

SHS AISI410

60° COUNTERSUNK SCREW



SMALL HEAD AND 3 THORNS TIP

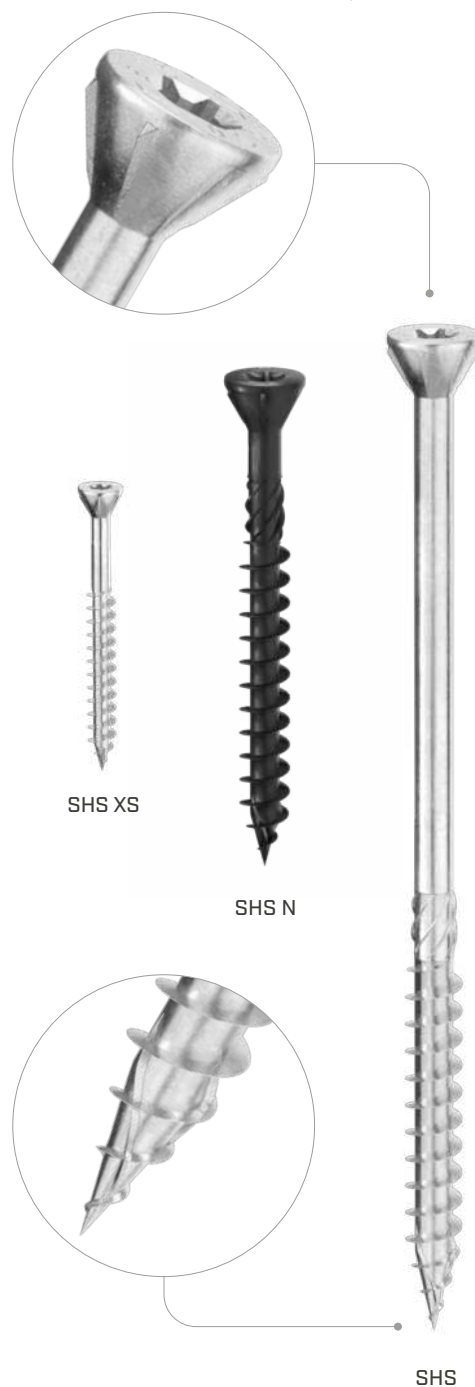
The concealed 60° head and 3 THORNS tip allow easy insertion of the screw into small thickness without creating openings in the timber.

OUTDOOR ON ACID WOOD

Martensitic stainless steel. This stainless steel offers the highest mechanical performance compared to the other available stainless steels. Suitable for outdoor applications and on acid wood, but away from corrosive agents (chlorides, sulphides, etc.).

SMALL ELEMENTS FASTENING

The smaller diameter versions are ideal for fixing beads or small elements, the 3.5 mm diameter version is perfectly suited for fastening tongue-and-groove boards.



SHS XS

SHS N

SHS



DIAMETER [mm]	3 (3,5) 8 12
LENGTH [mm]	12 (40) 280 1000
SERVICE CLASS	SC1 SC2 SC3
ATMOSPHERIC CORROSIVITY	C1 C2
WOOD CORROSIVITY	T1 T2 T3 T4
MATERIAL	410 AISI martensitic stainless steel AISI 410



FIELDS OF USE

- timber based panels
- solid timber
- glulam (Glued Laminated Timber)
- CLT, LVL
- high-density woods and acid woods



WINDOWS AND DOORS ON THE OUTSIDE

SHS AISI140 is the right choice for fastening small outdoor elements such as beads, façades and window/door frames.



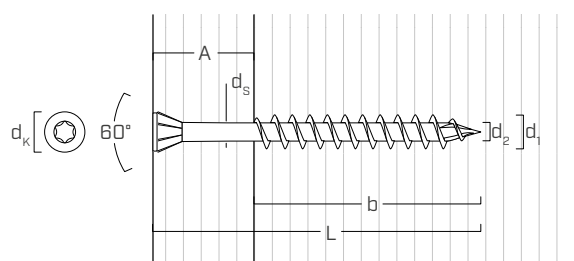
External casing slats fixed with 6 and 8 mm diameter SHS AISI410 screws.



