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Rolls for Welding Steel Pipe

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Foreword

This Standard was drafted as per the rules specified in GB/T 1.1-2009.

This Standard was proposed by China Iron and Steel Association.

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

Drafting organizations of this Standard: Shandong Sifang Technical Development Co., Ltd., Shandong University, Zhangjiagang Jiejia Machinery Manufacture Co., Ltd., and New Metallurgy Hi-Tech Group Co., Ltd..

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Rolls for Welding Steel Pipe

1 Scope

This Standard specifies the technical requirements, test methods, inspection rules, mark, package, transportation, storage and quality certificate of the rolls for roll-forming straight-seam welding steel pipe.

This Standard is applicable to the forging rolls and casting rolls used in the production of roll-forming straight-seam welding steel pipe.

2 Normative Reference

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 document.

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 223.4 Methods for Chemical Analysis of Iron, Steel and Alloy – Determination of Manganese Content - Potentiometric Titration or Visual Titration

GB/T 223.5 Steel and Iron - Determination of Acid - Soluble Silicon and Total Silicon Content - Reduced Molybdosilicate Spectrophotometric Method

GB/T 223.11 Iron, Steel and Alloy - Determination of Chromium Content - Visual Titration or Potentiometric Titration Method

GB/T 223.13 Methods for Chemical Analysis of Iron, Steel and Alloy - the Ammonium Ferrous Sulfate Titration 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 Titaninm Content

GB/T 223.18 Methods for Chemical Analysis of Iron, Steel and Alloy - the Sodium

Thiosulfate Separation Iodimetric Method for the Determination of Copper Content

GB/T 223.20 Methods for Chemical Analysis of Iron Steel and Alloy - the Potentiometric Titration Method for the Determination of Cobalt Content

GB/T 223.23 Iron, Steel and Alloy-Determination of Nickel Content - the Dimethylglyoxime Spectrophotometric Method

GB/T 223.26 Iron, Steel and Alloy - Determination of Molybdenum Content - the Thiocyanate Spectrophotometric Method

GB/T 223.38 Methods for Chemical Analysis of Iron, Steel and Alloy - the Anion-Exchange Separation-Gravimetric Method for the Determination of Niobium Content

GB/T 223.43 Iron Steel and Alloy - Determination of Tungsten Content - Gravimetric Method and Spectrophotometric Method

GB/T 223.85 Steel and Iron - Determination of Sulfur Content - Infrared Absorption Method after Combustion in an Induction Furnace

GB/T 223.86 Steel and Iron - Determination of Total Carbon Content - Infrared Absorption Method after Combustion in an Induction Furnace

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 230.1 Metallic Materials - Rockwell Hardness Test - Part 1: Test Method (Scales A, B, C, D, E, F, G, H, K, N, T)

GB/T 1503-2008 Cast Steel Rolls

GB/T 1804-2000 General Tolerances - Tolerances for Linear and Angular Dimensions without Individual Tolerance Indications

GB/T 1958-2004 Geometrical Product Specifications (GPS) - Geometrical Tolerance - Verification Prescription

GB/T 3177 Geometrical Product Specifications (GPS) - Inspection of Plain Workpiece Sizes

GB/T 4336 Carbon and Low-Alloy Steel - Determination of Multi-Element Contents -Spark Discharge Atomic Emission Spectrometric Method (Routine Method)

GB/T 13313 Methods of Shore and Leeb Hardness Testing for Rolls

3.5 Forging roll blank

3.5.1 The technical requirements of forging roll blank shall conform to the provision of YB/T 036.7.

3.5.2 Completely remove the macroscopic defects from the surface of the forging ingot; the materials with defects shall not be used for forging.

3.5.3 When forging the roll blank with the rolling material or forging material; generally the forging ratio is not considered; however, for the steel billet with large cross-section size, its upsetting forging ratio shall be ≥ 1.5 ; when forging, only stretch the non-upsetting ones; its stretching forging ratio shall be ≥ 1.7 . When using steel ingot to forge the roll blank, the forging ratio shall be ≥ 3 .

3.5.4 The machining allowance and dimension tolerance of forging roll blank shall meet the requirements of YB/T 036.8.

3.5.5 The macrostructure of forging roll blank shall be free from white spots, internal cracks, and the like defects. Its microstructure shall conform to the provision of relevant corresponding steel grade standard.

3.5.6 The surface of forging roll blank shall be free from slight local cracks, overlapping and the like defects; its depth shall not exceed 1/2 of one-way machining allowance.

3.5.7 The forging-post roll blank shall be annealed immediately; the hardness after annealing shall conform to the provision of corresponding steel grade standard.

