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Designated according to Article 29 of Regulation (EU) No 305/2011

Member of EOTA
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European Technical Assessment

ETA-08/0285
of 23/12/2024

General Part

Technical Assessment Body issuing the European Technical Assessment	SINTEF AS by its institute SINTEF Community
Trade name of the construction product	Guardian Fastening System
Product family to which the construction product belongs	Fasteners for mechanically fastened flexible roof waterproofing systems
Manufacturer	SFS Group Schweiz AG Division Construction Rosenbergsaustrasse 10 CH-9435 Heerbrugg Switzerland
Manufacturing plant(s)	SFS Group the Netherlands B.V. Grasbeemd 14 5705 DG Helmond The Netherlands
This European Technical Assessment contains	25 pages including 2 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 030351-00-0402, Systems of Mechanically Fastened Flexible Roof Waterproofing Membranes
This version is a corrigendum to	ETA 08/0285-2024-12-23

Specific parts

1. Technical description of the product

Guardian Fastening System is used as mechanical fastening of insulation, bitumen based single/multi-layer or single ply waterproofing membranes, or polymeric single ply waterproofing membranes, for flat roofing. The supporting roof structure may be of profiled steel sheets, concrete, light weight concrete or wood as defined in EAD 030351-00-0402, February 2019, *Systems of mechanically fastened flexible roof waterproofing membranes* (MEFAWAS), paragraph 1.1.

The range of fasteners consists of washers, washers with integrated sleeve, screws, nails, and plugs as illustrated in Annex 1. Guardian Fastening System also consists of GuardianWeld & Centrix electro bonding system which is used to bond special adhesive coated metal fixing plates to single-ply waterproofing membranes.

The fastener system is introduced to the market separately from the other components of roof waterproofing membrane kits, and this ETA covers only the performance characteristics of the Guardian Fastening System. A separate ETA according to EAD 030351-00-0402 is necessary in order to cover an entire kit for mechanically fastened roof waterproofing membranes.

The fasteners may be used for all types of flexible membranes. The supporting roof structure may consist of profiled steel sheets, concrete, light weight concrete, or a wood-based construction. The Guardian Fastening System may be used with membranes installed on a thermal insulation material or directly to the supporting roof deck.

2. Specification of the intended use in accordance with the applicable European Assessment Document (hereinafter EAD)

Installation and design:

General

The fasteners must be installed according to the manufacturer's instructions. It is the manufacturer's responsibility to provide correct information about the application of the products to the users.

Fastening with steel washers may on stiff substrates, i.e. on wood-based roof substrate, non-compressible insulation or on concrete.

Plastic fasteners with integrated sleeve or step secured steel washers (steel washers together with screws equipped with a separate threading which avoid the washer to be pressed down) are recommended on thermal insulation.

Care should be taken during design to ensure that galvanic corrosion between metal parts, especially between substrate and screw, does not occur. Likewise, use of insulation materials containing substances which can affect the performance of the fasteners must be avoided.

Fastening in wood

Minimum thickness for timber-based substrate is 18 mm. For timber deck applications, a site pull-out test is recommended.

Fastening in concrete

When fixing Guardian concrete nails and screws the drill hole diameter must be normally 5 mm. In case of Guardian concrete nails and plugs the recommended drill hole diameter is normally 8mm. The

drill hole depth should be normally minimum 30 mm, unless special precautions are taken regarding installation control and inspection. Minimum anchorage depth shall be normally minimum 20 mm. Fixings in 40 mm thick concrete without penetration requires drilling with depth control. Concrete compression strength is minimum class C25/30 according to EN 206-1.

Fastening in light weight concrete

When fixing Guardian Light Weight Concrete Screw LBS 8.0 and LBS 6.0 in aerated concrete, the anchoring depth must be normally minimum 60 mm. Pull-out tests are always recommended in light weight concrete. The LBS 6.0 screw can also be used in lower quality concrete less than C25/30 according to EN 206-1 with a minimum anchoring depth of 40mm and drill hole diameter of 5 mm.

Fastening in steel sheets

Load bearing decks made of profiled steel sheets normally have a minimum thickness of 0.7 mm and quality S280. Using Guardian steel sheet fasteners in profiled steel sheets, the anchoring depth must be minimum 20 mm. In annex 2 table 4 the axial load resistance of every steel sheet fastener is listed.

Fastening with GuardianWeld & Centrix-system

The GuardianWeld & Centrix electro bonding system must be applied according to the manufacturer's user manual. The different types of plates are laminated with special heat activated adhesive for PVC, TPO or EPDM waterproofing membranes.

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

Mechanical resistance and stability

Not relevant.

Safety in case of fire

No performance determined. The reaction to fire of roof waterproofing kits is determined for the complete kits including the membrane.

Hygiene, health and environment

According to the manufacturer's declaration the screws and washers with corrosion protection contains no chromium 6 compounds. Consequently, the products do not contain any dangerous substances according to the EU database. The leaching properties to soil and water is assessed not to be relevant. Likewise, the emission properties to indoor environment.

Safety in use

The fasteners have been tested for wind uplift according to EN-16002:2010, CEN/TS-17659 and EAD 030351-00-0402. Axial pull out performance from substrates and resistance to unwinding are shown in Annex 2. The wind uplift performance of roof waterproofing kits is mainly determined by the roofing membranes. More than 250 full scale wind load tests with bituminous and polymeric membranes have been executed. The membranes are fixed with washers, washers with integrated sleeves and barbed washers in combination with fixings to substrates of steel sheets, wood, concrete and light weight concrete. The complete test reports may be obtained from SFS Group the Netherlands B.V.

Protection against noise

Not relevant

Energy consumption and heat retention

Not relevant

Aspects of durability

The plastic fasteners produced of polypropylene and polyamide satisfy the aspects of durability according to EAD 030351-00-0402 ch. A.2.4, see Annex 2. The Guardian tube washers made of polypropylene and polyamide have an acceptable resistance to brittleness according to EAD 030351-00-0402 ch. 2.2.3.3, see Annex 2.

Carbon steel fasteners have a corrosion protection of Chrome 6 free Enduroguard 15® or Durocoat® coating. Stainless steel fasteners in grade SS304/A2 or SS316/A4. All metallic components in the Guardian fastening system correspond to corrosion protection according to EAD 030351-00-0402 ch. A.2.4, see Annex 2. Test-procedure for these products is 15 exposure cycles (humid atmosphere 2 litres of sulphur dioxide).

Identification

The characteristic values of detailed product dimensions and respective tolerances are stated in the manufacturer's technical dossier and form a part of the control plan for the factory production control. All fasteners, steel washers and tube washers are either marked with the Guardian "G" mark or brand name "Guardian" or "SFS". The marking of tube washers may be combined with the Guardian Type or another brand name for products produced under private label. All packaging is to be marked with product type and batch number, including CE marking.

4. Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base

According to Decision 98/143/EC by the European Commission, the system 2+ of assessment and verification of constancy of performance applies. See Annex V to Regulation (EU) No. 305/2011.

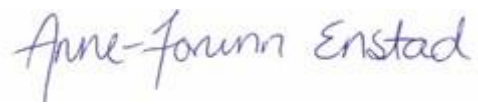
5. Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at SINTEF AS.

