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**NATIONAL STANDARD OF  
THE PEOPLE'S REPUBLIC OF CHINA**  
中华人民共和国国家标准

**GB/T 700-2006**  
**Replace GB/T 700-1988**

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**Carbon Structural Steels**

(ISO 630: 1995, Structural Steels – Plates, Wide Flats, Bars, Sections and Profiles,  
NEQ)

**碳素结构钢**

a CodeofChina.com translation work  
for your reference only

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**Jointly issued by the General Administration of Quality Supervision, Inspection,  
and Quarantine Headquarters of the People's Republic of China, and the  
Standardization Administration of the People's Republic of China**

## Foreword

This standard is not equivalent to ISO 630:1995 "Structural Steel and the chief differences are as follows:

- Have not set the designations with yield strength of grade 185 N/mm<sup>2</sup> and 335N/mm<sup>2</sup>;
- set the designations of grades 195 N/mm<sup>2</sup> and 215 N/mm<sup>2</sup> as Q195 and Q215;
- Reduce the copper and phosphorus content of grade A in Q235 and Q275 by 0.005%;
- Divide the thickness of Q235B steel into two grades with disoxidation method, and the carbon content is all 0.20%;
- The Q235B steels with thickness less than 25 mm may not be tested agreed by the purchaser if the supplier is able to ensure the qualification of the impact absorbing energy value;
- Q275 steels with thickness larger than 80 mm ~ 100 mm, improve their yield strength by 10 N/mm<sup>2</sup>;
- Add cold bending test;
- Specify specific regulations for forming batches according to domestic conditions;

This standard replaces GB/T 700-1988 "Carbon Structural Steels," and the major changes compared with GB/T 700-1988 are as follows:

- "Disoxidation method" removes the balanced steel;
- Cancel the designations Q255 and Q275 in GB/T 700-1998;
- Change the designation E275 in ISO 630:1995 to the new designation Q275;
- Cancel the lower limits of carbon and manganese content of each designation, and raise the upper limit of manganese content;
- Cancel the limits of silicon content in rimmed steel and killed steel;
- Change the silicon content from 0.30% to 0.35% (excluding the Q195);

- Reduce the phosphorus and sulfur content of designation Q195 from 0.045% and 0.050% to 0.035% and 0.040%;
- Cancel the provision on the elongation after fracture of the grade with thickness (or diameter) no larger than 16 mm;
- In Table 2, add "The upper limit of tensile strength of the wide strip (including sheared sheets) is not as the delivered terms" and " Q235B steels with thickness less than 25 mm may not be tested agreed by the purchaser if the supplier is able to ensure the qualification of impact absorbing energy value";
- Amend the provision on the nitrogen content in steels;
- Amend the provision on impact test, and add the figure about minimal impact absorbing energy of the test sample with width among 5 mm ~10 mm;
- Change the batch forming from "same furnace pot number" to "same furnace number," and cancel the limit of the mixing batch on the quantity of furnace number.

Appendix A of this standard is normative.

This standard was proposed by China Iron and Steel association China Iron and Steel Association.

This standard is under the jurisdiction of Steel Technical Committee for Standardization of P.R.C.

The drafting organizations of this standard are China Metallurgical Information and Standardization Research Institution, Shougang Group, Hangang Group, Benxi Iron and Steel CO., LTD.

This standard was prepared by Tang Yifan, Luan Yan, Wang Liping, Sun Ping, Zhang Xianfeng, and Dai Qiang.

This standard was firstly issued on January, 1965, amended on October, 1979 for the first time, and amended on June, 1988 for the second time.

*NOTE: The English version has been translated directly from the Chinese Standard GBT 700-2006. In the event of any discrepancy in the process of implementation, the Chinese version shall prevail.*

## Carbon Structural Steels

### 1. Scope

This code prescribes the technical conditions of carbon structure steel, including denotation, size, shape, weight and allowable deviation, specifications, testing methods, testing rules, packaging, marks and quality certificates.

The standard is applicable to general structural steel and hot-rolled steel plates, steel strip, formed steel and bar steel for works. The product can be used for weld, binding and bolting member. They are generally used under the supply state.

The chemical compositions stated in this code are applicable to the steel ingot, continuous casting billet, steel billet and its products.

### 2. Normative References

The following normative documents contain provisions which, through reference in this text, constitute provisions of this national standard. For dated reference, subsequent amendments to, or revisions of, any of these publications do not apply; but the parties to agreements based on this standard are encouraged to investigate the possibility of applying the latest editions of the standards indicated below. For undated references, the latest edition of the normative document referred to applies.

