1500 (±9.3mm)	max.22 mm

All dimensions in mm.

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.31
BM FT Quick Drill screws made of carbon steel d = 14 mm	

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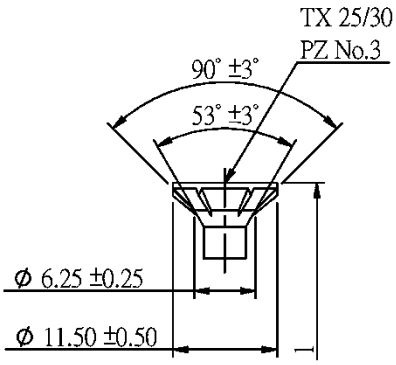
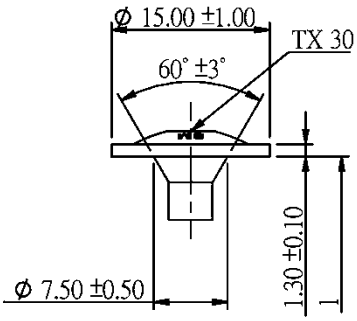
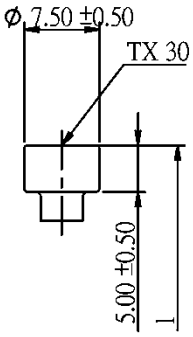
Head Types for d=6.0 mm



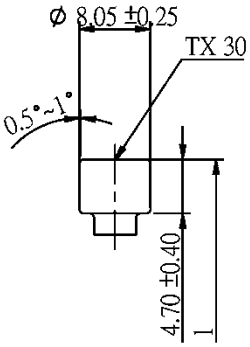
Countersunk head with cutter ribs - design with and without raise



Wafer Head



Cylinder Head



Wide Cylinder Head

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.32
BM DT Quick Drill screws made of carbon steel d = 6 mm	

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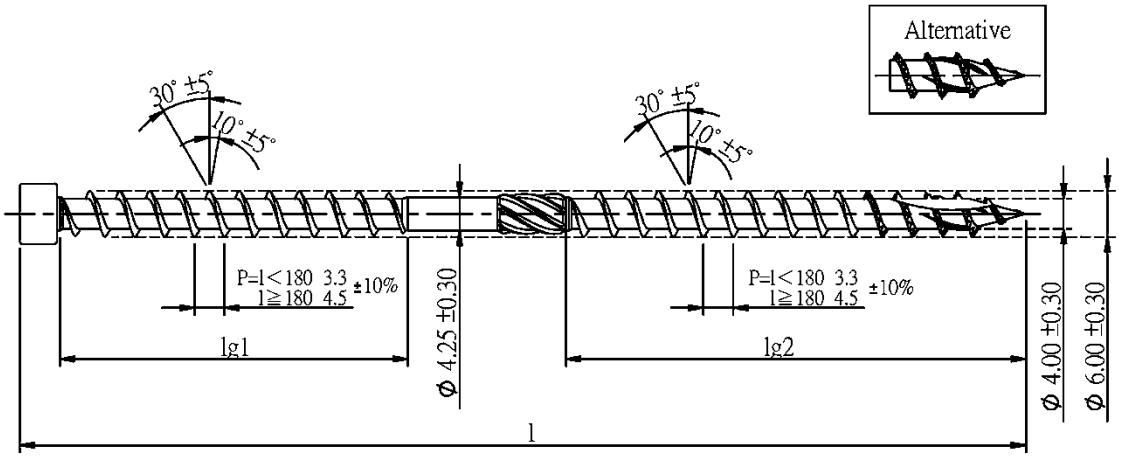
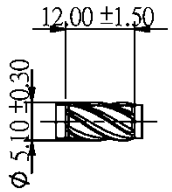
Thread Types d=6.0 mm



Lengths for d = 6.0 mm

Countersunk-and Cylinder head-and Wafer head

l	lg1	lg2	Shank cutter at DT Quickdrill
65~80 (±2.3 mm)	25~60 (±1.7mm)	35~100 (±2.0mm)	over all lengths optional
80~120 (±2.7 mm)			
120~180 (±3.2mm)			
180~250 (±3.6mm)			
250~300 (±4.1mm)			



Shank cutter

All dimensions in mm.

