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Authorised and notified according to Article 29 of the Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011

European Technical Assessment ETA-17/1005 of 2018-01-18

I General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: ETA-Danmark A/S

Trade name of the construction product:	JD-PLUS self-tapping screws
Product family to which the above construction product belongs:	Screws for use in timber constructions
Manufacturer:	Joseph Dresselhaus GmbH & Co. KG Zeppelinstraße 13 DE-32051 Herford Tel. +49 5221 12213-18 Internet www.dresselhaus.de
Manufacturing plant:	Held on file by ETA-Danmark A/S
This European Technical Assessment contains:	24 pages including 2 annexes which form an integral part of the document
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of:	European Assessment document (EAD) no. EAD 130118-00-0603 “Screws for timber constructions”
This version replaces:	

II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of product and intended use

Technical description of the product
JD-PLUS screws are self-tapping screws to be used in timber structures. JD-PLUS screws shall be threaded over a part of the length. The screws shall be produced from carbon or stainless (1.4567) steel wire. Where corrosion protection is required, the material or coating shall be declared in accordance with the relevant specification given in Annex A of EN 14592.

Geometry and Material
The nominal diameter (outer thread diameter), d, shall not be less than 3,5 mm and shall not be greater than 6,0 mm. The overall length, L, of screws shall not be less than 20 mm and shall not be greater than 240 mm. Other dimensions are given in Annex A.

The ratio of inner thread diameter to outer thread diameter d_i/d ranges from 0,60 to 0,09.

The screws are threaded over a minimum length ℓ_g of $4 \cdot d$ (i.e. $\ell_g \geq 4 \cdot d$).

No cracks shall be observed at a bend angle, α, of less than $(45/d^{0,7} + 10)$ degrees.

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

The screws are used for connections in load bearing timber structures between members of solid timber (softwood), glued laminated timber, cross-laminated timber, and laminated veneer lumber, similar glued members, wood-based panels or steel.

Steel plates and wood-based panels except solid wood panels, laminated veneer lumber and cross laminated timber shall only be located on the side of the screw head. The following wood-based panels may be used:

- Plywood according to EN 636 or ETA
- Particleboard according to EN 312 or ETA
- Oriented Strand Board according to EN 300 or ETA
- Fibreboard according to EN 622-2 and 622-3 or ETA (minimum density 650 kg/m³)
- Cement bonded particleboard according to ETA
- Solid wood panels according to EN 13353 and EN 13986 and cross laminated timber according to ETA
- Laminated Veneer Lumber according to EN 14374 or ETA
- Engineered wood products according to ETA; if the ETA of the product includes provisions for the use of self-tapping screws, the provisions of the ETA of the engineered wood product apply

The screws shall be driven into the wood without pre-drilling.

The screws are intended to be used in timber connections for which requirements for mechanical resistance and stability and safety in use in the sense of the Basic Works Requirements 1 and 4 of Regulation 305/2011 (EU) shall be fulfilled.

The design of the connections shall be based on the characteristic load-carrying capacities of the screws. The design capacities shall be derived from the characteristic capacities in accordance with Eurocode 5 or an appropriate national code.

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

The scope of the screws regarding resistance to corrosion shall be defined according to national provisions that apply at the installation site considering environmental conditions. Section 3.11 of this ETA contains the corrosion protection for JD-PLUS screws made from carbon steel and the material number of the stainless steel.

The provisions made in this European Technical Assessment are based on an assumed intended working life of the hold downs of 50 years.

The indications given on the working life cannot be interpreted as a guarantee given by the producer or Assessment Body, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

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

Characteristic	Assessment of characteristic
3.1 Mechanical resistance and stability*) (BWR1)	
Tensile strength, carbon steel	Characteristic value $f_{tens,k}$: d = 3,5 mm: 4,5 kN d = 4,0 mm: 5,0 kN d = 4,5 mm: 5,8 kN d = 5,0 mm: 8,5 kN d = 6,0 mm: 11,5 kN
Tensile strength, stainless steel	d = 3,5 mm: 2,5 kN d = 4,0 mm: 3,2 kN d = 4,5 mm: 3,8 kN d = 5,0 mm: 5,0 kN d = 6,0 mm: 7,0 kN
Insertion moment	Ratio of the characteristic torsional strength to the mean insertion moment: $f_{tor,k} / R_{tor,mean} \geq 1,5$
Torsional strength, carbon steel	Characteristic value $f_{tor,k}$: d = 3,5 mm: 2,2 Nm d = 4,0 mm: 3,4 Nm d = 4,5 mm: 4,6 Nm d = 5,0 mm: 6,0 Nm d = 6,0 mm: 10,0 Nm
Torsional strength, stainless steel	d = 3,5 mm: 1,4 Nm d = 4,0 mm: 1,9 Nm d = 4,5 mm: 2,8 Nm d = 5,0 mm: 3,7 Nm d = 6,0 mm: 6,5 Nm
3.2 Safety in case of fire (BWR2)	
Reaction to fire	The screws are made from steel classified as performance class A1 of the characteristic reaction to fire, in accordance with the provisions of EC decision 96/603/EC, amended by EC Decision 2000/605/EC.
3.3 Hygiene, health and the environment (BWR3)	
Influence on air quality	The product does not contain/release dangerous substances specified in TR 034, dated October 2015 * *
3.7 Sustainable use of natural resources (BWR7)	No Performance Assessed
3.8 General aspects related to the performance of the product	The screws have been assessed as having satisfactory durability and serviceability when used in timber structures using the timber species described in Eurocode 5 and subject to the conditions defined by service classes 1, 2 and 3
Identification	See Annex A

*) See additional information in section 3.9 – 3.12.

** In addition to the specific clauses relating to dangerous substances contained in this European Technical Assessment, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Regulation, these requirements need also to be complied with, when and where they apply.

3.9 Mechanical resistance and stability

The load-carrying capacities for JD-PLUS screws are applicable to the wood-based materials mentioned in paragraph 1 even though the term timber has been used in the following.

The characteristic lateral load-carrying capacities and the characteristic axial withdrawal capacities of JD-PLUS screws should be used for designs in accordance with Eurocode 5 or an appropriate national code.

Point side penetration length must be $\ell_{ef} \geq 4 \cdot d$, where d is the outer thread diameter of the screw. For the fixing of rafters, point side penetration must be at least 40 mm, $\ell_{ef} \geq 40$ mm.

ETAs for structural members or wood-based panels must be considered where applicable.

Lateral load-carrying capacity

The characteristic lateral load-carrying capacity of JD-PLUS screws shall be calculated according to EN 1995-1-1:2008 (Eurocode 5) using the outer thread diameter d as the nominal diameter of the screw. The contribution from the rope effect may be considered.

The characteristic yield moment shall be calculated from:

Carbon steel:

Screw d = 3,5 mm:	$M_{y,k}$ = 2,0 Nm
Screw d = 4,0 mm:	$M_{y,k}$ = 3,0 Nm
Screw d = 4,5 mm:	$M_{y,k}$ = 4,0 Nm
Screw d = 5,0 mm:	$M_{y,k}$ = 5,0 Nm
Screw d = 6,0 mm:	$M_{y,k}$ = 9,0 Nm

Stainless steel:

Screw d = 3,5 mm:	My,k = 1,0 Nm
Screw d = 4,0 mm:	My,k = 1,5 Nm
Screw d = 4,5 mm:	My,k = 2,0 Nm
Screw d = 5,0 mm:	My,k = 3,0 Nm
Screw d = 6,0 mm:	My,k = 6,0 Nm

Where

d outer thread diameter [mm]

Bending angle

A minimum plastic bending angle of $45°/d^{0,7} + 20°$ was reached without breaking the screws.

Axial withdrawal capacity

The characteristic axial withdrawal capacity of JD-PLUS screws in solid timber (softwood), glued laminated timber, cross-laminated timber or laminated veneer lumber members at an angle of $30° \leq \alpha \leq 90°$ to the grain calculated according to EN 1995-1-1:2008 from based on a characteristic density of the wood-based member of 350 kg/m³ is:

$f_{ax,k}$ = 12.0 N/mm² for JD-PLUS screws with d < 5 mm
$f_{ax,k}$ = 11.5 N/mm² for JD-PLUS screws with d ≥ 5 mm.

For screws penetrating more than one layer of cross laminated timber, the different layers may be taken into account proportionally.

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

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

$$K_{ser} = 780 \cdot d^{0,2} \cdot \ell_{ef}^{0,4} \quad [N/mm],$$

Where

d	outer thread diameter [mm]
ℓ_{ef}	penetration length in the timber member [mm]

Head pull-through capacity

The characteristic head pull-through capacity of JD-PLUS screws shall be calculated according to EN 1995-1-1:2008 based on a characteristic density of the wood-based member of 350 kg/m³ is

Characteristic head pull-through parameter for screws in connections with timber and in connections with wood-based panels with thicknesses above 20 mm:

$f_{head,k}$ = 9,4 N/mm²

For wood-based panels a maximum characteristic density of 380 kg/m³ shall be used in equation (8.40b) of EN 1995-1-1.

Characteristic head pull-through parameter for screws in connections with wood-based panels with thicknesses between 12 mm and 20 mm:
$f_{head,k}$ = 8 N/mm²

Screws in connections with wood-based panels with a thickness below 12 mm (minimum thickness of the wood based panels of 1,2·d with d as outer thread diameter):
$f_{head,k}$ = 8 N/mm²
limited to $F_{ax,Rk}$ = 400 N

The head diameter d_h shall be greater than 1,8·d_s, where d_s is the smooth shank or the wire diameter. Otherwise the characteristic head pull-through capacity $F_{ax,\alpha,Rk}$ = 0.

The minimum thickness of wood-based panels according to the clause 2.1 must be observed.

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

Tensile capacity
The characteristic tensile strength $f_{tens,k}$ of JD-PLUS screws is given in the table above.

For screws used in combination with steel plates, the tear-off capacity of the screw head including a washer shall be greater than the tensile capacity of the screw.

Laterally and/or axially loaded screws
For JD-PLUS screws minimum spacing and distances are given in EN 1995-1-1:2004+A1:2008, 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.