GB/T 222-2006 Permissible variation of chemical composition for steel

GB 223.3 Method of chemical analysis on steel and alloy / the dianipyryl methane phosphomolybdate gravimetric method for the determination of phosphorus content

GB/T 223.10 Method of chemical analysis on steel and alloy / the cupferron separation-chrome azurol S photometric method for the determination of aluminium content

- GB/T 223.11 Method of chemical analysis on steel and alloy /the ammonium persulfate oxidation volumetric method for the determination of chromium content
- GB/T 223.18 Method of chemical analysis on steel and alloy /the sodium thiosulfate separation iodimetric method for the determination of copper content
- GB/T 223.19 Method of chemical analysis on steel and alloy / the neocuproine-chloroform extraction photometric method for the determination of copper content
- GB/T 223.24 Method of chemical analysis on steel and alloy / the dimethylglyoxime spectrophotometric method for the determination of nickel content
- GB/T 223.32 Method of chemical analysis on steel and alloy /the hypophosphite reduction-iodimetric method for the determination of arsenic content
- GB/T 223.37 Method of chemical analysis on steel and alloy / the indophenol blue photometric method for the determination of nitrogen content after distillation
- GB/T 223.58 Method of chemical analysis on steel and alloy / the extraction-absorption catalytic polarographic method for the determination of manganese content
- GB/T 223.59 Method of chemical analysis on steel and alloy /the sodium arsenite-sodium nitrite titrimetric method for the determination of phosphorus content
- GB/T 223.60 Method of chemical analysis on steel and alloy /the perchloric acid dehydration for the determination of silicon content
- GB/T 223.63 Method of chemical analysis on steel and alloy / the sodium (potassium) periodate photometric method for the determination of manganese content
- GB/T 223.64 Method of chemical analysis on steel and alloy /the flame atomic absorption spectrometric method for the determination of manganese content
- GB/T 223.68 Method of chemical analysis on steel and alloy /the combustion potassium iodate volumetric method for the determination of sulfur content

- GB/T 223.71 Method of chemical analysis on steel and alloy /the gravimetric method after combustion in the pipe furnace for the determination of carbon content
- GB/T 223.72 Method of chemical analysis on steel and alloy /the alumina chromatographic separation-barium sulfate gravimetric method for the determination of sulphur content
- GB/T 228 Metallic materials/tensile testing method in room temperature (GB/T228-2002, eqv ISO 6892:1998)
- GB/T 229 Metallic materials/Charpy impact test (GB/T 229-2002, eqv ISO 83:1976, eqv ISO148:1983)
- GB/T 232 Metallic materials/bend testing methods (GB/T 232-1999, eqv ISO 7438:1985)
- GB/T 247 General rule of acceptance, package, mark and certification for steel plates (sheets) and strips
- GB/T 2101 General rule of acceptance, package, mark and certification for profile steel
- GB/T 2975 Rules for sampling in mechanical and technological testing of steel products
- GB/T 4336 Standard test method for spark discharge atomic emission spectrometric analysis of carbon and low-Alloy steel (routine method)
- GB/T 20066 Steel and iron - Sampling and preparation of samples for the determination of chemical composition (GB/T 20066-2006, ISO 14284: 1996, IDT)

### **3. Denotation and symbol of number, code name**

#### 3.1 Denotation of number

The steel number is composed of the following parts in order, like letter representing yielding point, yielding point value, quality grade symbol, deoxidation method symbol, etc.

For example: Q235-A·F

### 3.2 Symbol

Q- first letter of Chinese Pinyin "屈(qu)" in steel yielding point.

A, B, C and D are quality class respectively.

F-first letter of Chinese Pinyin "沸(bei)" in rimming steel.

Z-first letter of Chinese Pinyin "镇(zhen)" in killed steel.

TZ-first letter of Chinese Pinyin "特镇(te zhen)" in special killed steel.

"Z" and "TZ" symbols are omitted in number composing denotation.

### 4. Size, shape, weight and allowable deviation

Size, shape, weight and allowable deviation of steel should conform to prescriptions in corresponding standards.

### 5. Specifications

#### 5.1 Number and chemical compositions

The number and chemical compositions (melting analysis) of steel should conform to the prescriptions in Table 1.

