SINTEF Technical Approval

TG 2516

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Valid until 01.06.2031
Provided listed on
www.sintefcertification.no

SINTEF confirms that

Guardian Fastening System

has been found to be fit for use in Norway and to meet the provisions regarding product documentation given in the regulation relating to the marketing of products for construction works (DOK) and regulations on technical requirements for building works (TEK), with the properties, fields of application and conditions for use as stated in this document

1. Holder of the approval

SFS Group the Netherlands B.V.
Grasbeemd 14
5705 DG Helmond
The Netherlands
www.guardian.nl

2. Product description

Guardian Fastening System is a system for mechanically fastened waterproofing membranes and thermal insulation on external roof constructions.
Guardian Fastening System consists of plastic tube washers with or steel washers for fastening roof waterproofing membranes, and accompanying nails and screws for fastening the system to the structural roof deck.
The components of the system are illustrated in Fig. 1 - 36, and include the following:

- Tube washers made of polypropylene and polyamide fig. 1-9.
- Metal pressure washers (made of Sendzimir zinc coated steel), fig. 10-18.
- Fasteners for concrete fig. 19-22.
- Fasteners for aerated concrete, fig. 23-24.
- Fasteners for profiled steel decking substrate, fig. 25-32.
- Fasteners for aluminum profiles / sandwich panels, fig. 33-34.
- Fasteners for timber/wooden substrates, fig. 35-36.

3. Fields of application

Guardian Fastening System is used as mechanical fastening of thermal insulation for flat roofing, bitumen-based multilayer or single ply roof waterproofing systems on flat or pitched roof constructions with a structural roof deck made of profiled steel, concrete, aerated concrete or wood/timber materials.

4. Product performance

Anchorage capacity
Design anchorage capacities between plastic / steel washers and different roofing membranes are shown in table 1. Tables 2 – 4 show design pull-out capacity of fasteners from different substrates.

The defined system design load is determined according to TPF informs No. 5, SINTEF Building Research Guide 544.206 *Mekanisk innfesting av asfalttakbelegg og takfolie på skrå og flate tak* and in collaboration with the membrane manufacturer.

Corrosion protection
All steel components in the Guardian Fastening System have a corrosion protection corresponding to application category KLA as defined in SINTEF Byggforsk Design Guide No. 544.206, and which also corresponds to corrosion protection according to EAD 030351-00-0402 Section 2.2.3.4 Resistance to corrosion of metallic fasteners - 15 Kesternich cycles.

All screws in the Guardian Fastening System are made of stainless steel or carbon steel coated with Enduroguard 15 which has a zinc rich base and a multilayer topcoat. Metal pressure washers are coated with Sendzimir zinc, min. 350 g/m^2.

Safety against self-unwinding
All steel deck screws in Guardian Fastening System are tested and evaluated regarding safety against self-unwinding according to EAD 030351-00-0402 Section 2.2.3.2 Resistance to fastener unwinding. The screws are considered safe for use together with Guardian tube washers and Guardian metal pressure washers.

Application properties
Guardian Fastening System has been evaluated as being acceptable for use under the following conditions:

- Installation at temperatures down to –20°C.
- Oblique loading when fastened at the edge of membrane sheets or at flaps.
- Strength against loads caused by dynamic wind loads.
- Torch welding of bitumen roofing membranes.
- Ageing together with PVC roofing sheet and bituminous roof coverings.

5. Environmental aspects

Substances hazardous to health and environment

The product contains no hazardous substances with priority in quantities that pose any increased risk for human health and environment. Chemicals with priority include CMR, PBT or vPvB substances.

Waste treatment/recycling

The products shall be sorted as metal waste or residual waste. The products shall be delivered to an authorized waste treatment plant for material or energy recovery.

6. Conditions of use

Anchor load design capacities

The design anchorage capacity given in Table 1 is only valid for roofing membranes with the same composition and build-up as the roofing membrane tested in the wind load testing. Roofing membranes with SINTEF Technical Approval have the current design anchorage capacity for the relevant fastening specified in their approval.

The approval of the roofing membrane provides important conditions for using the design anchoring capacity. Among other things, the minimum fastening distance and which substrate and screws are used in the wind load test.

The number of fixing points and fastening pattern is calculated according to SINTEF Byggforsk Design Sheet No. 544.206 and "TPF informs No. 5", using the design capacities shown in Table 1 - 4.

