

## Guardian Fasteners for wooden substrates

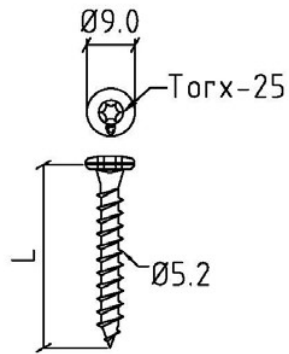


Fig. 38  
TS 5.2 Screw for fixing in wood

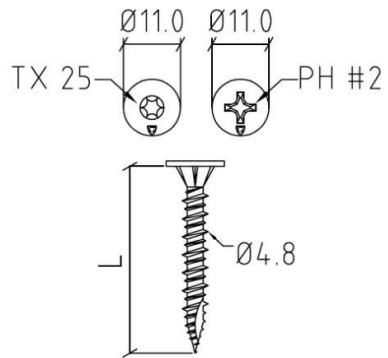


Fig. 39  
MTS 4.8 screw for fastening metal to timber constructions

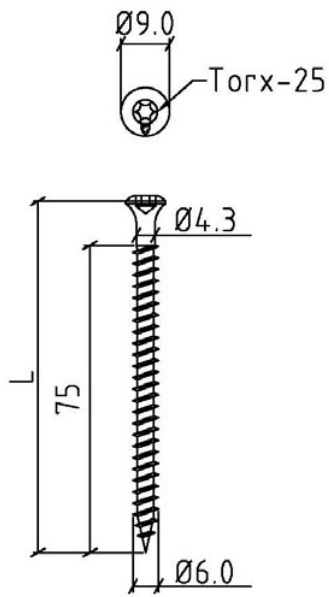


Fig. 40  
LBS 6.0 Screw for light weight concrete, concrete and wooden substrates  
LBS-S 6.0 Stainless screw for lightweight concrete and wooden substrates

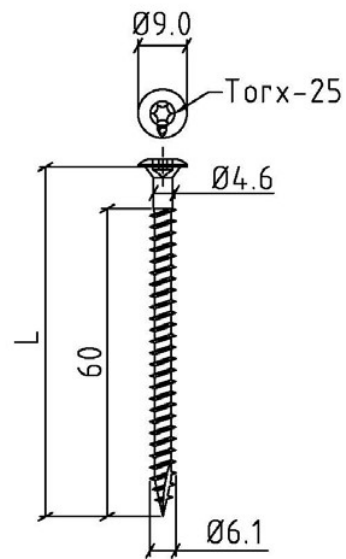


Fig. 41  
HD 6.1 Screw for light weight concrete, concrete and wooden substrates

## Annex 2

### Performance of Guardian Fastening system on different substrates

Characteristic values are calculated from the following formula:

$$R_k: \alpha (X_m - (k \times s))$$

where:  $R_k$  = characteristic y values of axial load resistance

$\alpha$  = corr. factor for tested substrate spec. compared with nominal substrate spec.

$X_m$  = mean axial pull-out load for 10 specimens

$k = 1,92$  (according to Table D1 in EN-1990:2002)

$s$  = standard deviation

**Table 2: Concrete substrate <sup>1)</sup>**

Fastener	Substrate	Washer	$R_k$ : Characteristic values of axial load resistance (kN)
GUARDIAN CS 6.1 / ACS-6.1	C25-C30	SP 50	4.28
GUARDIAN B NRF 5.5	C25-C30	SP-50	1.79
GUARDIAN BN 5.6	C25-C30	SP 50	1.92
GUARDIAN CP & CPN (Polypropylene)	C25-C30	-	1.57
GUARDIAN HD 6.1	C25-C30	SP 50	4.83
GUARDIAN LBS 6.0	C20-C25	SP 50	2.92
GUARDIAN LBS 6.0	C25-C30	SP 50	3.26
GUARDIAN CS-S 6.1	C25-C30	-	2.92
GUARDIAN CS-S 6.1	C32-C40	-	3.29
GUARDIAN CS-S 6.1	C40-C50	-	3.69