Number	Code <sup>a</sup>	Grade	Thickness (or dia.) /mm	Deoxidation	Chemical Compositions (weight percentage)/%, not larger than				
					C	Si	Mn	P	S
Q195	U11952	-	-	F, Z	0.12	0.30	0.50	0.035	0.040
Q215	U12152	A	-	F, Z	0.15	0.35	1.20	0.045	0.050
	U12155	B							
Q235	U12352	A	-	F, Z	0.22	0.35	1.40	0.045	0.050
	U12355	B			0.20				0.045
	U12358	C		Z	0.17			0.040	0.040
	U12359	D		TZ				0.035	0.035
Q275	Q12752	A	-	F, Z	0.24	0.35	1.50	0.045	0.050
	Q12755	B	≤40	Z	0.21			0.045	0.045
			>40		0.22			0.040	0.040
	Q12758	C	-	Z	0.20			0.035	0.035
	Q12759	D	-	TZ		0.035	0.035		

- a. The table shows the unified figures of Z and TZ, the unified figures of F are as follows:  
 Q195F - U11950;  
 Q215AF - U12150, Q215BF - U12153;  
 Q235AF - U12350, Q235BF - U12353;

Q275AF – U12750.

b) Upon the consent from the buyer, the carbon content cannot be larger than 0.22%.

5.1.1.1 The Grade-D steel shall have enough tinny crystal grains and give clear statement of tinny crystal grain content in the quality certificate. When adopting aluminum for de-oxidation, the acid-soluble aluminum content shall not be less than 0.015%, or the total aluminum content shall not be less than 0.020%.

5.1.1.2 The residual elements in steel should be no more than 0.30%, like Cr, Ni, Cu, etc. The analysis can't be made if suppliers can guarantee.

5.1.1.2.1 The N-content is allowed to exceed the limit value stated in Clause 5.1.1.2, but when the N-content increase 0.001%, the maximum P-content shall decrease 0.005%. In the melting analysis, the maximum N-content shall not be more than 0.012%; if the acid-soluble aluminum content is not less than 0.015% or the total aluminum content is not less than 0.020%, the upper limit of N-content is not confined. The fixed N content shall be stated in the quality certificate.

5.1.1.2.2 Cu-content in grade-A steel can be no more than 0.35% in the event that the buyer agrees with it. The supplier shall make Cu-content analysis and indicate the Cu-content in the quality certificate.

5.1.1.3 The remnant As-content in steel should be no less than 0.080%. The steel smelted from cast iron which is smelted from arsenic minerals, As-content is prescribed by suppliers and buyers through agreement. The As-content in steel needn't to analyze if there is no As in the raw material.

5.1.1.4 On the premise of guaranteeing the steel mechanical property conforming to standard prescription, C, Mn and Si content in grade-A steel of each number can be not taken as delivery terms. But their content shall be specified in the quality certificate.

5.1.1.5 When the steel ingot, continuous casting billet and steel billet are supplied, in order to guarantee each performance of rolled steel conforming to requirements of the code, the low limit of C and Mn contents can be required according to buyer's requirements.

5.1.2 Chemical composition allowable deviation of finished steel ingot, continuous casting billet and steel billet shall conform to prescriptions in Table 1 of GB/T 222-2006.

The N-content is allowed to exceed the rated value but has to conform to the requirements of Clause 5.1.1.2.1. The maximum N-content can't be larger than 0.014% in the finished goods analysis. If the aluminum content is compliant to the rated content stated in Clause 5.1.1.2.1 and is indicated in the quality certificate, the upper limit is not confined.

The chemical composition deviation of finished F steel or steel ingot is not necessary to make guarantee.



## **5.2 Smelting process**

The steel is smelted by oxygen converter or electronic furnace. Unless the buyer has special requirements and has noted them in contract, the smelting process is generally determined by supplier.

## **5.3 State of Delivery**

Generally, steels products shall be delivered in hot rolling, controlled rolling or normalizing state.

## **5.4 Mechanical Properties**

5.4.1 Tensile and impact tests of steels shall be compliant with provisions of Table 2, while bend test of steels shall be compliant with provisions of Table 3.

5.4.2 When using Q195 and Q235B F-type rolled steel, the thickness (or diameter) of steel shall be less than 25mm.

5.4.3 During tensile and bend tests, profiled steels and steels rod shall adopt transverse sampling, and 2% (absolute value) of post-breaking extensibility is allowed to be lower than values listed in Table 2. Formed steels can adopt longitudinal sampling if transverse sampling is confined.

5.4.4 In case that the supplier can guarantee the cold bending test is compliant to the provisions of Table 3, the testing is not necessarily to carry out. When grade-A steels are eligible in cold bending test, the upper limit of tensile strength may not be taken as one of the delivery terms.

5.4.5 For those steels whose thickness is not less than 12mm or diameter is not less than 16mm, impact test are needed and the sample size is 10mm X 10mm X 55mm. According to the agreement issued by both supplier and buyer, for those steels whose thickness is in 6mm-12mm or diameter is in 12mm-16mm, impact test can be done and the sample size is 10mm X 7.5mm X 55mm or 10mm X 5mm X 55mm or 10mm X thickness X 55mm. Appendix A shows the rated impact absorption value, for instance, when adopting 10mm X 5mm X 55mm for testing, the testing results shall not be less than 50% of the rated value.