The design anchorage capacities between Guardian plastic tube washers or metal pressure washers and the different waterproofing roof membrane systems in Table 1 are given for use in Norway and includes a safety factor (γ_m) of 1.5.

Fastening in concrete

The drill hole diameter shall be 5,0 mm when fixing concrete screw CS-6,1, TI-T25-6,3 and ACS-6,1.
When fastening BN-5,6 concrete nail the drill hole diameter shall be 5 mm.

The minimum setting/anchorage depths for the different concrete fasteners are given in table 2. The drill hole depth should be minimum setting/anchorage depth + 10 mm, unless special precautions are taken regarding inspection.
When fixings in concrete without penetration require precise length/depth control.

Fastening in aerated concrete

The minimum setting/anchorage depth for fasteners for aerated concrete are given in table 3.

Fastening in metal decks

Loadbearing profiled steel decks shall have a minimum thickness of 0.70 mm according to SINTEF Byggforsk Design Sheet No. 544.206. In particularly exposed areas the recommended minimum thickness is 0.80 mm for fixing roofing membranes to the steel deck.

Fastening with timber/wooden substrates

In case of mechanical fixing in timber or wooden substrates, the fastener should be installed minimum 10mm through the substrate.

Fastening with isoweld *induction system*

The *isoweld* induction system must be applied according to the manufacturer's user manual.

Re-roofing and unknown substrate

In cases of re-roofing, where it may be difficult to assess the quality of the substructure, SINTEF generally recommends performing pull-out tests on site.

Design anchorage capacity between plastic/steel washers and roofing membrane with regard to wind load

Design anchorage capacities with regard to wind load for plastic tube washers and steel washers for fastening roofing membranes is shown in table 1. The stated design capacities are a result of wind load testing according to EN-16002.
The design anchorage capacities to be used must not exceed the design pull-out capacities of the fastener in the roof structural deck shown in table 2-4

Design pull-out capacities from substructures

Design pull-out capacities (N/fastener) for fixings with Guardian Fastening System to timber/ wooden substructures, concrete- and aerated concrete substructures and profiled steel sheets is based on tests according to EAD 030351-00-0402 and defined according to TPF No 5 informs. See tables 2-4 for pull-out capacities

Tubes washer / sleeves



Fig. 1
R50 tube washer

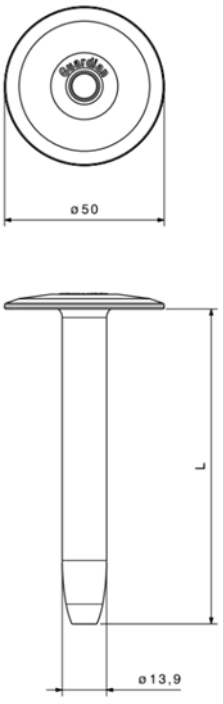


Fig. 2
R50-LN tube washer
Sleeve as R50, but adapted for use together with screw LBS-8,0



Fig. 3
ASTL50 tube washer
Sleeve as R50, but adapted for use together with screw ACS-6,1



Fig. 4
RB48 tube washer
with three barbs

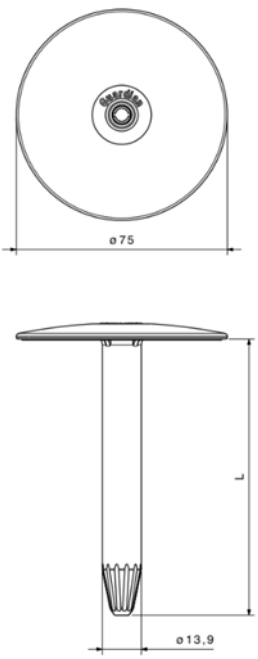


Fig. 5
R75 tube washer

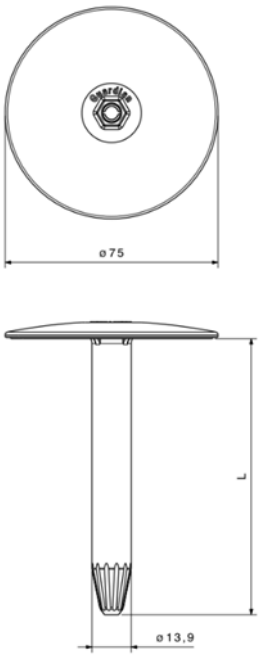


Fig. 6
ASTL75 tube washer
Sleeve as R75, but adapted for use together with screw ACS-6,1

