

Pre-Loading of high-strength structural bolts

Complete sets are only to be used. Hot dip galvanized nuts supplied by us are treated and ready for assembly (coated with molykote). An additional lubrication of screws, nuts or washers is not permissible, since it alters the preload values and leads to failures in assembly.

The preload is generally applied by tightening the nut. For this purpose, torque wrenches, impact screwdrivers or similar devices may be used.

Tightening via the bolt head requires a free turning shank, so that no additional frictional resistance is developed.

Torque wrench

When tightening with a torque wrench, the necessary pre-loading force is provided by applying a measured torque.

The wrench used must be properly adjustable or allow a reliable reading of the required torque.

The maximum discrepancy allowed for adjusting and reading should be +0.1 Ma. Testing is to be done before the torque wrench is used and also during use at least every six months.

Impact screwdriver

When tightening with impact screwdrivers the necessary preload force is provided by impulses.

The screwdriver is to be adjusted to the prescribed preload by tests with suitable equipment (e.g. tensometer) on at least three screws intended for use in the assembly.

Angle of rotation

Pre-loading the screws by the angle of rotation method is done by an alignment ("snug") tightening and then adding a further rotation through the angle α .

Bolt diameter		Necessary preload P _v in the bolt		Torque wrench		Impact Screwdriver	Method of tightening				
				Tightening torque M _s to be applied			Preload P _v to be applied	Necessary alignment torque	Dimension	Clamping range	Angle of rotation
		Bolt lubricated with MoS ₂ (hot dip galvanized)	Bolt slightly oiled	1)	M _{av} 1)	mm					
		kN	Nm 2)				Nm	kN	Nm		
M 12	050	0100	0120	060	010	M 12 - M 36	0-50	180°	1/2		
M 16	100	0250	0350	110	050	M 12 - M 36	51-100	240°	4/6		
M 20	160	0450	0600	175	100	M 12 - M 36	101-170	270°	3/4		
M 22	190	0650	0900	210	200	M 12 - M 36	171-240	360°	1/1		
M 24	220	0800	1100	240	200	M 12 - M 36	171-240	270°	3/4		
M 27	290	1250	1650	320	200	M 12 - M 36	171-240	360°	1/1		
M 30	350	1650	2200	390	200	M 12 - M 36	171-240	270°	3/4		
M 36	510	2850	3800	560	200	M 12 - M 36	171-240	270°	3/4		

1) Independent of lubrication of the thread or the surfaces of nut and bolt.

2) For tightening from the head, please ask for data.

Important: Tightening torques for hot dip galvanized bolts differ from those for plain. See table above.