

Translated English of Chinese Standard: GB/T 13793-2016

[www.ChineseStandard.net](http://www.ChineseStandard.net)

[Sales@ChineseStandard.net](mailto:Sales@ChineseStandard.net)

# GB

NATIONAL STANDARD

OF THE PEOPLE'S REPUBLIC OF CHINA

ICS 77.140.75

H 48

## GB/T 13793-2016

Replacing GB/T 13793-2008

---

### Steel pipes with a longitudinal electric (resistance) weld

直缝电焊钢管

#### **How to BUY & immediately GET a full-copy of this standard?**

1. [www.ChineseStandard.net](http://www.ChineseStandard.net);
2. Search --> Add to Cart --> Checkout (3-steps);
3. No action is required - Full-copy of this standard will be automatically & immediately delivered to your EMAIL address in 0~25 minutes.
4. Support: [Sales@ChineseStandard.net](mailto:Sales@ChineseStandard.net). Wayne, Sales manager

**Issued on: August 29, 2016**

**Implemented on: July 01, 2017**

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

**Standardization Administration of PRC.**

## Table of contents

|                                                                                                           |    |
|-----------------------------------------------------------------------------------------------------------|----|
| Foreword.....                                                                                             | 3  |
| 1 Scope .....                                                                                             | 5  |
| 2 Normative references .....                                                                              | 5  |
| 3 Classification and code .....                                                                           | 9  |
| 4 Order content .....                                                                                     | 9  |
| 5 Size, shape, weight and allowable deviation .....                                                       | 10 |
| 6 Technical requirements .....                                                                            | 15 |
| 7 Test methods.....                                                                                       | 21 |
| 8 Inspection rules .....                                                                                  | 23 |
| 9 Marking, packaging and quality certificates .....                                                       | 24 |
| APPENDIX A (Normative) Uniformity test for galvanized layer - Copper sulfate<br>impregnation method ..... | 25 |
| APPENDIX B (Normative) Unit weight measurement of galvanized layer -<br>Antimony chloride method .....    | 27 |

## Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This standard replaces GB/T 13793-2008 "Steel pipes with a longitudinal electric (resistance) weld". As compared with GB/T 13793-2008, the main changes are as follows:

- MODIFY the scope of application;
- MODIFY the allowable dimensional deviations;
- MODIFY the allowable deviation of sizing length and length of double length;
- MODIFY the weight conversion factor of galvanized steel pipe;
- ADD the designation Q275, Q390, Q420, Q460; DELETE the designation Q295 AND its technical requirements;
- DELETE the post-weld cold and hot working methods from the manufacturing method;
- MODIFY the mechanical property requirements of Q195;
- ADD the sampling methods and sampling locations for tensile test;
- MODIFY the transverse tensile test requirements of welds;
- MODIFY the non-destructive testing requirements of welds in steel pipes;
- MODIFY the galvanized layer weight requirements;
- MODIFY the conversion factor of the unit weight and thickness of galvanized layer.

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

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

This standard was drafted by Zhejiang Jinzhou Pipeline Technology Co., Ltd., Tianjin Youfa Steel Pipe Group Co., Ltd., Tianjin Juncheng Steel Pipe Group Co., Ltd., Jinghua Innovation Group, National Petroleum and Natural Gas Pipeline Engineering Technology Research Center (Baoji Petroleum Steel Pipe Co., Ltd.), Anji Zhongyuan Pipe Industry Co., Ltd., Qian'an Zhengda Steel Pipe Co., Ltd., Metallurgical Industry Information Standards Institute.

# **Steel pipes with a longitudinal electric (resistance) weld**

## **1 Scope**

This standard specifies the classification and code, ordering content, size, shape, weight and allowable deviations, technical requirements, test methods, inspection rules, marking, packaging and quality certificates of the steel pipes with a longitudinal electric (resistance) weld.

This standard applies to the steel pipes with a longitudinal electric (resistance) weld which is used for machinery, construction and other structural purposes, AND for which the outer diameter is not greater than 711 mm; it is also applicable to the welded steel pipes for general fluid delivery services.

