



S&G Fastech®
WEDGE LOCKING SYSTEMS



EFFECTIVE SECURING ELEMENTS

THE TASK: TO SECURE!

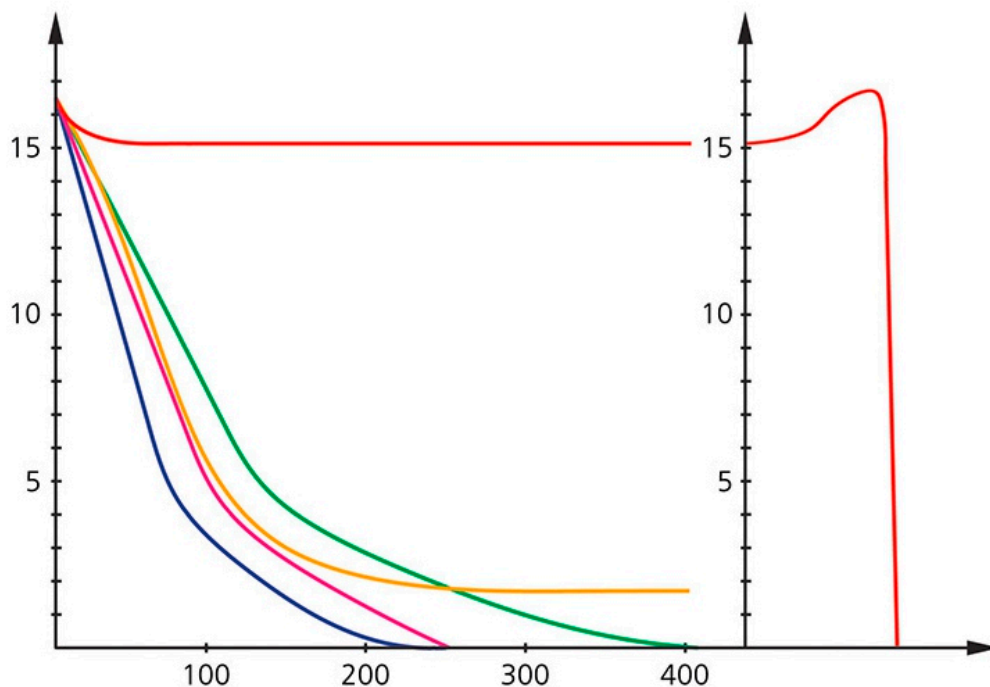
Bolted connections tend to work themselves loose under certain operating conditions. Vibrations cause particular problems as they can overpower the “self-locking effect” of bolted connections. This can lead to functional failure or even to the connection coming apart. As it's not always possible to know what forces are acting on the structure, and as constructional measures cannot be implemented everywhere, securing elements are often used.

However, certain securing elements no longer comply with state-of-the-art technology and are ineffective in modern,

weight and cost-optimised structures using high-tensile bolts and nuts. The corresponding standards have been withdrawn by the German Institute for Standardisation (DIN). A few others have been downgraded to the rank of bolt retainers as they do not prevent self-loosening but do stop the connection from falling apart.

Effective securing elements maintain a high pre-load force, reliably supporting the function even under extreme operating conditions.

One of the few effective securing technologies available is the S&G Fastech Wedge Locking Systems, the effectiveness of which has been demonstrated by the latest experimental standards (including DIN 65151, DIN 25201-4, NASM 1312-7).



Junker vibration test as per DIN 65 151 (M 8 screw (8.8) with 25 mm clamping length)

Red = standard M 8 nut with S&G Fastech Wedgelock Washer at 70% of yield point

Green = standard M 8 nut on threaded fastener, clamping length 50 mm

Yellow = nut with plastic insert (DIN 985)

Pink = spring washer

Blue = standard M 8 nut

S&G Fastech[®] WEDGE LOCKING SYSTEM

THE S&G Fastech[®] WEDGE LOCKING SYSTEM

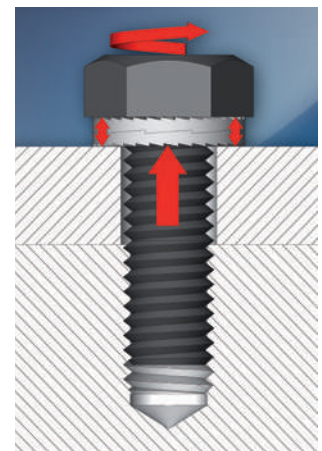
Even under extremes of vibration or dynamic loads, the S&G Fastech[®] Wedge Locking System provides maximum reliability. When the bolt is tightened, the external radial teeth of the S&G Fastech[®] Wedge Locking System embed themselves in an interlocking fashion with the respective mating surface.