Issued in Oslo on 23/12/2024

By

SINTEF AS by its institute SINTEF Community



Anne-Jorunn Enstad
Certification Manager

Annex 1

Description of Guardian Fastening System

Table 1

Fastener type	Fig. no	Function	Material
GUARDIAN R-50 GUARDIAN ASTL-50 GUARDIAN RPA-50	1	Tube washer Tube washer with hexagonal internal tube shape Tube washer	Polypropylene Polypropylene Polyamide
GUARDIAN R-48 GUARDIAN ASTL-48 / ASTL-50 GUARDIAN RPA-48	2	Tube washer Tube washer with hexagonal internal tube shape Tube washer	Polypropylene Polypropylene Polyamide
GUARDIAN RB-48 GUARDIAN RBPA-48	3	Tube washers with three barbs Tube washer with three barbs	Polypropylene Polyamide
GUARDIAN RBS 50	4	Tube washer with six barbs	Polypropylene
GUARDIAN Sleeve TBPA 8040 GUARDIAN Sleeve TBPP 8040	5	Tube washer with two barbs Tube washer with two barbs	Polyamide 6.6 Polypropylene
GUARDIAN R 75 GUARDIAN ASTL -75	6	Tube washer Tube washer with hexagonal internal tube shape	Polypropylene
GUARDIAN PP 45	7	Washer with ten barbs	Polyamide 6.0
GUARDIAN SP 40-D, F, DD, FD	8	Steel washer	Galvanized steel
GUARDIAN SP 40-LBS	9	Steel washer	Galvanized steel
GUARDIAN SP 50-D,F,S	10	Steel washer	Galvanized steel
GUARDIAN SPB 50-S	11	Barbed steel washer	Galvanized steel
GUARDIAN SP 8240-D, F, S	12	Steel washer	Galvanized steel
GUARDIAN SPA 8240-D, F	13	Steel washer	Galvanized steel
GUARDIAN SPB 8240-D GUARDIAN SPBA 8240-D	14	Barbed steel washers	Galvanized steel
GUARDIAN SP 70-D,F,S, CPE GUARDIAN SP-70-DX	15	Steel washer Steel washer with 0,5 mm thickness	Galvanized steel
GUARDIAN STBS GUARDIAN STBT GUARDIAN STBST GUARDIAN STBS7T15	16	Steel bar with small holes Steel bar with big holes Steel bar with small and big holes Steel bar with small and big holes	Galvanized steel
Sarnabar ® 6/15 Sarnabar ® 6/10 Sarnabar ® 6	17	Steel bar with big holes Steel bar with small and big holes Steel bar with small holes	Galvanized steel
GUARDIAN GWSP(P,T,E)-80-F4E GUARDIAN GWSP(P,T,E)-80-F2E	18	Steel washers	Galvanized steel + Coated & laminated
GUARDIAN GWT tube R23 tube for STBT/Sarnabar® 6/15	19	Tubes for combination with steel washers/bars	Polyamide 6.0 Polypropylene
GUARDIANWELD INDUCTION MACHINE*	20	Machine for welding GWSP(*)-80-F2E/F4E to PVC, TPO and EPDM membranes	-
GUARDIAN BN 5.6	21	Concrete nail	Coated carbon steel
GUARDIAN BNRF 5.5	22	Concrete nail	Stainless steel
GUARDIAN CS 6.1 GUARDIAN CS-S 6.1	23	Concrete screws with flat or sharp point	Coated carbon steel Stainless steel
GUARDIAN ACS-6.1	24	Concrete screw with hexagonal nut	Coated carbon steel
GUARDIAN CP-8 & CP50	25	Concrete plug	Coated steel pin/ Polypropylene
GUARDIAN LBS 6.0 GUARDIAN LBS-S 6.0	26	Light weight concrete/wood screws	Coated carbon steel Stainless steel
GUARDIAN LBS 8.0 GUARDIAN LBS-S 8.0	27	Light weight concrete screw	Coated carbon steel Stainless steel
GUARDIAN HD 6.1	28	Concrete/light weight concrete/wood screw	Coated carbon steel
GUARDIAN PS 4.8	29	Steel sheet screw	Coated carbon steel
GUARDIAN BS 4.8 GUARDIAN BSRF 4.8	30	Steel sheet screws	Coated carbon steel Stainless steel
GUARDIAN BSHD 4.8	31	Steel sheet screw	Coated carbon steel

GUARDIAN DBT-4.8 (-A) GUARDIAN DBT-S 4.8(-A)	32	Steel sheet screws	Coated carbon steel Stainless steel
GUARDIAN DB(A) 4.8	33	Steel sheet screw	Coated carbon steel
GUARDIAN BS 5.5	34	Steel sheet screw	Coated carbon steel
GUARDIAN BS 6.1	35	Steel sheet screw	Coated carbon steel
GUARDIAN BS 6.8	36	Steel sheet screw	Coated carbon steel
GUARDIAN TPR 6.3	37	Peel Rivet	Aluminium body/Galvanized Pin
GUARDIAN TS 5.2	38	Timber deck screw	Coated carbon steel
GUARDIAN MTS 4.8	39	Timber deck screw	Coated carbon steel
GUARDIAN LBS 6.0 GUARDIAN LBS-S 6.0	40	Light weight concrete, concrete and wood screw	Coated carbon steel Stainless steel
GUARDIAN HD 6.1	41	Light weight concrete, concrete and wood screw	Coated carbon steel
Guardian identification mark	42	-	-
Guardian identification mark	43	-	-

**The GUARDIANWELD induction machine is not assessed by SINTEF*

Guardian Tubes

Guardian R50 sleeve range

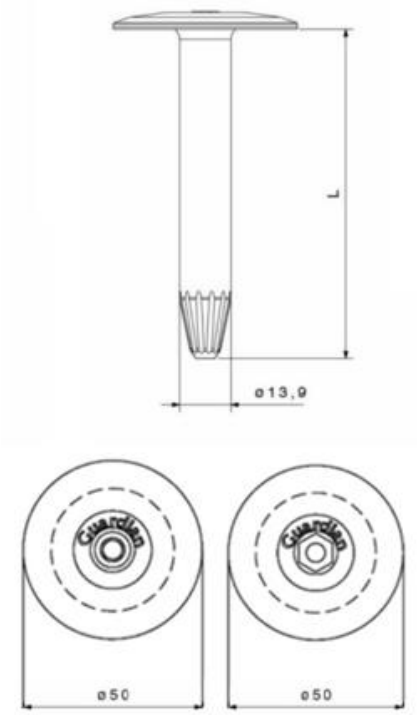


Fig. 1
Tube washer R-50
Tube washer ASTL-50with hexagonal internal tube shape (used together with ACS 6.1)
Tube washer RPA-50 (Polyamide)

Guardian R48 sleeve range

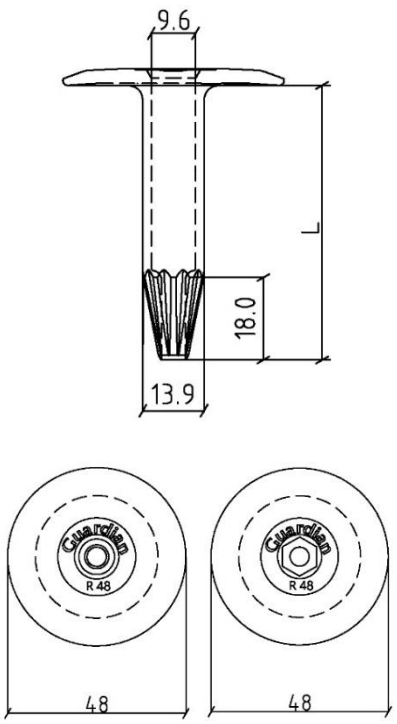


Fig. 2
Tube washer R-48 (Polypropylene)
Tube washer ASTL-48 / ASTL-50 with hexagonal internal tube shape (used together with ACS 6.1)
Tube washer RPA-48 (Polyamide)

Guardian RB48 sleeve range

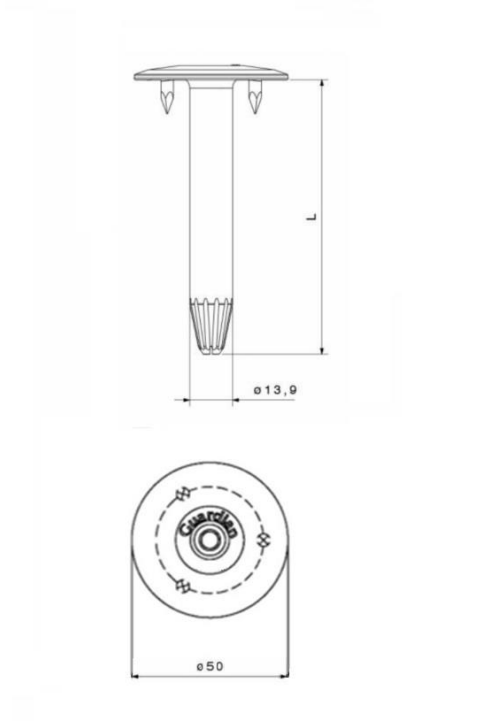


Fig. 3
Tube washer RB-48 with three barbs (Polypropylene)
Tube washer RBPA-48 with three barbs (Polyamide)