## **2 Normative references**

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.

GB/T 222 Permissible tolerances for chemical composition of steel products

GB/T 223.3 Methods for chemical analysis of iron, steel and alloy - The diantipyrylmethane phosphomolybdate gravimetric method for the determination of phosphorus content

GB/T 223.5 Steel and iron - Determination of acid-soluble silicon and total silicon content - Reduced molybdosilicate spectrophotometric method

GB/T 223.9 Iron, steel and alloy - Determination of aluminium content - Chrom azurol S photometric method

GB/T 223.11 Iron, steel and alloy - Determination of chromium content - Visual titration or potentiometric titration method

GB/T 223.12 Methods for chemical analysis of iron, steel and alloy - The sodium carbonate separation - Diphenyl carbazide photometric method for the determination of chromium content

GB/T 223.14 Methods for chemical analysis of iron, steel and alloy - The N-Benzoyl-N-Phenylhydroxylamine extraction photometric method for the determination of vanadium content

GB/T 223.16 Methods for chemical analysis of iron, steel and alloy - The chromotropic acid photometric method for the determination of titanium content

GB/T 223.18 Methods for chemical analysis of iron, steel and alloy - The sodium thiosulfate separation - The iodometric method for the determination of copper content

GB/T 223.19 Methods for chemical analysis of iron, steel and alloy - The NHCM - chloride-chloroform extraction photometric method for the determination of copper content

GB/T 223.23 Methods for chemical analysis of iron, steel and alloy - The dimethylglyoxime spectrophotometric method for the determination of nickel content

GB/T 223.32 Methods for chemical analysis of iron, steel and alloy - The hypophosphite reduction-iodometric method for the determination of arsenic content

GB/T 223.37 Methods for chemical analysis of iron, steel and alloy - The indophenol blue photometric method for the determination of nitrogen content after distillation separation

GB/T 223.40 Iron, steel and alloy - Determination of niobium content by the suphochlorosulfonol S spectrophotometric method

GB/T 223.53 Methods for chemical analysis of iron, steel and alloy - The flame atomic absorption spectrophotometric method for the determination of copper content

GB/T 223.54 Methods for chemical analysis of iron, steel and alloy - The flame atomic absorption spectrophotometric method for the determination of nickel content

GB/T 223.58 Methods for chemical analysis of iron, steel and alloy - The sodium arsenite-sodium nitrite titration method for the determination of manganese content

GB/T 223.59 Iron, steel and alloy - Determination of phosphorus content - Bismuth phosphomolybdate blue spectrophotometric method and antimony phosphomolybdate blue spectrophotometric method

GB/T 223.60 Methods for chemical analysis of iron, steel and alloy - The perchloric acid dehydration gravimetric method for the determination of silicon content

GB/T 223.61 Methods for chemical analysis of iron, steel and alloy - The ammonium phosphomolybdate volumetric method for the determination of phosphorus content

GB/T 223.62 Methods for chemical analysis of iron, steel and alloy - The butyl acetate extraction photometric method for the determination of phosphorus content

GB/T 223.63 Methods for chemical analysis of iron, steel and alloy - The sodium periodate (potassium) photometric method for the determination of manganese content

GB/T 223.64 Iron, steel and alloy - Determination of manganese content - Flame atomic absorption spectrometric method

GB/T 223.67 Iron, steel and alloy - Determination of sulfur content - Methylene blue spectrophotometric method

GB/T 223.68 Methods for chemical analysis of iron, steel and alloy - The potassium iodate titration method after combustion in the pipe furnace for the determination of sulfur content

GB/T 223.69 Iron, steel, and alloy - Determination of carbon contents - Gas-volumetric method after combustion in the pipe furnace

GB/T 223.71 Methods for chemical analysis of iron, steel and alloy - The gravimetric method after combustion in the pipe furnace for the determination of carbon content

GB/T 223.72 Iron, steel and alloy - Determination of sulfur content - Gravimetric method

