

# MARYLAND METRICS

P.O.Box 261 Owings Mills, MD 21117 USA

(410)358-3130 (800)638-1830 Faxes: (410)358-3142 (800)872-9329  
<http://mdmetric.com> [techinfo@mdmetric.com](mailto:techinfo@mdmetric.com)

## TECHNICAL INFORMATION and DATA

### Locking of fasteners

When bolted joints are put under dynamic stress, they may become loose unless they are properly secured. A distinction is made between two types of fastener locking.

#### a) Securing against loss of clamping load (setting)

With axially stressed, preloaded screws, setting occurs (i.e. smoothing (= local plastic deformation) of the surfaces in the parting planes, compensation of excessive surface pressure) and leads to a loss of clamping load. A drop in preload increases the dynamic portion of the load in the screw and can cause fatigue failure.

#### b) Securing against rotation (unscrewing/loosening)

If a relative movement between the tightened parts is able to occur as a result of high lateral force (or insufficient preload due to loss of clamping load, faulty assembly, or incorrect dimensioning), it releases the self-locking in the thread and the friction in the head or nut section and the fastener will loosen by itself. This can, in fact, result in a total loosening (falling apart) of the bolted joint.

Precaution against loss of clamping load	Effects
Setting partially compensated by tightening	Setting partially compensated during tightening
Increase clamping/diameter ratio, length = 4 x diameter	Greater elasticity, more space for compensation of setting
Reduce surface roughness, clean separating seams, minimize the number of parting planes	Less possibilities for loss through setting (embedding)
Use flange products	Larger bearing surface prevents exceeding the maximum permissible surface pressure
Use spring elements with sufficient rigidity	Compensation of setting (too soft spring elements have no effect, rather they merely increase the number of separating seams and setting possibilities!)
Re-tighten after initial operating time	Compensates setting

Precaution against unscrewing	Effects
Tighten properly, increase preload, use larger dimensions, higher property class	Increased axial forces prevent lateral movements
Increase clamping/diameter ratio (length = 4 x diameter)	Easier bending of the shank. Prevention of relative movement below head or nut
Use shoulder bolts, pin parts together	Prevention of lateral movement (slip) between parts
Increase grip on head and nut surface	Helps prevent relative movement under head or nut
Increase friction in thread	Unscrewing torque increased

Precaution against loosening / (falling apart)	Effects
Secure against loss of clamping load and unscrewing	No basis for loosening
Increase friction in thread	Even when clamping force is fully lost, a minimum torque still exists and prevents a complete unscrewing
Limit further rotation through shape locking	Nut cannot be turned beyond the stop.