Guardian RBS50 sleeve range

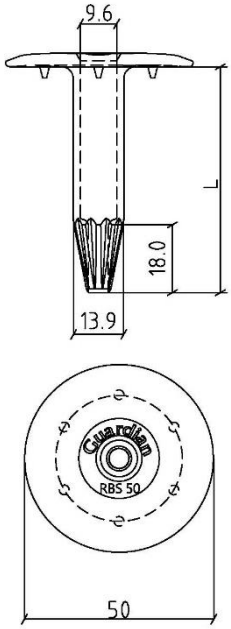


Fig. 4
Tube washer RBS-50 with six barbs

Guardian TB 8040 sleeve range

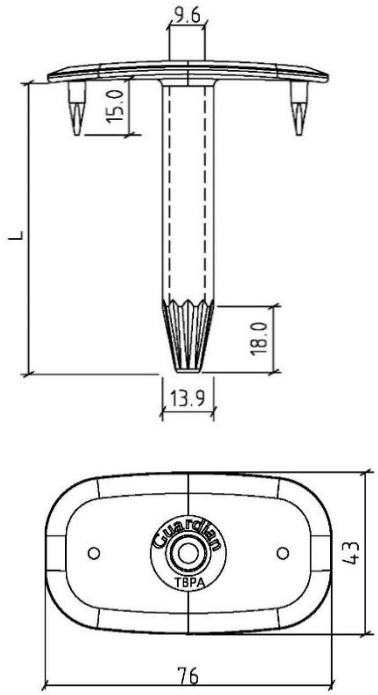


Fig. 5
Sleeve TBPA-8040 with two barbs (Polyamide)
Sleeve TBPP-8040 with two barbs (Polypropylene)

Guardian R75 sleeve range

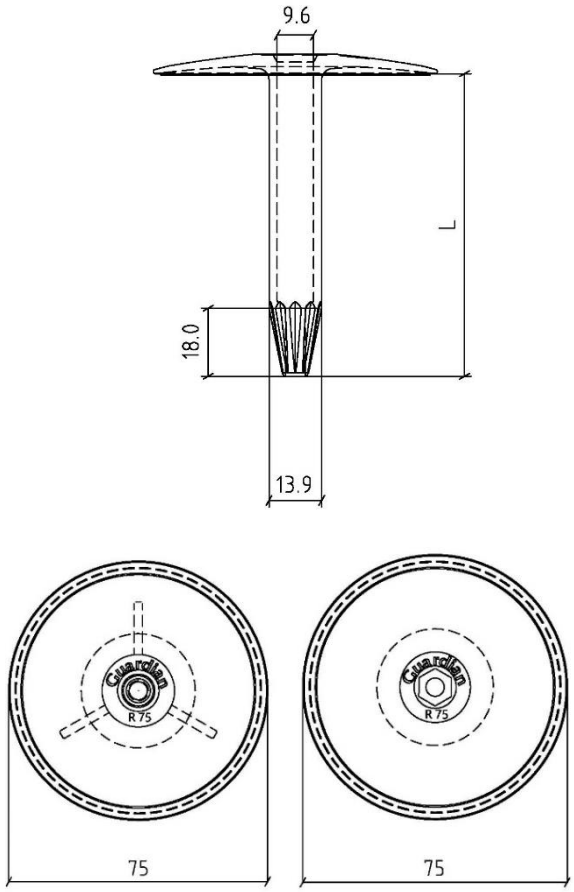


Fig. 6
Tube washer R-75
Tube washer ASTL-75 with hexagonal internal tube shape (used together with ACS 6.1)

