

Fasteners
Steel screws, bolts and studs with locking coating
Technical delivery conditions

DIN
267
Part 2B

Mechanische Verbindungselemente; Schrauben aus Stahl mit klemmender Beschichtung; technische Lieferbedingungen

In keeping with current practice in standards published by the International Organization for Standardization (ISO), a comma has been used throughout as the decimal marker.

1 Scope and field of application

This standard specifies technical delivery conditions for M3 to M16 steel screws, bolts and studs ("bolts", for short) provided with a locking coating, with ISO metric screw thread as specified in ISO 261, assigned to property classes as specified in ISO 898 Part 1, and designed for service temperatures from -50°C to 90°C .

It does not cover bolts with coating the application of which requires additional machining.

2 Concepts

For the purposes of this standard, the following definitions apply.

2.1 Locking coating

Locking coating is a plastic coating applied on the thread of bolts which, when the latter are tightened, is designed to prevent disengagement. The bolts may either be completely coated or the coating applied in the form of strips or spots. Such coatings do not prevent the bolts working loose, but do prevent complete disengagement.

2.2 Screw-in torque

The screw-in torque, M_{in} , is the torque measured when a bolt is screwed into a test nut.

2.3 Tightening torque

The tightening torque, M_A , is the torque required to tighten a bolt to a level of stress as given in table 1.

2.4 Breakaway torque

The breakaway torque, M_L , is the torque measured at the moment when the relative motion between test nut and bolt is detected in both stressed and unstressed assemblies.

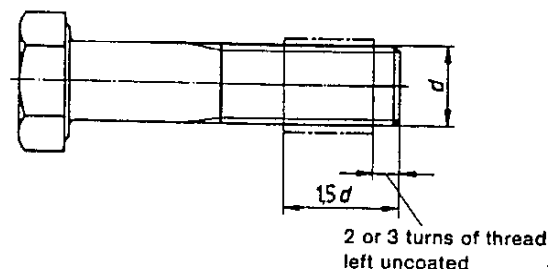
2.5 Loosening torque

The loosening torque, M_{out} , is the torque measured after the breakaway point when unscrewing bolts with a locking coating.

3 Dimensions and designation

3.1 Standard coating

Unless otherwise specified, the coating shall cover a zone, measured from the bolt end, of length equal to $1,5d \pm 2P$ for P smaller, and $1,5d \pm P$ for P equal to or greater than 1. The first two or three turns of thread should be free from coating material to facilitate bolting.



d = nominal bolt thread diameter

P = pitch

Figure 1. Length and position of coated zone on bolts with standard coating.

3.2 Non-standard coating

If, for design reasons, a different length, l_b , or distance from the bolt end, a , of the coated zone is required (see figure 2), both dimensions shall be indicated in the standard designation (cf. subclause 3.3), both dimensions being subject to a tolerance equal to $\pm 2P$ for P smaller than 1, and to $\pm P$ for P equal to or greater than 1.



l_b = length of coated zone

a = distance of coated zone from bolt end

P = pitch

Figure 2. Length and position of coated zone on bolts with non-standard coating

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3.3 Designation

Bolts provided with a locking coating as specified in this standard shall be identified by inclusion of the symbol KL.

Examples of designation

Designation of an M12 hexagon head bolt as specified in DIN 933, of nominal length, $l=80$ mm, assigned to property class 8.8 and provided with a locking coating (KL):

Bolt DIN 933 – M12 × 80 – 8.8 – KL

Designation of an M12 hexagon head bolt as specified in DIN 933, of nominal length, $l=80$ mm, assigned to property class 8.8 and provided with a locking coating (KL) 30 mm in length, with $a=10$ mm (30 × 10):

Bolt DIN 933 – M12 × 80 – 8.8 – KL 30 × 10

4 Requirements

When bolts are tested in accordance with subclause 5.2, the specifications regarding M_{in} and M_{out} given in table 1 shall be complied with.

5 Testing

5.1 Test equipment

5.1.1 Torquemeter

For torque measurement, a device (e.g. torquemeter) with a limit of error of 2% of the measuring range shall be used. In cases of arbitration, the device shall be chosen so that all values can be read off in the upper half of the measuring range.