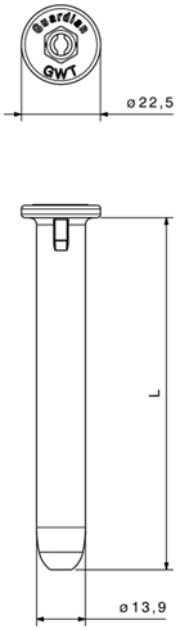


Fig. 7
GWT tube (polyamide)
For use with induction, STBT, ASTL and Fall Protection



Fig. 8
FI-R-20 tube (polyamide)
For use with induction and BSA

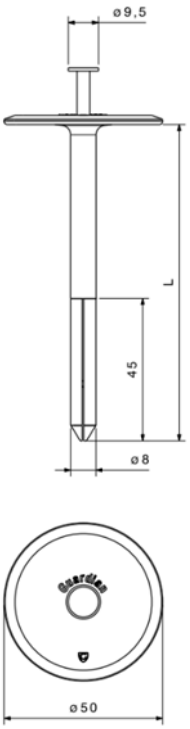


Fig. 9
CP50 concrete plug with energy bridge stop (also combinable with SP-70-CPE)

Metal pressure washers

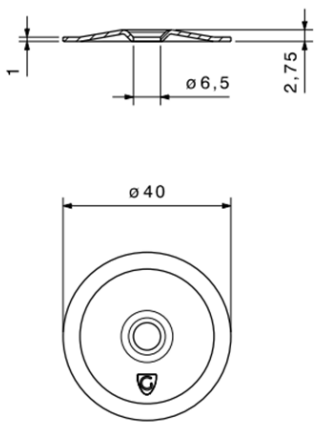


Fig. 10
SP-40-D, F, DD, FD

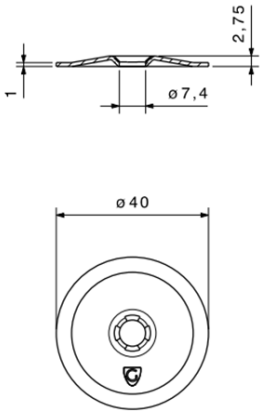


Fig. 11
SP-40-LBS

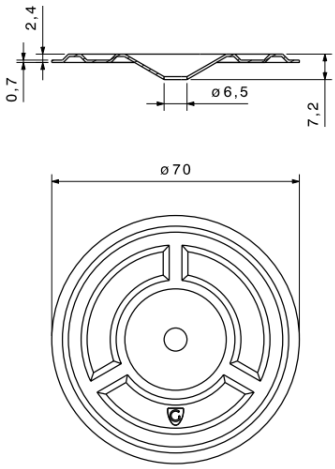


Fig. 12
SP-50-D, F, S

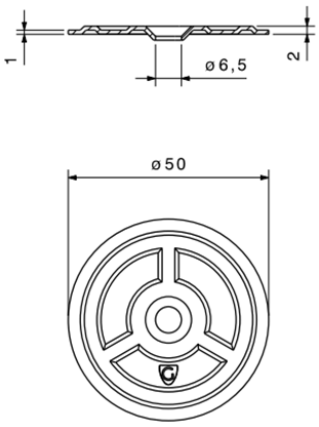


Fig. 13
SP-70-D, F, S, DX, SX

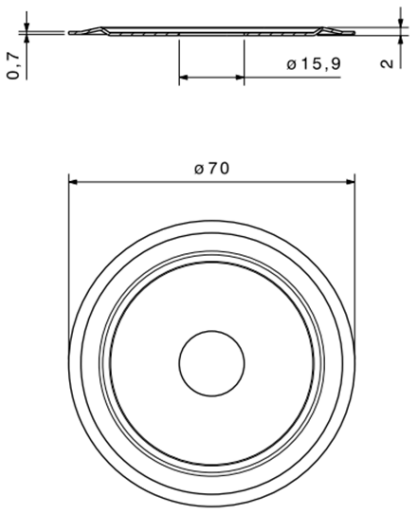


Fig. 14
SP-70-CPE

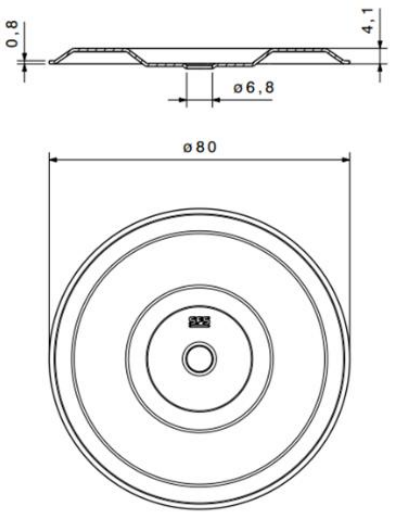


Fig. 15
FI-P-6,8
