STA

SMOOTH DOWEL

CE
EN 14592

HIGH-RESISTANCE STEEL
Dowel Ø16 and Ø20 made of S355 steel grade to provide higher shear strength to the standard sizes used in structural design.

TAPERED TIP
The end is narrowed for easy insertion inside the prepared hole in the timber. Available in 1,0 m long version.

FOR SEISMIC ZONES
Available upon request in high bond steel and geometry designed to avoid pull-out when used in seismic areas.

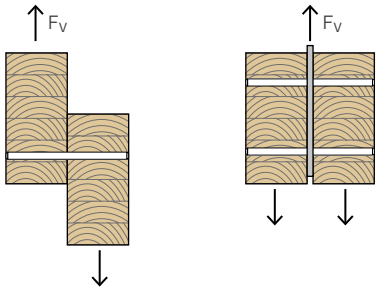
STAINLESS STEEL VERSION
Available in A2 | AISI304 stainless steel for outdoor structural applications.

USA, Canada and more design values available online.

STA STAS

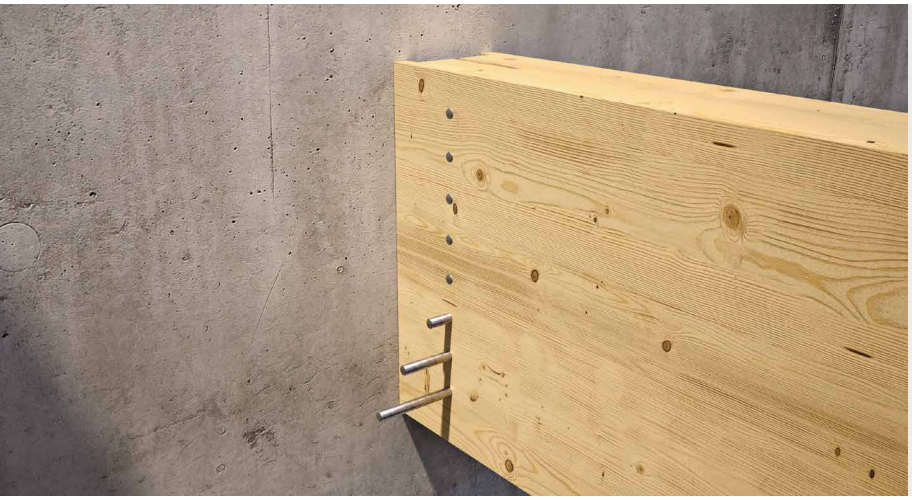
DIAMETER [mm]	7,5	8 – 20	
LENGTH [mm]	55	60 – 1000	
MATERIAL			
Zn ELECTRO PLATED	S235-S355 electrogalvanized carbon steel	SC2	C2 T2
A2 AISI 304	A2 stainless steel	SC3	C4 T4

EXTERNAL LOADS



FIELDS OF USE

Assembly and structural connection of timber components for timber-to-timber and timber-to-steel shear connections
- solid timber and glulam
- CLT, LVL
- timber based panels



LARGE STRUCTURES ALSO OUTDOOR

Stainless steel A2 version suitable for outdoor applications up to 1 km from the sea and on class T4 acid wood.

TIMBER-TO-METAL

Ideal for being used with ALU and ALUMEGA brackets in realizing concealed joints. When used with wood taps it meets the fire safety requirements and provides an optimal aesthetic appearance.