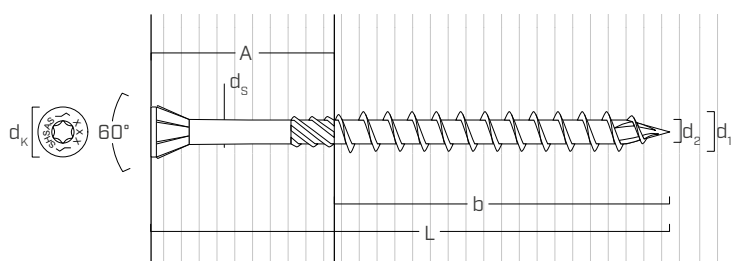
Fastening hardwood and acid wood in far-from-sea environments with SHS AISI410 8 mm diameter.

GEOMETRY AND MECHANICAL CHARACTERISTICS

SHSAS Ø3,5



SHSAS Ø4,5 - Ø5 - Ø6 - Ø8



GEOMETRY

Nominal diameter	d_1	[mm]	3,5	4,5	5	6	8
Head diameter	d_k	[mm]	5,75	7,50	8,50	11,00	13,00
Thread diameter	d_2	[mm]	2,15	2,80	3,40	3,95	5,40
Shank diameter	d_s	[mm]	2,50	3,15	3,65	4,30	5,80
Pre-drilling hole diameter ⁽¹⁾	$d_{v,s}$	[mm]	2,0	2,5	3,0	4,0	5,0
Pre-drilling hole diameter ⁽²⁾	$d_{v,h}$	[mm]	-	-	3,5	4,0	6,0

⁽¹⁾ Pre-drilling valid for softwood.

⁽²⁾ Pre-drilling valid for hardwood and beech LVL.

CHARACTERISTIC MECHANICAL PARAMETERS

Nominal diameter	d_1	[mm]	4,5	5	6	8
Tensile strength	$f_{tens,k}$	[kN]	6,4	7,9	11,3	20,1
Yield moment	$M_{y,k}$	[Nm]	4,1	5,4	9,5	20,1

			softwood (softwood)	LVL softwood (LVL softwood)	pre-drilled beech LVL (beech LVL predrilled)
Withdrawal resistance parameter	$f_{ax,k}$	[N/mm ²]	11,7	15,0	29,0
Head-pull-through parameter	$f_{head,k}$	[N/mm ²]	10,5	20,0	-
Associated density	ρ_a	[kg/m ³]	350	500	730
Calculation density	ρ_k	[kg/m ³]	≤ 440	410 ÷ 550	590 ÷ 750

For applications with different materials please see ETA-11/0030.

CODES AND DIMENSIONS

SHS XS AISI410

	d ₁ [mm]	CODE	L [mm]	b [mm]	A [mm]	pcs
3,5 TX 10		SHS3540AS(*)	40	26	14	500
		SHS3550AS(*)	50	34	16	500
		SHS3560AS(*)	60	40	20	500
4,5 TX 20		SHS4550AS	50	30	20	500
		SHS4560AS	60	35	25	500
		SHS4570AS	70	40	30	200
		SHS550AS	50	24	26	200
5 TX 25		SHS560AS	60	30	30	200
		SHS570AS	70	35	35	100
		SHS580AS	80	40	40	100
		SHS5100AS	100	50	50	100

(*) Not holding CE marking.

SHS N AISI410 - black version

	d ₁ [mm]	CODE	L [mm]	b [mm]	A [mm]	pcs
4,5 TX 20		SHS4550ASN	50	30	20	100
		SHS4560ASN	60	35	25	100
5 TX 25		SHS550ASN	50	24	26	100
		SHS560ASN	60	30	30	200

SHS AISI410

	d ₁ [mm]	CODE	L [mm]	b [mm]	A [mm]	pcs
6 TX 30		SHS680AS	80	40	40	100
		SHS6100AS	100	50	50	100
		SHS6120AS	120	60	60	100
		SHS6140AS	140	75	65	100
		SHS6160AS	160	75	85	100
		SHS6180AS	180	75	105	100
		SHS6200AS	200	75	125	100
		SHS8120AS	120	60	60	100
8 TX 40		SHS8140AS	140	60	80	100
		SHS8160AS	160	80	80	100
		SHS8180AS	180	80	100	100
		SHS8200AS	200	80	120	100
		SHS8220AS	220	80	140	100
		SHS8240AS	240	80	160	100
		SHS8260AS	260	80	180	100
		SHS8280AS	280	80	200	100