5.4.6 Charpy (V-notch) impact absorption value can be calculated according to arithmetical mean value of a group consisting of three sample single values. One of three sample single values is allowed to be less than the rated value, and its minimum value shall be higher than 70% of the rated value.

If the above conditions are not satisfied, another three samples can be selected to test, the mean value of 6 samples shall not be less than the rated value, and two of them can be lower than the rated value, and only one of them can be

lower than 70% of the rated value.

Table 2

No.	Grade	Yield strength <sup>a</sup> ReH/(N/mm <sup>2</sup> ), be larger than					Tensile strength <sup>b</sup> Rm/(N/mm <sup>2</sup> )	Post-breaking tractility A%, be larger than				Impact Test (V-notch)		
		Thickness (or diameter)/mm						Thickness (or diameter)/mm				Tem. °C	Impact absorption energy (vertical) /J be larger than	
		≤16	>16-40	>40-60	>60-100	>100-150		>150-200	≤40	>40-60	>60-100			>100-150
Q195	-	195	195	-	-	-	315-430	33	-	-	-	-	-	-
Q215	A	215	205	195	185	175	335-450	31	30	29	27	26	-	-
	B													
Q235	A												+20	
	B	235	225	215	215	195	370-500	26	25	24	22	21	0	27°
	C												-20	
	D												-	
Q275	A												-	-
	B	275	265	255	245	225	410-540	22	21	20	18	17	+20	
	C												0	27
	D												-20	

Notes:

- The yield strength value of Q195 is for reference only and is excluded from the delivery conditions.
- For those steel products whose thickness is larger than 100mm, the low limit of tensile strength is allowed to decrease by 20N/mm<sup>2</sup>. The tensile strength upper limit of wide steel strip (including cutting steel plate) is excluded from delivery conditions.
- For those Q235B steel products whose thickness is less than 25mm, if the supplier can guarantee the impact absorption value is eligible, the testing is not necessary upon consent from the buyer.

Table 3

No.	Testing Direction	Cold bend test 180°, B-2a <sup>a</sup>	
		Steel thickness (or diameter) <sup>b</sup> /mm	
		≤60	>60-100
		Bending diameter d	
Q195	vertical	0	-
	transverse	0.5a	
Q215	vertical	0.5a	1.5a
	transverse	a	2a
Q235	vertical	a	2a
	transverse	1.5a	2.5a
Q275	vertical	1.5a	2.5a
	transverse	2a	3a

Notes:

- a. B is referred to as the width of sample, a is referred to as thickness or diameter of sample.  
b. When the thickness or diameter is larger than 100mm, the bending test is determined by both supplier and buyer through negotiation.

## 5.5 Surface Quality

Surface quality of steels shall meet relevant standards of steel plate, steel trip, profiled steel and steel rod.

## 6. Test Method

6.1 Testing items, sampling amount/method and testing method of each batch of steels, shall be compliant to the provisions of Table 4.

Table 4

SN	Item	Sampling amount/unit	Sampling method	Testing method
1	Chemical analyses	1(per furnace)	GB/T 20066	GB/T 223 series, and GB/T 4336 quoted in Chapter 2
2	Tensile	1	GB/T 2975	GB/T 228
3	Cold bend			GB/T 232
4	Impact	3		GB/T 229

6.2 for tensile and cold bend test, the longitudinal axial of steel plate or steel strip shall be upright on the rolling direction; the longitudinal axial of profiled steel and steel rod as well as confined steel sample shall be parallel with the rolling direction.

6.3 Longitudinal axial line of impacted sample steels shall be parallel with rolling direction. The impacted sample can remain a rolling face.

## **7. Examination Provisions**

7.1 Examination and acceptance of steels shall be carried out by technical supervision authority, and the buyer is entitled to examine and inspect any item stated in this code or the contract.

7.2 Steels shall be accepted in batches, each of which shall be composed of same number, including same furnace number, quality grade, variety, specification and state of delivery. Weight of each batch shall not exceed 60t.

Steels smelted in smaller furnace, or steels rolled from continuous casting are allowed to form mixed batch. This mixed batch shall be composed of same number of grade A or grade B, same smelting method and casting method and different furnace number. But the carbon content difference shall not be greater than 0.02%, and the Mn-content difference shall not be greater than 0.15%.