CODES AND DIMENSIONS

Zn ELECTRO PLATED

STA - smooth dowel made of S235-S355 carbon steel

d [mm]	d [in]	CODE	L [mm]	L [in]	steel	pcs
8	0.32	STA860B	60	2 3/8	S235	100
		STA880B	80	3 1/8	S235	100
		STA8100B	100	4	S235	100
		STA8120B	120	4 3/4	S235	100
		STA8140B	140	5 1/2	S235	100
12	0.48	STA1260B	60	2 3/8	S235	50
		STA1270B	70	2 3/4	S235	50
		STA1280B	80	3 1/8	S235	50
		STA1290B	90	3 1/2	S235	50
		STA12100B	100	4	S235	50
		STA12110B	110	4 3/8	S235	50
		STA12120B	120	4 3/4	S235	50
		STA12130B	130	5 1/8	S235	50
		STA12140B	140	5 1/2	S235	25
		STA12150B	150	6	S235	25
		STA12160B	160	6 1/4	S235	25
		STA12170B	170	6 3/4	S235	25
		STA12180B	180	7 1/8	S235	25
		STA12200B	200	8	S235	25
		STA12220B	220	8 5/8	S235	25
		STA12240B	240	9 1/2	S235	25
		STA12260B	260	10 1/4	S235	25
		STA12280B	280	11	S235	25
		STA12320B	320	12 5/8	S235	25
		STA12340B	340	13 3/8	S235	25
12	0.48	STA121000B	1000	39 3/8	S235	1
16	0.63	STA1680B	80	3 1/8	S355	25
		STA16100B	100	4	S355	25
		STA16110B	110	4 3/8	S355	25
		STA16120B	120	4 3/4	S355	25
		STA16130B	130	5 1/8	S355	25
		STA16140B	140	5 1/2	S355	25
		STA16150B	150	6	S355	25
		STA16160B	160	6 1/4	S355	15
		STA16170B	170	6 3/4	S355	15
		STA16180B	180	7 1/8	S355	15
		STA16190B	190	7 1/2	S355	15
		STA16200B	200	8	S355	15
		STA16220B	220	8 5/8	S355	15
		STA16240B	240	9 1/2	S355	15
		STA16260B	260	10 1/4	S355	10
		STA16280B	280	11	S355	10
		STA16300B	300	11 3/4	S355	10
		STA16320B	320	12 5/8	S355	10
		STA16340B	340	13 3/8	S355	10
		STA16360B	360	14 1/4	S355	10
		STA16380B	380	15	S355	10
		STA16400B	400	15 3/4	S355	10
		STA16500B	500	19 3/4	S355	10
16	0.63	STA161000B	1000	39 3/8	S355	1
20	0.79	STA20120B	120	4 3/4	S355	10
		STA20140B	140	5 1/2	S355	10
		STA20160B	160	6 1/4	S355	10
		STA20180B	180	7 1/8	S355	10
		STA20190B	190	7 1/2	S355	10
		STA20200B	200	8	S355	10
		STA20220B	220	8 5/8	S355	10
		STA20240B	240	9 1/2	S355	10
		STA20260B	260	10 1/4	S355	5
		STA20300B	300	11 3/4	S355	5
		STA20320B	320	12 5/8	S355	5
		STA20360B	360	14 1/4	S355	5
		STA20400B	400	15 3/4	S355	5
20	0.79	STA201000B	1000	39 3/8	S355	1

Available upon request the STAS high bond steel and geometry designed to avoid pull-out when used in seismic areas (e.g. STAS16200).
Minimum quantity: 1000 pcs

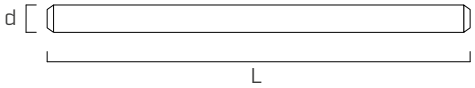
A2 AISI 304

STA A2 | AISI304 - stainless steel smooth dowel[1]

d [mm]	d [in]	CODE	L [mm]	L [in]	pcs
12	0.48	STA12100A2	100	4	25
		STA12120A2	120	4 3/4	25
		STA12140A2	140	5 1/2	25
		STA12160A2	160	6 1/4	25
		STA12180A2	180	7 1/8	25
		STA12200A2	200	8	25
		STA12220A2	220	8 5/8	25
		STA12240A2	240	9 1/2	25
		STA12260A2	260	10 1/4	25
16	0.63	STA16120A2	120	4 3/4	25
		STA16140A2	140	5 1/2	10
		STA16150A2	150	6	10
		STA16160A2	160	6 1/4	10
		STA16180A2	180	7 1/8	10
		STA16200A2	200	8	10
		STA16220A2	220	8 5/8	10
		STA16240A2	240	9 1/2	10
		STA16260A2	260	10 1/4	10
		STA16280A2	280	11	10
		STA16300A2	300	11 3/4	10
		STA20160A2	160	6 1/4	10
		STA20180A2	180	7 1/8	10
		STA20200A2	200	8	10
		STA20220A2	220	8 5/8	10
		STA20240A2	240	9 1/2	10
20	0.79	STA20260A2	260	10 1/4	5
		STA20280A2	280	11	5
		STA20300A2	300	11 3/4	5
		STA20320A2	320	12 5/8	5
		STA20340A2	340	13 3/8	5
		STA20360A2	360	14 1/4	5
		STA20380A2	380	15	5

[1] Not holding CE marking.
STA A2 | AISI304 codes are only available on request, with an estimated lead time of 30 days.