APPLICATION



Oak
Quercus petraea
 $\rho_k = 665-760 \text{ kg/m}^3$
 $\text{pH} \sim 3,9$



Oak or European oak
Quercus robur
 $\rho_k = 690-960 \text{ kg/m}^3$
 $\text{pH} = 3,4-4,2$



Douglas fir
Pseudotsuga menziesii
 $\rho_k = 510-750 \text{ kg/m}^3$
 $\text{pH} = 3,3-5,8$



American black cherry
Prunus serotina
 $\rho_k = 490-630 \text{ kg/m}^3$
 $\text{pH} \sim 3,9$



European chestnut
Castanea sativa
 $\rho_k = 580-600 \text{ kg/m}^3$
 $\text{pH} = 3,4-3,7$



Red oak
Quercus rubra
 $\rho_k = 550-980 \text{ kg/m}^3$
 $\text{pH} = 3,8-4,2$



Blue Douglas fir
Pseudotsuga taxifolia
 $\rho_k = 510-750 \text{ kg/m}^3$
 $\text{pH} = 3,1-4,4$



Maritime pine
Pinus pinaster
 $\rho_k = 500-620 \text{ kg/m}^3$
 $\text{pH} \sim 3,8$

Possible installation on acid wood but away from corrosive agents (chlorides, sulphides, etc.).

Find out the pH and density of the various wood species on page 314.



"aggressive" woods
high acidity



"standard" timbers
low acidity

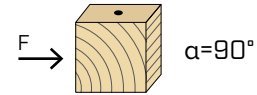
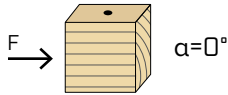


FAÇADES IN DARK TIMBER

Specially designed to match façades made of charred wood, the black SHS N variant ensures perfect compatibility and offers an excellent aesthetic result. Thanks to its strength to corrosion, it can be used outdoors, allowing to create striking and long-lasting black façades.

MINIMUM DISTANCES FOR SHEAR LOADS

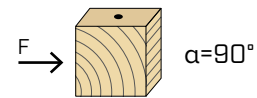
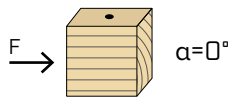
screws inserted **WITHOUT** pre-drilled hole $\rho_k \leq 420 \text{ kg/m}^3$



d_1	[mm]	4,5		5	6	8	
a_1	[mm]	10·d	45	10·d	50	60	80
a_2	[mm]	5·d	23	5·d	25	30	40
$a_{3,t}$	[mm]	15·d	68	15·d	75	90	120
$a_{3,c}$	[mm]	10·d	45	10·d	50	60	80
$a_{4,t}$	[mm]	5·d	23	5·d	25	30	40
$a_{4,c}$	[mm]	5·d	23	5·d	25	30	40

d_1	[mm]	4,5		5	6	8	
a_1	[mm]	5·d	23	5·d	25	30	40
a_2	[mm]	5·d	23	5·d	25	30	40
$a_{3,t}$	[mm]	10·d	45	10·d	50	60	80
$a_{3,c}$	[mm]	10·d	45	10·d	50	60	80
$a_{4,t}$	[mm]	7·d	32	10·d	50	60	80
$a_{4,c}$	[mm]	5·d	23	5·d	25	30	40

