

ICS 77.140.60
CCS H 40



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

GB/T 3077-2015

Replacing GB/T 3077-1999

Alloy Structure Steels

合金结构钢

Issued on: December 10, 2015

Implemented on: November 1, 2016

**Issued by: General Administration of Quality Supervision, Inspection and
Quarantine;
Standardization Administration of PRC..**

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Foreword

This Standard is drafted in accordance with the rules specified by GB/T 1.1-2009.

This Standard replaces GB/T 3077-1999 "alloy structure steel".

Compared with GB/T 3077-1999, the main technical changes of this Standard are as follows:

- MODIFY the classification requirements based on metallurgical quality (see Table 1 of this version);
- ADJUST the lower limit of boron steel's B content from 0.0005% to 0.0008% (see Table 1 of this version);
- same designation is adjusted to the chemical composition of the original designation with letter A (see Table 1 of this version; Table 1 of 1999 version);
- ADD 12 designations and related technical requirements, such as 25MnB, 35MnB, 25CrMo, 50CrMo, 34CrNi2, 15CrNiMo, 30CrNiMo, 30Cr2Ni2Mo, 30Cr2Ni4Mo, 34Cr2Ni2Mo, 35Cr2Ni4Mo, 40CrNi2Mo (see Table 1 and Table 3 of this version; Tables 1 and 3 of 1999 version);
- SUBDIVIDE the surface defects into defect and deficiency (see 6.10 of this version);
- MODIFY the surface quality description, and INCLUDE GB/T 28300 standard specifications (see 6.10 of this version; 6.6 of 1999 version);
- MODIFY the "nonmetallic inclusion" requirements (see 6.7 of this version; 6.9 of 1999 version);
- ADD "grain size" requirements (see 6.8 of this version);
- MODIFY "special requirements" (see 6.11 of this version; 6.10 of 1999 version);
- ADD the numerical rounding requirements (see 7.2 of this version);
- ADD the comparison table of this Standard's designations and foreign standard's similar designations (see Appendix A of this version).

This Standard was proposed by the National Iron and Steel Association.

This Standard shall be under the jurisdiction of the National Steel Standardization Technical Committee (SAC/TC 183).

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This Standard specifies the classification and code, order content, size, shape, weight and

allowable tolerance, technical requirements, test method, inspection rules, packaging, marking and quality certificate of alloy structure steel.

This Standard applies to the hot-rolled and forged alloy steel bars which are not more than 250mm of nominal diameter or thickness. However, after negotiated by the Supplier and Demander, it is also allowed to supply hot-rolled and forged alloy steel bars which are more than 250mm of nominal diameter or thickness (abbreviated as the steel bar).

The designations and chemical compositions which are specified in this Standard are also applicable to steel ingot, billet and their products.

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this Standard.

3.1 Based on metallurgical quality, the steel bar is divided into the following three categories:

- b) Advanced-quality steel (ADD "A" after designation);
- c) Excellent-quality steel (ADD "E" after designation).

3.2 Based on application and processing method, the steel bar is divided into the following two categories:

- a) Steel for pressure processing UP;

3.3 Based on surface types, the steel bar is divided into the following five categories:

- c) Shot blasting (sand blasting) SS;

In accordance with this Standard, the order contract or order shall include the following:

- c) Designations OR unified digit code;
- d) Controlled residual elements (if required, see Table 2);
- f) Size, shape and allowable tolerance;
- g) Processing method used (if not indicated, it is deemed as cutting steel);
- h) Heat treatment delivery or special surface state delivery (if required, see 6.3.2 i) Hot upsetting (if required, see 6.5);
- j) Decarburization (if required, see 6.9);
- k) Special requirements (if required, see 6.11).

shall be indicated in the contract.

5.3 The size, shape, weight, and allowable tolerance of other-sized steel bar shall comply with corresponding standards OR otherwise negotiated by the Demander and Supplier; the specific requirements shall be indicated in the contract.

6.1 Designation and chemical composition

The allowable tolerance of finished bar's (or blank's) chemical composition shall comply with the provisions of GB/T 222. Unless otherwise agreed by user, it is not allowed to add intentionally any elements which are not specified in this table. It shall take measures to prevent bringing in elements which may impact steel performance from waste steel or other raw materials. It is allowed to order each designation in this table based on advanced-quality steel or excellent-quality steel;

6.2 Melting method

Unless otherwise specified in the contract, the smelting method is to be selected by the manufacturer itself.

6.3 Delivery status

6.3.2 Based on the Demander's requirements AND indicated in the contract, it is also allowed to make delivery under heat treatment (annealing, normalizing or tempering) state.

6.3.3 If it is agreed by the Demander and Supplier AND indicated in the contract, it is allowed to deliver the steel bar with the surface polished, peeled or finished otherwise.

6.4 Mechanical properties

6.4.1 After the sample blank is subject to the heat treatment system processing which is recommended in Table 3, the steel bar's measured longitudinal mechanical properties shall comply with the requirements in Table 3. 6.4.2 The mechanical properties listed in Table 3 are applicable to the steel bars which is not more than 80mm of nominal diameter or thickness. As for the steel bars which are more than 80mm of nominal diameter or thickness, the mechanical properties shall meet the following requirements: a) As for the steel bar which is more than 80mm ~ 100mm of nominal size, it is allowed to reduce its fractured elongation, percentage reduction of area, and impact energy absorption for 1% (absolute value), 5% (absolute value) and 5% respectively, as compared with Table 3; b) As for the steel bar which is more than 100mm ~ 150mm of nominal size, it is allowed to reduce its fractured elongation, percentage reduction of area, and impact energy absorption for 2% (absolute value), 10% (absolute value) and 10% respectively, as compared with Table 3;

6.5 Hot upsetting

6.6 Microstructure

6.7 Nonmetallic inclusions

The advanced-quality steel and excellent-quality steel bars shall be subject to nonmetallic