Guardian PP45 washer

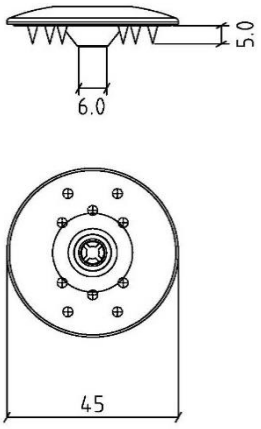


Fig. 7
Tube washer PP-45 with ten barbs for fixation of synthetic membranes

Guardian metal pressure plates

SP 40 metal plate range

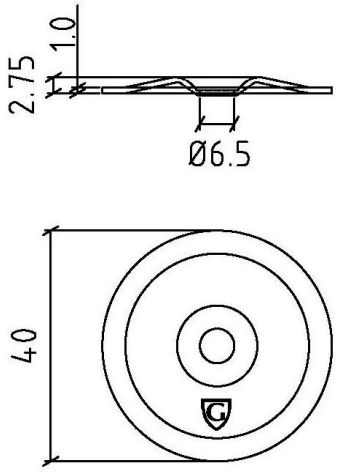


Fig. 8
SP-40-D, F, DD, FD

SP 40 metal plate range

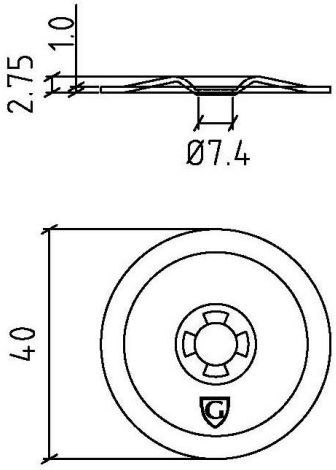


Fig. 9
SP-40-LBS

SP 50 metal plate range

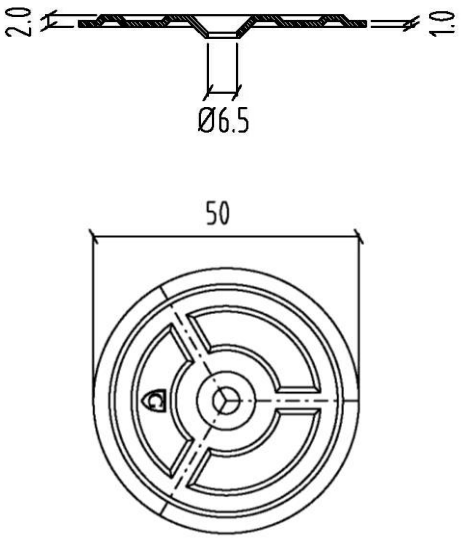


Fig. 10
SP-50-D, F, S

SP 50 barbed metal plate range

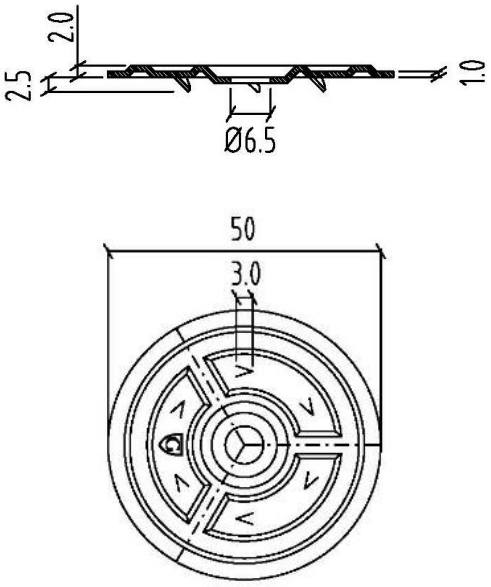


Fig. 11
SPB-50-S

SP 8240 metal plate range

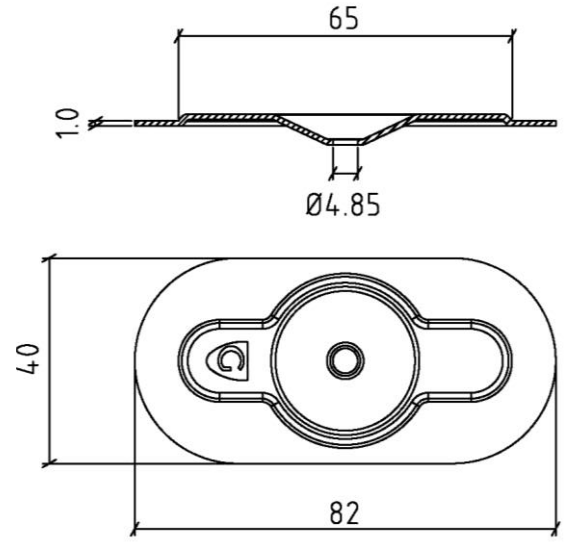


Fig. 12
SP-8240-D,F,S

SPA 8240 metal plate range

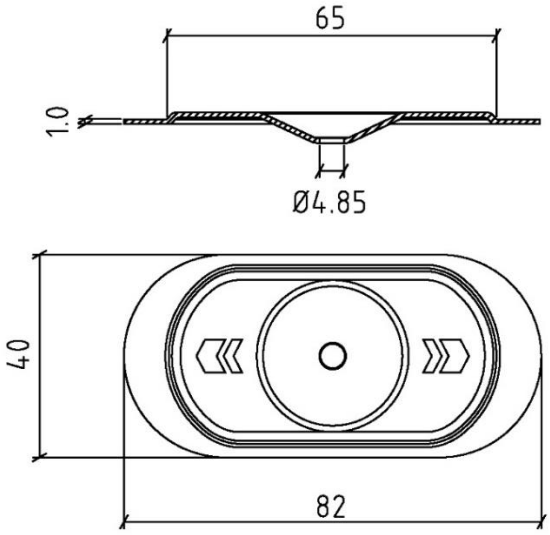


Fig. 13
SPA-8240-D, F

SPB/SPBA 8240 metal plate range

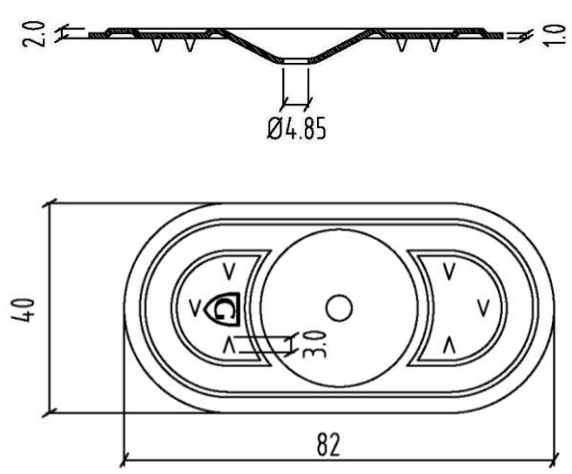


Fig. 14
SPB-8240-D
SPBA-8240-D

SP 70 metal plate range

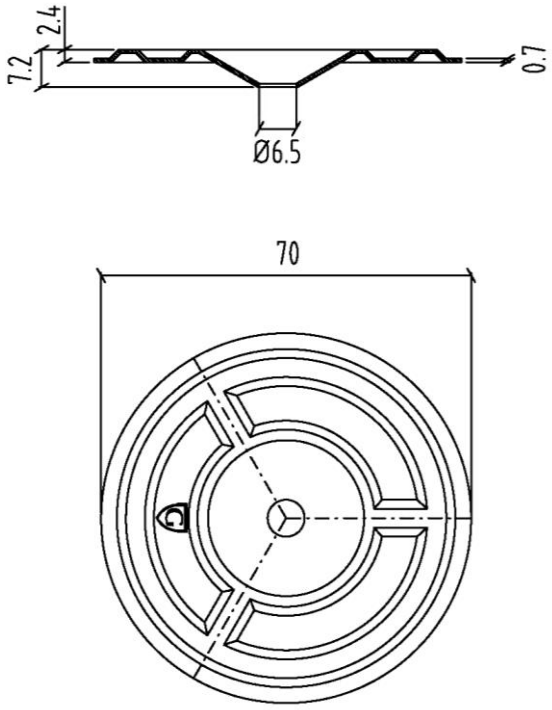


Fig. 15
SP-70-D, F, S, CPE
SP-70-DX, SX (Thickness 0,50 mm)

Guardian Steel bar system

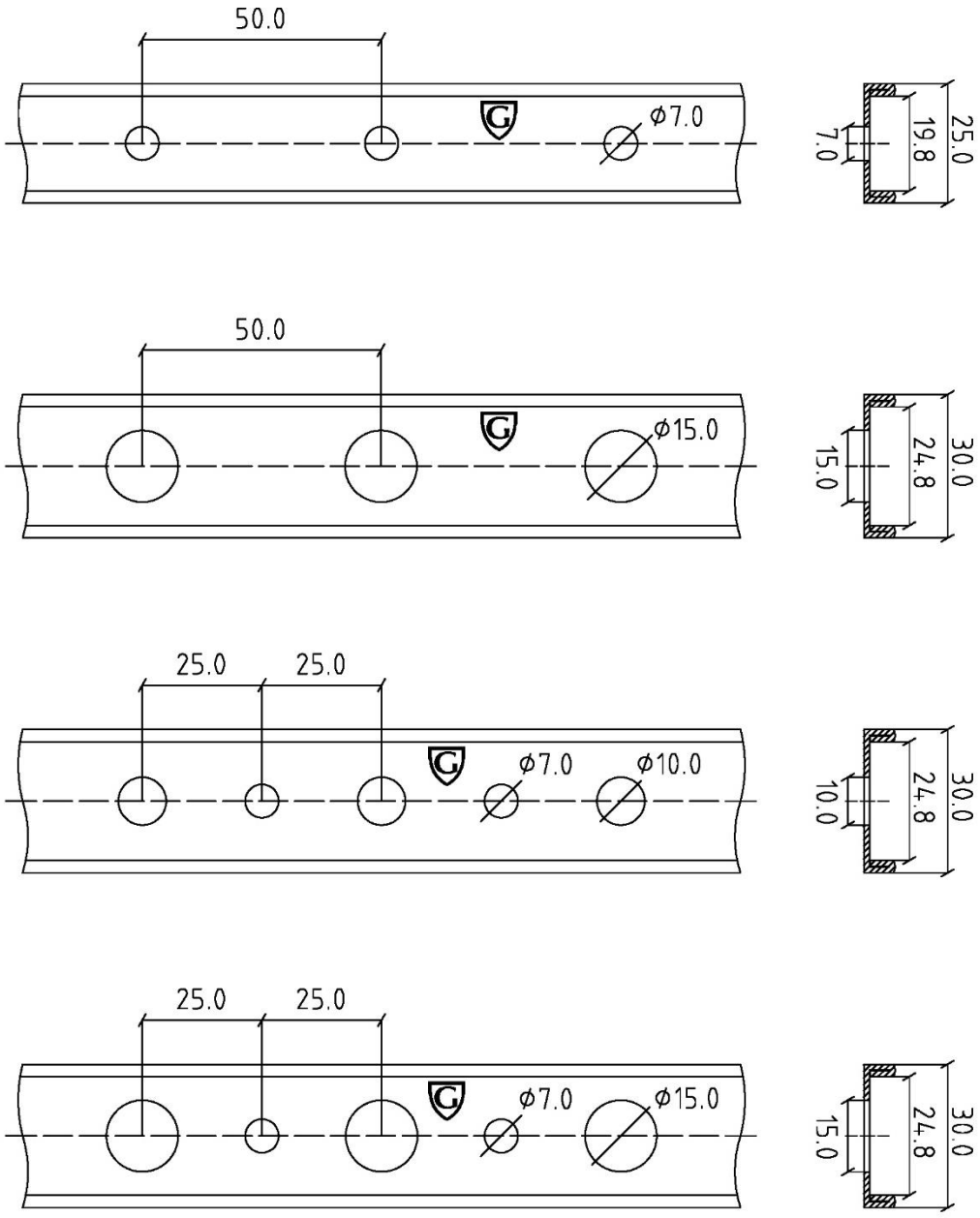


Fig. 16
STBS Steel bar with small holes and a thickness of 1.25mm
STBT Steel bar with big holes (usable with GWT tube fig. 19) and a thickness of 1.25mm
STBST Steel bar with small and big holes and a thickness of 1.25mm
STBS7T15 Steel bar with small and big holes and thickness of 1.25mm