GB/T 223.74 Methods for chemical analysis of iron, steel and alloy - The combustion gravimetric/gas-volumetric method for the determination of combined carbon content

GB/T 228.1 Metallic materials - Tensile testing - Part 1: Method of test at room temperature

GB/T 229 Metallic materials - Charpy pendulum impact test method

GB/T 241 Metallic materials - Tube - Hydrostatic pressure test

GB/T 242 Metallic materials - Tube - Flaring test

GB/T 244 Metallic materials - Tube - Bend test

GB/T 246 Metallic materials - Tube - Flattening test

GB/T 699-2015 Quality carbon structural steel

GB/T 700-2006 Carbon structural steels

GB/T 1591-2008 High strength low alloy structural steels

GB/T 2102 Acceptance, packing, marking and quality certification of steel pipe

GB/T 2650 Impact test methods for welded joint

GB/T 2651 Tensile test method on welded joints

GB/T 2975 Steel and steel products - Location and preparation of test pieces for mechanical testing

GB/T 4336 Carbon and low-alloy steel - Determination of multi-element contents - Spark discharge atomic emission spectrometric method (routine method)

GB/T 7735-2004 Steel tubes - The inspection method on eddy current test

GB/T 20066 Steel and iron - Sampling and preparation of samples for the determination of chemical composition

GB/T 20123 Steel and iron - Determination of total carbon and sulfur content - Infrared absorption method after combustion in an induction furnace (routine method)

GB/T 20125 Low-alloy steel - Determination of multi-element content - Inductively coupled plasma atomic emission spectrometric method

GB/T 21835 Dimensions and masses per unit length of welded steel pipes

SY/T 6423.2-2013 Petroleum and natural gas industries - Non-destructive testing (NDT) methods of steel tubes - Part 2: Automated ultrasonic testing of the weld seam of welded steel tubes for the detection of longitudinal and/or transverse imperfections

h) Use.

## 4.2 Special requirements

If agreed by the supplier and the buyer AND indicated in the contract, the buyer may select the following requirements:

- a) Hydraulic test;
- b) Manufacturing accuracy;
- c) Pipe end state;
- d) Removal of internal burrs;
- e) Weight of galvanized layer;
- f) Other requirements.

## 5 Size, shape, weight and allowable deviation

### 5.1 Outer diameter and wall thickness

**5.1.1** The nominal outer diameter (D) and nominal wall thickness (t) of steel pipes shall comply with the provisions of GB/T 21835. As required by the buyer AND through negotiation between the supplier and the buyer, it may supply the steel pipes of other sizes than those specified in GB/T 21835.

**5.1.2** The allowable deviation of outer diameter and wall thickness of steel pipe shall comply with the requirements of Table 1 and Table 2, respectively. When the contract does not indicate the allowable deviation level of steel pipe size, the allowable deviation of the outer diameter and wall thickness of the steel pipe used for belt conveyor shall be supplied at high accuracy, AND the allowable deviation of the outer diameter and wall thickness of other steel pipes shall be supplied at general accuracy.

As required by the buyer, through negotiation between the supplier and the buyer, AND indicated in the contract, it may supply the steel pipes of other allowable dimensional deviations than those specified in Table 1 and Table 2.

**Table 1 Allowable deviation of the outer diameter of steel pipe** in mm

**5.6.1** The weld burrs outside the steel pipe shall be cleared and flattened.

**5.6.2** The steel pipes for the belt conveyer idler shall be supplied after removing the inner burrs. As required by the buyer, other steel pipes of more than 25 mm outer diameter can be supplied after removing the inner burrs.

**5.6.3** When the steel pipes are supplied after removing the inner burrs, the inner weld burr height shall comply with the provisions of Table 4, AND after the burr is removed, the remaining wall thickness of the steel pipe shall be not less than the allowable minimum value of the wall thickness. If the steel pipe accuracy level does not specified in the contract, it shall follow the general accuracy. As required by the buyer, through negotiation between the supplier and the buyer, AND indicated in the contract, it may supply the steel pipe of other inner burr height than those specified in Table 4.