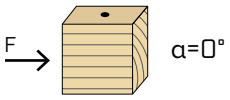
GEOMETRY AND MECHANICAL CHARACTERISTICS

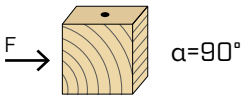


Nominal diameter	d	[mm]	8	12	16	20
			S235	S235	S355	S355
Steel	$f_{u,k,min}$	[N/mm^2]	360	360	470	470
	$f_{y,k,min}$	[N/mm^2]	235	235	355	355
Characteristic yield moment	$M_{y,k}$	[Nm]	24,1	69,1	191,0	340,0

Mechanical parameters according to CE marking, in accordance with EN 14592.

MINIMUM DISTANCES FOR DOWELS SUBJECT TO SHEAR

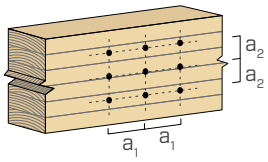




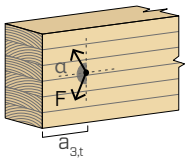
d	[mm]		8	12	16	20
a_1	[mm]	**5·d**	40	60	80	100
a_2	[mm]	**3·d**	24	36	48	60
$a_{3,t}$	[mm]	**max(7·d ; 80 mm)**	80	84	112	140
$a_{3,c}$	[mm]	**max(3,5·d ; 40 mm)**	40	42	56	70
$a_{4,t}$	[mm]	**3·d**	24	36	48	60
$a_{4,c}$	[mm]	**3·d**	24	36	48	60

d	[mm]		8	12	16	20
a_1	[mm]	**3·d**	24	36	48	60
a_2	[mm]	**3·d**	24	36	48	60
$a_{3,t}$	[mm]	**max(7·d ; 80 mm)**	80	84	112	140
$a_{3,c}$	[mm]	**max(7·d ; 80 mm)**	80	84	112	140
$a_{4,t}$	[mm]	**4·d**	32	48	64	80
$a_{4,c}$	[mm]	**3·d**	24	36	48	60

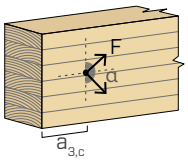
α = load-to-grain angle
d = nominal dowel diameter



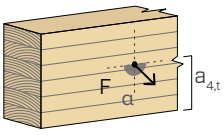
stressed end
-90° < α < 90°



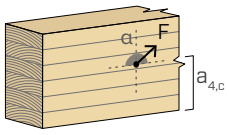
unloaded end
90° < α < 270°



stressed edge
0° < α < 180°



unload edge
180° < α < 360°

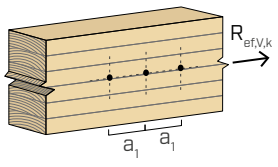


NOTES
- Minimum distances FOR CONNECTORS SUBJECTED TO SHEAR STRESS in accordance with EN 1995:2014.

EFFECTIVE NUMBER FOR SHEAR-STRESSED DOWELS

The load-bearing capacity of a connection made with several dowels, all of the same type and size, may be lower than the sum of the load-bearing capacities of the individual connection system.
For a row of n dowels arranged parallel to the direction of the grain (α = 0°) at a distance a_1, the characteristic effective load-bearing capacity is equal to:

$$R_{ef,V,k} = n_{ef} \cdot R_{V,k}$$



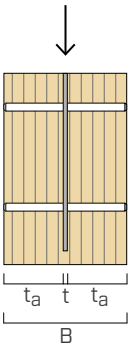
The n_{ef} value is given in the table below as a function of n and a_1.

		a_1(*) [mm]										
		4·d	5·d	6·d	7·d	8·d	9·d	10·d	11·d	12·d	13·d	≥ 14·d
n	2	1,39	1,47	1,54	1,60	1,65	1,70	1,75	1,79	1,83	1,87	1,90
	3	2,00	2,12	2,22	2,30	2,38	2,45	2,52	2,58	2,63	2,69	2,74
	4	2,59	2,74	2,87	2,98	3,08	3,18	3,26	3,34	3,41	3,48	3,55
	5	3,17	3,35	3,51	3,65	3,77	3,88	3,99	4,08	4,17	4,26	4,34
	6	3,74	3,95	4,13	4,30	4,44	4,58	4,70	4,81	4,92	5,02	5,11

(*)For intermediate a_1 values a linear interpolation is possible.