<sup>1)</sup> See clause 2 regarding hole diameter and drill depth

**Table 3: Light weight concrete substrate <sup>2)</sup>**

Fastener	Substrate	Washer	$R_k$ : Characteristic values of axial load resistance (kN)
GUARDIAN LBS 6.0	Density 600 kg/m <sup>3</sup>	SP 50	2.07
GUARDIAN LBS 8.0	Density 450 kg/m <sup>3</sup>	SP-40-LBS	0.93
GUARDIAN LBS 8.0	Density 550 kg/m <sup>3</sup>	SP-40-LBS	1.44
GUARDIAN HD 6.1	Density 600 kg/m <sup>3</sup>	SP 50	1.36
GUARDIAN LBS-S 6.0	Density 450 kg/m <sup>3</sup>	SP 50	1.34

<sup>2)</sup> Autoclaved aerated concrete units according to EN 12602:2016

**Table 5: Wood substrate**

Fastener	Substrate	Washer	R <sub>k</sub> : Characteristic values of axial load resistance (kN)
GUARDIAN HD 6.1	18 mm OSB/3 <sup>7)</sup>	-	1.36
GUARDIAN HD 6.1	18 mm multilayer wood deck <sup>12)</sup>	-	2.37
GUARDIAN HD 6.1	18 mm wood deck underlayment <sup>11)</sup>	-	1.94
GUARDIAN MTS 4.8	18 mm OSB/3 <sup>7)</sup>	SP 50	1.16
GUARDIAN TS 5.2	17mm softwood <sup>9)</sup>	SP 50	1.28
GUARDIAN TS 5.2	23mm softwood <sup>9)</sup>	SP 50	1.90
GUARDIAN TS 5.2	18 mm OSB/3 <sup>7)</sup>	SP 50	1.35
GUARDIAN TS 5.2	18 mm chipboard <sup>10)</sup>	SP 50	1.18
GUARDIAN TS 5.2	18 mm multilayer wood deck <sup>12)</sup>	SP 50	1.89
GUARDIAN TS 5.2	18 mm wood deck underlayment <sup>11)</sup>	SP 50	1.94
GUARDIAN LBS 6.0	18 mm OSB/3 <sup>7)</sup>	SP 50	1.40
GUARDIAN LBS 6.0	23mm softwood <sup>9)</sup>	SP 50	2.00
GUARDIAN LBS-S 6.0	18 mm OSB/3 <sup>7)</sup>	SP 50	1.44
GUARDIAN LBS-S 6.0	18 mm Plywood <sup>8)</sup>	SP 50	2.92
GUARDIAN BS 4.8	18 mm OSB/3 <sup>7)</sup>	SP 50	1.05
GUARDIAN BS 4.8	18 mm Plywood <sup>8)</sup>	SP 50	1.80
GUARDIAN BSRF 4.8	18 mm OSB/3 <sup>7)</sup>	SP 50	1.05
GUARDIAN BSRF 4.8	18 mm Plywood <sup>8)</sup>	SP 50	1.54
GUARDIAN DBTA 4.8	18 mm OSB/3 <sup>7)</sup>	SP 50	1.05
GUARDIAN DBTA 4.8	18 mm Plywood <sup>8)</sup>	SP 50	1.80

<sup>7)</sup> OSB board type 3 according to EN 300

<sup>8)</sup> Plywood according to EN 636-2, structural application

<sup>9)</sup> Soft wood according to EN 338 C24

<sup>10)</sup> Chipboard according to EN 312:2010 class P4 minimum

<sup>11)</sup> Multilayer wood deck Underlayment according to EN 636-2 Structural application