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.33
BM DT Quick Drill screws made of carbon steel d = 6 mm	

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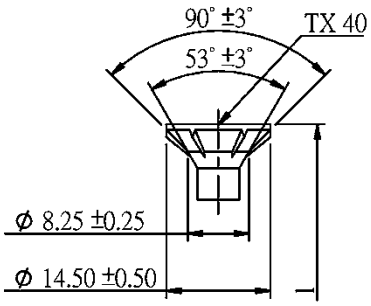
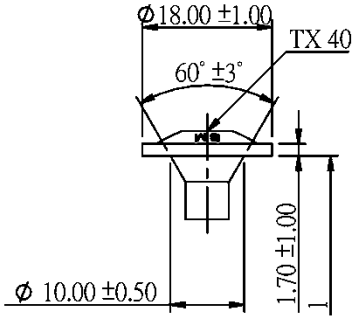
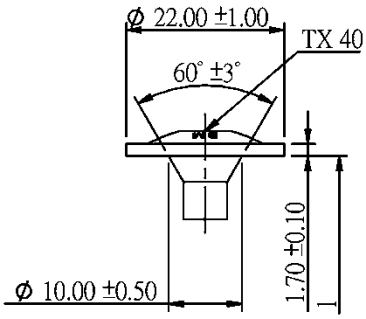
Head Types for d=8.0 mm



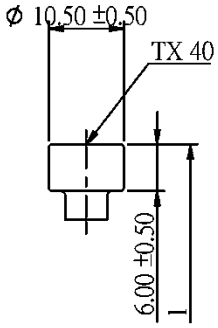
Countersunk head with cutter ribs - design with and without raise



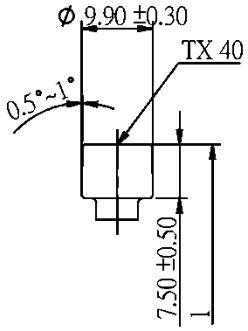
Small Wafer Head



Large Wafer Head



Cylinder Head



Long Cylinder Head

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.34
BM DT Quick Drill screws made of carbon steel d = 8 mm	

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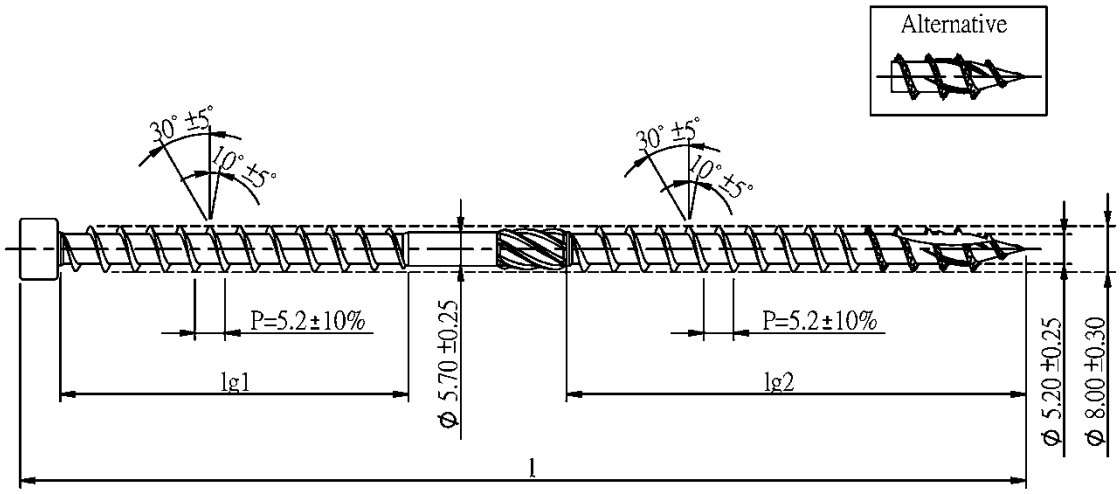
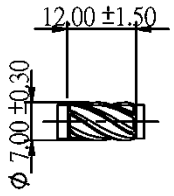
Thread Types d=8.0 mm