GWSP(P,T,E)-80-F2E

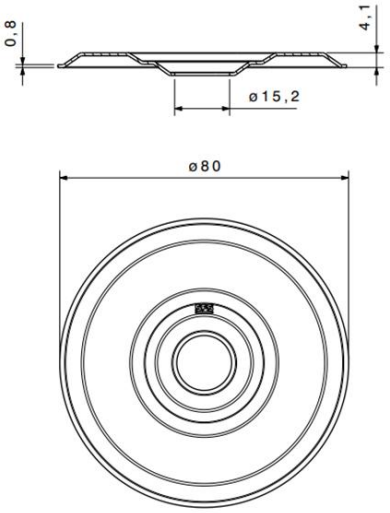


Fig. 16
FI-P-16,0
GWSP(P,T,E)-80-F4E (usable with GWT fig. 7)

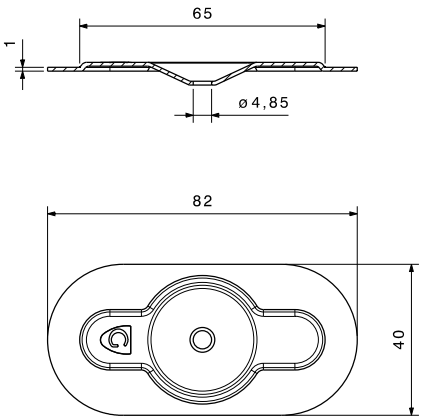


Fig. 17
SP-8240-D,F,S
SPA-8240-D, F

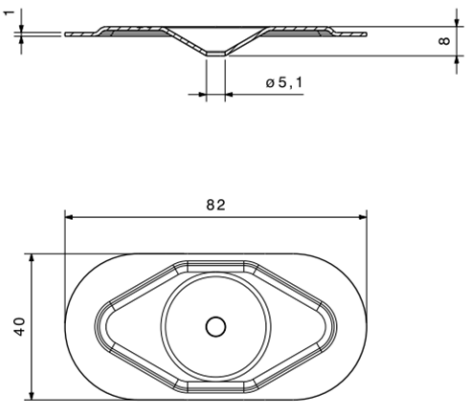


Fig. 18
SP-8240-D,F,S
SPA-8240-D, F

Fasteners for concrete

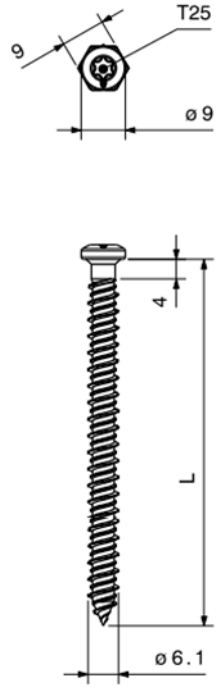


Fig. 19
CS-6,1 Concrete screw
(with flat or sharp point)

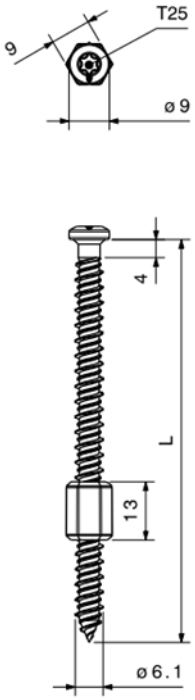


Fig. 20
ACS-6,1 Concrete screw
Adjustable fastener for use together with tube washer ASTL versions
Also available in stainless steel version: ACS-S-6,1

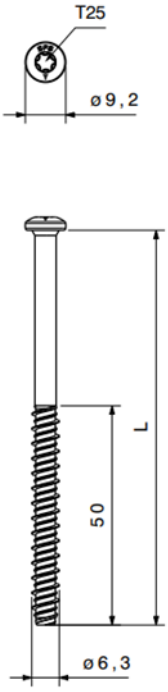


Fig. 21
TI-T25-6,3 Concrete screw
Also available in stainless steel version: TI-S-T25-6,3

