SINTEF Technical Approval

TG 2137

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Amended:
Valid until 01.06.2031
Provided listed on
www.sintefcertification.no

SINTEF confirms that

SFS 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 Norway AS
Fjellboveien 3,
NO-2016 Frogner
Norway
https://no.sfs.com/

2. Product description

SFS Fastening System is a system for mechanically fastened waterproofing membranes and thermal insulation on external roof constructions.
SFS Fastening System consists of plastic tube washers 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. 1-40, and include the following:

- Tube washers made of polypropylene and polyamide fig. 1-8.
- Metal pressure washers (made of Sendzimir zinc coated steel), fig. 9-20.
- Fasteners for concrete fig. 21-25.
- Fasteners for aerated concrete, fig. 26-27.
- Fasteners for profiled steel decking substrate, fig. 28-36.
- Fasteners for aluminum profiles / sandwich panels, fig. 37-38.
- Fasteners for timber/wooden substrates, fig. 39-40.

3. Fields of application

SFS 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 systems design anchorage capacity 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 SFS Fastening System have a corrosion protection corresponding to application category KLA as defined in SINTEF Byggforsk Design Guide No., 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 SFS 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. 275 g/m^2.

Safety against self-unwinding
All steel deck screws in SFS 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 SFS tube washers and SFS metal pressure washers.

Application properties
SFS 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 SFS 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 1.3.

Fastening in concrete

The drill hole diameter shall be 5,0 mm when fixing concrete screws ACS-6.1, BS-6,1, TI-T25-6.3 and TIA-T25-6.3.
For DT 4.8, the drill hole diameter shall be 4.8 mm, and 6,3 mm for DT-6,3.

The minimum setting/anchorage depths (SD) for the different concrete fasteners are given in table 3. The drill hole depth should be minimum setting/anchorage depth + 10 mm, unless special precautions are taken regarding inspection.
When fixing in concrete without penetration require precise length/depth control.

Fastening in aerated concrete

The minimum setting/anchorage depths (SD) 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 SFS 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

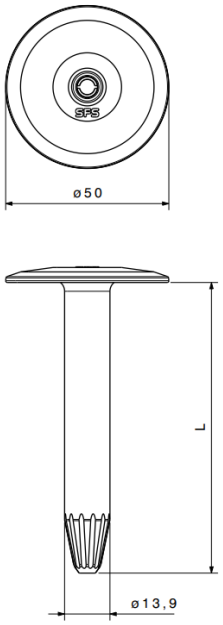


Fig. 1
RP50n tube washer

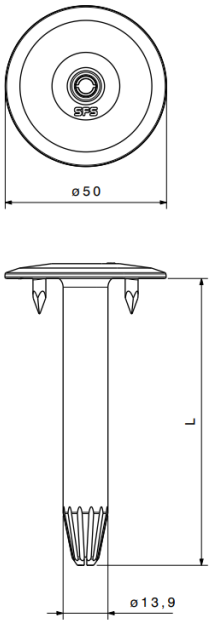


Fig. 2
RP48n tube washer with three barbs

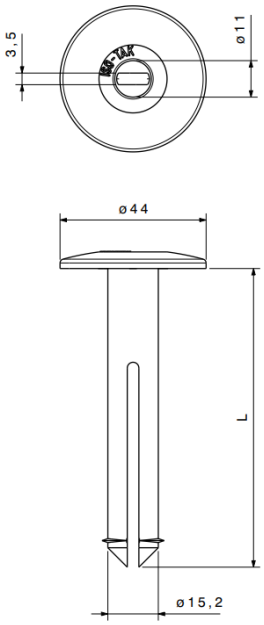


Fig. 3
LB-45 Fastening plug

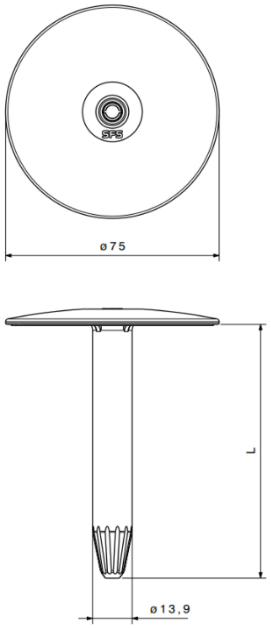


Fig. 4
RP75n tube washer

Fig. 5
ASTL50 tube washer
Sleeve as RP50n, adapted for use with concrete screw ACS-6.1