Lengths for d = 8.0 mm

Countersunk-and Cylinder head-and Wafer head

l	lg1	lg2	Shank cutter at DT Quickdrill
160~180 (±3.2 mm)	60 (±2.0mm)	80~100 (±2.0mm)	over all lengths optional
180~250 (±3.6mm)			
250~315 (±4.1mm)			
315~400 (±4.5mm)			
400~500 (±4.9mm)			



Shank cutter

All dimensions in mm.

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.35
BM DT Quick Drill screws made of carbon steel d = 8 mm	

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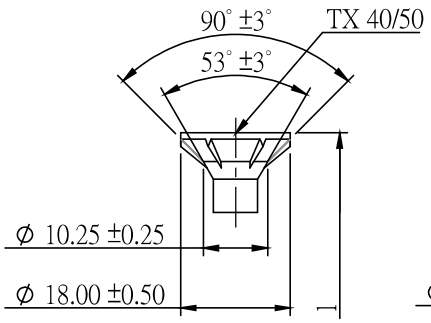
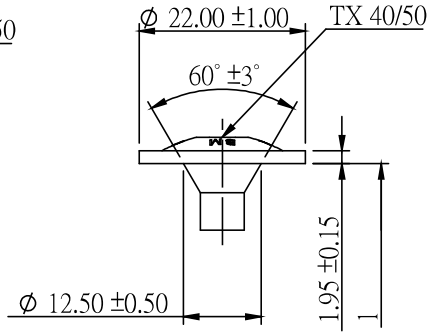
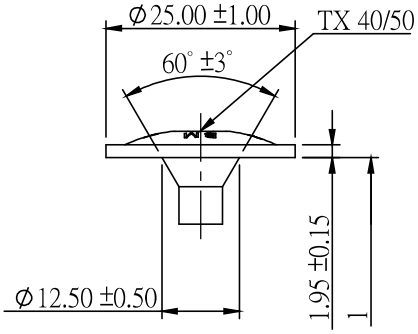
Head Types for d=10.0 mm



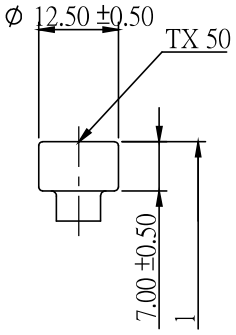
Countersunk head with cutter ribs - design with and without raise



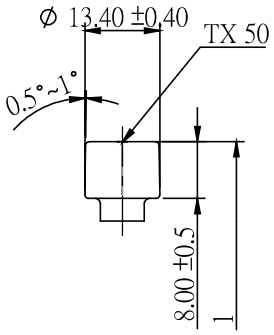
Wafer Head



Large Wafer Head



Cylinder Head



Wide Cylinder Head

All dimensions in mm.

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.36
BM DT Quick Drill screws made of carbon steel d = 10 mm	