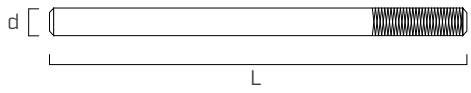
STRUCTURAL VALUES | TIMBER-TO-STEEL AND ALUMINIUM

1 INTERNAL PLATE - SHEAR $R_{v,k}$



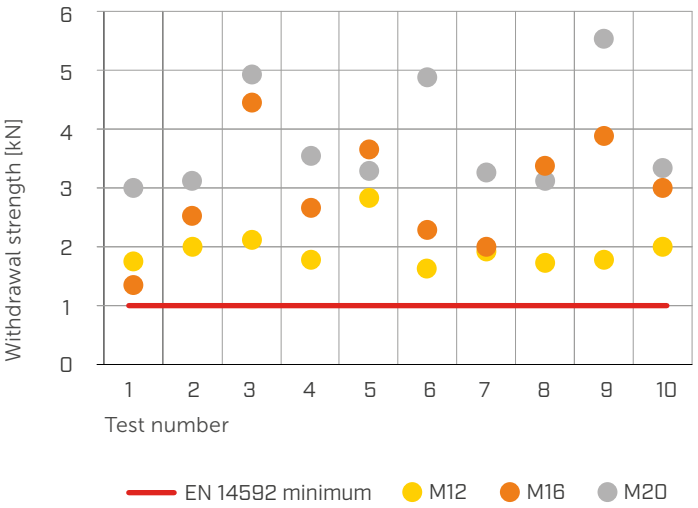
d_1	L	B	t_a	$R_{v,k}$ [kN] load-to-grain angle				
[mm]	[mm]	[mm]	[mm]	0°	30°	45°	60°	90°
8	60	60	27	7,56	7,00	6,54	6,16	5,84
	80	80	37	8,90	8,14	7,53	7,02	6,59
	100	100	47	10,46	9,51	8,74	8,10	7,56
	120	120	57	10,89	10,30	9,80	9,28	8,63
	140	140	67	10,89	10,30	9,80	9,36	8,98
12	60	60	27	13,88	12,93	12,16	11,52	10,99
	70	70	32	14,43	13,34	12,46	11,75	11,15
	80	80	37	15,15	13,92	12,93	12,13	11,46
	90	90	42	16,01	14,62	13,52	12,62	11,88
	100	100	47	16,96	15,42	14,20	13,20	12,38
	110	110	52	17,99	16,29	14,94	13,85	12,95
	120	120	57	19,07	17,21	15,75	14,55	13,57
	130	130	62	20,19	18,18	16,59	15,29	14,22
	140	140	67	21,36	19,18	17,46	16,07	14,91
	150	150	72	22,08	20,21	18,37	16,87	15,63
	160	160	77	22,08	20,75	19,30	17,70	16,37
	170	170	82	22,08	20,75	19,63	18,54	17,13
	180	180	87	22,08	20,75	19,63	18,68	17,85
	200	200	97	22,08	20,75	19,63	18,68	17,85
	220	220	107	22,08	20,75	19,63	18,68	17,85
	240	240	117	22,08	20,75	19,63	18,68	17,85
16	80	80	37	25,77	23,90	22,41	21,20	19,75
	100	100	47	27,03	24,79	23,04	21,62	20,46
	110	110	52	27,92	25,48	23,57	22,04	20,79
	120	120	57	28,93	26,28	24,22	22,57	21,22
	130	130	62	30,05	27,19	24,97	23,19	21,73
	140	140	67	31,25	28,17	25,78	23,88	22,32
	150	150	72	32,51	29,22	26,67	24,63	22,96
	160	160	77	33,83	30,32	27,60	25,43	23,66
	170	170	82	35,20	31,47	28,58	26,28	24,40
	180	180	87	36,62	32,66	29,60	27,16	25,17
	190	190	92	38,06	33,88	30,65	28,08	25,98
	200	200	97	39,54	35,14	31,74	29,03	26,82
	220	220	107	41,41	37,72	33,97	30,99	28,55
	240	240	117	41,41	38,66	36,28	33,02	30,37
20	120	120	57	39,26	35,74	33,03	30,89	29,14
	140	140	67	41,45	37,40	34,32	31,88	29,91
	160	160	77	44,07	39,48	35,99	33,24	31,03
	180	180	87	47,01	41,85	37,95	34,88	32,41
	190	190	92	48,57	43,13	39,01	35,78	33,18
	200	200	97	50,17	44,45	40,12	36,72	33,99
	220	220	107	53,51	47,22	42,45	38,73	35,73
	240	240	117	56,99	50,11	44,92	40,85	37,58