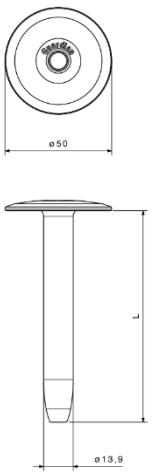


Fig. 6
R50-LN tube washer
Sleeve as RP50n, adapted for use with screw LBS-8.0

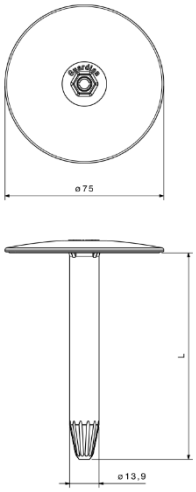


Fig. 7
ASTL75 tube washer
Sleeve as RP75n, adapted for use with screw ACS-6.1

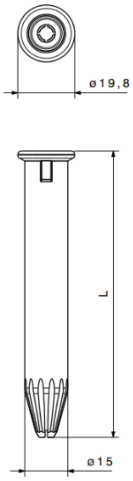


Fig. 8
FI-R-20 tube (polyamide)
For use with induction and BSA

Metal pressure washers

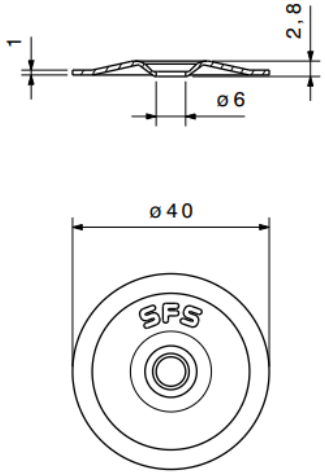


Fig. 9
MW-40-F
Metal washer

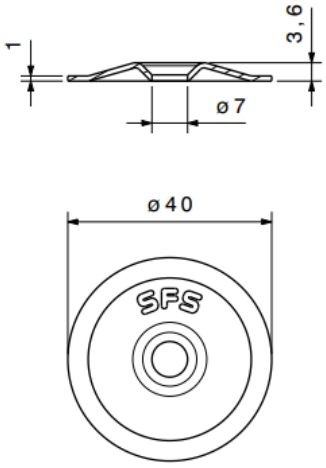


Fig. 10
MW-40-LBS
Metal washer like MW-40-F, but adapted for use together with LBS-8.0

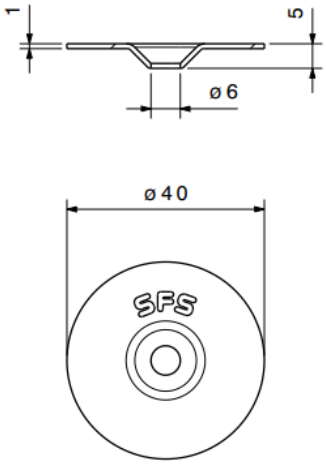
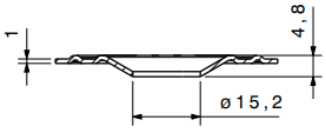