3.6 Casting roll blank

3.6.1 If the working surface of casting roll blank has slight defects, its depth shall not exceed 1/2 of one-way machining allowance.

3.6.2 Each roll blank shall reserve no less than 2 co-joined chemical composition specimens; the size of which shall be no less than 30mm×30mm×20mm.

3.7 Roll working surface hardness, hardness uniformity

Table 6 Roll Working Surface Hardness, Hardness Uniformity

Specification	Roll Type	Working Surface Hardness HRC	Hardness Uniformity HRC
<Φ168	Forming, sizing, straightening	56~62	3
≥Φ168	Fine-forming, sizing, straightening, composite side-squeezed roll, and bottom roll	56~62	4
All	Rough-forming	56~60	4
All	Composite top squeezed roll, double-roll-type squeezed roll	47~52	3

are less than the 20% of full scale, the internal radial ultrasonic flaw detection allows no existence of bottom-wave attenuation zone and crack defects.

3.13 Others

If special demands are required, then they shall be agreed by both purchaser and supplier.

4 Test Methods

4.1 The roll chemical composition shall be tested as per the provisions of GB/T 223.3, GB/T 223.4, GB/T 223.5, GB/T 223.11, GB/T 223.13, GB/T 223.16, GB/T 223.18, GB/T 223.20, GB/T 223.23, GB/T 223.26, GB/T 223.38, GB/T 223.43, GB/T 223.85, GB/T 223.86 or GB/T 4336. Arbitration analysis shall be performed as per the provision of GB/T 223. The allowable deviation of the chemical composition shall conform to the provision of GB/T 222.

4.2 The roll pass shall be tested as per the method of A 6.5 linear contour error detection code 1-2 in Appendix A of GB/T 1958-2004; and use the pass template approved by both the purchaser and supplier to test.

4.3 The measurement of other roll geometric dimension shall be performed as per the provision of GB/T 3177.

4.4 The test of roll shape and position tolerance shall be performed as per the provision of GB/T 1958-2004.

4.5 The measurement of roll surface roughness shall adopt specimen comparison method of roughness. When measurement results are controversial, other measuring instrument can be used to measure.

4.6 The roll working surface hardness shall be tested as per the provision of GB/T 230.1; or use Richter or Shore Hardness Tester to test; the test results shall perform hardness conversion as per the provision of GB/T 13313.

4.7 The tensile strength of roll working layer shall conform to the provision of GB/T 228.1.

4.8 The impact toughness of roll working layer at room temperature shall adopt specimen with size of 10mm×10mm×55mm and without notch to test as per the provision of GB/T 229.

4.9 The measurement of roll surface quality shall adopt visual observation method.

4.10 The magnetic particle flaw detection of roll working surface shall be performed as per the provision of GB/T 15822.1-GB/T 15822.3.

the same material, the same manufacturing process can be used for judgement agreed by both parties; the sampling position for the inspection of mechanical property shall be the axial of the test roll; the quantity of inspection shall be agreed by both parties; the results shall conform to the provisions of 3.8, 3.9, 3.10.

5.7 Ultrasonic flaw detection, for the rolls with diameter $\leq \phi 300\text{mm}$, sampling 20% per batch to test; if 1 piece of roll is tested defect beyond tolerance, such batch of rolls shall be inspected piece by piece; for the rolls with diameter $> \phi 300\text{mm}$, they shall be inspected piece by piece; the results shall conform to the provisions of 3.12.

6 Mark, Package, Transportation, Storage and Quality Certificate

6.1 Mark

The rolls shall be marked piece by piece. The marking contents include manufacturer logo, roll material grade, roughcast manufacturing process, production date, and relevant symbols required by the purchaser. The engraving position and quality shall be indicated in the booking diagram or booking contract.

6.2 Package, Transportation, Storage

6.2.1 Before packaging, rolls shall be cleaned, after that coat the anti-rust oil; when the oil film is dried, pack the rolls; the package of the rolls shall meet the condition that they shall be stored indoors for 6 months without corrosion.

6.2.2 The packaging method and materials shall ensure the rolls, under normal transportation, loading and unloading conditions, not to be damaged or corroded.

6.2.3 During transporting period, the rolls shall be ensured not to suffer damage, moisture or rain.

6.2.4 Rolls shall be placed in the dry and ventilated indoor environment.

6.3 Quality certificate

The Quality Inspection Department shall fill in the quality certificate, the contents of which shall include supplier name, address, contact phone, and etc..

- a) Purchaser name;
- b) Contract number, product standard number;
- c) Roll name, specification, purchaser diagram number, material, supplier number;

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