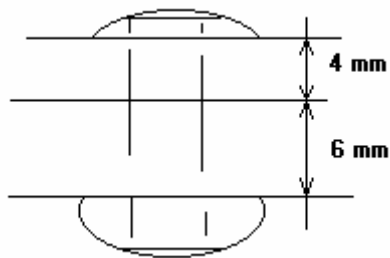


When should locking-nuts be used?

Short clamp lengths

When the clamp length is relatively short, ratio $L_k/d < 3$. The short elongation of the screw can't compensate for settings that occur inside the goods. The consequence is that the clamp load will decrease or fully disappear in which case the screw-joint might fail.

Example: M8 nut



$$\begin{aligned} L_k &= \text{thickness of the plate} + 1/2 \text{ nut} \\ &= 10 + 1/2 \times 8 \\ &= 14 \\ 14/8 &< 3 \rightarrow \text{self-locking nut} \end{aligned}$$

Settings in the surface of joined materials

A major proportion of the clamp load can be lost due to settings in threads and joined material surfaces. The amount of settings is related to surface finish, material hardness and number of "joined surfaces". If the risk occurs of losing clamp load due to large settings for example by dynamic loads or vibrations, a locking-nut should be used.

Example: Galvanized material has a soft coating

Soft materials

Locking nuts should be used when the screw joint consists of one or more soft materials. It is difficult to achieve and to maintain a high level of clamp load because the soft material deforms due to high surface pressure. This plastic deformation continues after the torque value has been applied to the screw. This again is a type of setting and might eventually lead to the complete loss of clamp load. Wood, plastics and aluminum are typical examples of soft materials.

Example: Other solution = apply a washer

Material starts to creep: Alu starts from 160°C // Steel starts from 240°C

Vibrations

If the clamp load is too low, dynamic loads normally lead to the loosening of the screw joint in ordinary applications. The use of a locking nut will in most cases prevent this process.

Uncontrolled torque value/ method

It's impossible to create a specified clamp load without using proper "torque methods". The scatter will vary significantly depending on used tools and the amount of operators involved over a period of time. The conclusion is that some of the screw joints will be "under torqued" and as a result might loosen. In this case locking nuts will reduce the risk of failure for screw joints with low initial clamp load.

80% of all bolts that break are due to a too low clamp force.

Example: difficult reached places or bad tools → locking torque will never be the same

Remember bad connection can mean: a safety problem // hold of production
Dynamic forces make bolts easily break via fatigue
Consequence is an unsatisfied customer of the end product