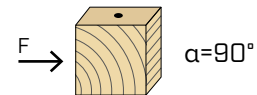
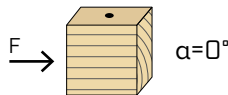
screws inserted **WITHOUT** pre-drilled hole $420 \text{ kg/m}^3 \leq \rho_k \leq 500 \text{ kg/m}^3$



d_1	[mm]	4,5		5	6	8	
a_1	[mm]	15·d	68	15·d	75	90	120
a_2	[mm]	7·d	32	7·d	35	42	56
$a_{3,t}$	[mm]	20·d	90	20·d	100	120	160
$a_{3,c}$	[mm]	15·d	68	15·d	75	90	120
$a_{4,t}$	[mm]	7·d	32	7·d	35	42	56
$a_{4,c}$	[mm]	7·d	32	7·d	35	42	56

d ₁	[mm]	4,5	5	6	8		
a ₁	[mm]	7·d	32	7·d	35	42	56
a ₂	[mm]	7·d	32	7·d	35	42	56
a _{3,t}	[mm]	15·d	68	15·d	75	90	120
a _{3,c}	[mm]	15·d	68	15·d	75	90	120
a _{4,t}	[mm]	9·d	41	12·d	60	72	96
a _{4,c}	[mm]	7·d	32	7·d	35	42	56

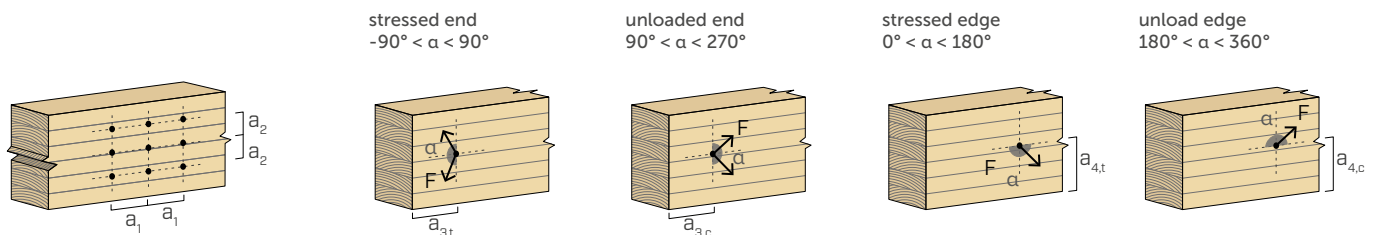
screws inserted **WITH** pre-drilled hole



d ₁	[mm]	4,5	5	6	8		
a ₁	[mm]	5·d	23	5·d	25	30	40
a ₂	[mm]	3·d	14	3·d	15	18	24
a _{3,t}	[mm]	12·d	54	12·d	60	72	96
a _{3,c}	[mm]	7·d	32	7·d	35	42	56
a _{4,t}	[mm]	3·d	14	3·d	15	18	24
a _{4,c}	[mm]	3·d	14	3·d	15	18	24

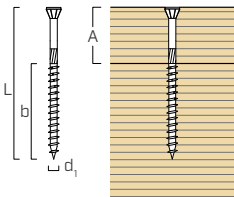
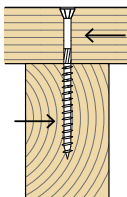
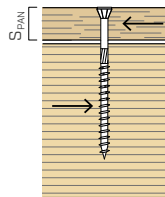
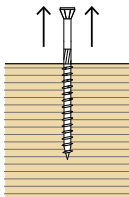
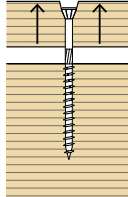
d ₁	[mm]	4,5		5	6	8	
a ₁	[mm]	4·d	18	4·d	20	24	32
a ₂	[mm]	4·d	18	4·d	20	24	32
a _{3,t}	[mm]	7·d	32	7·d	35	42	56
a _{3,c}	[mm]	7·d	32	7·d	35	42	56
a _{4,t}	[mm]	5·d	23	7·d	35	42	56
a _{4,c}	[mm]	3·d	14	3·d	15	18	24

α = load-to-grain angle
 d = d_1 = nominal screw diameter



NOTES

- The minimum distances comply with the EN 1995:2014 standard in accordance with ETA-11/0030.
- The minimum spacing for all panel-to-timber connections (a_1 , a_2) can be multiplied by a coefficient of 0,85.
- In the case of joints with elements in Douglas fir (*Pseudotsuga menziesii*), the minimum spacing and distances parallel to the grain must be multiplied by a coefficient of 1.5.
- The spacing a_1 in the table for screws with 3 THORNS tip and $d_1 \geq 5$ mm inserted without pre-drilling hole in timber elements with density $\rho_k \leq 420 \text{ kg/m}^3$ with minimum height and width equal to 10·d and load-to-grain angle $\alpha = 0^\circ$ equal to 10·d. Alternatively, adopt 12·d in accordance with EN 1995:2014.