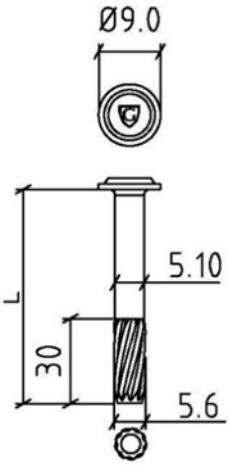


Fig. 22
BN 5,6 Concrete nail

Fasteners for lightweight concrete / aerated concrete

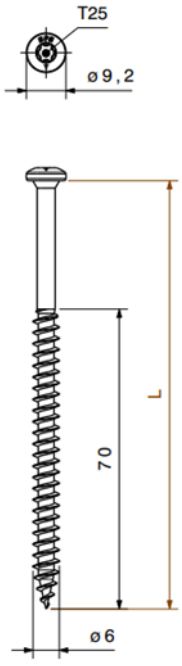


Fig. 23
LBS 6,0 Screw for fixing in aerated concrete and timber/wooden substrates

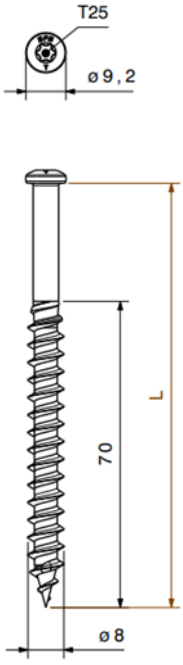


Fig. 24
LBS 8,0 Screw for fixing in aerated concrete and timber/wooden substrates
Also available in stainless steel version: LBS-S-8,0

Fasteners for profiled metal decking substrate

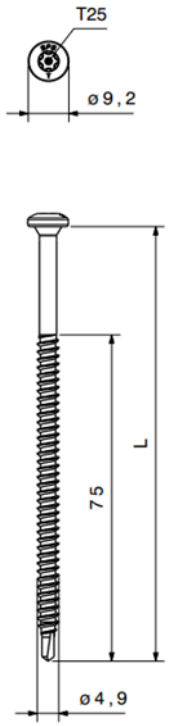


Fig. 25
BS-4,8 Screw for fixing in steel decks. Also available in stainless steel version: BS-S-4,8

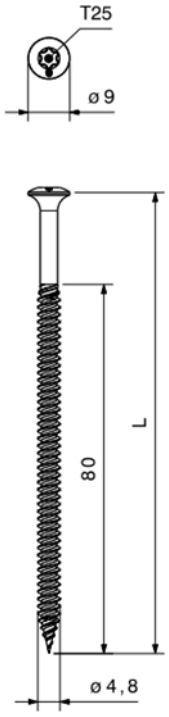


Fig. 26
PS-4,8 Screw for fixing in steel decks

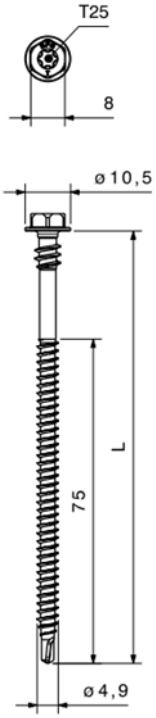


Fig. 27
DBT-4,8-A Screw for fixing in steel deck. Usable with automatic setting tool

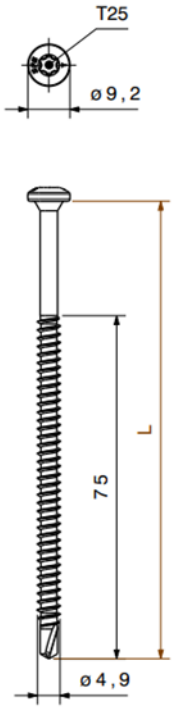


Fig. 28
BS3-4,8 Screw for fixing in thicker steel decks > 1,25 mm

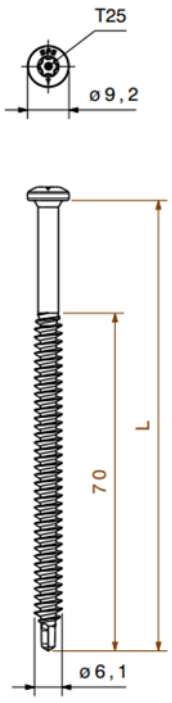


Fig. 29
BS-6,1 Screw for fixing in steel decks. Also available in stainless steel version: BS-S-6,1