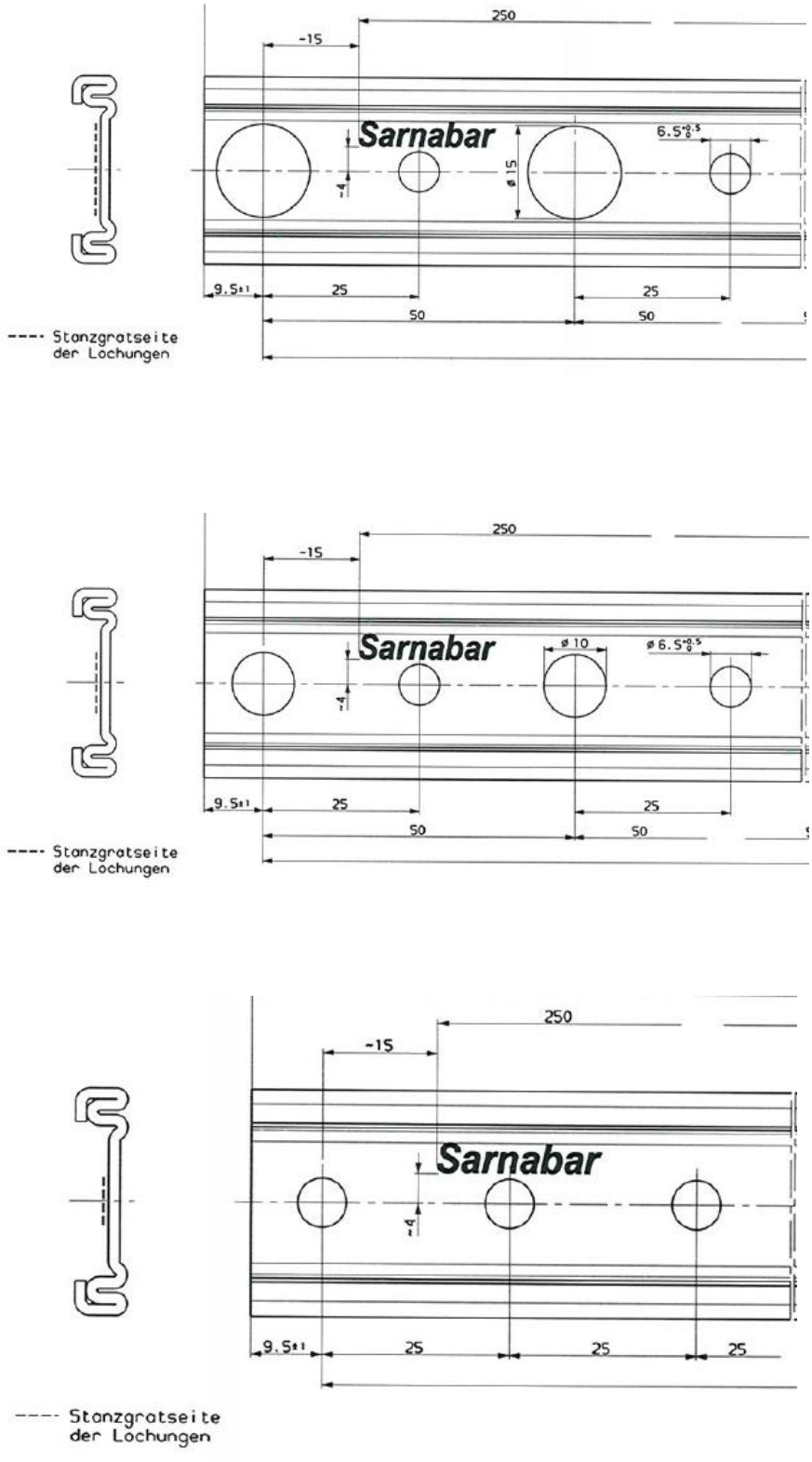


Fig. 17
Sarnabar ® 6/15 Steel bar with big holes (usable with R23 tube fig. 19)
Sarnabar ® 6/10 Steel bar with small and big holes
Sarnabar ® 6 Steel bar with small holes

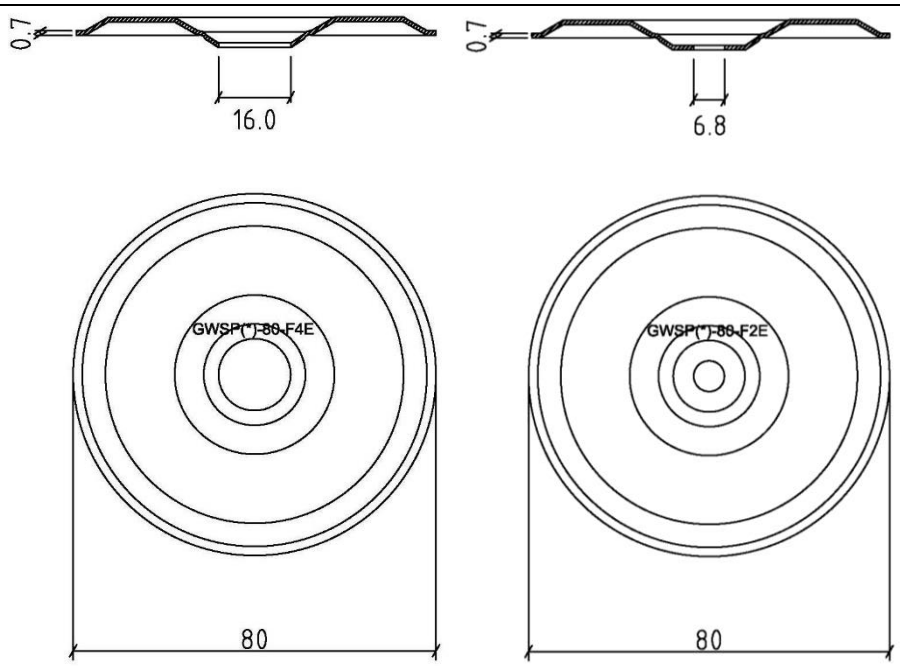


Fig. 18
GWSP(P,T,E)-80-F4E (usable with GWT fig. 19)
GWSP(P,T,E)-80-F2E

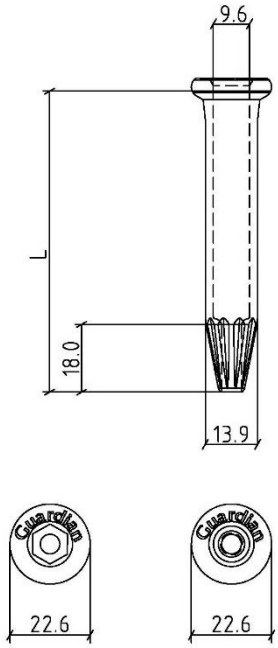


Fig. 19
GWT tube (Polyamide)
R23 tube for STBT/Sarnabar ® 6/15 (Polypropylene)

Fig. 20
GuardianWeld induction machine
Welds the GWSP(*)-80-F2E/F4E to PVC, TPO and EPDM membranes