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

Only axially loaded screws
For only axially loaded JD-PLUS screws the minimum spacing, end and edge distances are given in EN 1995-1-1:2004+A1:2008, clause 8.7.2 and Table 8.6.

3.11 Aspects related to the performance of the product

3.11.1 Corrosion protection in service class 1, 2 and 3.
The JD-PLUS screws are produced from carbon wire. They are electrogalvanised and e.g. yellow chromated with thicknesses of the zinc coating from 5 – 8 µm.
Steel no. 1.4567 is used for screws made from stainless steel.

3.12 General aspects related to the intended use of the product

The screws are manufactured in accordance with the provisions of the European Technical Assessment using the automated manufacturing process as identified during the inspection of the plant by the assessment body issuing the ETA.

The screws are used for connections in load bearing timber structures between members of solid timber (softwood), glued laminated timber, cross-laminated timber (minimum diameter d = 6,0 mm), and laminated veneer lumber, similar glued members, wood-based panels or steel members.

The screws may be used for connections in load bearing timber structures with structural members according to an associated European Technical Assessment, if according to the associated European Technical Assessment of the structural member a connection in load bearing timber structures with screws according to a European Technical Assessment is allowed.

A minimum of two screws should in general be used for connections in load bearing timber structures.

The minimum penetration depth in structural members made of solid, glued or cross-laminated timber is 4·d.

Wood-based panels and steel plates should only be arranged on the side of the screw head. The minimum thickness of wood-based panels should be 1,2·d. Furthermore, the minimum thickness for following wood-based panels should be:

- Plywood, Fibreboards: 6 mm
- Particleboards, OSB, Cement Particleboards: 8 mm
- Solid wood panels: 12 mm

For structural members according to ETA's the terms of the ETA must be considered.

The minimum angle between the screw axis and the grain direction is α = 30°.

The screws shall be driven into the wood without pre-drilling.

Only the equipment prescribed by Joseph Dresselhaus GmbH & Co. KG. shall be used for driving the screws.

In connections with screws with countersunk head according to Annex A, the head must be flush with the surface of the connected structural member. A deeper countersink is not allowed.

For JD-PLUS screws in non-predrilled holes, minimum spacing and distances are given in EN 1995-1-1:2004 (Eurocode 5) clause 8.3.1.2 and table 8.2 as for nails in non-predrilled holes. Here, the outer thread diameter d

must be considered. The minimum thickness for structural members is t = 30 mm.

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

Minimum distances and spacing for screws in the plane surface of cross laminated timber members with a minimum thickness t = 10·d may be taken as (see Annex B):

Spacing a_1 parallel to the grain	$a_1 = 4 \cdot d$
Spacing a_2 perpendicular to the grain	$a_2 = 2{,}5 \cdot d$
Distance $a_{3,c}$ from centre of the screw-part in timber to the unloaded end grain	$a_{3,c} = 6 \cdot d$
Distance $a_{3,t}$ from centre of the screw-part in timber to the loaded end grain	$a_{3,t} = 6 \cdot d$
Distance $a_{4,c}$ from centre of the screw-part in timber to the unloaded edge	$a_{4,c} = 2{,}5 \cdot d$
Distance $a_{4,t}$ from centre of the screw-part in timber to the loaded edge	$a_{4,t} = 6 \cdot d$

Minimum distances and spacing for screws in the edge surface of cross laminated timber members with a minimum thickness t = 10·d and a minimum penetration depth perpendicular to the edge surface may be taken as (see Annex B):

Spacing a_1 parallel to the CLT plane	$a_1 = 10 \cdot d$
Spacing a_2 perpendicular to the CLT plane	$a_2 = 4 \cdot d$
Distance $a_{3,c}$ from centre of the screw-part in timber to the unloaded end	$a_{3,c} = 7 \cdot d$
Distance $a_{3,t}$ from centre of the screw-part in timber to the loaded end	$a_{3,t} = 12 \cdot d$
Distance $a_{4,c}$ from centre of the screw-part in timber to the unloaded edge	$a_{4,c} = 3 \cdot d$
Distance $a_{4,t}$ from centre of the screw-part in timber to the loaded edge	$a_{4,t} = 6 \cdot d$

Minimum distances and spacing for JD-PLUS screws in cross laminated timber are given in Annex B.

4 Attestation and verification of constancy of performance (AVCP)

4.1 AVCP system

According to the decision 97/176/EC of the European Commission1, as amended, the system(s) of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) is 3.

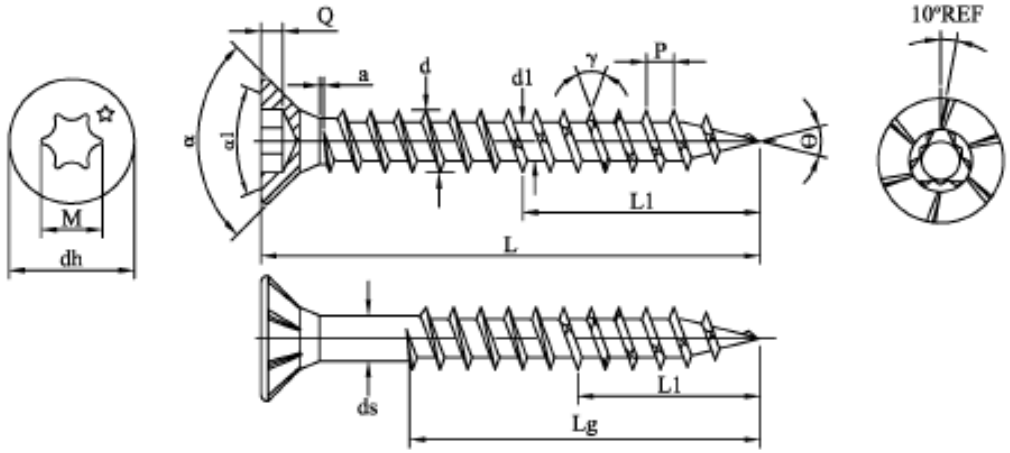
5 Technical details necessary for the implementation of the AVCP system, as foreseen in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ETA-Danmark prior to CE marking.

Issued in Copenhagen on 2018-01-18 by

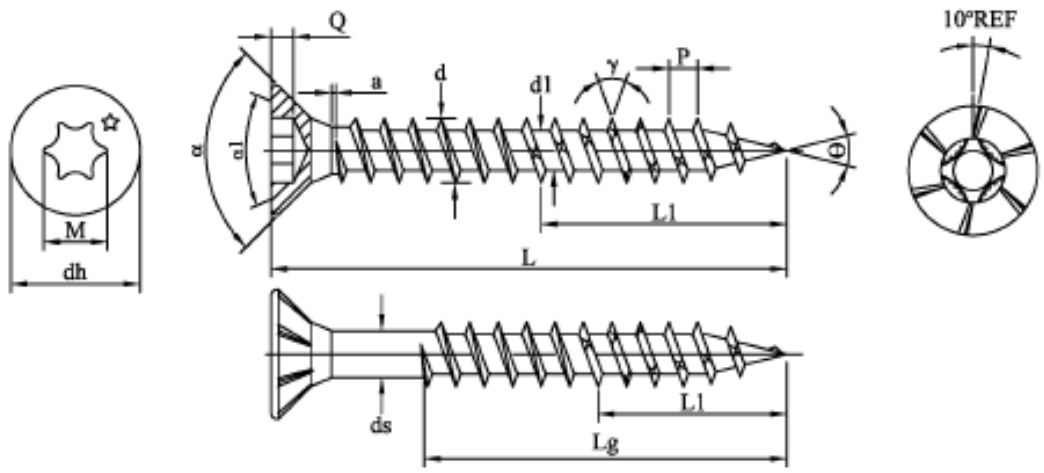
Thomas Bruun
Managing Director, ETA-Danmark

Annex A
Drawings of JD-PLUS screws



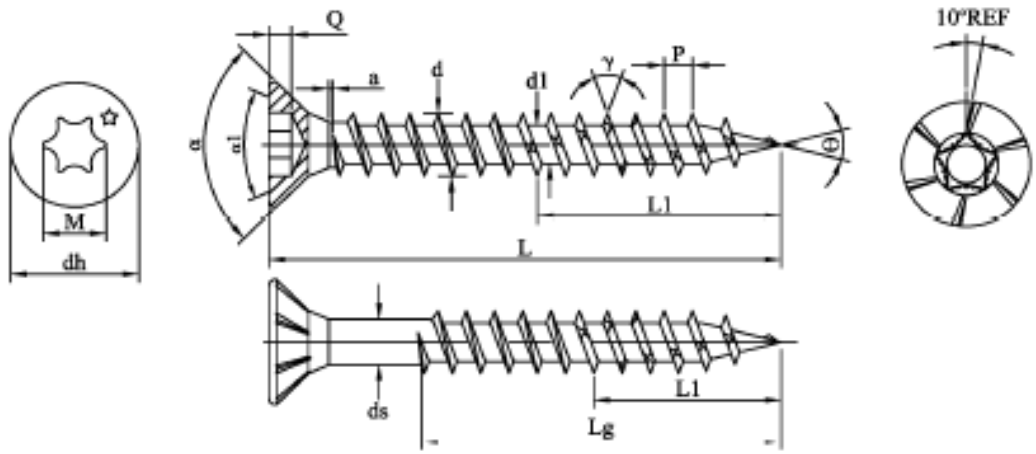
ASTER SCREWS DOUBLE FLAT HEAD TORX DRIVE WITH 6 RIBS UNDER HEAD.