**Table 4 Inner burr height** in mm

| General accuracy | High accuracy    | Higher accuracy  |
|------------------|------------------|------------------|
| + 0.50<br>- 0.20 | + 0.50<br>- 0.05 | + 0.20<br>- 0.05 |

## 5.7 Weight

**5.7.1** The steel pipe shall be supplied based on either the theoretical weight or the actual weight.

**5.7.2** The theoretical weight per unit length of non-galvanized steel pipe is calculated in accordance with the equation (1) (the density of steel is 7.85 kg/dm<sup>3</sup>):

$$W = 0,024\ 661\ 5(D - t)t \quad \dots\dots\dots(1)$$

Where:

W - The theoretical weight per meter of steel pipe, in kilograms per meter (kg/m);

D - Nominal outer diameter of steel pipe, in millimeters (mm);

t - Nominal wall thickness of steel pipe, in millimeters (mm).

**5.7.3** The theoretical weight per unit length of galvanized steel pipe is calculated in accordance with the equation (2):

$$W' = cW \quad \dots\dots\dots(2)$$

Where:

Q345A, Q345B, Q345C, Q390A, Q390B, Q390C, Q420A, Q420B, Q420C , Q460C, Q460D in GB/T 1591-2008.

As required by the buyer AND through negotiation between the supplier and the buyer, it may supply the steel pipes of other designations.

**6.1.2** The chemical composition of the steel pipe shall be accepted based on the melting composition. When the buyer requires finished product analysis, it shall make indication in the contract; AND the allowable deviation of the chemical composition of the finished product shall comply with the provisions of GB/T 222.

## **6.2 Manufacturing methods**

Steel pipe shall be manufactured using hot-rolled steel strip or cold-rolled steel strip through high-frequency resistance welding method. When the buyer specifies the raw material of a certain rolling status, it shall be indicated in the contract.

## **6.3 Supply status**

The steel pipe shall be supplied in welded status or heat treatment status.

As required by the buyer, through negotiation between the supplier and the buyer, AND indicated in the contract, the steel pipe can be supplied at the overhaul heat treatment status or weld heat treatment status.

## **6.4 Mechanical properties**

### **6.4.1 Base metal tensile test**

**6.4.1.1** The tensile mechanical properties of steel pipe shall comply with the provisions of Table 6.

**Table 6 Mechanical properties of steel pipes**

Table 6. The samples for weld transverse tensile test shall be taken from a location perpendicular to the weld, to make the weld locate at the sample center.

### **6.4.3 Impact test**

As required by the buyer, through negotiation between the supplier and the buyer, AND indicated in the contract, the steel pipes of quality level B, C and D can be subjected to impact test. AND the impact energy absorption of the pipe, weld, and heat affected zone shall be determined by the supplier and the buyer through negotiation.

## **6.5 Process performance**

### **6.5.1 Flattening test**

**6.5.1.1** Steel pipes of an outer diameter greater than 60.3 mm shall be subjected to the flattening test. The length of the flattened sample shall not be less than 63.5 mm, AND the welds of the two samples shall be located at 90° and 0° to the force application direction, respectively. When the sample is flattened to the extent that the distance between the two plates is  $\frac{2}{3}D$  (OR the designations in Table 6 for which the yield strength is not less than 345 MPa are  $\frac{3}{4}D$ ), it is not allowed for the sample to have fracture or crack.

**6.5.1.2** As required by the buyer, through negotiation between the supplier and the buyer, AND indicated in the contract, the flattening test may continue the subsequent ductility test and the integrity test:

- a) The second step ductility test, when the distance between the two parallel plates is less than  $\frac{1}{3}D$  BUT not less than 5 times the wall thickness of the steel pipe, it is not allowed for the other parts than the sample inner and outer surface welds to have fracture or crack. When the ratio of the outer diameter to the wall thickness is less than 10, the fractures or cracks in the inner surface of the sample at 6 o'clock (bottom) and 12 o'clock (top) positions may not be used as the basis for judgment.
- b) The third step integrity test, CONTINUE the flattening until the sample breaks OR the opposite pipe walls contact; during the entire flattening process, it is not allowed to have delamination, defective material or incomplete weld.