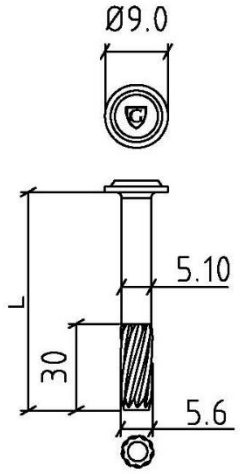


Fig. 21
BN 5.6 Concrete nail

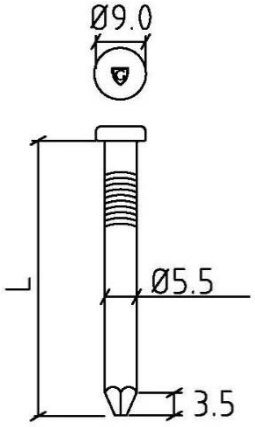


Fig. 22
BNRF 5.5 Stainless concrete nail

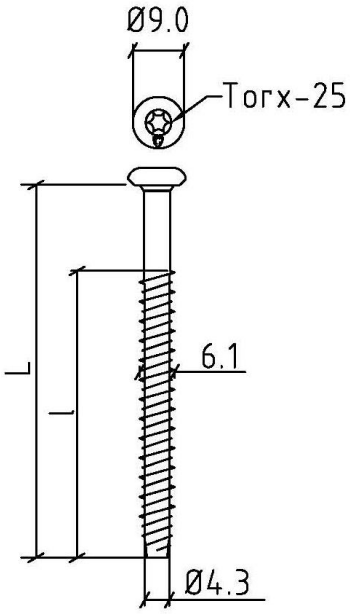


Fig. 23
CS 6.1 Concrete screw (with flat or sharp point)
CS-S 6.1 Stainless Concrete screw

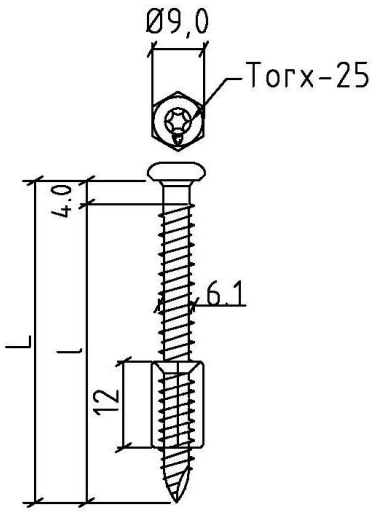


Fig. 24
ACS 6.1 Adjustable concrete screw
(used together with tube washer ASTL versions)

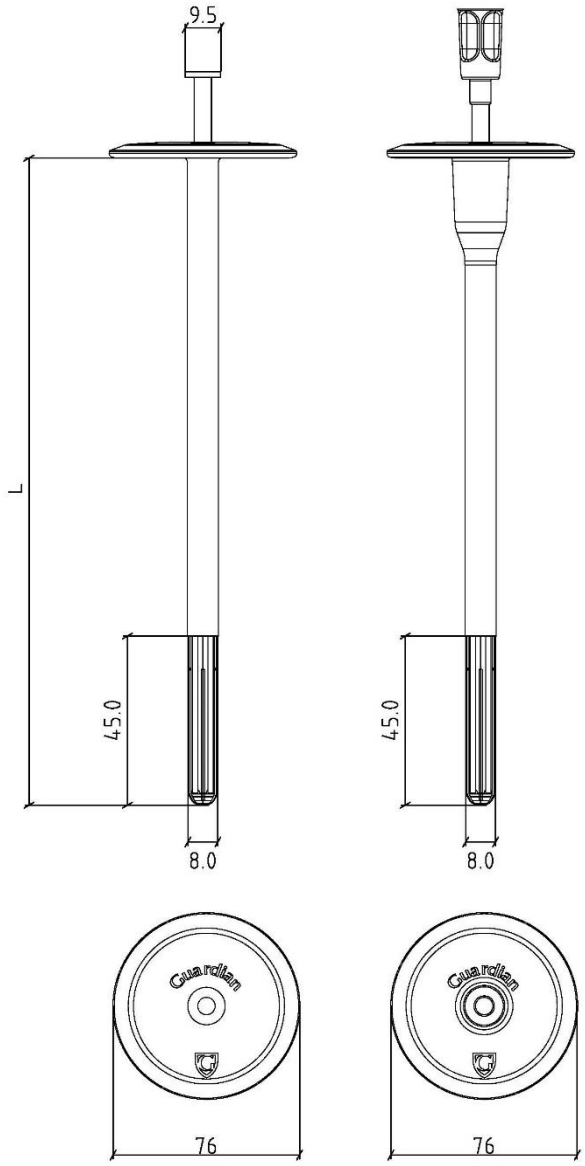


Fig. 25
CP50 Concrete plug
CP-8 Concrete plug with cold bridge stop (also usable with SP-70-CPE)

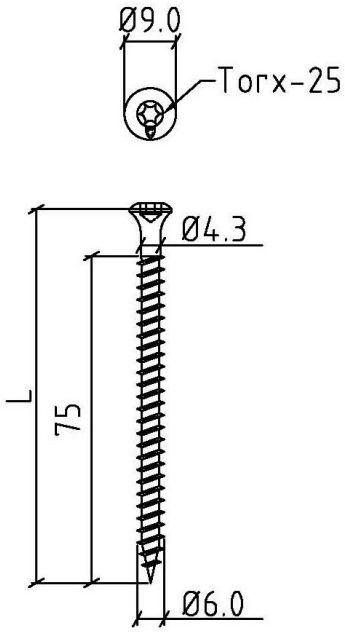


Fig. 26
LBS 6.0 screw for lightweight concrete, concrete and wooden substrates
LBS-S 6.0 Stainless screw for lightweight concrete and wooden substrates

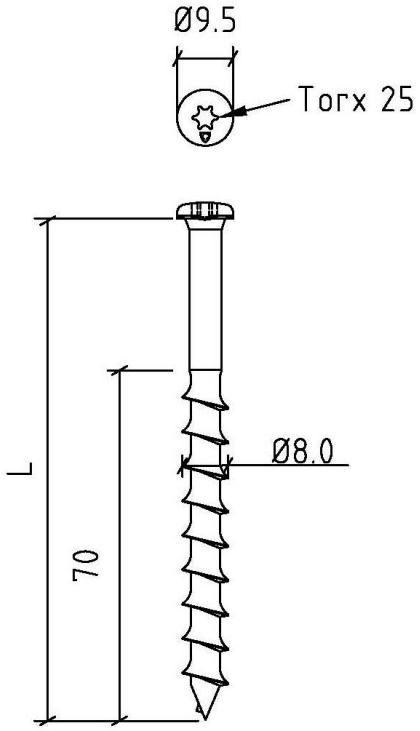


Fig. 27
LBS 8.0 screw for lightweight concrete
LBS-S 8.0 Stainless screw for lightweight concrete

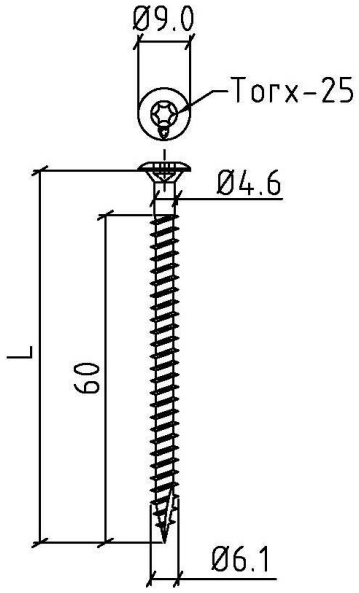


Fig. 28
HD 6.1 Screw for lightweight concrete, concrete and wooden substrates

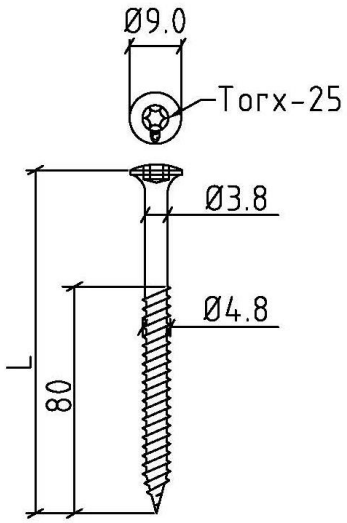


Fig. 29
PS 4.8 Screw for fixing in metal sheets

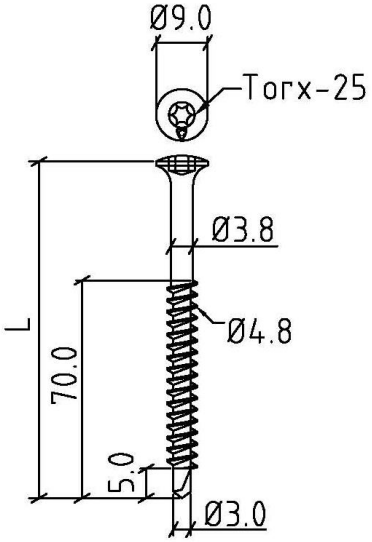


Fig. 30
BS 4.8 Screw for fixing in metal sheets
BSRF 4.8 Stainless screw for fixing in metal sheets