DRAWING NO	AS-388 EX2	DIA OF MATERIAL		2.48-2.50		γ	37°-43°
DESCRIPTION	AS/6DFT	DIA OF MATERIAL		2.50-2.52	Lg≧21	Θ	21°-27°
SIZE	M3.5	Head diameter	dh	7.00-0.4	Lg≤20	Θ1	32°-35°
MATERIAL	302 HQ	Shaft diameter	ds	2.50-2.60	SCREW LENGTH	L	TOLERANCE ON LENGTH
CUSTOMER DRAWING NO	A124-		α	88°-92°			
LENGTH UNIT	mm		α1	43°-47°	≧14~≤18		+0/-0.90
TORSIONAL TEST	12.6 MIN kg-cm	PUNCH NO		T-15	≧20~≤30		+0/-1.10
	Lg ±1.50		M	3.37 REF	≧35~≤40		+0/-1.30
Lg≤16	L1 1/2×Lg	GO	Q	1.40-1.70			
Lg>16	L1 1/3×Lg	NO/GO		0.56 MAX			
		Thread outside diameter	d	3.50-0.2			
		Thread inside diameter	d1	2.35-0.25			
			p	1.60±10%			
			a	0.30-0.80	L≧25~≤30		Lg 18-0.3
					L≧35~≤40		Lg 24-0.3



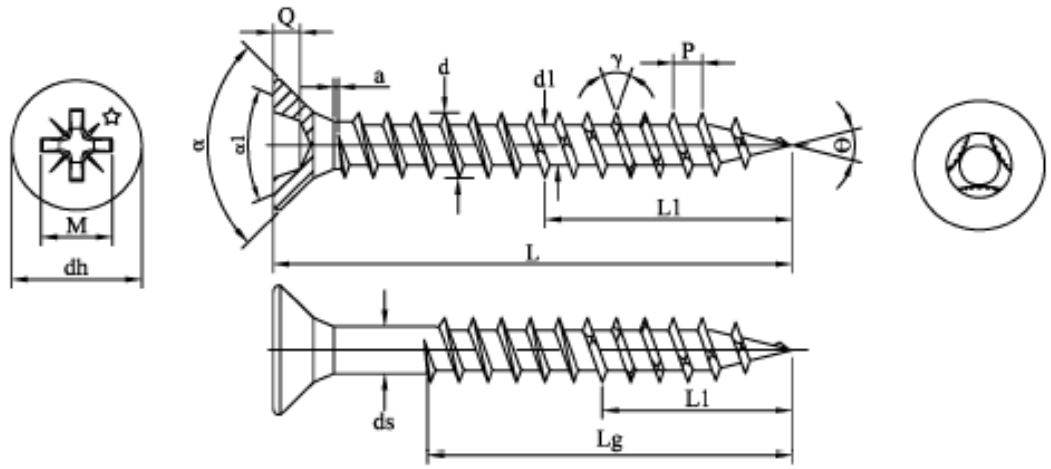
ASTER SCREWS DOUBLE FLAT HEAD TORX DRIVE WITH 6 RIBS UNDER HEAD.

DRAWING NO	AS-389 EX3	DIA OF MATERIAL		2.78-2.80		γ	37°-43°
DESCRIPTION	AS/6DFT	DIA OF MATERIAL		2.80-2.85	Lg≧22	Θ	21°-27°
SIZE	M4.0	Head diameter	dh	8.00-0.5	Lg≤20	Θ1	32°-35°
MATERIAL	302 HQ	Shaft diameter	ds	2.80-2.90	SCREW LENGTH	L	TOLERANCE ON LENGTH
CUSTOMER DRAWING NO	A124-		α	88°-92°			
LENGTH UNIT	mm		α1	43°-47°	18		+0/-0.90
TORSIONAL TEST	19 MIN kg-cm	PUNCH NO		T-20	≧20~≤30		+0/-1.10
	lg ±1.50		M	3.95 REF	≧35~≤50		+0/-1.30
lg≤24	L1 1/2×Lg	GO	Q	1.40-1.70	≧60~≤70		+0/-1.50
lg>24	L1 1/3×Lg	NO/GO		0.79 MAX			
		Thread outside diameter	d	4.00-0.2	L≧25~≤30		Lg 18-0.3
		Thread inside diameter	d1	2.60-0.25	L≧35~≤40		Lg 24-0.3
			p	1.80±10%	L≧45~≤50		Lg 30-0.3
			a	0.30-0.70	L60		Lg 36-0.4
					L70		Lg 42-0.4
DRAWING NO	AS-390 EX3	DIA OF MATERIAL		3.13-3.15		γ	37°-43°
DESCRIPTION	AS/6DFT	DIA OF MATERIAL		3.14-3.16	Lg≧26	Θ	21°-27°
SIZE	M4.5	Head diameter	dh	9.00-0.5	Lg≤25	Θ1	32°-35°
MATERIAL	302 HQ	Shaft diameter	ds	3.14-3.24	SCREW LENGTH	L	TOLERANCE ON LENGTH
CUSTOMER DRAWING NO	A124-		α	88°-92°			
LENGTH UNIT	mm		α1	43°-47°			
TORSIONAL TEST	31 MIN kg-cm	PUNCH NO		T-20	≧20~≤30		+0/-1.10
	lg ±1.50		M	3.95 REF	≧35~≤50		+0/-1.30
	L1 1/2×Lg	GO	Q	1.40-1.70	≧60~≤70		+0/-1.50
	L1 1/3×Lg	NO/GO		0.79 MAX			
		Thread outside diameter	d	4.50-0.25	L≧25~≤30		Lg 18-0.3
		Thread inside diameter	d1	2.90-0,3	L≧35~≤40		Lg 24-0.3
			p	2.00±10%	L≧45~≤50		Lg 30-0.3
			a	0.30-0.70	L60		Lg 36-0.4
					L70		Lg 42-0.4



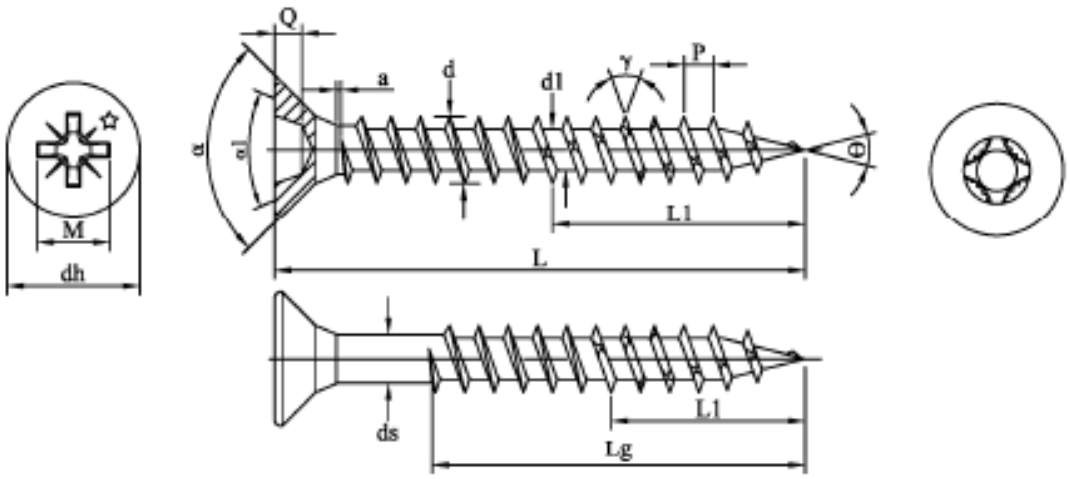
ASTER SCREWS DOUBLE FLAT HEAD TORX DRIVE WITH 6 RIBS UNDER HEAD.

DRAWING NO	AS-391 EX4	DIA OF MATERIAL		3.45-3.47		γ	37°-43°
DESCRIPTION	AS/6DFT	DIA OF MATERIAL		3.45-3.50	Lg≧26	θ	21°-27°
SIZE	M5.0	Head diameter	dh	10.00-0.5	Lg≤25	θ1	32°-35°
MATERIAL	302 HQ	Shaft diameter	ds	3.45-3.55	SCREW LENGTH	L	TOLERANCE ON LENGTH
CUSTOMER DRAWING NO	A124-		α	88°-92°			
LENGTH UNIT	mm		α1	43°-47°			
TORSIONAL TEST	39 MIN kg-cm	PUNCH NO		T-25/T20	≧22~≤30		+0/-1.10
	Lg ±1.50		M	4.54 REF	≧35~≤50		+0/-1.30
Lg≤30	L1 1/2×Lg	GO	Q	2.10-2.40	≧60~≤80		+0/-1.50
Lg>30	L1 1/3×Lg	NO/Go		0.90 MAX	≧90~≤100		±1.10
		Thread outside diameter	d	5.00-0.3	L≧25~≤30	Lg	18-0.3
		Thread inside diameter	d1	3.10-0.3	L≧35~≤40	Lg	24-0.3
			p	2.20±10%	L≧45~≤50	Lg	30-0.3
			a	0.30-0.80	L60	Lg	36-0.4
					L70	Lg	42-0.4
					L80	Lg	48-0.4
					L≧90~≤100	Lg	60-0.5
DRAWING NO	AS-392 EX4	DIA OF MATERIAL		4.18-4.20		γ	37°-43°
DESCRIPTION	AS/6DFT	DIA OF MATERIAL		4.20-4.25	Lg≧41	θ	21°-27°
SIZE	M6.0	Head diameter	dh	12.00-0.5	Lg≤40	θ1	32°-35°
MATERIAL	302 HQ	Shaft diameter	ds	4.20-4.30	SCREW LENGTH	L	TOLERANCE ON LENGTH
CUSTOMER DRAWING NO	A124-		α	88°-92°			
LENGTH UNIT	mm		α1	43°-47°			
TORSIONAL TEST	60 MIN kg-cm	PUNCH NO		T-30	≧26~≤30		+0/-1.10
	Lg ±1.50		M	5.63 REF	≧35~≤50		+0/-1.30
Lg≤30	L1 1/2×Lg	GO	Q	2.30-2.70	≧60~≤80		+0/-1.50
Lg>30	L1 1/3×Lg	NO/GO		1.12 MAX	≧90~≤120		±1.10
		Thread outside diameter	d	6.00-0.25	L≧25~≤30	Lg	18-0.3
		Thread inside diameter	d1	3.80-0.3	L≧35~≤40	Lg	24-0.3
			p	2.60±10%	L≧45~≤50	Lg	30-0.3
			a	0.30-0.80	L60	Lg	36-0.4
					L70	Lg	42-0.4
					L80	Lg	48-0.4
					L≧90~≤100	Lg	60-0.5
					L≧100~≤240	Lg	70-0.5



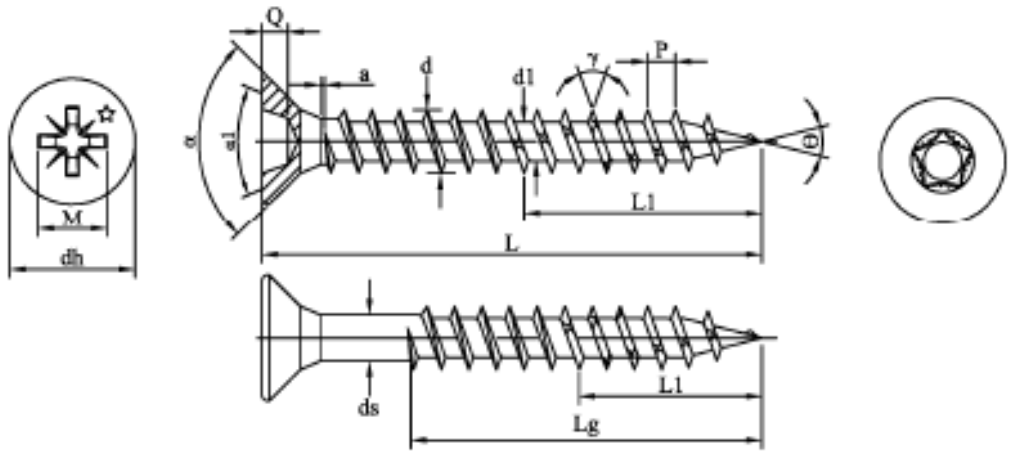
ASTER SCREWS DOUBLE FLAT HEAD POZI DRIVE.