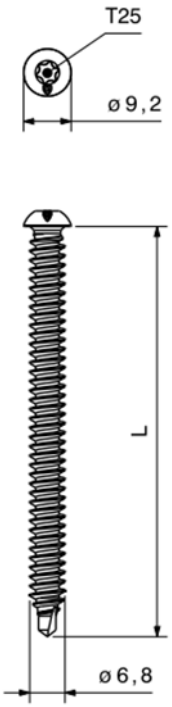


Fig. 30
BS-6,8 Screw for fixing in steel decks

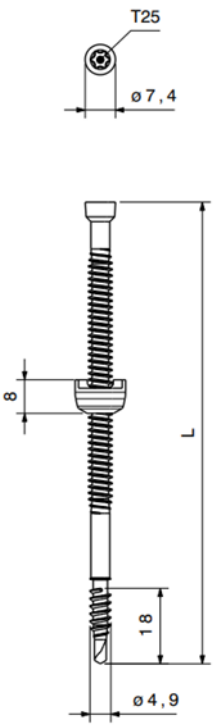


Fig. 31
BSA-N-4,8 Screw for fixing in steel decks.
Adjustable fastener for use together with tube washer BSA versions

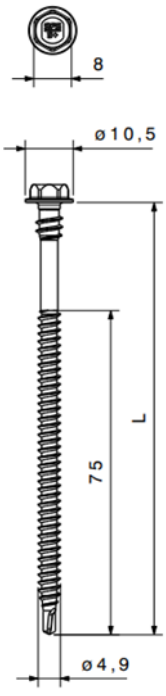


Fig. 32
IR2-S-4,8 Stainless steel screw for fixing in steel decks. Usable with automatic setting tool

Fasteners for aluminum profiles / sandwich panels / thin profiled steel decking substrate

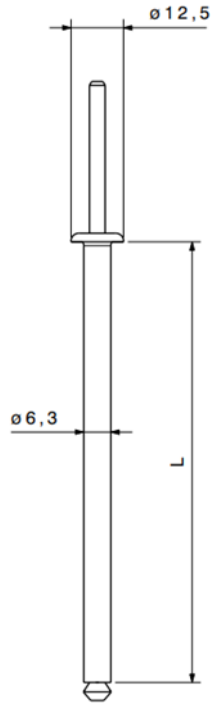


Fig. 33
TPR 6,3
Peel rivet for fixing in aluminum profiles / thin profiled steel decks

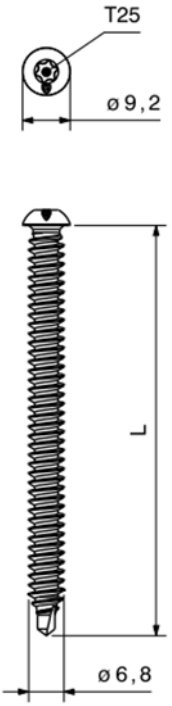
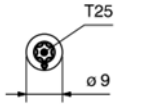


Fig. 34
BS 6,8
Screw for fixing in sandwich panels and thin profiled steel decks

Fasteners for timber/wooden substrates



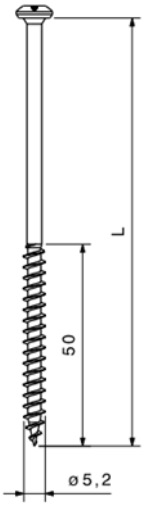
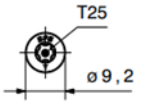


Fig. 35
TS 5,2 Screw for fixing in timber/wooden substrates



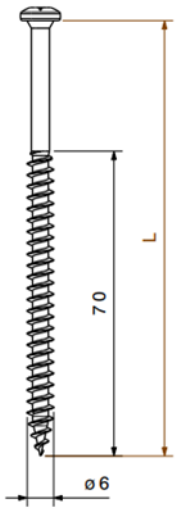


Fig. 36
LBS 6,0 Screw for fixing in aerated concrete and timber/wooden substrates

Table 1: Design anchorage capacity between plastic/steel washers and roofing membrane as result of wind load testing according to EN 16002