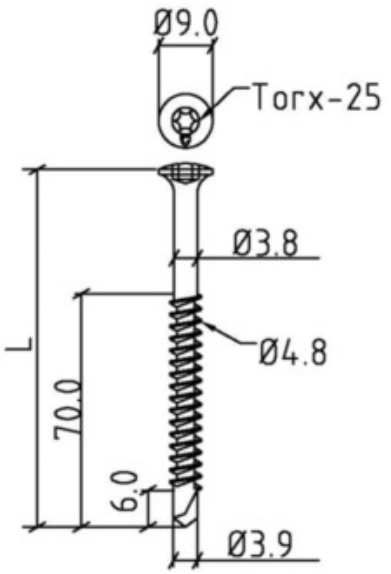


Fig. 31
BSHD 4.8 Screw for fixing in metal sheets
(steel thickness from 1,0mm up to maximum 3,0mm)

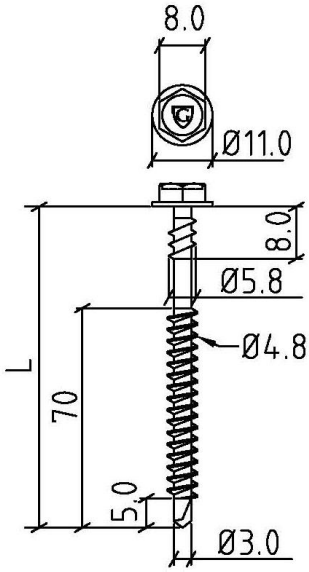


Fig. 32
DBT(A) 4.8 Screw for fixing in metal sheets
DBT(A)-S 4.8 Stainless A4 screw for fixing in metal sheets (usable with automatic setting tool)

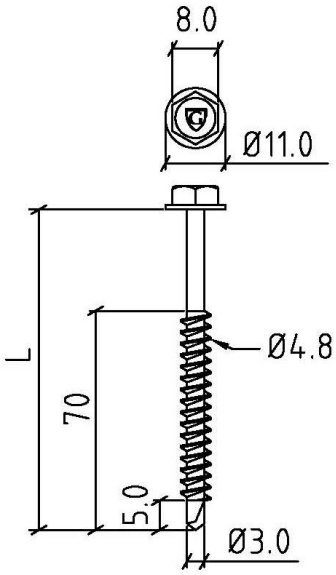


Fig. 33
DB(A) 4.8 Screw for fixing in metal sheets
(usable with automatic setting tool)

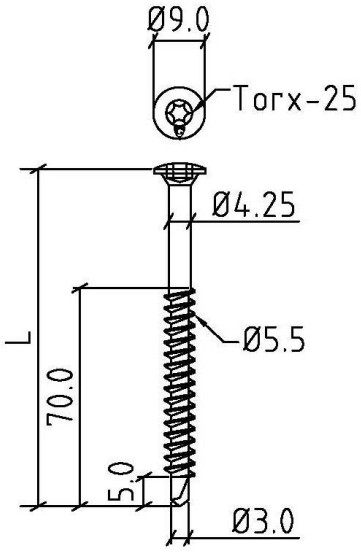


Fig. 34
BS 5.5 Screw for fixing in metal sheets

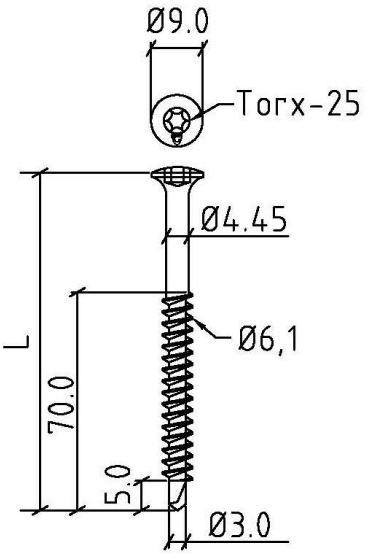


Fig. 35
BS 6.1 Screw for fixing in metal sheets

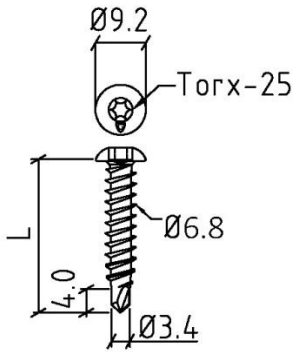


Fig. 36
BS 6.8 Screw for fixing in thin metal sheets

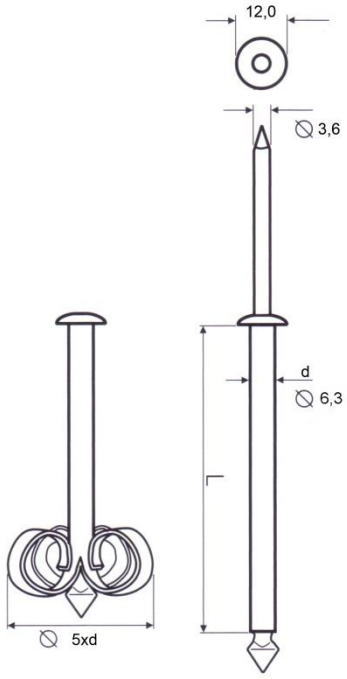


Fig. 37
TPR 6.3 Peel Rivet

Guardian Fasteners for wooden substrates

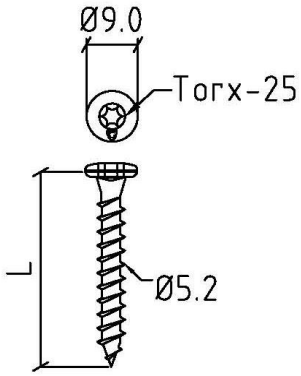


Fig. 38
TS 5.2 Screw for fixing in wood

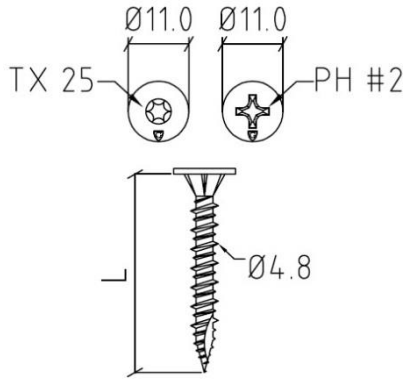


Fig. 39
MTS 4.8 screw for fastening metal to timber constructions

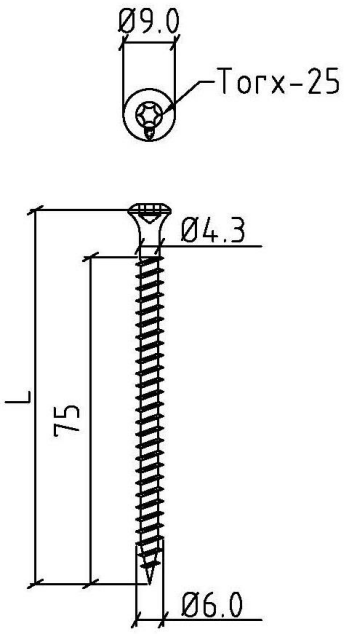


Fig. 40
LBS 6.0 Screw for light weight concrete, concrete and wooden substrates
LBS-S 6.0 Stainless screw for lightweight concrete and wooden substrates

