



Original SCHNORR® Safety Washers

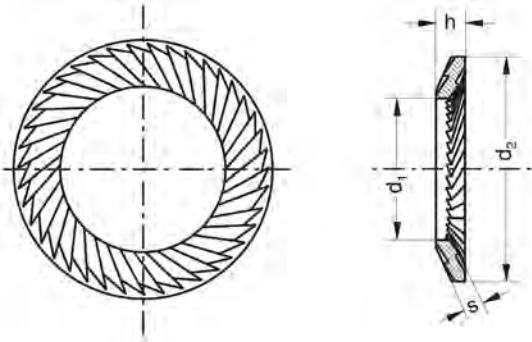
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SCHNORR®
DISC SPRING ENGINEERING

Original SCHNORR® Safety Washers

The Original SCHNORR® Safety Washers are in the form of a disc spring but with a trapezoidal cross-section and serrations on both sides. The outer diameter is matched to the head diameter of the hexagon socket head cap screw (acc. to DIN 912 / ISO 4762).



The Original SCHNORR® Safety Washers are available in two versions with the following characteristics:

	Type S	Type VS
Screw Sizes	M 1,6 to M 36	M 5 to M 30
Property Classes	up to 8.8	8.8 to 10.9
Standard Materials	C60S (1.1211) X5CrNi18-10 (1.4301)	C60S (1.1211) X5CrNi18-10 (1.4301)
Standard Surfaces (C60S)	blackened Gal.Zn8 + passivation Zn8M + passivation	blackened Zn8M + passivation
Tolerances	h14/H14 acc. to DIN 286-2	h14/H14 acc. to DIN 286-2

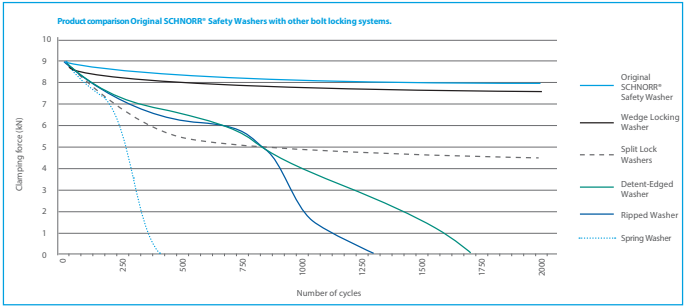
Engineering:

Our engineers and technicians are able to develop and engineer tailor-made SCHNORR® Safety Washers with further dimensions, materials and surfaces to customer requirements.

A sight better securing action with the Original SCHNORR® Safety Washers

Extensive test series carried out through independent public material research laboratory prove that the Original SCHNORR® Safety Washers manufactured using the patented manufacturing method brings about a clear improvement of the safety properties.

Results of vibration test according to DIN 65151



Conclusions:

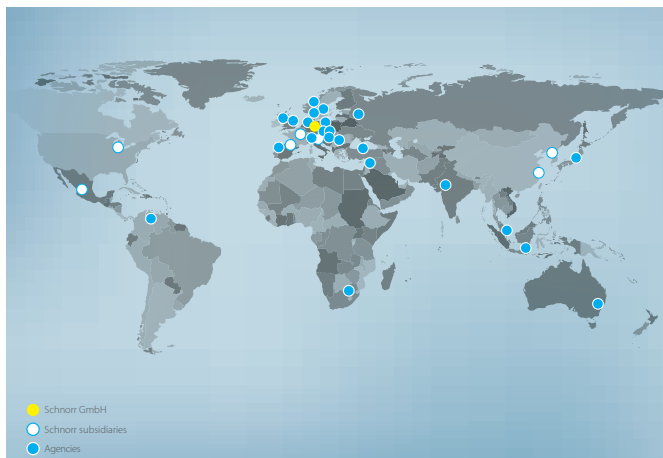
- Connections secured using a Original SCHNORR® Safety Washers maintain the pretension force also after 2,000 cycles.
- The test clearly shows a superior locking performance of the Original SCHNORR® Safety Washer in terms of number of cycles lasted and in terms of residual clamping force after 2,000 cycles in comparison to split lock washers, detent-edged washers, ribbed washers and spring washers (acc. to DIN 137 B)
- Furthermore, the test shows a equilivant locking effect of the Original SCHNORR® Safety Washer compared with a wedge-locking washer.



The Original SCHNORR® Safety Washers offer the following advantages

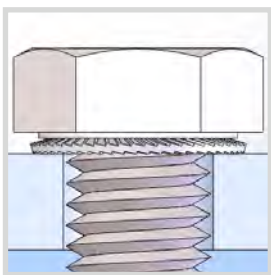
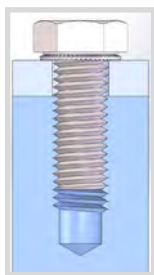
- High resistance to vibration due to positive locking of the serrations.
- Concentric force transmission and uniform axial load eliminate bending torques and deformation of the bolt stem.
- The design of the serrations prevents friction and damage to components when tightening.
- Extremely high safety against loss of pretension force and loosening.
- Wide variety for materials and different finishes.
- The closed ring form results in high degree of pre-tensioning, while avoiding burst-open effect.
- Development and design of the washers take place on the basis of the screw geometrics, tightening torque as well as the constructive circumstances.
- Also applicable for clearance holes (safety washer is necessary on both sides)
- Applicable for elongated holes (using type VS)
- Equivalent locking effect like wedge-locking washers.

SCHNORR worldwide



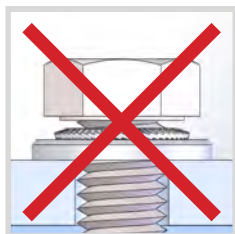
Correct usage of the Original SCHNORR® Safety Washers

The Original SCHNORR® Safety Washer is only able to obtain its full effectiveness as a bolt locking device if it is used correctly.

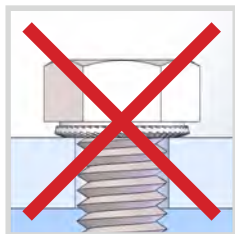


Incorrect usage of the Original SCHNORR® Safety Washers

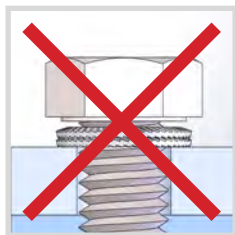
To obtain the maximum locking effect of the Original SCHNORR® Safety Washers we recommend **not** to use them in combination with a flat washer.



To obtain the maximum locking effect of the Original SCHNORR® Safety Washers we recommend **not** to use them up-side down.



To obtain the maximum locking effect of the Original SCHNORR® Safety Washers we recommend **not** to use them stacked.



Tightening torques for Original SCHNORR® Safety Washers

Nominal size	Tightening torque M_A in Nm $\mu_K = \mu_G = 0,14$	
	Strength grade	
	8.8	10.9
M4	3,6	5,3
M5	7,2	10,5
M6	12,4	18,2
M7	20,6	30,3
M8	30,0	44,1
M10	59,4	86,9
M12	102,3	150,7
M14	162,8	239,8
M16	253,0	371,8
M18	361,9	515,9
M20	510,4	727,1
M22	697,4	994,4
M24	877,8	1249,6
M27	1293,6	1841,4
M30	1756,7	2501,4
M33	2377,1	3385,8
M36	3055,8	4352,7

All specifications are valid for Original SCHNORR® Safety Washers made of C60S (1.1211) and are non-binding approximate values.

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