Fig. 11
MW-40-R
Metal washer



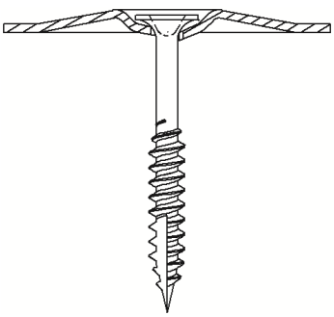


Fig. 12
MW-40-FH
Metal washer pre-assembled with SFS IWF-5.2

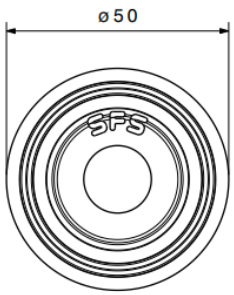


Fig. 13
BSA-P-50
Metal washer

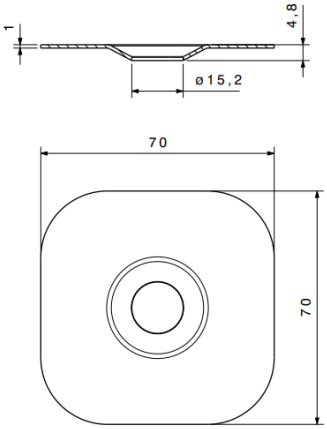


Fig. 14
BSA-P-70
Metal washer

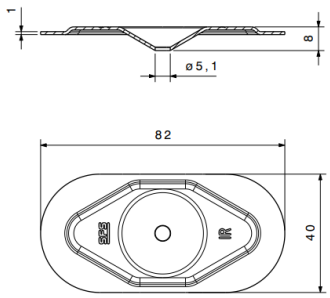


Fig. 15
IR-82X40
Metal washer

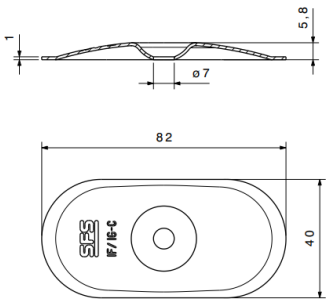


Fig. 16
IF/IG-C-82X40
Metal washer

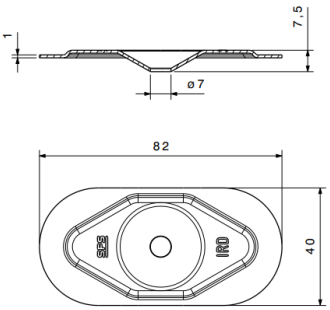


Fig. 17
IRD-82X40
Metal washer

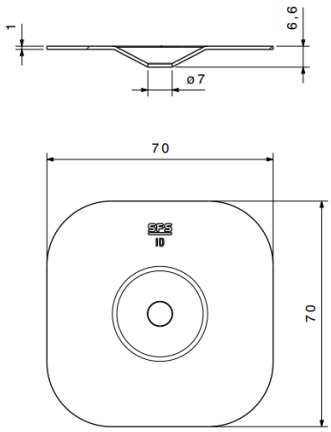


Fig. 18
ID-70X70
Metal washer

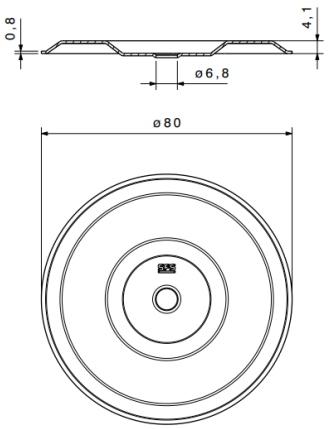


Fig. 19
FI-P-6.8
Metal washer for induction system

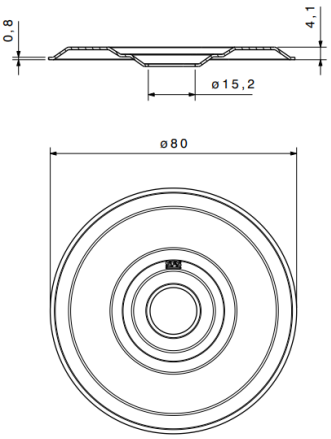


Fig. 20
FI-P-16.0
Metal washer for induction system
(compatible with FI-R-20 fig. 8)

Fasteners for concrete

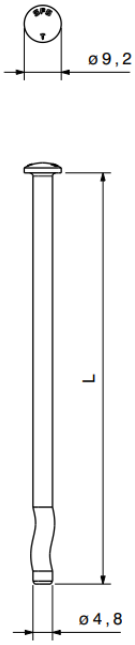


Fig. 21
DT-4,8
Impact anchor
Also available in stainless steel version: DT-S-4,8

Fig. 22
DT-6,3
Impact anchor

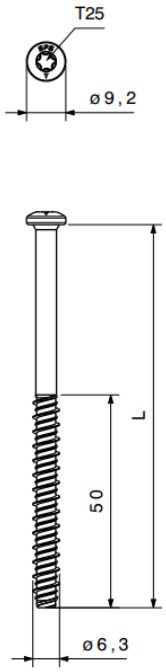


Fig. 23
TI-T25-6,3
Screw for concrete
Also available in stainless steel
version: TI-S-T25-6,3