5.1.2 Test nut

The test nut shall meet the following requirements.

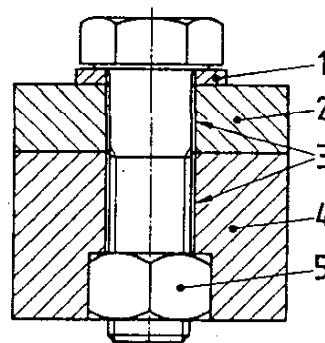
- The property class shall at least be equal to that of the bolt.
- The nut shall have a height equal to $0,8d$ to $0,9d$ and be countersunk at 120° .
- The thread shall be produced to 6H tolerance (subject to agreement, the nut may be produced to a closer tolerance) and the thread surface be bright or blackened.
- The thread of the nut shall be free from oil or grease, and burr.

Test nuts shall be used once only.

5.2 Procedure

The test assembly shall be as shown in figure 3. The bolt to be tested, shall be passed through a washer to DIN 125 Part 2, free from grease, with a hardness of 300 HV or more and a bright finish, and two distance blocks, and tightened by screwing into a test nut at a rate of 5 min^{-1} , until the relevant torque M_A is reached. The thickness of the blocks shall be selected so that the nut thread is in complete contact with the coated zone. During engagement, the maximum screw-in torque shall be measured.

After a period of at least 15 s, the bolt shall be loosened by turning it through 360° , followed by a further turn through 360° at a rate of 5 min^{-1} , and the maximum loosening torque, M_{out} measured. The bolt shall then be fully unscrewed and engaged again, without subjecting the assembly to stress (i.e. without tightening the bolt). This procedure shall be repeated once, and following that, M_{out} measured.



- 1 Washer
- 2 Distance block, hardness exceeding 35 HRC
- 3 Medium series clearance hole as in ISO 273
- 4 Distance block, hardness exceeding 35 HRC
- 5 Test nut

Figure 3. Test assembly

Table 1. Torques and torque ratios (at ambient temperature)

Thread size		Maximum screw-in torque, M_{in} , in Nm	Tightening torque, M_A^* , in Nm, for bolts of property class					Minimum loosening torque, M_{out} , in Nm	
			5.6	5.8	6.8	8.8	10.9	12.9	First disengagement
M3		0,43		0,6		1,2		0,1	0,08
M4		0,9		1,4		2,8		0,12	0,1
M5		1,6		2,6		5,5		0,18	0,15
M6		3		4,5		9,5		0,35	0,23
M8	M8 × 1	6		11		23		0,85	0,45
M10	M10 × 1,25	10,5		22		46		1,5	0,75
M12	M12 × 1,25, M12 × 1,5	15,5		38		79		2,3	1,6
M14	M14 × 1,5	24		60		125		3,3	2,3
M16	M16 × 1,5	32		90		195		4	2,8

*) M_A has been determined on the basis of an overall friction coefficient of 0,12, assuming a 90% utilization of the minimum yield stress or 0,2% proof stress for the relevant lowest property class. It shall be applied only during the first engagement of the bolt.

6 Bolt/nut assembly

6.1 Nut thread

There are no special requirements with regard to the surface roughness of the nut thread surface. Nuts shall be free from burr. Coated bolts shall not be used together with nuts and threaded holes without countersunk thread.

6.2 Repeated bolting

Bolts provided with a locking coating, except adjusting bolts, shall be used only once.

7 Storage life

Bolts shall be stored so that their properties (when tested) remain unchanged for at least two years.

Standards referred to

DIN 125 Part 2	Product grade A washers with a hardness of 300 HV designed for use with hexagon head screws and nuts
DIN 933	M1,6 to M52 hexagon head screws threaded up to the head; product grades A and B
ISO 261 : 1973 *)	ISO general purpose metric screw threads; general plan
ISO 273 : 1979 *)	Fasteners; clearance holes for bolts and screws
ISO 898-1 : 1988 *)	Mechanical properties of fasteners; bolts, screws and studs

International Patent Classification

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