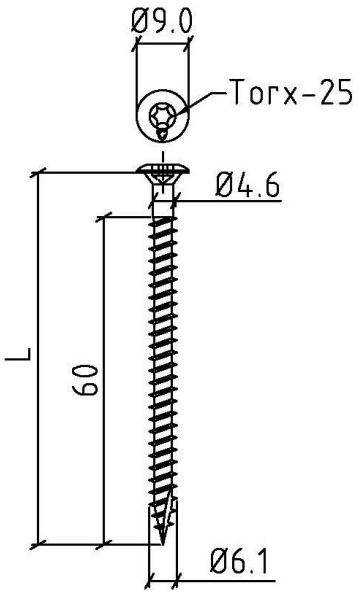


Fig. 41
HD 6.1 Screw for light weight concrete, concrete and wooden substrates

Guardian Identification mark

Fig. 42
Guardian "G2000" logo

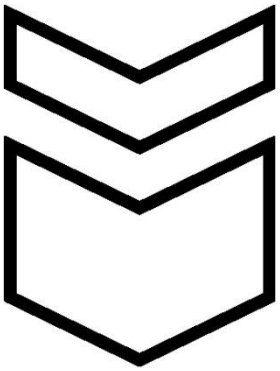


Fig. 43
Guardian "G2020" logo

Fig 44
SFS logo 2024

Annex 2

Performance of Guardian Fastening system on different substrates

Characteristic values are calculated from the following formula according to EAD-030351-00-0402 and CEN/TS-17659:

R_k: α (X_m – (k x s))

where: R_k = characteristic y values of axial load resistance

α = 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 [1)]

Fastener	Substrate	R_k: Characteristic values of axial load resistance (kN)
GUARDIAN CS 6.1 / ACS-6.1	C25-C30	4.28
GUARDIAN BNRF 5.5	C25-C30	1.79
GUARDIAN BN 5.6	C25-C30	1.92
GUARDIAN CP & CPN (Polypropylene)	C25-C30	1.57
GUARDIAN HD 6.1	C25-C30	4.83
GUARDIAN LBS 6.0	C20-C25	2.92
GUARDIAN LBS 6.0	C25-C30	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

[1)] See clause 2 regarding hole diameter and drill depth

Table 3: Light weight concrete substrate [2)]

Fastener	Substrate	R_k: Characteristic values of axial load resistance (kN)
GUARDIAN LBS 6.0	Density 600 kg/m3	2.07
GUARDIAN LBS 8.0	Density 450 kg/m3	0.93
GUARDIAN LBS 8.0	Density 550 kg/m3	1.44
GUARDIAN HD 6.1	Density 600 kg/m3	1.36
GUARDIAN LBS-S 6.0	Density 450 kg/m3	1.34

[2)] Autoclaved aereated concrete units according to EN 12602:2016

Table 4: Profiled steel sheets substrate [3)]

Fastener	Substrate	R_k: Characteristic values of axial load resistance (kN) [5)]	Durability Resistance to unwinding EAD 030351-00-0402 cl. 5.3.7 D.2.3, D.3.1, D.3.2 and cl. 5.3.4 D.2.2
GUARDIAN PS 4.8	Steel sheet 0.70mm	1.31	Approved
GUARDIAN PS 4.8	Steel sheet 0.75mm	1.52	Approved
GUARDIAN PS 4.8	Steel sheet 1.00mm	1.94	Approved
GUARDIAN BS 4.8	Steel sheet 0.70mm	1.17	Approved
GUARDIAN BS 4.8	Steel sheet 0.70mm[4)]	1.35	Approved
GUARDIAN BS 4.8	Steel sheet 0.75mm	1.45	Approved
GUARDIAN BS 4.8	Steel sheet 0.80mm	1.54	Approved
GUARDIAN BSHD 4.8	Steel sheet 1.00mm	1.65	Approved
GUARDIAN BSHD 4.8	Steel sheet 1.25mm	2.10	Approved
GUARDIAN BSRF 4.8	Steel sheet 0.75mm[4)]	1.02	Approved
GUARDIAN BS 5.5	Steel sheet 0.72mm [4)]	1.74	Approved
GUARDIAN BS 6.1	Steel sheet 0.60mm	1.56	Approved
GUARDIAN BS 6.1	Steel sheet 0.70mm	1.78	Approved
GUARDIAN BS 6.1	Steel sheet 0.75mm	1.98	Approved
GUARDIAN BS 6.1	Steel sheet 1.00mm	2.77	Approved
GUARDIAN BS 6.8	Steel sheet 0.50mm	1.06	Approved
GUARDIAN BS 6.8	Steel sheet 0.60mm	1.31	Approved
GUARDIAN BS 6.8	Steel sheet 0.70mm	1.78	Approved
GUARDIAN DBT 4.8-A	Steel sheet 0.70mm	1.17	Approved
GUARDIAN DBT 4.8-A	Steel sheet 0.75mm	1.41	Approved
GUARDIAN DBT 4.8-A	Steel sheet 0.80mm	1.52	Approved
GUARDIAN DBT-S-4.8-A	Steel sheet 0.75mm4)	1.16	Approved
GUARDIAN TPR 6.3	Steel sheet 0.50mm	1.19	Approved

[3)] Steel sheets, galvanized,min S280 according to EN 10147

[4)] Steel sheets, galvanized, yieldstrength 320 MPa

[5)] Obtained value from the axial load test in steel sheets substrates, table 4, and the pullover test, table 6, of washers is compared and the lowest of the two gives the characteristic value for the fastener / sleeve, washer combination of the application.

Table 5: Wood substrate

Fastener	Substrate	$R_{k:}$ Characteristic values of axial load resistance (kN)
GUARDIAN HD 6.1	18 mm OSB/3 [7)]	1.36
GUARDIAN HD 6.1	18 mm multilayer wood deck [12)]	2.37
GUARDIAN HD 6.1	18 mm wood deck underlayment [11)]	1.94
GUARDIAN MTS 4.8	18 mm OSB/3 [7)]	1.16
GUARDIAN TS 5.2	17mm softwood [9)]	1.28
GUARDIAN TS 5.2	23mm softwood [9)]	1.90
GUARDIAN TS 5.2	18 mm OSB/3 [7)]	1.35
GUARDIAN TS 5.2	18 mm chipboard [10)]	1.18
GUARDIAN TS 5.2	18 mm multilayer wood deck [12)]	1.89
GUARDIAN TS 5.2	18 mm wood deck underlayment [11)]	1.94
GUARDIAN LBS 6.0	18 mm OSB/3 [7)]	1.40
GUARDIAN LBS 6.0	23mm softwood [9)]	2.00
GUARDIAN LBS-S 6.0	18 mm OSB/3 [7)]	1.44
GUARDIAN LBS-S 6.0	18 mm Plywood [8)]	2.92
GUARDIAN BS 4.8	18 mm OSB/3 [7)]	1.05
GUARDIAN BS 4.8	18 mm Plywood [8)]	1.80
GUARDIAN BSRF 4.8	18 mm OSB/3 [7)]	1.05
GUARDIAN BSRF 4.8	18 mm Plywood [8)]	1.54
GUARDIAN DBT 4.8-A	18 mm OSB/3 [7)]	1.05
GUARDIAN DBT- 4.8-A	18 mm Plywood [8)]	1.80

[7)] OSB board type 3 according to EN 300

[8)] Plywood *according to EN 636-2, structural application*

[9)] Soft wood according to EN 338 C24

[10)] Chipboard according to EN 312:2010 class P4 minimum

[11)] Multilayer wood deck Underlayment according to EN 636-2 Structural application

[12)] Multilayer wood deck according to EN 636-2 Structural application

Table 6: Pullover test of washer

Washer	Fastener[13] Guardian															R_k: 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 S 6.1	DBT 4.8(-A)	DBT-S-4.8(-A)	HD 6.1	LBS 6.0 / LBS S 6.0	LBS-8.0 / LBS S 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	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	-	-	-	-	-	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	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 50	-	X	X	X	X	X	X	X	-	-	X	X	-	X	X	1.58	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 ASTL-50	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.58	Approved
Sleeve ASTL 48 / ASTL 50	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.58	Approved
Sleeve ASTL 75	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.58	Approved
Sleeve R50-LN	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	1.58	Approved
Sleeve R48-LN	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	1.58	Approved
Sleeve R75-LN	-	-	-	-	-	-	-	-	-	-	-	-	X	-	-	1.58	Approved

[13] 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.