### **6.5.2 Bending test**

The steel pipes of outer diameter not more than 60.3 mm can be subjected to bending test to substitute the flattening test. During the bending test, it is not allowed for the pipe to have filling materials, the bending radius is 6 times of the outer diameter of the steel pipe, AND the bending angle is 90°. The weld is

**6.7.3** The steel pipe of thickness not more than 6 mm can be subjected to eddy current testing. Eddy current testing acceptance level shall comply with the provisions of acceptance level A of GB/T 7735-2004.

**6.7.4** The supplier may use the ultrasonic or eddy current testing to substitute the hydraulic test. In case of dispute between the supplier and the buyer, the hydraulic test shall prevail.

## **6.8 Surface quality**

**6.8.1** The inner and outer surface of the steel pipe shall not be allowed to have cracks, scarring, folding, delamination, lap welding and over-burning defects. BUT it is allowed for the scratches, weld dislocations, burns, scales, and outer burrs removal marks which do not more than the wall thickness negative deviation.

**6.8.2** As for the steel pipe of outer diameter more than 219.1 mm, it is allowed to conduct repair welding against the defects at the base metal and weld. Before repair welding, it shall thoroughly remove the defects to make it comply with the repair welding requirements. The quantity of defect repair welding of each steel pipe shall not exceed 3, the length of each repair welding ranges 50 mm ~ 150 mm, AND the total length of the repair welding shall not exceed 300 mm. The repaired weld shall be grounded to ensure smooth transition with the original contour of the steel pipe surface. It is not allowed to conduct repair welding at the locations within 200 mm to the pipe end.

**6.8.3** If a hydraulic test is specified, the repaired steel pipe shall be subjected to a hydraulic test in accordance with 6.6.

**6.8.4** As for the steel pipe of outer diameter not more than 219.1 mm, it is not allowed for repair welding.

## **6.9 Galvanizing**

**6.9.1** As required by the buyer, through negotiation between the supplier and the buyer, AND indicated in the contract, the steel pipe shall be galvanized externally through hot dip galvanizing method before being supplied.

**6.9.2** The inner and outer surfaces of the galvanized steel pipe shall have a complete galvanized coating, AND be free from un-galvanized black spots or bubbles. BUT it is allowed for rough surface and zinc nodules locally.

**6.9.3** The galvanized steel pipe shall be subjected to galvanized layer uniformity test. The sample shall, after being continuously immersed in copper sulphate solution for 5 times, not turn red (copper-plated color).

weight level (if applicable). The quantity of each batch of steel pipes shall not exceed the provisions below:

- a) The steel pipes of outer diameter not more than 219.1 mm AND manufactured by each shift;
- b) If the outer diameter is greater than 219.1 mm BUT not more than 406.4 mm, 200 pieces;
- c) If the outer diameter is greater than 406.4 mm, 100 pieces.

### **8.3 Number of samples**

The number of steel pipe samples to be inspected shall be in accordance with Table 8.

### **8.4 Re-inspection and judgement rules**

The re-inspection and judgment rules of steel pipes shall comply with the provisions of GB/T 2102.

## **9 Marking, packaging and quality certificates**

### **9.1 Marking**

The marking of the steel pipe shall include at least the following: manufacturer name or trademark, product standard number, steel designation, product specification, classification and code, and traceable identification number.

The remaining requirements of the marking shall comply with the provisions of GB/T 2102.

### **9.2 Steel pipe packaging and quality certificate**

The packaging and quality certificate of the steel pipe shall comply with the provisions of GB/T 2102.

it. The sample shall be continuously immersed for 1 min; then immediately TAKE it out; CLEAN it in clean water; USE soft brush to remove all the black precipitate; USE soft cloth to wipe it dry.