DRAWING NO	AS-562 EX5	DIA OF MATERIAL		2.58-2.60		γ	37°-43°
DESCRIPTION	AS/DFZ	DIA OF MATERIAL		2.60-2.65	Lg≧21	Θ	23°-26°
SIZE	M3.5	Head diameter	dh	7.00-0.3	Lg≤20	Θ1	32°-35°
MATERIAL	C10B21	Shaft diameter	ds	2.60-2.70	SCREW LENGTH	L	TOLERANCE ON LENGTH
CUSTOMER DRAWING NO	A124-		α	88°-92°			
LENGTH UNIT	mm		α1	43°-47°	≧16~≤18		+0/-0.90
TORSIONAL TEST	20.4 MIN kg-cm	PUNCH NO		NO.2	≧20~≤30		+0/-1.10
SURFACE HARDNESS	450-750 $HV_{0.3}$		M	4.00 REF	≧35~≤50		+0/-1.30
CORE HARDNESS	450 MAX $HV_{0.3}$		Q	2.03-2.30			
BENDING	45° MIN	Thread outside diameter	d	3.50-0.25	L≧25~≤30	Lg	18-0.3
	Lg ±1.50	Thread inside diameter	d1	2.45-0.2	L≧35~≤40	Lg	24-0.3
Lg≤16	L1 1/2×Lg		p	1.80±10%	L≧45~≤50	Lg	30-0.3
Lg>16	L1 1/3×Lg		a	0.30-0.70			



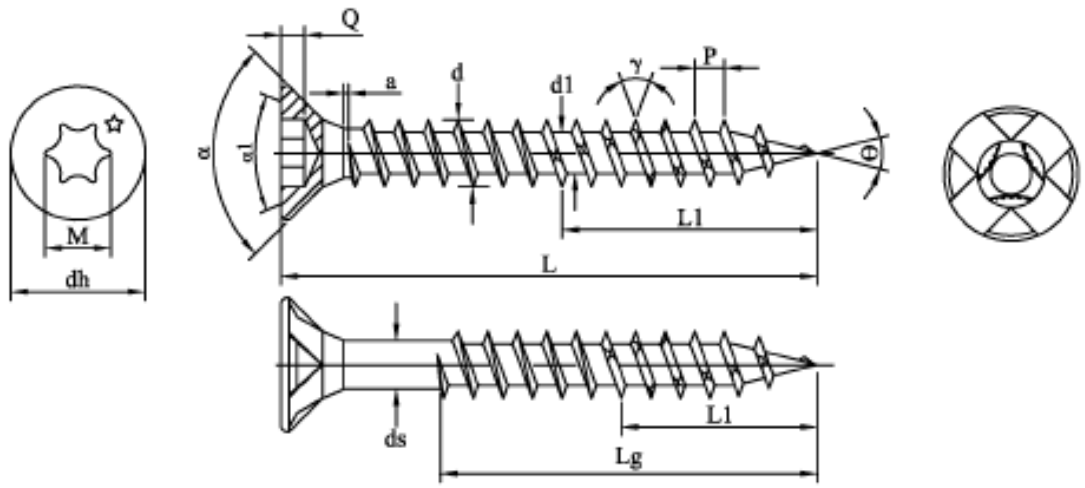
ASTER SCREWS DOUBLE FLAT HEAD POZI DRIVE.

DRAWING NO	AS-563 EX6	DIA OF MATERIAL		2.90-2.92		γ	37°-43°
DESCRIPTION	AS/DFZ	DIA OF MATERIAL		2.90-2.95	Lg≧21	θ	23°-26°
SIZE	M4.0	Head diameter	dh	8.00-0.3	Lg≤20	θ1	32°-35°
MATERIAL	C10B21	Shaft diameter	ds	2.90-3.00	SCREW LENGTH	L	TOLERANCE ON LENGTH
[illegible]	A124-		α	88°-92°			
LENGTH UNIT	mm		α1	43°-47°	18		+0/-0.90
TORSIONAL TEST	33 MIN kg-cm	PUNCH NO		NO.2	≧20~≤30		+0/-1.10
SURFACE HARDNESS	450-750 $HV_{0.3}$		M	4.40 REF	≧35~≤50		+0/-1.30
CORE HARDNESS	450 MAX $HV_{0.3}$		Q	2.50-2.92	≧55~≤70		+0/-1.50
BENDING	45° MIN	Thread outside diameter	d	4.00-0.25			
	Lg ±1.50	Thread inside diameter	d1	2.70-0.2	L≧25~≤30		Lg 18-0.3
Lg≤24	L1 1/2×Lg		p	2.00±10%	L≧35~≤40		Lg 24-0.3
Lg>24	L1 1/3×Lg		a	0.30-0.70	L≧45~≤50		Lg 30-0.3
					L60		Lg 36-0.4
					L70		Lg 42-0.4
DRAWING NO	AS-564 EX6	DIA OF MATERIAL		3.13-3.15		γ	37°-43°
DESCRIPTION	AS/DFZ	DIA OF MATERIAL		3.15-3.20	Lg≧26	θ	23°-26°
SIZE	M4.5	Head diameter	dh	9.00-0.3	Lg≤25	θ1	32°-35°
MATERIAL	C10B21	Shaft diameter	ds	3.15-3.25	SCREW LENGTH	L	TOLERANCE ON LENGTH
[illegible]	A124-		α	88°-92°			
LENGTH UNIT	mm		α1	43°-47°			
TORSIONAL TEST	44 MIN kg-cm	PUNCH NO		NO.2	≧20~≤30		+0/-1.10
SURFACE HARDNESS	450-750 $HV_{0.3}$		M	4.80 REF	≧35~≤50		+0/-1.30
CORE HARDNESS	450 MAX $HV_{0.3}$		Q	3.02-3.45	≧55~≤80		+0/-1.50
BENDING	45° MIN	Thread outside diameter	d	4.50-0.25			
	Lg ±1.50	Thread inside diameter	d1	2.90-0.2			
Lg≤24	L1 1/2×Lg		p	2.20±10%	L≥25~≤30		Lg 18-0.3
Lg>24	L1 1/3×Lg		a	0.30-0.70	L≧35~≤40		Lg 24-0.3
					L≧45~≤50		Lg 30-0.3
					L60		Lg 36-0.4
					L70		Lg 42-0.4
					L80		Lg 48-0.4



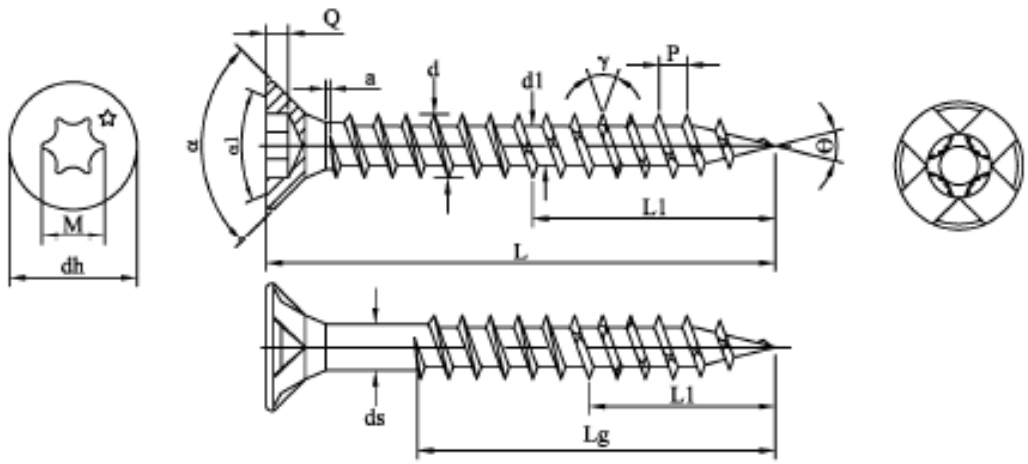
ASTER SCREWS DOUBLE FLAT HEAD POZI DRIVE.