7.3 If result of Charpy (V-notch) impact test of steels is incompliant to the relevant provisions of Clause 5.4.6, the selected samples shall be rejected, and another two samples shall be selected from the rest products. For each selected sample, three testing units are selected respectively. These two group of testing units shall be ratified, otherwise, the batch of products cannot be delivered to the buyer.

7.4 Re-examination and acceptance of other testing items of steels shall be compliant to the provisions of GB/T 247 and GB/T 2101.

## **8. Package, Mark and Quality Certificate**

Package, mark and quality certificate of steels shall be compliant to the provisions of GB/T 247 and GB/T 2101.

Appendix A  
(Normative)

The impact absorption value of the small-size impact sample

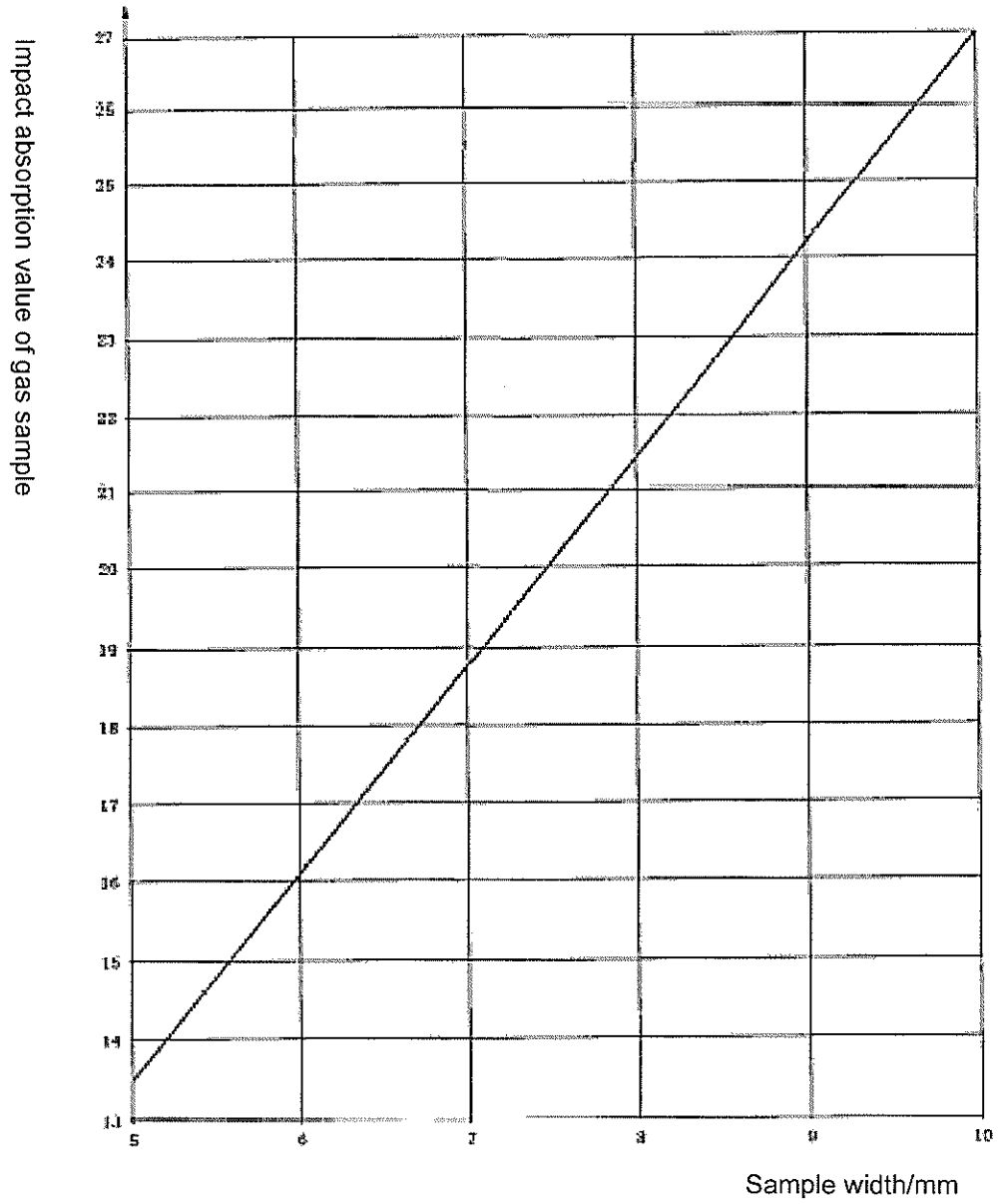


Figure A.1 Minimum impact absorption value of 5mm-10mm-wide impact sample