Roofing	*Design capacity N/fastener[1)2)]*	
	Fasteners of plastic	
	R50 / R50-LN / ASTL-50	*RB48 w/three studs*
Bitumen roof covering:		
Bauder Flex One 45	*780*	
Copernit Astroflex SBS 3000 + Astroflex 5000 Supra (2-layer)	*650*	
Copernit Astroflex SBS 5000 Supra (1-layer)	*650*	
Derbicoat Artic + toplayer (2-layer)	*650*	
Derbicolor Artic	*860*	
Derbigum SP FR (1-layer)	*780*	
Derbigum Totaltekking (2-layer)	*650*	
Derbigum NT (1-layer)	*780*	
General Membrane Mercury FC 5kg mineral Broof (1-layer)	*860*	
General Membrane Mercury P 4kg + General Membrane Mercury FC 5kg mineral Broof (2-layer)	*860*	
Isola Mestertekk	*780*	
Isola Dobbeltlag (2-layer)	*730*	
Isola Mestertekk Kombi (1-layer)	*730*	
Katepal Tupla (1-layer)	*780*	
Katepal Topp Tornado (1-layer)	*710*	
Katepal extra ATB (2-layer)	*600*	
Katepal Tupla FR (1-layer)	*780*	
Katepal Tupla Green	*730*	
Mataki DuoTech (2-layer)	*780*	
Mataki Ettlags Sveisebelegg	*730*	
Mataki Power FR	*730*	
Mataki UnoTech FR	*780*	
Mataki UnoTech Nordic	*780*	
Norbit Arctic (2-layer)	*730*	
Norbit Arctic Solo	*780*	
Residek N4 5500 WSL	*780*	
SikaShield (2-layer)	*520*	
SikaShield E65 (2-layer)	*780*	
SikaShield E65 MG 4mm	*860*	
Sopralene MF 5500	*780*	
Polymeric membranes fastened in overlap:		
Bauder Thermoplan T (1,5mm)	*780*	
Protan SE, T, SE-L og EX (1,2mm)	*690*	*910*
Renolit Alkorplan F	*730*	*780*
Sikaplan VG (1,2mm)	*690*	*910*
Roofing membrane system through flips:		
Protan BlueProof	*690*	*910*
Protan PreFab FLAK	*690*	

[1)] The given design capacities shall be used both when the test results are given according to NT Build 307, EAD 030351-00-0402 and EN 16002 when a safety factor γ_m= 1.5 is used.

[2)] Wind load capacity is determined using a partial factor of γ_m=1.5. During a transitional period until January 1, 2028, designers may choose to use wind load capacities recalculated with a partial factor of γ_m=1.3.

Table 1 (continued): Design anchorage capacity between plastic/steel washers and roofing membrane as result of wind load testing according to EN 16002

Roofing	*Design capacity N/fastener[1) 2)]*	
	Steel washers	
	Washers SP-40 / SP-40-LBS	*Washer SPA-82X40*
Bitumen roof covering:		
Bauder Flex One 45	780	
Isola Mestertekk Kombi (1-layer)	990	
Katepal extra ATB (2-layer)	600	
Katepal Topp Tornado (1-layer)	730	
Katepal Tupla (1-layer)	780	
Katepal Tupla FR (1-layer)	690	
Mataki UnoTech Nordic	950	
Norbit Arctic Solo	780	
SikaShield (2-layer)	430	
Sopralene MF 5500	730	
Polymeric membranes; fastened along membrane edge:		
Bauder Thermoplan T		950
Protan SE, T, SE-L og EX 1,2mm	860	950
Sikaplan VG (1,2mm)		860
Roofing membrane system through flips:		
Protan BlueProof	560	

[3)] The given design capacities shall be used both when the test results are given according to NT Build 307, EAD 030351-00-0402 and EN 16002 when a safety factor γ_m= 1.5 is used.

[4)] Wind load capacity is determined using a partial factor of γ_m=1.5. During a transitional period until January 1, 2028, designers may choose to use wind load capacities recalculated with a partial factor of γ_m=1.3.

Table 2: Design pull-out capacities in concrete & aerated concrete substructures

Fastener	Substructure	Design capacity N/fastener
ACS-6,1 (SD 20 mm)[1)]	Concrete C20/25	2400
BS-6,1 (SD 20 mm)[1)]	Concrete C20/25	1400
BN 5,6 (SD 20 mm)[1)]	Concrete B25	1050
CS-6,1 (SD 20 mm)[1)]	Concrete B25	1300
CP-nail (concrete plug)	Concrete B25	1000
LBS-6,0 (SD 60 mm)[1)]	Aerated concrete density 600 kg/m³	800
LBS-8,0 (SD 60 mm)[1)]	Aerated concrete density 450 kg/m³	900
	Aerated concrete density 550 kg/m³	1050
	Aerated concrete density 600 kg/m³	1700
LBS-S-8,0 (SD 60 mm)[1)]	Aerated concrete density 450 kg/m³	950
	Aerated concrete density 550 kg/m³	1100
	Aerated concrete density 600 kg/m³	1200

