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**Mechanical Properties of Fasteners - Bolts,
Screws and Studs**

紧固件机械性能螺栓, 螺钉和螺柱

(ISO 898-1: 2009, MOD)

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Foreword

This part of GB/T 3098 (hereinafter referred to as this part) is one of the series of standards "Mechanical Properties of Fasteners". This series include:

- GB/T 3098.1-2000 Mechanical Properties of Fasteners - Bolts, Screws and Studs;
- GB/T 3098.2-2000 Mechanical Properties of Fasteners - Nuts - Coarse Thread;
- GB/T 3098.3-2000 Mechanical Properties of Fasteners - Set Screws;
- GB/T 3098.4-2000 Mechanical Properties of Fasteners - Nuts - Fine Pitch Thread
- GB/T 3098.5-2000 Mechanical Properties of Fasteners - Tapping Screws;
- GB/T 3098.6-2000 Mechanical Properties of Corrosion - Resistant Stainless - Steel Fasteners-Part 1: Bolts, Screws and Studs;
- GB/T 3098.7-2000 Mechanical Properties of Fasteners - Thread Rolling Screws;
- GB/T 3098.8-2010 Mechanical Properties of Fasteners Parts for Bolted Connections for Use at Temperatures from -200°C~+700°C;
- GB/T 3098.9-2010 Mechanical Properties of Fasteners - Prevailing Torque Type Steel Nuts;
- GB/T 3098.10-1993 Mechanical Properties of Fasteners Bolts, Screws, Studs and Nuts Made of Non-ferrous Metals;
- GB/T 3098.11-2002 Mechanical Properties of Fasteners - Drilling Screws with Taping Screw Thread;
- GB/T 3098.12-1996 Mechanical Properties of Fasteners - Cone Proof Load Test on Nuts;
- GB/T 3098.13-1996 Mechanical Properties of Fasteners -Torsional Test and Minimum Torques for Bolts and Screws with Nominal Diameters 1mm to 10mm";
- GB/T 3098.14 Mechanical Properties of Fasteners - Widening Test on Nuts;
- GB/T 3098.15-2000 Mechanical Properties of Fasteners - Nuts Made of Stainless-steel;
- GB/T 3098.16-2000 Mechanical Properties of Fasteners - Set Screws Made of Stainless-steel;
- GB/T 3098.17-1996 Mechanical Properties of Fasteners - Preloading Test for the Detection of Hydrogen Embrittlement - Parallel Bearing Surface Method;
- GB/T 3098.18-2004 Mechanical Properties of Fasteners - Blind Rivets Testing;
- GB/T 3098.19-2004 Mechanical Properties of Fasteners - Blind Rivets with Break Pull Mandrel;
- GB/T 3098.20-2004 Mechanical Properties of Fasteners - Wing Nuts with Specified Proof Torque;
- GB/T 3098.21-2008 Mechanical Properties of Fasteners - Part 21: Tapping Screws of Stainless-steel;
- GB/T 3098.22-2009 Mechanical Properties of Fasteners Made of the Fine Grain Non-heat Treatment Steel - Bolts, Screws and Studs.

This part is Part 1 of GB/ T 3098.

This part is modified in relation to ISO 898-1: 2009 "Mechanical Properties of Fasteners Made of Carbon Steel and Alloy Steel - Part 1: Bolts, Screws and Studs with Specified Property Classes - Coarse Thread and Fine Pitch Thread" (English edition) and the main

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Mechanical Properties of Fasteners – Bolts, Screws and Studs

紧固件机械性能螺栓，螺钉和螺柱

1 Scope

This part of GB/T 3098 specifies mechanical and physical properties of bolts, screws and studs made of carbon steel or alloy steel when tested at an ambient environment temperature range of 10°C to 35°C. Within the range of this environment temperature, as for fasteners (including bolts, screws and studs, the same below) that conform to the technical requirements of this part, at higher (See Appendix 8) and/or lower temperature, they are possible to fail to conform to the specified mechanical and physical properties.

Note: 1 Fasteners conforming to the requirements of this part are used in applications from -50°C~ to 150°C. Users are advised to consult with the parties concerned for temperatures outside the range of -50°C~ to 150°C and up to a maximum temperature of +300°C.

2 Information for the selection and application of low temperature and high temperature steels is given, for example, in EN 10269^[1], ASTM F2281^[3] and ASTM A320/A320M^[4].

Certain fasteners might not fulfill the tensile or torsion requirements of this part because the geometry of their heads reduces the shear area in the head. These include fasteners having a low head, with or without external driving feature, a low round or cylindrical head with internal driving feature or a countersunk head with internal driving feature (see Section 8.2).

This part is applicable to fasteners:

- a) Made of carbon steel or alloy steel;
- b) Common threads that meet those specified in GB/T 192;
- c) With coarse thread 1.6 to M39 and fine pitch thread M8*1 to M39*3;
- d) With diameter/pitch combinations according to GB/T 193;
- e) Having tolerances according to GB/T 197, GB/T 9145 and GB/T 22029;

This part is not applicable to set screws and similar threaded fasteners not under tensile stresses (see GB/T 3098.3).