				SHEAR		TENSION		
geometry				timber-to-timber	panel-to-timber	thread withdrawal	head pull-through	
								
d ₁	L	b	A	R _{V,90,k}	S _{PAN}	R _{V,k}	R _{ax,90,k}	R _{head,k}
[mm]	[mm]	[mm]	[mm]	[kN]	[mm]	[kN]	[kN]	[kN]
4,5	50	30	20	0,99	15	1,01	1,70	0,64
	60	35	25	1,11		1,01	1,99	0,64
	70	40	30	1,15		1,01	2,27	0,64
5	50	24	26	1,21	15	1,14	1,52	0,82
	60	30	30	1,38		1,14	1,89	0,82
	70	35	35	1,38		1,14	2,21	0,82
	80	40	40	1,38		1,14	2,53	0,82
	100	50	50	1,38		1,14	3,16	0,82
6	80	40	40	2,01	18	1,60	3,03	1,37
	100	50	50	2,01		1,60	3,79	1,37
	120	60	60	2,01		1,60	4,55	1,37
	140	75	65	2,01		1,60	5,68	1,37
	160	75	85	2,01		1,60	5,68	1,37
	180	75	105	2,01		1,60	5,68	1,37
	200	75	125	2,01		1,60	5,68	1,37
8	120	60	60	3,16	22	2,48	6,06	1,92
	140	60	80	3,16		2,48	6,06	1,92
	160	80	80	3,16		2,48	8,08	1,92
	180	80	100	3,16		2,48	8,08	1,92
	200	80	120	3,16		2,48	8,08	1,92
	220	80	140	3,16		2,48	8,08	1,92
	240	80	160	3,16		2,48	8,08	1,92
	260	80	180	3,16		2,48	8,08	1,92
	280	80	200	3,16		2,48	8,08	1,92

GENERAL PRINCIPLES

- Characteristic values comply with the EN 1995:2014 standard in accordance with ETA-11/0030.
- Design values can be obtained from characteristic values as follows:

$$R_d = \frac{R_k \cdot k_{mod}}{\gamma_M}$$

The coefficients γ_M and k_{mod} should be taken according to the current regulations used for the calculation.

- For the mechanical resistance values and the geometry of the screws, reference was made to ETA-11/0030.
- Sizing and verification of the timber elements and panels must be done separately.
- The characteristic shear resistances are calculated for screws inserted without pre-drilling hole. In the case of screws inserted with pre-drilling hole, greater resistance values can be obtained.
- The screws must be positioned in accordance with the minimum distances.
- The characteristic shear resistances are calculated for screws inserted without pre-drilling hole. In the case of screws inserted with pre-drilling hole, greater resistance values can be obtained.
- The characteristic shear strengths were evaluated by considering the threaded part fully inserted in the second element.

- The characteristic panel-timber shear strengths are calculated considering an OSB3 or OSB4 panel, as per EN 300, or a particle board panel, as per EN 312, with thickness S_{PAN} and density $\rho_k = 500 \text{ kg/m}^3$.
- The thread withdrawal characteristic strength has been evaluated considering a fixing length equal to b .
- The head pull-through characteristic strength was calculated using timber elements.

NOTES

- The characteristic shear and tensile strengths were evaluated considering both an ϵ angle of 90° ($R_{ax,90,k}$) between the grains of the timber element and the connector.
- For the calculation process a timber characteristic density $\rho_k = 385 \text{ kg/m}^3$ has been considered. For different values of ρ_k , the strength values in the table can be converted by the $k_{dens,y}$ coefficient (see page 19).
- For a row of n screws arranged parallel to the direction of the grain at a distance a_1 , the characteristic effective shear bearing capacity $R_{ef,V,k}$ can be calculated by means of the effective number n_{ef} (see page 18).