DRAWING NO	AS-565 EX7	DIA OF MATERIAL		3.45-3.47		γ	37°-43°	
DESCRIPTION	AS/DFZ	DIA OF MATERIAL		3.45-3.50	Lg≧26	θ	23°-26°	
SIZE	M5.0	Head diameter	dh	10.00-0.3	Lg≤25	θ1	32°-35°	
MATERIAL	C10B21	Shaft diameter	ds	3.45-3.55	SCREW LENGTH	L	TOLERANCE ON LENGTH	
CUSTOMER MARKING NO	A124-		α	88°-92°				
LENGTH UNIT	mm		α1	43°-47°				
TORSIONAL TEST	63 MIN kg-cm	PUNCH NO		NO.2	≧22~≤30		+0/-1.10	
SURFACE HARDNESS	450-750 $HV_{0.3}$		M	5.30 REF	≧35~≤50		+0/-1.30	
CORE HARDNESS	450 MAX $HV_{0.3}$		Q	3.02-3.45	≧55~≤80		+0/-1.50	
BENDING	45° MIN	Thread outside diameter	d	5.00-0.3	≧90~≤120		±1.10	
	Lg ±1.50	Thread inside diameter	d1	3.20-0.25	L≧25~≤30		Lg 18-0.3	
Lg≤30	L1 1/2×Lg		p	2.60±10%	L≧35~≤40		Lg 24-0.3	
Lg>30	L1 1/3×Lg		a	0.30-0.80	L≧45~≤50		Lg 30-0.3	
					L60		Lg 36-0.4	
					L70		Lg 42-0.4	
					L80		Lg 48-0.4	
					L≧90~≤100		Lg 60-0.5	
					L≧110~≤120		Lg 70-0.5	
DRAWING NO	AS-566 EX7	DIA OF MATERIAL		4.18-4.20		γ	37°-43°	
DESCRIPTION	AS/DFZ	DIA OF MATERIAL		4.20-4.25	Lg≧41	θ	23°-26°	
SIZE	M6.0	Head diameter	dh	12.00-0.4	Lg≤40	θ1	32°-35°	
MATERIAL	C10B21	Shaft diameter	ds	4.20-4.30	SCREW LENGTH	L	TOLERANCE ON LENGTH	
CUSTOMER MARKING NO	A124-		α	88°-92°	≧26~≤30		+0/-1.10	
LENGTH UNIT	mm		α1	43°-47°	≧35~≤50		+0/-1.30	
TORSIONAL TEST	110.2 MIN kg-cm	PUNCH NO		NO.3	≧55~≤80		+0/-1.50	
SURFACE HARDNESS	450-750 $HV_{0.3}$		M	6.60 REF	≧90~≤120		±1.10	
CORE HARDNESS	450 MAX $HV_{0.3}$		Q	3.40-3.84	≧130~≤180		±1.30	
BENDING	45° MIN	Thread outside diameter	d	6.00-0.25	≧190~≤240		±1.50	
	Lg ±1.50	Thread inside diameter	d1	3.90-0.25	L≧25~≤30		Lg 18-0.3	
Lg≤30	L1 1/2×Lg		p	3.00±10%	L≧35~≤40		Lg 24-0.3	
Lg>30	L1 1/3×Lg		a	0.30-0.80	L≧45~≤50		Lg 30-0.3	
					L60		Lg 36-0.4	
					L70		Lg 42-0.4	
					L80		Lg 48-0.4	
					L≧90~≤100		Lg 60-0.5	
					L≧110~≤240		Lg 70-0.5	



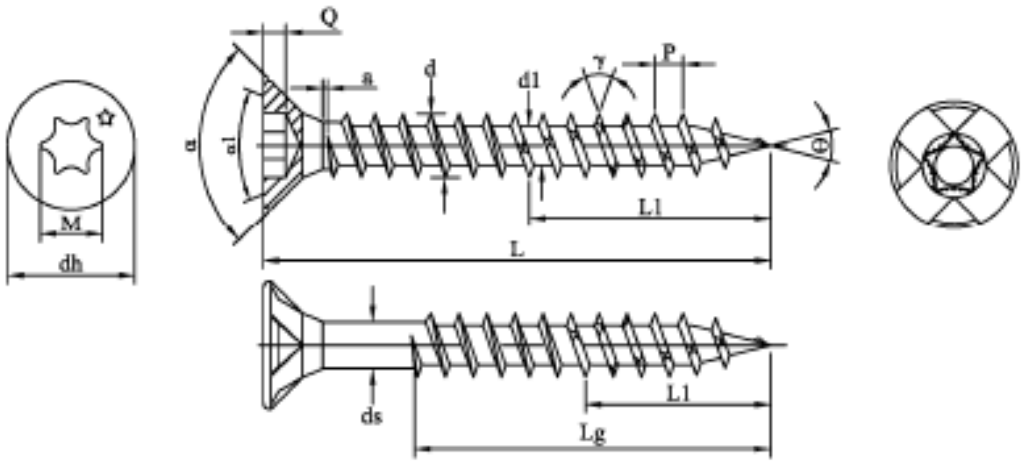
ASTER SCREWS DOUBLE FLAT HEAD TORX DRIVE WITH 4 RIBS UNDER HEAD.

DRAWING NO	AS-587 EX8	DIA OF MATERIAL		2.58-2.60		γ	37°-43°
DESCRIPTION	AS/4DFT	DIA OF MATERIAL		2.60-2.65	Lg≧21	Θ	23°-26°
SIZE	M3.5	Head diameter	dh	7.00-0.3	Lg≤20	Θ1	32°-35°
MATERIAL	C10B21	Shaft diameter	ds	2.60-2.70	SCREW LENGTH	L	TOLERANCE ON LENGTH
CUSTOMER DRAWING NO	A124-		α	88°-92°			
LENGTH UNIT	mm		α1	43°-47°	≧16~≤18		+0/-0.90
TORSIONAL TEST	20.4 MIN kg-cm	PUNCH NO		T-15	≧20~≤30		+0/-1.10
SURFACE HARDNESS	450-750 $HV_{0.3}$		M	3.37 REF	≧35~≤50		+0/-1.30
CORE HARDNESS	450 MAX $HV_{0.3}$	GO	Q	1.40-1.70			
BENDING	45° MIN	NO/GO		0.56 MAX	L≧25~≤30	Lg	18-0.3
	Lg ±1.50	Thread outside diameter	d	3.50-0.25	L≧35~≤40	Lg	24-0.3
Lg≤16	L1 1/2×Lg	Thread inside diameter	d1	2.45-0.2	L≧45~≤50	Lg	30-0.3
Lg>16	L1 1/3×Lg		p	1.80±10%			
			a	0.30-0.80			



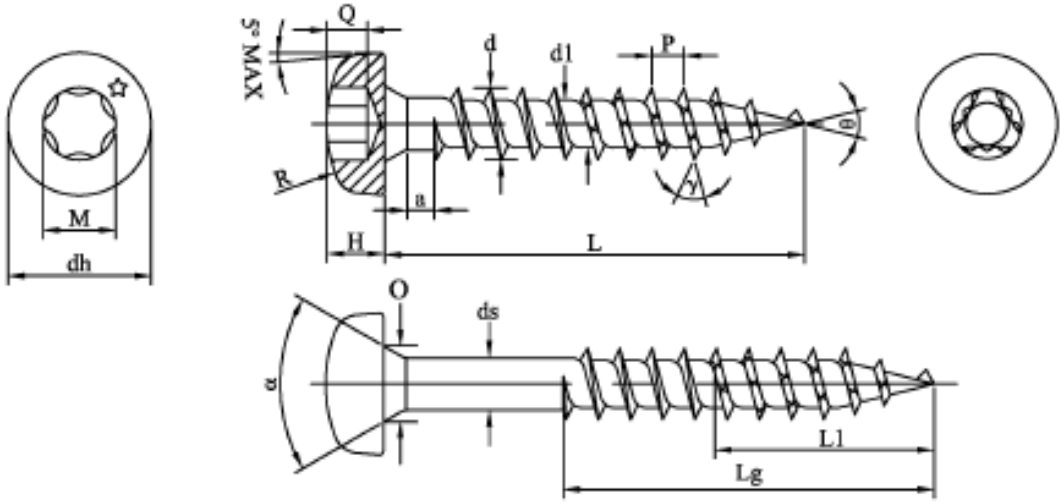
ASTER SCREWS DOUBLE FLAT HEAD TORX DRIVE WITH 4 RIBS UNDER HEAD.

DRAWING NO	AS-588 EX9		DIA OF MATERIAL		2.90-2.92		γ	37°-43°
DESCRIPTION	AS/4DFT		DIA OF MATERIAL		2.90-2.95	Lg≧21	θ	23°-26°
SIZE	M4.0		Head diameter	dh	8.00-0.3	Lg≤20	θ1	32°-35°
MATERIAL	C10B21		Shaft diameter	ds	2.90-3.00	SCREW LENGTH	L	TOLERANCE ON LENGTH
CUSTOMER DRAWING NO	A124-			α	88°-92°			
LENGTH UNIT	mm			α1	43°-47°	18		+0/-0.90
TORSIONAL TEST	33 MIN kg-cm		PUNCH NO		T-20	≧20~≤30		+0/-1.10
SURFACE HARDNESS	450-750 $HV_{0.3}$			M	3.95 REF	≧35~≤50		+0/-1.30
CORE HARDNESS	450 MAX $HV_{0.3}$		GO	Q	1.40-1.70	≧55~≤70		+0/-1.50
BENDING	45° MIN		NO/GO		0.79 MAX	L≧25~≤30		Lg 18-0.3
	L2	±1.50	Thread outside diameter	d	4.00-0.25	L≧35~≤40		Lg 24-0.3
Lg≤24	L1	1/2×Lg	Thread inside diameter	d1	2.70-0.2	L≧45~≤50		Lg 30-0.3
Lg>24	L1	1/3×Lg		p	2.00±10%	L60		Lg 36-0.4
				a	0.30-0.80	L70		Lg 42-0.4
DRAWING NO	AS-589 EX9		DIA OF MATERIAL		3.13-3.15		γ	37°-43°
DESCRIPTION	AS/4DFT		DIA OF MATERIAL		3.15-3.20	Lg≧26	θ	23°-26°
SIZE	M4.5		Head diameter	dh	9.00-0.3	Lg≤26	θ1	32°-35°
MATERIAL	C10B21		Shaft diameter	ds	3.15-3.25	SCREW LENGTH	L	TOLERANCE ON LENGTH
CUSTOMER DRAWING NO	A124-			α	88°-92°			
LENGTH UNIT	mm			α1	43°-47°			
TORSIONAL TEST	44 MIN kg-cm		PUNCH NO		T-20	≧20~≤30		+0/-1.10
SURFACE HARDNESS	450-750 $HV_{0.3}$			M	3.95 REF	≧35~≤50		+0/-1.30
CORE HARDNESS	450 MAX $HV_{0.3}$		GO	Q	1.40-1.70	≧55~≤80		+0/-1.50
BENDING	45° MIN		NO/GO		0.79 MAX			
	Lg	±1.50	Thread outside diameter	d	4.50-0.25			
Lg≤24	L1	1/2×Lg	Thread inside diameter	d1	2.90-0.2	L≧25~≤30		Lg 18-0.3
Lg>24	L1	1/3×Lg		p	2.20±10%	L≧35~≤40		Lg 24-0.3
				a	0.30-0.80	L≧45~≤50		Lg 30-0.3
						L60		Lg 36-0.4
						L70		Lg 42-0.4
						L80		Lg 48-0.4