<sup>12)</sup> Multilayer wood deck according to EN 636-2 Structural application

**Table 6: Pullover test of washer**

Washer	Fastener <sup>13)</sup> Guardian																R <sub>k</sub> : Characteristic values of axial load resistance	Durability according to EAD 030351-00-0402
	ACS 6.1	BS 4.8	BS 5.5	BS 6.1	BS 6.8	BSHD 4.8	BSRF 4.8	CS 6.1 / CS 6.1	DB(A) 4.8	DBT(A) 4.8	DBT(A)-S 4.8	HD 6.1	LBS 6.0 / LBS S 6.0	LBS-8.0	PS 4.8	TS 5.2		
SP-40 – D/F/DD/FD	-	X	X	X	X	X	X	X	-	-	-	X	X	-	X	X	3.88	Approved
SP-40-LBS	-													X			4.29	Approved
SP-50-D. F. S	-	X	X	X	X	X	X	X	-	-	-	X	X	-	X	X	4.83	Approved
SPB-50-S	-	X	X	X	X	X	X	X	-	-	-	X	X	-	X	X	4.83	Approved
SP-70-D. F. S	-	X	X	X	X	X	X	X	-	-	-	X	X	-	X	X	2.88	Approved
SP 8240-D/F/S	-	X	X	X	X	X	X	X	-	-	-	X	X	-	X	X	5.30	Approved
SPA 8240-D/F	-	-	-	-	-	-	-	-	X	X	X	-	-	-	-	-	5.00	Approved
STBS	-	X	X	X	X	X	X	X	-	-	-	X	X	-	X	X	3.68	Approved
Sleeve R23 – STBT	-	X	X	X	X	X	X	X	-	-	-	X	X	-	X	X	1.78	Approved
Sleeve R23 – STBS7T15	-	X	X	X	X	X	X	X	-	-	-	X	X	-	X	X	1.78	Approved
Guardian screw-STBS7T15	-	X	X	X	X	X	X	X	-	-	-	X	X	-	X	X	3.68	Approved
STBST	-	X	X	X	X	X	X	X	-	-	-	X	X	-	X	X	3.68	Approved
Sarnabar + R23	X	X	X	X	X	X	X	X	-	-	-	X	X	-	X	X	1.78	Approved
Sarnabar + Guardian screw	-	X	X	X	X	X	X	X	X	X	X	X	X	-	X	X	5.00	Approved
GWSP (*)-80-F2E	-	-	X	X	X	-	-	X	-	-	-	-	X	-	-	X	2.48	Approved
Sleeve GWT + GWSP (*)-80-F4E	-	X	X	X	X	X	X	X	-	-	-	X	X	-	X	X	3.17	Approved
Sleeve R 45	-	X	X	X	X	X	X	X	-	-	-	X	X	-	X	X	1.58	Approved
Sleeve RPA 45	-	X	X	X	X	X	X	X	-	-	-	X	X	-	X	X	3.00	Approved
Sleeve R 48	-	X	X	X	X	X	X	X	-	-	-	X	X	-	X	X	1.58	Approved
Sleeve RPA 48	-	X	X	X	X	X	X	X	-	-	-	X	X	-	X	X	3.00	Approved
Sleeve RB 48	-	X	X	X	X	X	X	X	-	-	-	X	X	-	X	X	1.58	Approved
Sleeve RBPA 48	-	X	X	X	X	X	X	X	-	-	-	X	X	-	X	X	3.00	Approved
Sleeve RBS 50	-	X	X	X	X	X	X	X	-	-	-	X	X	-	X	X	1.58	Approved
Sleeve R 75	-	X	X	X	X	X	X	X	-	-	-	X	X	-	X	X	1.58	Approved
Sleeve TBPP 8040	-	X	X	X	X	X	X	X	-	-	-	X	X	-	X	X	1.58	Approved
Sleeve TBPA 8040	-	X	X	X	X	X	X	X	-	-	-	X	X	-	X	X	2.52	Approved
PP 45	-	X	X	X	-	X	X	X	-	-	-	-	X	-	X	X	2.50	Approved
Sleeve HR 45	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.58	Approved
Sleeve HR 48	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.58	Approved
Sleeve HR 75	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.58	Approved
Sleeve R45-LN	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	1.58	Approved
Sleeve R48-LN	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	1.58	Approved
Sleeve R75-LN	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	1.58	Approved

<sup>13)</sup>Obtained values from the axial load test in different substrates (table 2 - 5) and the pullover test (table 6) of washers/sleeves are compared and the lowest of the two gives the characteristic value for the fastener / sleeve, washer combination of the application.