[1)] SD = minimum setting/anchor depth

Table 3: Design pull-out capacities in timber & wooden substructures

Fastener	Substructure	Design capacity N/fastener
BS-4,8	OSB3 18mm	800
	C24/Structural timber 22 mm	1300
	Plywood 18 mm	1100
BS-S-4,8	OSB3 18 mm	800
	C24/Structural timber 22 mm	1300
	Plywood 18 mm	1200
BS-6,1	OSB3 18 mm	800
	C24/Structural timber 22 mm	1450
	Plywood 18 mm	1400
BS-S-6,1	OSB3 18 mm	850
	C24/Structural timber 22 mm	1350
	Plywood 18 mm	1400
DBT-4,8-A	OSB3 18 mm	850
	C24/Structural timber 22 mm	1250
	Plywood 18 mm	1150
PS-4,8	OSB3 18 mm	900
	C24/Structural timber 22 mm	1150
	Plywood 18 mm	1200
TS-5,2	OSB3 18 mm	1000
	Plywood 18 mm	1200

Table 4: Design pull-out capacitiesin steel decks

Fastener	Substructure	Design capacity N/fastener
BS-4,8	Steel sheet 0.70 mm	850
	Steel sheet 0.75 mm	900
	Steel sheet 0.80 mm	1000
	Steel sheet 0.88 mm	1100
	Steel sheet 1.00 mm	1300
BS3-4,8	Steel sheet 1.00 mm	1200
	Steel sheet 1.25 mm	1500
BS-S-4,8	Steel sheet 0.70 mm	850
	Steel sheet 0.75 mm	900
	Steel sheet 0.80 mm	950
	Steel sheet 0.88 mm	1100
	Steel sheet 1.00 mm	1250
BS-6,1	Steel sheet 0,70 mm	1200
	Steel sheet 0,75 mm	1350
	Steel sheet 0,80 mm	1450
	Steel sheet 0,88 mm	1650
	Steel sheet 1,00 mm	1950
	Steel sheet 1,25 mm	2600
BS-S-6,1	Steel sheet 0,70 mm	900
	Steel sheet 0,75 mm	1000
	Steel sheet 0,80 mm	1100
	Steel sheet 0,88 mm	1250
BS-6,8	Steel sheet 0.70 mm	1250
	Steel sheet 0.75 mm	1400
IR2-4,8	Steel sheet 0.70 mm	850
	Steel sheet 0.75 mm	900
	Steel sheet 0.80 mm	1000
	Steel sheet 0.88 mm	1100
	Steel sheet 1.00 mm	1300
PS 4,8	Steel sheet 0.70 mm	950
	Steel sheet 0.75 mm	1000
	Steel sheet 0.80 mm	1100
	Steel sheet 0.88 mm	1250
	Steel sheet 1.00 mm	1450

7. Product and factory production control

The tube washers and steel washers are produced by SFS Group the Netherlands B.V., Grasbeemd 14, 5705 DG Helmond, the Netherlands. The fasteners are produced by factories given in the approvals control description.

The holder of the approval is responsible for maintaining the factory production control to ensure that Guardian Fastening System is manufactured in compliance with the preconditions upon which this approval is based.

The manufacturing of the products and the manufacturer's system for factory production control (FPC) is subject to continuous surveillance in accordance with the contract regarding SINTEF Technical Approval.

The manufacturer has a quality management system which is certified according to EN ISO 9001 and environmental management system certified according to EN ISO 14001.

8. Basis for the approval

The product's characteristics are documented in reports issued by independent bodies. The technical documentation serves as the basis for SINTEF's product assessment with respect to EAD 030351-00-0402 and recommendations as outlined in SINTEF Building Research Design Guides.

9. Marking

All fasteners, steel washers and tube washers are marked with the SFS mark, Guardian mark or product name. The marking of tube and metal washers may be combined with the SFS name and another brand name for products produced under private label. All packaging is to be marked with product type and time of production.

Guardian Fastening system is CE-marked in accordance with ETA 23/0859 and/or ETA 08/0285.

The approval mark for SINTEF Technical Approval TG 2137 may also be used.

10. Liability

The holder/manufacturer has sole product liability according to **current** law. Claims can only be made against SINTEF under general law or other special grounds.

for SINTEF



Ola Asphaug
Approval Manager