If the securing system is subject to dynamic stress, movement is only possible between the internal washer surfaces. This results in an increase in the clamping force.

FUNCTIONAL PRINCIPLE

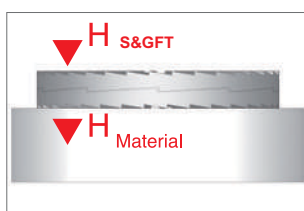
An important feature of S&G Fastech[®] Wedge Locking System, setting it apart from other systems that are available, is the securing of the bolt fastening using preload force rather than friction

- Wedge-shaped cams on the inside of the lock washers, radial teeth on the outside
- Interlocking embedding of the radial teeth with the respective mating surface (when tightening the bolted joint)
- System movement only possible between the inner wedge shaped cams. Movement across these wedge shaped surfaces effectively self locks the bolt.
- Increase in clamping force



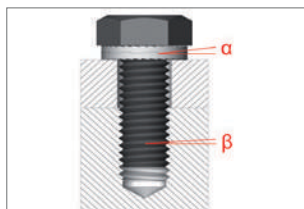


TECHNICAL DATA



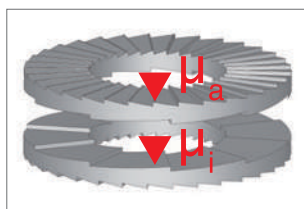
1. Difference in hardness: $H_{S\&GFT} > H_{Material}$

- The surface hardness of S&G Fastech® Wedge Lock Washers is greater than that of structural grade and high tensile bolts (e.g. strength classes: 8.8, 10.9, 12.9)
Steel (through-hardened, zinc flake coated) 485 ±25 HV0.3
Stainless steel (surface-hardened) > 520 HV0.05



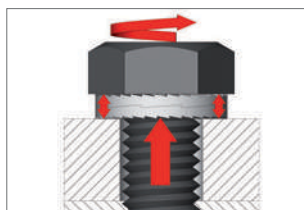
2. Difference in angles: $\alpha > \beta$

- The wedge angle (α) between the S&G Fastech® Wedge Lock Washers is greater than the pitch (β) of the bolt thread
- This angle means the expansion in thickness of the S&G Fastech® Wedge Lock Washers is greater than the possible longitudinal movement of the bolt along the thread



3. Difference in friction: $\mu_a > \mu_i$

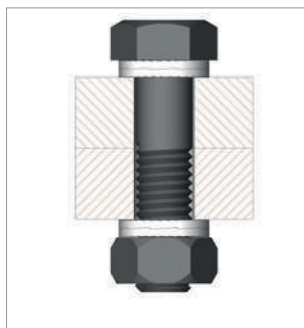
- The wedge-shaped surfaces have a considerably lower friction coefficient μ_i than the toothed outside of the washers (friction coefficient μ_a)
- Loosening caused by dynamic stresses causes movement between the two washers in the region of the wedged surfaces



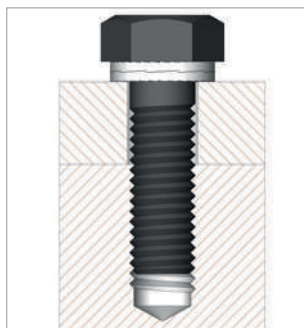
4. Difference in preload: $F_{dyn} > F_{stat}$

- An expansion in thickness of the S&G Fastech® Wedge Lock Washers as a result of loosening leads to an increase in the clamping force
- This causes an increase in the preload compared to when in a static state and thus causes the bolt to self-lock