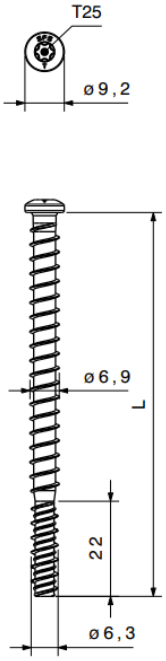


Fig. 24
TIA-T25-6,3
Screw for concrete

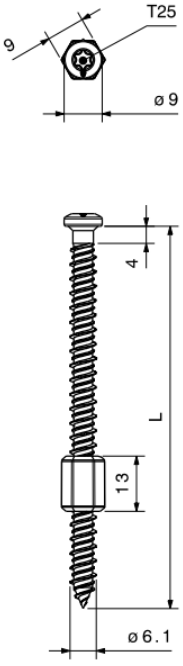


Fig. 25
ACS-6,1
Screw for concrete.
Used together with ASTL sleeve for slopes

Fasteners for lightweight concrete / aerated concrete

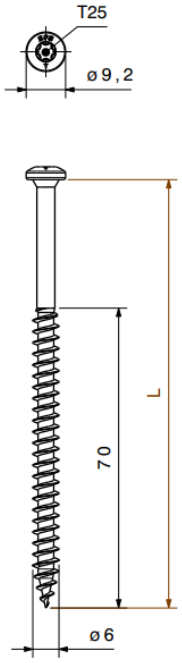


Fig. 26
TS-6,0
Screw for fixing in aerated concrete and timber/wooden substrates

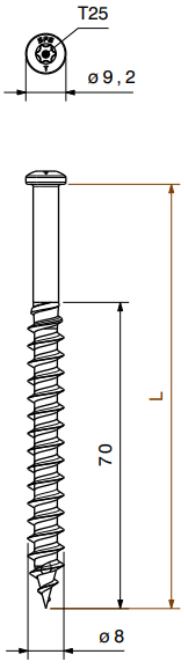


Fig. 27
LBS 8,0
Screw for fixing in aerated concrete and timber/wooden substrates
Also available in stainless steel version: LBS-S-8,0

Fasteners for profiled metal decking substrate

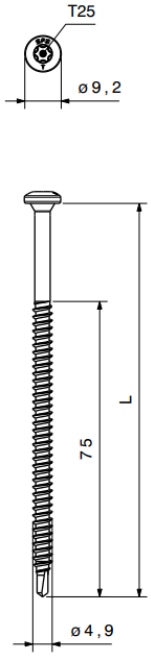


Fig. 28
BS-4,8
Screw for fixing in steel decks.
Also available in stainless steel version: BS-S-4,8

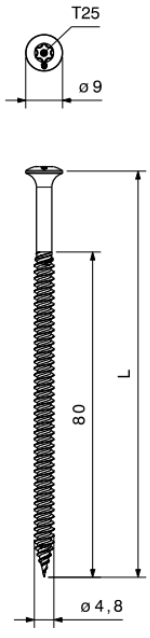


Fig. 29
PS-4,8
Screw for fixing in steel decks

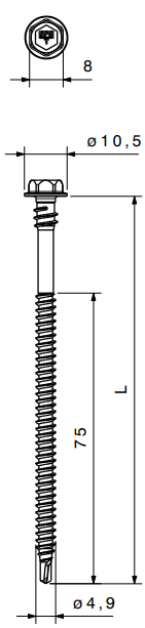


Fig. 30
IR2-4,8
Screw for fixing in steel deck.
Usable with automatic setting tool

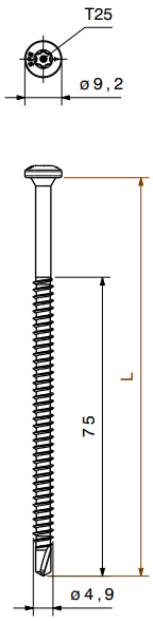


Fig. 31
BS3-4,8
Screw for fixing in thicker steel decks > 1,25 mm

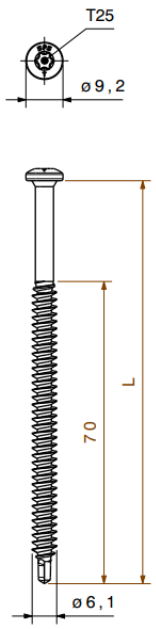


Fig. 32
BS-6,1
Screw for fixing in steel decks.
Also available in stainless steel version: BS-S-6,1

