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**NATIONAL STANDARD OF THE  
PEOPLE'S REPUBLIC OF CHINA**

**GB/T 3098.22-2009**

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**Mechanical properties of fasteners - Bolts, screws and studs  
made of fine grain non-heat-treated steel**

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## Foreword

GB/T 3098 "Mechanical properties of fasteners" series of criteria including.

- a) GB/T 3098.1-2000 Mechanical properties of fasteners Bolts, screws and studs;
- b) GB/T 3098.2-2000 Mechanical properties of fasteners coarse thread;
- c) GB/T 3098.3-2000 Mechanical properties of fasteners set screws;
- d) GB/T 3098.4-2000 Mechanical properties of fasteners fine thread;
- e) GB/T 3098.5-2000 Mechanical properties of fasteners self-tapping screws;
- f) GB/T 3098.6-2000 Mechanical properties of fasteners stainless steel bolts, screws and studs;
- g) GB/T 3098.7-2000 Mechanical properties of fasteners rolling screws;
- h) GB/T 3098.8-1992 Mechanical properties of fasteners bolted connections;

- i) GB/T 3098.9-2002 Mechanical properties of fasteners torque type steel hexagon nuts;
- j) GB/T 3098.10-1993 Mechanical properties of fasteners non-ferrous metal manufacturing bolts, screws, studs and nuts;
- k) GB/T 3098.11-2002 Mechanical properties of fasteners drilling tapping screws;
- l) GB/T 3098.12-1996 Mechanical properties of fasteners - Cone proof load test;
- m) GB/T 3098.13-1996 Mechanical properties of fasteners Bolts and screws with torque test and minimum torques nominal diameter 1 ~ 10mm;

## 1 Scope

China's national standard for the mechanical properties of bolts, screws and studs made from fine grain non-heat-treated steel. It is Part 22 of the GB/T 3098 series on the mechanical properties of fasteners, and it specifies the property classes, the material and manufacturing requirements, the mechanical and physical properties and the test methods for fasteners of this material. A non-heat-treated steel, also called a microalloyed or precipitation-hardened ferrite-pearlite steel, reaches its strength through controlled cooling from the hot forming temperature rather than through quenching and tempering. Small additions of vanadium, niobium or titanium form fine carbonitride precipitates during that cooling, and a controlled fine grain size does the rest. The commercial attraction is direct: the quench and temper operation is removed from the process, which eliminates a furnace, the associated energy, the quenching distortion and the straightening that follows it. For a high volume automotive fastener that is a significant cost. The reason it needs a standard of its own, rather than being folded into the property classes of GB/T 3098.1, is that a non-heat-treated fastener is a different material even where it reaches the same tensile strength. Its microstructure is ferrite-pearlite rather than tempered martensite, its ratio of yield to tensile strength differs, its behaviour after cold forming differs, and it cannot be re-heat-treated to recover properties. Above all, its susceptibility to hydrogen embrittlement and its response to plating and to elevated temperature are not those of a quenched and tempered bolt, and specifying it as though it were would be unsafe. Issued on 15 October 2009 and in force since 1 March 2010.

This section GB/T 3098 requirements by fine-grained non-quenched and tempered steel manufacturing, testing at an ambient temperature of 10 °C ~ 35 °C under the conditions When, bolts, screws, studs and screws (hereinafter referred to as fasteners) mechanical properties. Determined at the ambient temperature conditions to comply with the technical requirements of this part of the fastener, at higher or lower temperatures may reach Regulation Given the mechanical and physical properties. GB/T this section applies fasteners T 3098 shall comply with.

--- Fine grain by the thermomechanical rolling process to produce non-quenched and tempered steel;

- In line with the common thread GB/T 192 provisions;
- Coarse thread M6 ~ M16; fine pitch thread M8 x 1 ~ M16 x 1.5;
- In line with the diameter of the pitch combination GB/T 193 provisions;
- Thread tolerance in line with GB/T 197 or GB/T 22029 requirements. This section does not apply to set screws and similar fasteners not pulling (see GB/T 3098.3). This section does not specify the following performance requirements.
- Weldability;
- Resistance to shear stress;
- Fatigue resistance.

## 2 Normative references

The following documents contain provisions which, through reference to GB/T 3098 to the present, constitute provisions of this section. For dated reference documents Member, all subsequent amendments (not including errata content) or revisions do not apply to this section, however, encouraged to reach under this section Parties to research agreement to use the latest versions of these documents. For undated reference documents, the latest versions apply to this section.

GB/T 192 ordinary screw threads - Basic model ( GB/T 192-2003,

ISO 68-1.1998, ISO generalpurposescrew threads-Basicprofile-Part 1. Metricscrewthreads, MOD)

GB/T 193 series ordinary thread diameter and pitch ( GB/T 193-2003,

ISO 261.1998, ISO generalpurpose metricscrewthreads-Generalplan, MOD)

GB/T 196 common thread basic size ( GB/T 196-2003,

ISO 724.1993, ISO generalpurposemetric screwthreads-Basicdimensions, MOD)

GB/T 197 common thread tolerance ( GB/T 197-2003,

ISO 965-1.1998, ISO generalpurposemetric screwthreads-Tolerances-Part 1. Principlesbasicdata, MOD)

GB/T 222 chemical composition of finished steel tolerance

GB/T 223 (all parts), steel and alloy

GB/T 224 Determination of depth of decarburization of steel method ( GB/T 224-2008, ISO 3887.2003, MOD)

GB/T 226 steel macrostructure and defect etching test method ( GB/T 226-1991, neq ISO

4969. 1980)

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