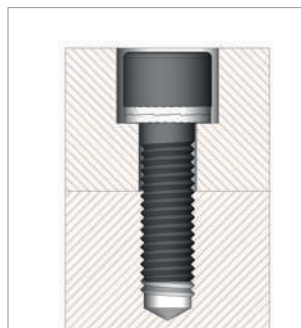
INSTALLATION EXAMPLES



Hexagon bolt in a through-hole, secured on both sides



Hexagon bolt secured in a blind hole



Countersunk socket head bolt secured in position



No locking function when combined with flat and freely rotating washers



PRODUCT OVERVIEW

| M | UNC | STEEL* ITEM NO. | STAINLESS STEEL* ITEM NO. | INTERNAL-Ø [MM] | EXTERNAL-Ø [MM] | BOX QTY [PAIR] |
|-----|--------|--------------------|------------------------------|--------------------|--------------------|-------------------|
| 3 | #5 | SGF-3 | SGF-3S | 3,4 | 7,0 | 200 |
| 3,5 | #6 | SGF-3,5 | SGF-3,5S | 3,9 | 7,6 | 200 |
| 3,5 | #6 | SGFP-3,5 | SGFP-3,5S | 3,9 | 9,0 | 200 |
| 4 | #8 | SGF-4 | SGF-4S | 4,4 | 7,6 | 200 |
| 4 | #8 | SGFP-4 | SGFP-4S | 4,4 | 9,0 | 200 |
| 5 | #10 | SGF-5 | SGF-5S | 5,4 | 9,0 | 200 |
| 5 | #10 | SGFP-5 | SGFP-5S | 5,4 | 10,8 | 200 |
| 6 | | SGF-6 | SGF-6S | 6,5 | 10,8 | 200 |
| 6 | | SGFP-6 | SGFP-6S | 6,5 | 13,5 | 200 |
| | 1/4" | SGF-1/4" | SGF-1/4"S | 7,2 | 11,5 | 200 |
| | 1/4" | SGFP-1/4" | SGFP-1/4"S | 7,2 | 13,5 | 200 |
| 8 | 5/16" | SGF-8 | SGF-8S | 8,6 | 13,5 | 200 |
| 8 | 5/16" | SGFP-8 | SGFP-8S | 8,6 | 16,6 | 200 |
| | 3/8" | SGF-3/8" | SGF-3/8"S | 10,3 | 16,0 | 200 |
| | 3/8" | SGFP-3/8" | SGFP-3/8"S | 10,3 | 21,0 | 200 |
| 10 | | SGF-10 | SGF-10S | 10,7 | 16,6 | 200 |
| 10 | | SGFP-10 | SGFP-10S | 10,7 | 21,0 | 200 |
| 11 | 7/16" | SGF-11 | SGF-11S | 11,4 | 18,5 | 200 |
| 12 | | SGF-12 | SGF-12S | 13,0 | 19,5 | 200 |
| 12 | | SGFP-12 | SGFP-12S | 13,0 | 25,4 | 100 |
| | 1/2" | SGF-1/2" | SGF-1/2"S | 13,5 | 19,5 | 200 |
| | 1/2" | SGFP-1/2" | SGFP-1/2"S | 13,5 | 25,4 | 100 |
| 14 | 9/16" | SGF-14 | SGF-14S | 15,2 | 23,0 | 100 |
| 14 | 9/16" | SGFP-14 | SGFP-14S | 15,2 | 30,7 | 100 |
| 16 | 5/8" | SGF-16 | SGF-16S | 17,0 | 25,4 | 100 |
| 16 | 5/8" | SGFP-16 | SGFP-16S | 17,0 | 30,7 | 100 |
| 18 | | SGF-18 | SGF-18S | 19,5 | 29,0 | 100 |
| 18 | | SGFP-18 | SGFP-18S | 19,5 | 34,5 | 100 |
| | 3/4" | SGF-3/4" | SGF-3/4"S | 20,0 | 30,7 | 100 |
| | 3/4" | SGFP-3/4" | SGFP-3/4"S | 20,0 | 39,0 | 100 |
| 20 | | SGF-20 | SGF-20S | 21,4 | 30,7 | 100 |
| 20 | | SGFP-20 | SGFP-20S | 21,4 | 39,0 | 100 |
| 22 | 7/8" | SGF-22 | SGF-22S | 23,4 | 34,5 | 100 |
| 22 | 7/8" | SGFP-22 | SGFP-22S | 23,4 | 42,0 | 50 |
| 24 | | SGF-24 | SGF-24S | 25,3 | 39,0 | 100 |
| 24 | | SGFP-24 | SGFP-24S | 25,3 | 48,5 | 50 |
| | 1" | SGF-1" | SGF-1"S | 27,9 | 39,0 | 100 |
| | 1" | SGFP-1" | SGFP-1"S | 27,9 | 48,5 | 50 |
| 27 | | SGF-27 | SGF-27S | 28,4 | 42,0 | 50 |
| 27 | | SGFP-27 | SGFP-27S | 28,4 | 48,5 | 25 |
| 30 | 1 1/8" | SGF-30 | SGF-30S | 31,4 | 47,0 | 50 |
| 30 | 1 1/8" | SGFP-30 | SGFP-30S | 31,4 | 58,5 | 25 |
| 33 | 1 1/4" | SGF-33 | SGF-33S | 34,4 | 48,5 | 25 |
| 33 | 1 1/4" | SGFP-33 | SGFP-33S | 34,4 | 58,5 | 25 |
| 36 | 1 3/8" | SGF-36 | SGF-36S | 37,4 | 55,0 | 25 |
| 36 | 1 3/8" | SGFP-36 | SGFP-36S | 37,4 | 63,0 | 25 |
| 39 | 1 1/2" | SGF-39 | SGF-39S | 40,4 | 58,5 | 25 |
| 42 | | SGF-42 | SGF-42S | 43,2 | 63,0 | 25 |
| 42 | | SGFP-42 | SGFP-42S | 43,2 | 70,0 | 25 |
| 45 | 1 3/4" | SGF-45 | SGF-45S | 46,2 | 70,0 | 25 |
| 48 | | SGF-48 | SGF-48S | 49,6 | 75,0 | 25 |
| 52 | 2" | SGF-52 | SGF-52S | 53,6 | 80,0 | 1 |
| 56 | 2 1/4" | SGF-56 | SGF-56S | 59,1 | 85,0 | 1 |
| 60 | | SGF-60 | SGF-60S | 63,1 | 90,0 | 1 |
| 64 | 2 1/2" | SGF-64 | SGF-64S | 67,1 | 95,0 | 1 |
| 68 | | SGF-68 | SGF-68S | 71,1 | 100,0 | 1 |
| 72 | | SGF-72 | SGF-72S | 75,1 | 105,0 | 1 |
| 76 | 3" | SGF-76 | SGF-76S | 79,1 | 110,0 | 1 |