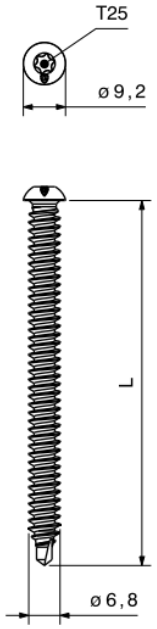


Fig. 33
BS-6,8
Screw for fixing in steel decks

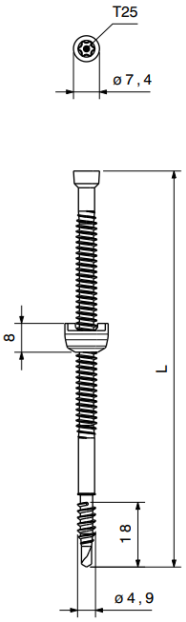


Fig. 34
BSA-N-4,8
Screw for fixing in steel decks.
Adjustable fastener for use together with tube washer BSA versions

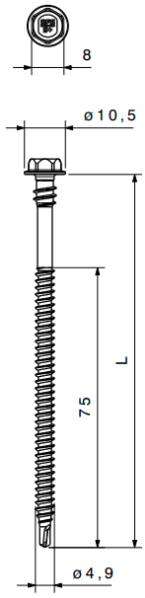


Fig. 35
IR2-S-4,8
Stainless steel screw for fixing in steel decks.
Usable with automatic setting tool.

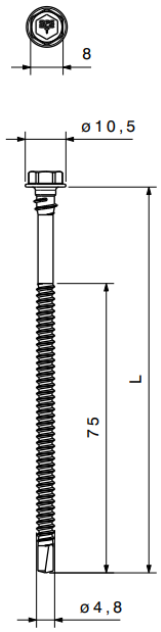


Fig. 36
IR3-4,8
Screw for fixing in thicker steel decks > 1,25 mm
Usable with automatic setting tool

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

Fasteners for timber/wooden substrates

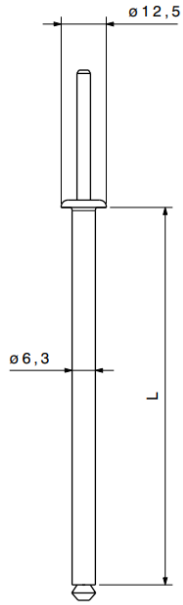


Fig. 37
TPR-6,3
TPR 6,3 Peel rivet for fixing in aluminum profiles / thin profiled steel decks