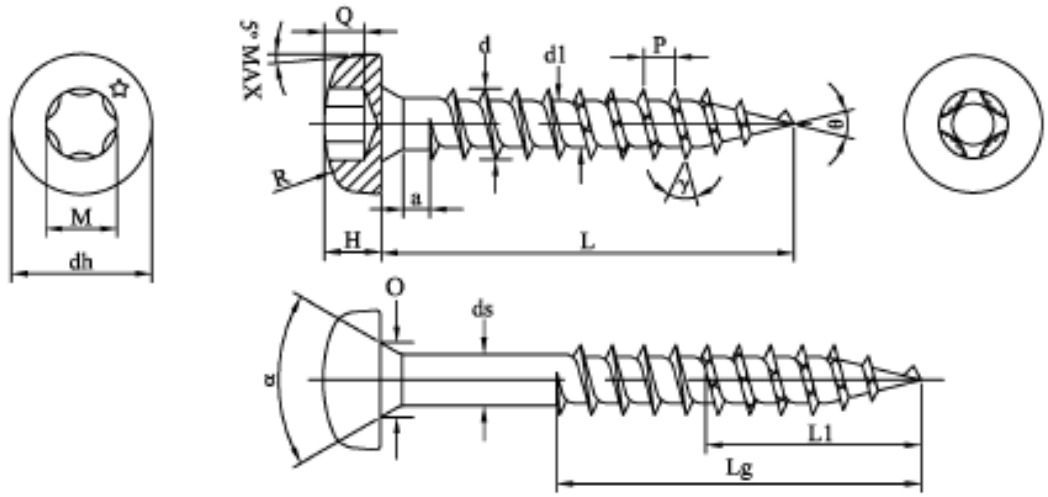
ASTER SCREWS DOUBLE FLAT HEAD TORX DRIVE WITH 4 RIBS UNDER HEAD.

DRAWING NO	AS-590 EX10	DIA OF MATERIAL		3.45-3.47		γ	37°-43°
DESCRIPTION	AS/4DFT	DIA OF MATERIAL		3.45-3.50	Lg≧26	θ	23°-26°
SIZE	M5.0	Head diameter	dh	10.00-0.3	Lg≤25	θ1	32°-35°
MATERIAL	C10B21	Shaft diameter	ds	3.45-3.55	SCREW LENGTH	L	TOLERANCE ON LENGTH
CUSTOMER DRAWING NO	A124-		α	88°-92°			
LENGTH UNIT	mm		α1	43°-47°			
TORSIONAL TEST	63 MIN kg-cm	PUNCH NO		T-25 / T-20	≧22~≤30		+0/-1.10
SURFACE HARDNESS	450-750 $HV_{0.3}$		M	4.54 REF	≧35~≤50		+0/-1.30
CORE HARDNESS	450 MAX $HV_{0.3}$	GO	Q	2.10-2.40	≧55~≤80		+0/-1.50
BENDING	45° MIN	NO/GO		0.79 MAX	≧90~≤120		±1.10
	L2 ±1.50	Thread outside diameter	d	5.00-0.3	L≧25~≤30		Lg 18-0.3
Lg≤30	L1 1/2×Lg	Thread inside diameter	d1	3.20-0.25	L≧35~≤40		Lg 24-0.3
Lg>30	L1 1/3×Lg		p	2.60±10%	L≧45~≤50		Lg 30-0.3
			a	0.30-0.80	L60		Lg 36-0.4
					L70		Lg 42-0.4
					L80		Lg 48-0.4
					L≧90~≤100		Lg 60-0.5
					L≧110~≤120		Lg 70-0.5
DRAWING NO	AS-591 EX10	DIA OF MATERIAL		4.18-4.20		γ	37°-43°
DESCRIPTION	AS/4DFT	DIA OF MATERIAL		4.20-4.25	Lg≧41	θ	23°-26°
SIZE	M6.0	Head diameter	dh	12.00-0.4	Lg≤40	θ1	32°-35°
MATERIAL	C10B21	Shaft diameter	ds	4.20-4.30	SCREW LENGTH	L	TOLERANCE ON LENGTH
CUSTOMER DRAWING NO	A124-		α	88°-92°	≧26~≤30		+0/-0.80
LENGTH UNIT	mm		α1	43°-47°	≧35~≤50		+0/-1.30
TORSIONAL TEST	110.2 MIN kg-cm	PUNCH NO		T-30	≧55~≤80		+0/-1.50
SURFACE HARDNESS	450-750 $HV_{0.3}$		M	5.63 REF	≧90~≤120		±1.10
CORE HARDNESS	450 MAX $HV_{0.3}$	GO	Q	2.30-2.70	≧130~≤180		±1.30
BENDING	45° MIN	NO/GO		1.12 MAX	≧190~≤240		±1.50
	Lg ±1.50	Thread outside diameter	d	6.00-0.25	L≧25~≤30		Lg 18-0.3
Lg≤30	L1 1/2×Lg	Thread inside diameter	d1	3.90-0.25	L≧35~≤40		Lg 24-0.3
Lg>30	L1 1/3×Lg		p	3.00±10%	L≧45~≤50		Lg 30-0.3
			a	0.50-1.00	L60		Lg 36-0.4
					L70		Lg 42-0.4
					L80		Lg 48-0.4
					L≧90~≤100		Lg 60-0.5
					L≧110~≤240		Lg 70-0.5



ASTER SCREWS PAN HEAD TORX DRIVE.

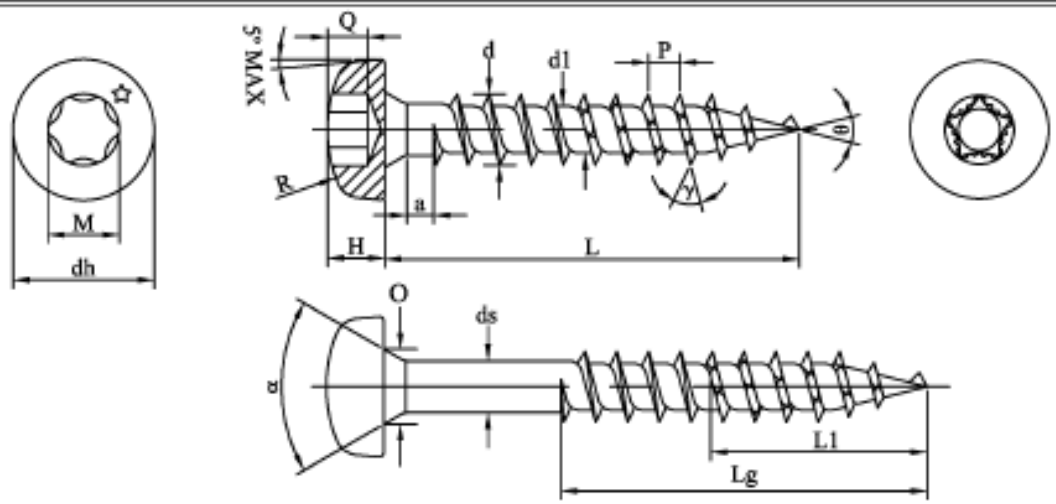
DRAWING NO	AS-902 EX11	DIA OF MATERIAL		2.58-2.60		γ	37°-43°
DESCRIPTION	AS/PT	DIA OF MATERIAL		2.60-2.65	SCREW LENGTH	L	TOLERANCE ON LENGTH
SIZE	M3.5	Head diameter	dh	7.00-0.3			
MATERIAL	C10B21	Shaft diameter	ds	2.60-2.70	≧14~≤18		+0/-0.90
CUSTOMER DRAWING NO	A124-		H	2.30-2.60	≧20~≤30		+0/-1.10
LENGTH UNIT	mm		O	3.50-3.70	≧35~≤50		+0/-1.30
TORSIONAL TEST	20.4 MIN kg-cm		R	7.00R REF			
SURFACE HARDNESS	450-750 $HV_{0.3}$		α	57°-63°			
CORE HARDNESS	450 MAX $HV_{0.3}$	PUNCH NO		T-15			
BENDING	45° MIN		M	3.37 REF	L≧25~≤30	Lg	18 -0.3
	Lg ±1.50		Q	1.30-1.70	L≧35~≤40	Lg	24 -0.3
Lg≤16	L1 1/2×Lg	Thread outside diameter	d	3.5-0.25	L≧45~≤50	Lg	30 -0.3
Lg>16	L1 1/3×Lg	Thread inside diameter	d1	2.45-0.2			
Lg≧21	θ 23°-26°		p	1.80±10%			
Lg≤20	θ1 32°-35°		a	0.30-0.80			



ASTER SCREWS PAN HEAD TORX DRIVE.