STAS | IMPROVED BOND DOWEL FOR SEISMIC LOADS

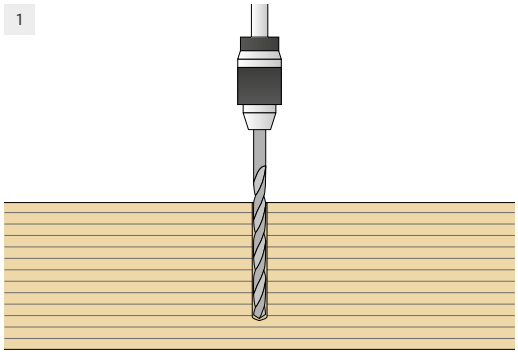


Knurled dowel available on request. Knurling limits the displacement of the dowels from the joint during an earthquake, as stipulated in Eurocode 8, and allows for a pull-out strength of 1 kN, as stipulated in EN 14592:2022.

STAS - WITHDRAWAL VALUES

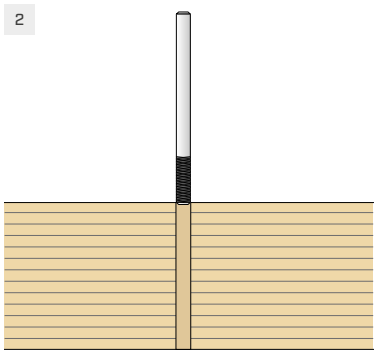


1



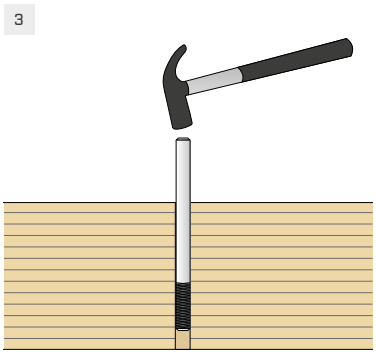
Make a pre-drilling hole with a diameter equal to the diameter of the dowel using a drill press or CNC machine. The hole must be perfectly perpendicular.

2



Clean the hole and place the dowel with the knurling in contact with the timber.

3



Drive the dowel into the hole using a hammer.

GENERAL PRINCIPLES

- Characteristic values according to EN 1995-1-1.
- 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.
- Mechanical strength values and dowels geometry comply with CE marking according to EN 14592.
- The values provided are calculated using 5 mm thick plates and a 6 mm thick milled cut in the wood. Values are relative to a single STA dowel.
- Sizing and verification of the wooden elements and steel plates must be done separately.
- The bolts must be positioned in accordance with the minimum distances.

NOTES

- For the calculation process a timber characteristic density ρ_k = 385 kg/m^3 has been considered.

  For different ρ_k values, the strength on the table on the timber side can be converted by the $k_{dens,v}$ coefficient.

$$R'_{V,k} = k_{dens,v} \cdot R_{V,k}$$

ρ_k [kg/m^3]	350	380	**385**	405	425	430	440
C-GL	*C24*	*C30*	*GL24h*	*GL26h*	*GL28h*	*GL30h*	*GL32h*
$k_{dens,v}$	0,90	0,98	1,00	1,02	1,05	1,05	1,07

Strength values thus determined may differ, for higher safety standards, from those resulting from an exact calculation.