* Carbon Steel, Stainless Steel A4

Non-standard sizes and special materials upon request

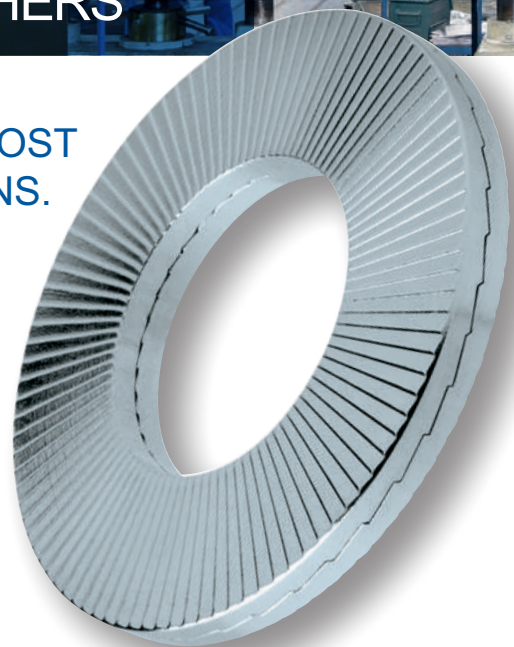


S&G Fastech® WEDGE LOCK WASHERS

THE PROVEN LOCKING SYSTEM FOR THE MOST DEMANDING OF BOLTED JOINT APPLICATIONS.

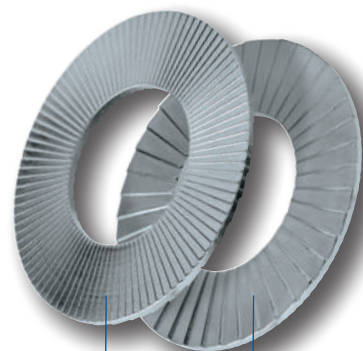
The self-loosening of bolted joints is one of the most commonly occurring failure modes in the operation of machines and systems. S&G Fastech® Wedge Lock Washers prevent loosening of the bolted joint by providing a safe and reliable bolt securing system - even for extremes of vibration or dynamic loads.

- Certified system for securing bolts, working at low and high preload levels
- Particularly suitable for dynamic loads – including when using lubricants
- Can be re-used
- Very easy to install and remove (Wedge Lock Washers are supplied as a pre-assembled pair)
- Also suitable for high-tensile bolts of 8.8, 10.9 and 12.9 and their respective nuts
- Available in steel or stainless steel with narrow or wide bearing surfaces – other materials are available upon request
- Available from M3 – M76 custom sizes upon request



SPECIAL MATERIALS

In addition to our S&G Fastech® Wedge Lock Washers made from steel [1.1191 / Sk5] and stainless steel [1.4404 / 316] we also produce our products from other special materials like 254 SMO® [1.4547] and INCONEL® / Alloy 718 [2.4668]. These special materials are resistant in highly corrosive environments (i.e. seawater or acids) with a high temperature stability. This leads to a wide variety of applications, especially within the offshore industry, energy sector, chemical industry and many more.



radial teeth wedge shaped cams

FIELDS OF APPLICATION



MECHANICAL ENGINEERING



OFFSHORE



AGRICULTURAL TECHNOLOGY

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