**A.4.2** Except for the last immersion, the sample shall be immediately re-immersed in the solution.

**A.4.3** The same test solution shall be discarded after being used to immerse sample for 20 times; AND it is not allowed to use it again.

### **A.5 Judgement of results**

As for the samples subjected to continuous 5 times of immersion as specified AND the final cleaning and drying, it is not allowed for the sample base metal to have red color (copper-plated color), with the exception of red deposits of metallic copper within 25mm from the end of the sample AND within 10mm from the surface of the solution.

After the test described above, the adhesion of the red deposits of metallic copper on the sample can be determined by the following methods: IMMERSE it in the hydrochloric acid solution volume ratio (1:10) for 15 s; immediately PLACE it in flowing clean water and SCRUB it. If the galvanized layer appears again from the bottom surface, the sample is judged as qualified.

When there is dispute on availability of the galvanized layer at the bottom surface under the red deposit of the metallic copper, it may remove the red deposit of the metallic copper; and DROP one or several drops of diluted hydrochloric acid, if there is galvanized layer, active hydrogen will be generated. In addition, it may also use the zinc qualitative test for judgement, that is, USE a small piece of filter paper or pipette to collect the drop acid solution; USE ammonium hydroxide to neutralize it, to make it in weak acid; LEAD the hydrogen sulphide into solution to see whether there is white precipitation (zinc sulphide); CONDUCT judgement.

**B.3.5** The test solution can be reused as long as the galvanized layer can be easily removed.

#### **B.4 Calculation of test results**

The surface area of the test sample is calculated using the equation (B.1):

$$A = \pi(D + d)h \quad \dots\dots\dots ( B.1 )$$

Where:

A - Surface area of the sample after stripping the galvanized layer, in square meters (m<sup>2</sup>);

$\pi$  - Circumference, taken as 3.1416;

D - Actual outer diameter of the sample after stripping the galvanized layer, in meters (m);

d - Actual inner diameter of the sample after stripping the galvanized layer, in meters (m);

h - The length of the sample, in meters (m).

The reduced weight of sample after secondary weighing is calculated using the equation (B.2):

$$\Delta m = m_1 - m_2 \quad \dots\dots\dots ( B.2 )$$

Where:

$\Delta m$  - The reduced weight of the sample after the second weighing, in grams (g);

$m_1$  - The weight of the sample before stripping the galvanized layer, in grams (g);

$m_2$  - The weight of the sample after stripping the galvanized layer, in grams (g).

The weight of galvanized layer is calculated using the equation (B.3)

$$m_A = \Delta m / A \quad \dots\dots\dots ( B.3 )$$

Where:

**This is an excerpt of the PDF (Some pages are marked off intentionally)**

**Full-copy PDF can be purchased from 1 of 2 websites:**

1. <https://www.ChineseStandard.us>

- SEARCH the standard ID, such as GB 4943.1-2022.
- Select your country (currency), for example: USA (USD); Germany (Euro).
- Full-copy of PDF (text-editable, true-PDF) can be downloaded in 9 seconds.
- Tax invoice can be downloaded in 9 seconds.
- Receiving emails in 9 seconds (with download links).

2. <https://www.ChineseStandard.net>

- SEARCH the standard ID, such as GB 4943.1-2022.
- Add to cart. Only accept USD (other currencies - <https://www.ChineseStandard.us>).
- Full-copy of PDF (text-editable, true-PDF) can be downloaded in 9 seconds.
- Receiving emails in 9 seconds (with PDFs attached, invoice and download links).

Translated by: Field Test Asia Pte. Ltd. (Incorporated & taxed in Singapore. Tax ID: 201302277C)

About Us (Goodwill, Policies, Fair Trading...): <https://www.chinesestandard.net/AboutUs.aspx>

Contact: Wayne Zheng, [Sales@ChineseStandard.net](mailto:Sales@ChineseStandard.net)

Linkin: <https://www.linkedin.com/in/waynezhengwenrui/>

**----- The End -----**