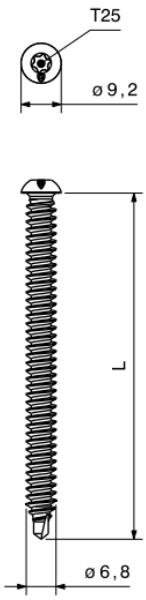


Fig. 38
BS 6,8
Screw for fixing in sandwich panels and thin profiled steel decks

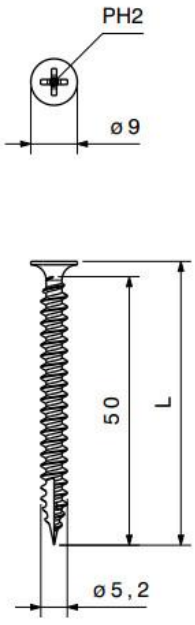


Fig. 39
IWF-5,2
Screw for fixing in timber/wooden substrates

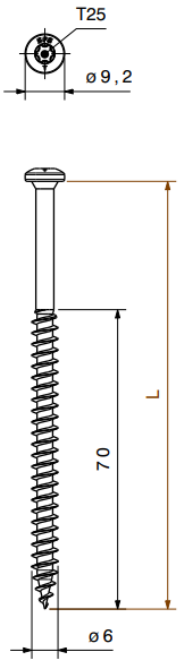


Fig. 40
TS-6,0
Screw for fixing in aerated concrete and timber/wooden substrates

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)]	
	Fasteners of plastic	
	RP50n / R50-LN / ASTL-50	*RP48n w/three studs*
Bitumen roof covering:		
Bauder Flex One 45	*900*	
Copernit Astroflex SBS 3000 + Astroflex 5000 Supra (2-layer)	*750*	
Copernit Astroflex SBS 5000 Supra (1-layer)	*750*	
Derbicoat Artic + toplayer (2-layer)	*750*	
Derbicolor Artic	*1000*	
Derbigum SP FR (1-layer)	*900*	
Derbigum Totaltekking (2-layer)	*750*	
Derbigum NT (1-layer)	*900*	
General Membrane Mercury FC 5kg mineral Broof (1-layer)	*1000*	
General Membrane Mercury P 4kg + General Membrane Mercury FC 5kg mineral Broof (2-layer)	*1000*	
Isola Mestertekk	*900*	
Isola Dobbeltlag (2-layer)	*850*	
Isola Mestertekk Kombi (1-layer)	*850*	
Katepal Tupla (1-layer)	*900*	
Katepal Topp Tornado (1-layer)	*850*	
Katepal extra ATB (2-layer)	*700*	
Katepal Tupla FR (1-layer)	*900*	
Katepal Tupla Green	*850*	
Mataki DuoTech (2-layer)	*900*	
Mataki Ettlags Sveisebelegg	*850*	
Mataki Power FR	*850*	
Mataki UnoTech FR	*900*	
Mataki UnoTech Nordic	*900*	
Norbit Arctic (2-layer)	*850*	
Norbit Arctic Solo	*900*	
Residek N4 5500 WSL	*900*	
SikaShield (2-layer)	*600*	
SikaShield E65 (2-layer)	*900*	
SikaShield E65 MG 4mm	*1000*	
Sopralene MF 5500	*900*	
Polymeric membranes fastened in overlap:		
Bauder Thermoplan T (1,5mm)	*900*	
Protan SE, T, SE-L og EX (1,2mm)	*800*	*1050*
Renolit Alkorplan F	*850*	*900*
Sikaplan VG (1,2mm)	*800*	*1050*
Roofing membrane system through flips:		
Protan BlueProof	*800*	*1050*
Protan PreFab FLAK	*800*	

[1)] *Design capacities are given for use in Norway and include a safety factor (γ_m) of 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)]*	
	Steel washers	
	Washers MW-40 / MW-40-LBS	*Washer IR-82X40*
Bitumen roof covering:		
Bauder Flex One 45	*900*	
Isola Mestertekk Kombi (1-layer)	*1150*	
Katepal extra ATB (2-layer)	*700*	
Katepal Topp Tornado (1-layer)	*850*	
Katepal Tupla (1-layer)	*900*	
Katepal Tupla FR (1-layer)	*800*	
Mataki UnoTech Nordic	*1100*	
Norbit Arctic Solo	*900*	
SikaShield (2-layer)	*500*	
Sopralene MF 5500	*850*	
Polymeric membranes: ***Fastened along membrane edge:***		
Bauder Thermoplan T		*1100*
Protan SE, T, SE-L og EX 1,2mm	*1000*	*1100*
Sikaplan VG (1,2mm)		*1000*
Roofing membrane system through flips:		
Protan BlueProof	*650*	

[1)] *Design capacities are given for use in Norway and include a safety factor (γ_m) of 1,3.*

Table 2: 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
IR2-4,8	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

Table 3: Design pull-out capacities in concrete & aerated concrete substructures

Fastener	Substructure	Design capacity N/fastener
ACS-6,1 (SD 25 mm)[1)]	Concrete C20/25	2400
BS-6,1 (SD 32 mm)[1)]	Concrete C20/25	1400
DT-4,8 (SD 25 mm)[1)]	Concrete C25/30	3350
DT-6,3 (SD 32 mm)[1)]	Concrete C25/30	4050
TI-T25-6,3 (SD 20mm)[1)]	Concrete B25	2500
TI-T25-6,3 (SD 15mm)[1)]	Concrete B25	1200
TIA-6,3 (SD 20mm)[1)]	Concrete B25	2500
TIA-6,3 (SD 15mm)[1)]	Concrete B25	1200
LBS-6.0, TS-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/anchorage depth

Table 4: Design pull-out capacities in 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 NetherlandsB.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 SFS 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 by SQS 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 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.

SFS 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