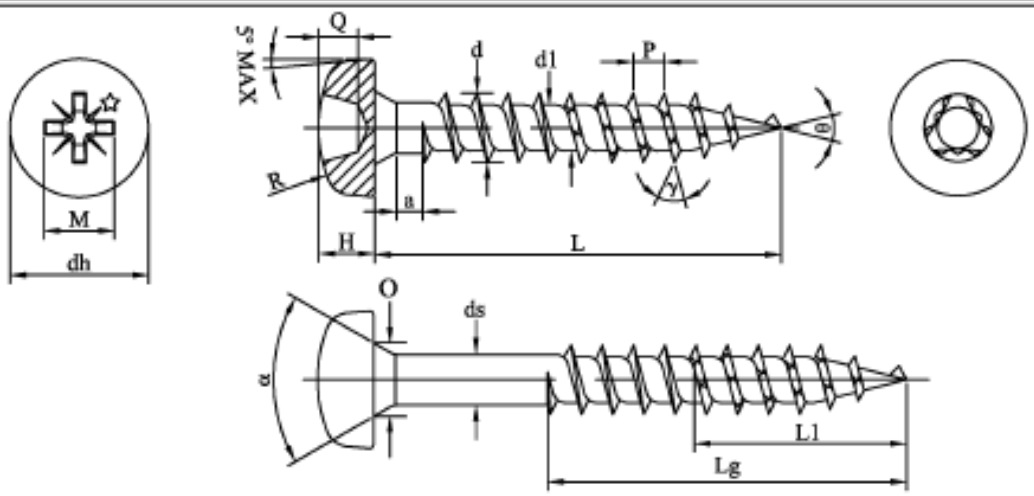
DRAWING NO	AS-903 EX1		DIA OF MATERIAL		2.90-2.92		γ	37°-43°
DESCRIPTION	AS/PT		DIA OF MATERIAL		2.90-2.95	SCREW LENGTH	L	TOLERANCE ON LENGTH
SIZE	M4.0		Head diameter	dh	8.00-0.3	≤10		+0/-0.80
MATERIAL	C10B21		Shaft diameter	ds	2.90-3.00	18		+0/-0.90
CUSTOMER DRAWING NO	A124-			H	2.60-2.90	≧20~≤30		+0/-1.10
LENGTH UNIT	mm			O	4.00-4.20	≧35~≤40		+0/-1.30
TORSIONAL TEST	33 MIN kg-cm			R	8.00R REF			
SURFACE HARDNESS	450-750 $HV_{0.3}$			α	57°-63°			
CORE HARDNESS	450 MAX $HV_{0.3}$		PUNCH NO		T-20			
BENDING	45° MIN			M	3.95 REF			
	Lg	±1.50		Q	1.40-1.80			
Lg≤24	L1	1/2×Lg	Thread outside diameter	d	4.00-0.25	L≧25~≤30	Lg	18-0.3
Lg>24	L1	1/3×Lg	Thread inside diameter	d1	2.70-0.2	L≧35~≤40	Lg	24-0.3
				p	2.00±10%			
				a	0.30-0.80			

DRAWING NO	AS-904 EX1		DIA OF MATERIAL		3.13-3.15		γ	37°-43°
DESCRIPTION	AS/PT		DIA OF MATERIAL		3.15-3.20	SCREW LENGTH	L	TOLERANCE ON LENGTH
SIZE	M4.5		Head diameter	dh	9.00-0.3			
MATERIAL	C10B21		Shaft diameter	ds	3.15-3.25			
CUSTOMER DRAWING NO	A124-			H	2.90-3.20	≧20~≤30		+0/-1.10
LENGTH UNIT	mm			O	4.50-4.70	≧35~≤50		+0/-1.30
TORSIONAL TEST	44 MIN kg-cm			R	9.00R REF			
SURFACE HARDNESS	450-750 $HV_{0.3}$			α	57°-63°			
CORE HARDNESS	450 MAX $HV_{0.3}$		PUNCH NO		T-20			
BENDING	45° MIN			M	3.95 REF			
	Lg	±1.50		Q	1.40-1.80			
Lg≤24	L1	1/2×Lg	Thread outside diameter	d	4.50-0.25			
Lg>24	L1	1/3×Lg	Thread inside diameter	d1	2.90-0.2			
				p	2.20±10%	L≧25~≤30	Lg	18-0.3
				a	0.30-0.80	L≧35~≤40	Lg	24-0.3
						L≧45~≤50	Lg	30-0.3



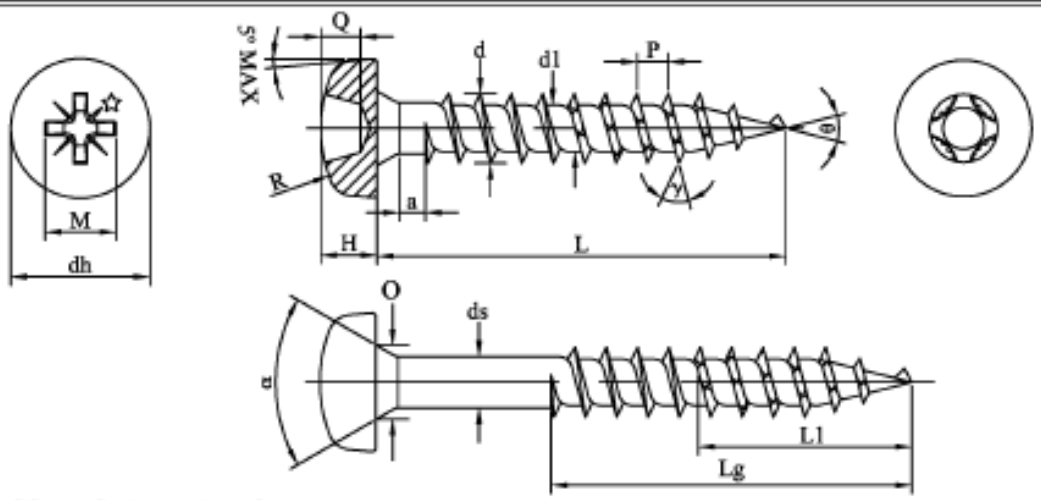
ASTER SCREWS PAN HEAD TORX DRIVE.

DRAWING NO	AS-905 EX12		DIA OF MATERIAL		3.45-3.47		γ	37°-43°
DESCRIPTION	AS/PT		DIA OF MATERIAL		3.45-3.50	SCREW LENGTH	L	TOLERANCE ON LENGTH
SIZE	M5.0		Head diameter	dh	10.00-0.3			
MATERIAL	C10B21		Shaft diameter	ds	3.45-3.55			
CUSTOMER DRAWING NO	A124-			H	3.30-3.60	≧22~≤30		+0/-1.10
LENGTH UNIT	mm			O	5.00-5.20	≧35~≤50		+0/-1.30
TORSIONAL TEST	63 MIN kg-cm			R	10.00R REF	≧55~≤80		+0/-1.50
SURFACE HARDNESS	450-750 $HV_{0.3}$			α	57°-63°			
CORE HARDNESS	450 MAX $HV_{0.3}$		PUNCH NO		T-25/T20			
BENDING	45° MIN			M	4.54 REF	L≧25~≤30	Lg	18-0.3
	Lg ±1.50			Q	1.80-2.20	L≧35~≤40	Lg	24-0.3
Lg≤30	L1 1/2×Lg		Thread outside diameter	d	5.00-0.3	L≧45~≤50	Lg	30-0.3
Lg>30	L1 1/3×Lg		Thread inside diameter	d1	3.20-0.25	L60	Lg	36-0.4
				p	2.60±10%	L70	Lg	42-0.4
				a	0.30-0.80	L80	Lg	48-0.4
DRAWING NO	AS-906 EX12		DIA OF MATERIAL		4.18-4.20		γ	37°-43°
DESCRIPTION	AS/PT		DIA OF MATERIAL		4.20-4.25	SCREW LENGTH	L	TOLERANCE ON LENGTH
SIZE	M6.0		Head diameter	dh	12.00-0,4			
MATERIAL	C10B21		Shaft diameter	ds	4.20-4.30			
CUSTOMER DRAWING NO	A124-			H	3.80-4.20	≧26~≤30		+0/-1.10
LENGTH UNIT	mm			O	6.00-6.20	≧35~≤50		+0/-1.30
TORSIONAL TEST	110.2 MIN kg-cm			R	12.00R REF	≧55~≤80		+0/-1.50
SURFACE HARDNESS	450-750 $HV_{0.3}$			α	57°-63°			
CORE HARDNESS	450 MAX $HV_{0.3}$		PUNCH NO		T-30			
BENDING	45° MIN			M	5.63 REF			
	Lg ±1.50			Q	2.30-2.70	L≧25~≤30	Lg	18-0.3
Lg≤30	L1 1/2×Lg		Thread outside diameter	d	6.00-0.3	L≧35~≤40	Lg	24-0.3
Lg>30	L1 1/3×Lg		Thread inside diameter	d1	3.90-0.25	L≧45~≤50	Lg	30-0.3
				p	3.00±10%	L60	Lg	36-0.4
				a	0.30-0.80	L70	Lg	42-0.4
						L80	Lg	48-0.4



ASTER SCREWS PAN HEAD POZI DRIVE.

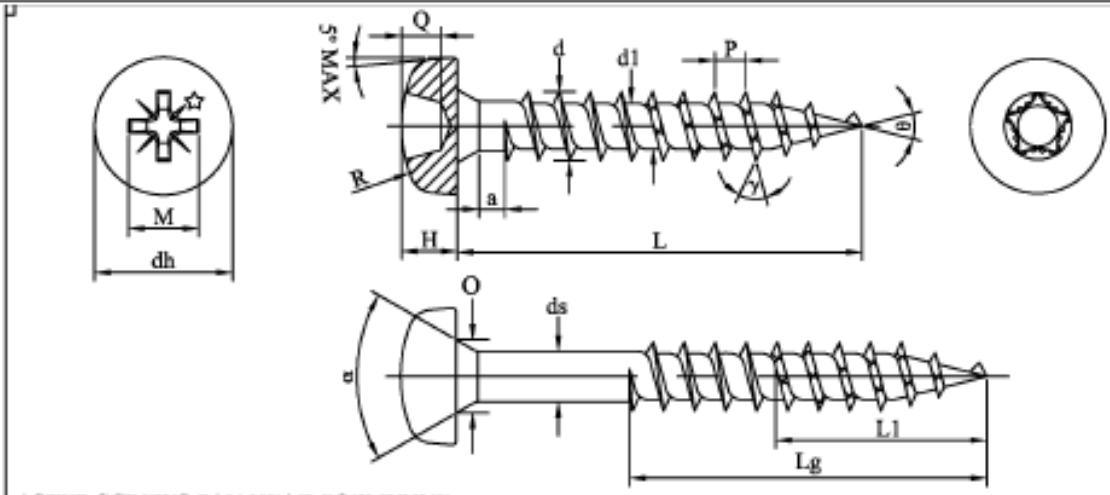
DRAWING NO	AS-908 EX13	DIA OF MATERIAL		2.58-2.60		γ	37°-43°	
DESCRIPTION	AS/PZ	DIA OF MATERIAL		2.60-2.65	SCREW LENGTH	L	TOLERANCE ON LENGTH	
SIZE	M3.5	Head diameter	dh	7.00-0.3				
MATERIAL	C10B21	Shaft diameter	ds	2.60-2.70	≧14~≤18		+0/-0.90	
CUSTOMER DRAWING NO	A124-		H	2.30-2.60	≧20~≤30		+0/-1.10	
LENGTH UNIT	mm		O	3.50-3.70	≧35~≤50		+0/-1.30	
TORSIONAL TEST	20.4 MIN kg-cm		R	7.00R REF				
SURFACE HARDNESS	450-750 $HV_{0.3}$		α	57°-63°				
CORE HARDNESS	450 MAX $HV_{0.3}$	PUNCH NO		NO.2				
BENDING	45° MIN		M	3.80 REF	L≧25~≤30		Lg	18 -0.3
	Lg ±1.50		Q	1.60-2.10	L≧35~≤40		Lg	24 -0.3
Lg≤16	L1 1/2×Lg	Thread outside diameter	d	3.5-0.25	L≧45~≤50		Lg	30 -0.3
Lg>16	L1 1/3×Lg	Thread inside diameter	d1	2.45-0.2				
Lg≧21	θ 23°-26°		p	1.80±10%				
Lg≤20	θ1 32°-35°		a	0.30-0.80				



ASTER SCREWS PAN HEAD POZI DRIVE.