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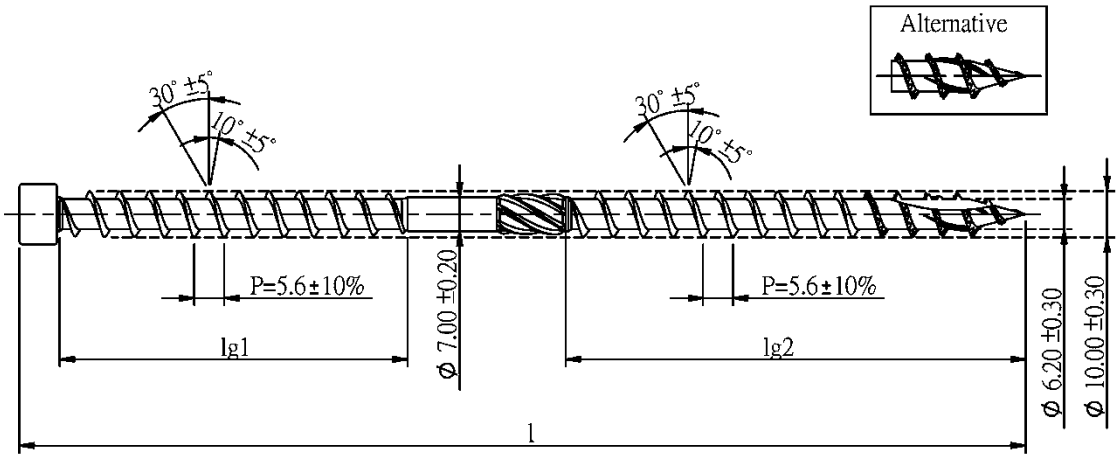
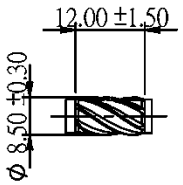
Thread Types d=10.0 mm



Lengths for d = 10.0 mm

Countersunk-and Cylinder head-and Wafer head

l	lg1	lg2	Shank cutter at DT Quickdrill
160~180 (±3.2 mm)	60 (±2.0mm)	80~100 (±2.0mm)	over all lengths optional
180~250 (±3.6mm)			
250~315 (±4.1mm)			
315~400 (±4.5mm)			
400~500 (±4.9mm)			
500~600 (±5.5mm)			



Shank cutter

All dimensions in mm.

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.37
BM DT Quick Drill screws made of carbon steel d = 10 mm	

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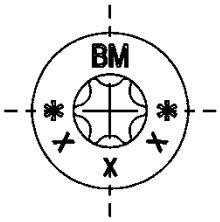
Head Marking



Marking at BM d=3~14 of designs:
Countersunk Heads,Hexagon Torx Head
Pan Head,Wafer Heads.
Named head type are possible without marking,too.

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.38
Head marking	

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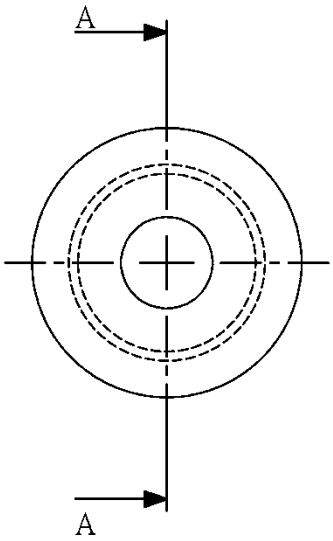
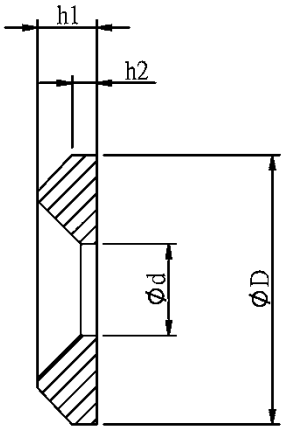
Washer





A-A

Size	ØD	Ød	h1	h2
6	19.5±0.4	7.5±0.4	4.5±0.3	1.7±0.3
8	25.0±0.4	8.5±0.4	5.5±0.3	2.3±0.3
10	30.0±0.4	11.0±0.4	6.5±0.3	3.2±0.3
12	37.4±0.4	14.0±0.4	8.5±0.3	2.5±0.3

All dimensions in mm.

BM Quick Drill, BM Quick Drill +, BM Quick Drill II, BM Quick Drill III, BM DT Quick Drill and BM FT Quick Drill screws	Annex 6.39
Washer made of carbon or stainless steel	