This part doesn't not specify requirements for such properties as:

- Weldability;
- Corrosion resistance;
- Resistance to shear stress;
- Torsion/clamp force performance; or
- Fatigue resistance.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 90.3 Fasteners - Quality Assurance System (GB/T 90.3-2010, ISO 16426: 2002, IDT)

GB/T 192 General Purpose Metric Screw Threads - Basic Profile (ISO 68-1: 1998, ISO General Purpose Screw Threads - Basic Profile - Part 1: Metric Screw Threads, MOD);

GB/T 193 General Purpose Metric Screw Threads - General Plan (ISO 261: 1998, ISO General Purpose Metric Screw Threads - General Plan, MOD);

GB/T 196 General Purpose Metric Screw Threads - Basic dimensions (ISO 724: 1993, ISO General Purpose Metric Screw Threads - Basic Dimensions, MOD);

GB/T 197 General Purpose Metric Screw Threads - Tolerances (ISO 965-1: 1998, ISO General Purpose Metric Screw Threads - Tolerances - Part 1: Principles and Basic Data, MOD);

GB/T 228.1 Metallic Materials - Tensile Testing - Part 1: Method of Test at Room Temperature (GB/T 228.1-2010, ISO 6892-1: 2009, MOD);

GB/T 229 Metallic Materials - Charpy Pendulum Impact Test Method (GB/T 229-2007, ISO 148-1: 2006, MOD);

GB/T 230.1 Metallic Materials - Rockwell Hardness Test - Part 1: Test method (Scales A, B, C, D, E, F, G, H, K, N and T) (GB/T 230.1-2009, ISO 6508-1: 2005, MOD);

GB/T 231.1 Metallic Materials - Brinell Hardness Test - Part 1: Test Method;

GB/T 3098.2 Mechanical Properties of Fasteners - Nuts - Coarse Thread (GB/T 3098.2-2000, idt ISO 898-2: 1992);

GB/T 3098.3 Mechanical Properties of Fasteners - Set Screw (GB/T 3098.3-2000, idt ISO 898-5: 1998);

GB/T 3098.13 Mechanical Properties of Fasteners - Torsional Test and Minimum Torques for Bolts and Screws with Nominal Diameters 1mm to 10mm (GB/T 3098.13-1996, idt ISO 898-7: 1992);

GB/T 4340.1 Metallic Materials - Vickers Hardness Test - Part 1: Test Method (GB/T 4340.1-2009, ISO 6507-1: 2005, MOD);

GB/T 5267.1 Fasteners - Electroplated Coatings (GB/T 5267.1-2002, ISO 4042: 1999, IDT)

GB/T 5267.2 Fasteners - Non-electrolytically Applied Zinc Flake Coatings (GB/T 5267.2-2002, ISO 10683: 2000, IDT);

GB/T 5267.3 Fasteners - Hot Dip Galvanized Coatings (GB/T 5267.3-2008, ISO 10684: 2004, IDT);

GB/T 5267 Fasteners - Bolts, Screws, Studs and Nuts - Symbols and Designations of Dimensions (GB/T 5267-1985, eqv ISO 225: 1983);

GB/T 5277 Fasteners - Clearance Holes for Bolts and Screws (GB/T 5277-1985, eqv ISO 273: 1979);

GB/T 5779.1 Fasteners - Surface Discontinuities - Bolts, Screws and Studs for General Requirements (GB/T 5779.1-2000, idt ISO 6157-1: 1988);

GB/T 5779.3 Fasteners - Surface Discontinuities - Bolts, Screws and Studs for Special Requirements (GB/T 5779.3-2000, idt ISO 6157-3: 1988);

GB/T 9144 General Purpose Metric Screw Threads - Preferable Plan (GB/T 9144-2003, ISO 262: 1998, ISO General Purpose Metric Screw Threads - Selected Sizes for Screws, Bolts and Nuts, MOD);

GB/T 9145 General Purpose Metric Screw Threads - Limit of Sizes for the Screw Threads of Medium Quality and Preferable Plan (GB/T 9145-2003, ISO 965-2: 1998, ISO General Purpose Metric Screw Threads - Tolerances - Limit of Sizes for General Purpose External and Internal Screw Threads - Medium Quality, MOD);

GB/T 16825.1-2002 Verification of Static Uniaxial Testing Machines - Part 1: Tension and (or) compression Testing Machines - Verification and Calibration of the Force - Measuring System (idt ISO 7500-1: 2004, IDT);

GB/T 22029 Hot-dip Galvanized Screw Threads - On External Screw Threads There is the Clearance for Accommodating the Hot-dip Galvanized Coat (GB/T 22029-2008, ISO 965-4: 1998, ISO General Purpose Metric Screw Threads - Tolerances - Part 4: Limit of Sizes for Hot-dip Galvanized External Screw Threads to Mate with Internal Screw Threads Tapped with Tolerance Position H or G after Galvanizing, MOD);

ISO 4885: 1996 Ferrous Products - Heat Treatment – Vocabulary.

3 Terms and Definitions

For the purpose of this part, the following terms and definitions apply.

3.1

Finished fastener

Fastener for which all manufacturing steps have been completed, with or without any surface coating and with full or reduced loadability, and which has not been machined into a test piece.

3.2

Machined test piece

Test pieces machined from a fastener to evaluate material properties.

3.3

Full-size fastener

Finished fastener with a shank diameter of $d_s \approx d$ or $d_s > d$, or or fully threaded screws (bolts) or studs (screw shank).

3.4

Fastener with waisted shank

Finished fastener with the shank diameter $d_s < d_2$.

3.5

Base metal hardness

Hardness closest to the surface (when traversing from core to outside diameter) just before an increase or decrease occurs, denoting, respectively, carburization or decarburization)

3.6

Decarburization

Depletion of carbon from the surface layer of a ferrous metal materials (steels) (See ISO 4885: 19960)

3.7

Partial decarburization

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