DRAWING NO	AS-909 EX14		DIA OF MATERIAL		2.90-2.92		γ	37°-43°
DESCRIPTION	AS/PZ		DIA OF MATERIAL		2.90-2.95	SCREW LENGTH	L	TOLERANCE ON LENGTH
SIZE	M4.0		Head diameter	dh	8.00-0.3	≤10		+0/-0.80
MATERIAL	C10B21		Shaft diameter	ds	2.90-3.00	18		+0/-0.90
CUSTOMER DRAWING NO	A124-			H	2.60-2.90	≧20~≤30		+0/-1.10
	mm			O	4.00-4.20	≧35~≤40		+0/-1.30
TORSIONAL TEST	33 MIN kg-cm			R	8.00R REF			
SURFACE HARDNESS	450-750 $HV_{0.3}$			α	57°-63°			
CORE HARDNESS	450 MAX $HV_{0.3}$		PUNCH NO		NO.2			
BENDING	45° MIN			M	4.30 REF			
	L2	±1.50		Q	2.10-2.50			
Lg≤24	L1	1/2×Lg	Thread outside diameter	d	4.00-0.25	L≧25~≤30	Lg	18-0.3
Lg>24	L1	1/3×Lg	Thread inside diameter	d1	2.70-0.2	L≧35~≤40	Lg	24-0.3
Lg≧21	θ	23°-26°		p	2.00±10%			
Lg≤20	θ1	32°-35°		a	0.30-0.80			

DRAWING NO	AS-910 EX14		DIA OF MATERIAL		3.13-3.15		γ	37°-43°
DESCRIPTION	AS/PZ		DIA OF MATERIAL		3.15-3.20	SCREW LENGTH	L	TOLERANCE ON LENGTH
SIZE	M4.5		Head diameter	dh	9.00-0,3			
MATERIAL	C10B21		Shaft diameter	ds	3.15-3.25			
CUSTOMER DRAWING NO	A124-			H	2.90-3.20	≧20~≤30		+0/-1.10
LENGTH UNIT	mm			O	4.50-4.70	≧35~≤50		+0/-1.30
TORSIONAL TEST	44 MIN kg-cm			R	9.00R REF			
SURFACE HARDNESS	450-750 $HV_{0.3}$			α	57°-63°			
CORE HARDNESS	450 MAX $HV_{0.3}$		PUNCH NO		NO.2			
BENDING	45° MIN			M	5.00 REF			
	L2	±1.50		Q	2.60-3.10			
Lg≤24	L1	1/2×Lg	Thread outside diameter	d	4.50-0.25			
Lg>24	L1	1/3×Lg	Thread inside diameter	d1	2.9-0,2			
Lg≧26	θ	23°-26°		p	2.20±10%	L≧25~≤30	Lg	18-0.3
Lg≤25	θ1	32°-35°		a	0.30-0.80	L≧35~≤40	Lg	24-0.3
						L≧45~≤50	Lg	30-0.3



ASTER SCREWS PAN HEAD POZI DRIVE.

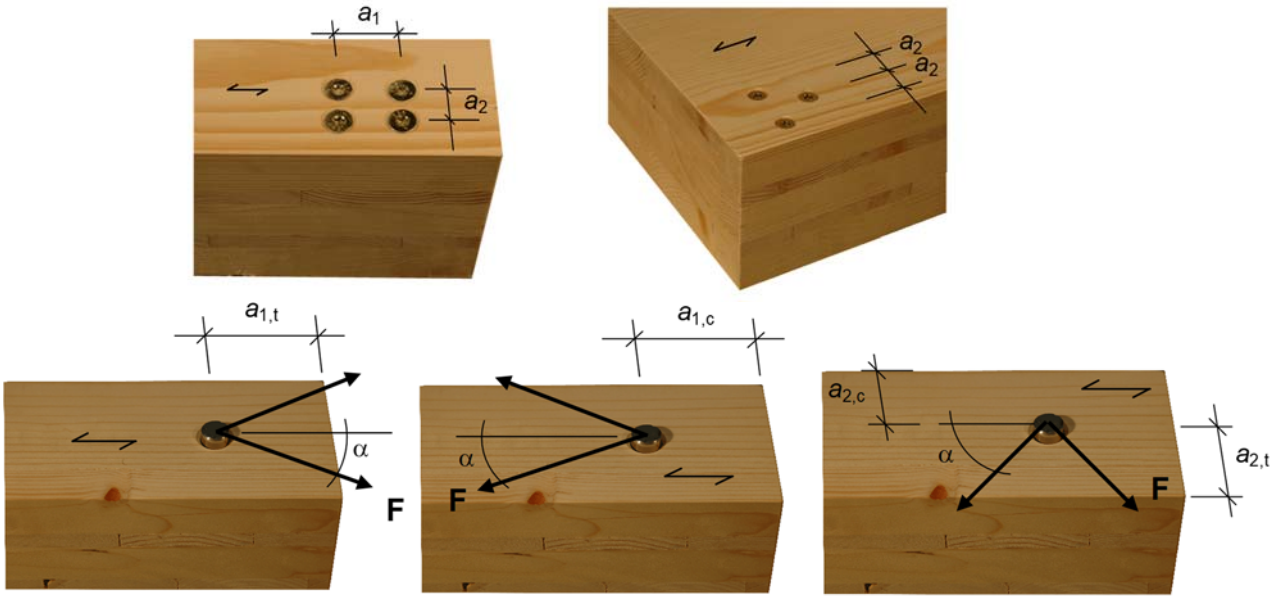
DRAWING NO	AS-911 EX15	DIA OF MATERIAL		3.45-3.47		γ	37°-43°
DESCRIPTION	AS/PZ	DIA OF MATERIAL		3.45-3.50	SCREW LENGTH	L	TOLERANCE ON LENGTH
SIZE	M5.0	Head diameter	dh	10.00-0.3			
MATERIAL	C10B21	Shaft diameter	ds	3.45-3.55			
CUSTOMER DRAWING NO	A124-		H	3.30-3.60	≧22~≤30		+0/-1.10
LENGTH UNIT	mm		O	5.00-5.20	≧35~≤50		+0/-1.30
TORSIONAL TEST	63 MIN kg-cm		R	10.00R REF	≧55~≤80		+0/-1.50
SURFACE HARDNESS	450-750 $HV_{0.3}$		α	57°-63°			
CORE HARDNESS	450 MAX $HV_{0.3}$	PUNCH NO		NO.2			
BENDING	45° MIN		M	5.30 REF	L≧25~≤30	Lg	18-0.3
	Lg ±1.50		Q	3.00-3.45	L≧35~≤40	Lg	24-0.3
Lg≤30	L1 1/2×Lg	Thread outside diameter	d	5.00-0.3	L≧45~≤50	Lg	30-0.3
Lg>30	L1 1/3×Lg	Thread inside diameter	d1	3.20-0.25	L60	Lg	36-0.4
Lg≧26	θ 23°-26°		p	2.60±10%	L70	Lg	42-0.4
Lg≤25	θ1 32°-35°		a	0.30-0.80	L80	Lg	48-0.4

DRAWING NO	AS-912 EX15	DIA OF MATERIAL		4.18-4.20		γ	37°-43°
DESCRIPTION	AS/PZ	DIA OF MATERIAL		4.20-4.25	SCREW LENGTH	L	TOLERANCE ON LENGTH
SIZE	M6.0	Head diameter	dh	12.00-0,4			
MATERIAL	C10B21	Shaft diameter	ds	4.20-4.30			
CUSTOMER DRAWING NO	A124-		H	3.80-4.20	≧26~≤30		+0/-1.10
LENGTH UNIT	mm		O	6.00-6.20	≧35~≤50		+0/-1.30
TORSIONAL TEST	110.2 MIN kg-cm		R	12.00R REF	≧55~≤80		+0/-1.50
SURFACE HARDNESS	450-750 $HV_{0.3}$		α	57°-63°			
CORE HARDNESS	450 MAX $HV_{0.3}$	PUNCH NO		NO.3			
BENDING	45° MIN		M	6.60 REF			
	Lg ±1.50		Q	3.00-3.45	L≧25~≤30	Lg	18-0.3
Lg≤30	L1 1/2×Lg	Thread outside diameter	d	6.00-0,3	L≧35~≤40	Lg	24-0.3
Lg>30	L1 1/3×Lg	Thread inside diameter	d1	3.90-0,25	L≧45~≤50	Lg	30-0.3
Lg≧41	θ 23°-26°		p	3.00±10%	L60	Lg	36-0.4
Lg≤40	θ1 32°-35°		a	0.30-0.80	L70	Lg	42-0.4
					L80	Lg	48-0.4

Annex B
Minimum distances and spacing

Axially or laterally loaded screws in the plane or edge surface of cross laminated timber

Definition of spacing, end and edge distances in the plane surface:



Definition of spacing, end and edge distances in the edge surface: