YB

FERROUS METAL INDUSTRY STANDARD

OF THE PEOPLE'S REPUBLIC OF CHINA

ICS 77.140.75

H 48

YB/T 4164-2007

Double wall copper-brazed steel tubing

双层铜焊钢管

Issued on: May 29, 2007 **Implemented on: November 01, 2007**

Issued by: National Development and Reform Commission, People's Republic of China

Table of Contents

Double wall copper-brazed steel tubing

1 Scope

This Standard specifies the size, shape, weight, technical requirements, test methods, inspection rules, packaging, marks and quality certificate of double wall copper-brazed steel tubing.

This Standard is applicable to the double wall copper-brazed steel tubing that uses copper as brazing material used to make brake tubing, fuel tubing, lubricating oil tubing, heating or coolers and other engineering pipelines in automobile, refrigeration, electric heating, electrical appliances and other industries.

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 228, *Metallic materials - Tensile testing* (GB/T 228-2002, eqv ISO 6892: 1998)

GB/T 241, *Metal materials - Tube - Hydrostatic pressure test*

GB/T 242, *Metal materials - Tube - Drift-expending test* (GB/T 242-1997, eqv ISO 8493: 1986)

GB/T 244, *Metallic materials - Tube - Bend test method* (GB/T 244-1997, eqv ISO 8491:1986)

GB/T 246, *Metallic materials - Tube - Flattening test* (GB/T 246-1997, eqv ISO 8492: 1986)

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

GB/T 7735-2004, *Steel tubes - The Inspection Method on Eddy Current Test* (GB/T 7735-2004, ISO 9304: 1989, MOD)

GB/T 10125, *Corrosion tests in artificial atmospheres - Salt spray tests* (GB/T 10125-1997, eqv ISO 9227: 1990)

5 Technical requirements

5.1 Technical requirements for steel strips

The technical requirements of copper-plated steel strip for tubing making shall comply with YB/T 069.

5.2 Production method

The steel tube shall be manufactured by coiling the copper-locked steel strip into two turns, heating and needle welding in a reducing atmosphere to form a double-layer pipe wall. Agreed by the supplier and the purchaser and indicated in the contract, it is also possible to use a manufacturing method of drawing a double-layer brazed steel tube of a certain specification into another specification.

5.3 Mechanical properties

The mechanical properties of steel tube that has not been straightened and processed shall meet the requirements of Table 4. Agreed by the supplier and the purchaser and indicated in the contract, the mechanical properties of steel tube can also be subject to regulations other than Table 4.

Table 4 -- Mechanical properties of steel tube

Tensile strength R_m, MPa	Yield strength R_{eL}, MPa	Elongation after breaking A, %
≥290	≥180	≥25

5.4 Process test

5.4.1 Composite test of flattening and bending

Steel tube shall be subjected to the composite test of flattening and bending. The pressure plate squashes the steel tube with the sample length of 50mm~100mm to contact with the inner wall. The direction of the welding seam and the flattening force is 90°. The flattened sample is bent 90° around an axis with a diameter equal to 6 times the wall thickness of the steel tube along the axis of the tubing. Straighten it. The sample after the test shall not have cracks, breaches or weld cracks.

5.4.2 Flaring test

Steel tube shall be subjected to flaring test. Sample length is 50mm~100mm. The top center taper is 12°. The outer diameter flaring rate is 20%. The sample after the test shall not have cracks, breaches or weld cracks.

5.4.3 Bending test

otherwise specified in the contract, the compactness test is selected by the manufacturer. Either eddy current defect inspection or air tightness inspection can be used, or both inspections can be selected at the same time.

Eddy current defect inspection and air tightness inspection shall meet the following requirements:

a) Eddy current defect inspection shall be in accordance with acceptance level A of GB/T 7735. Agreed by both parties, the manufacturer can also use other higher acceptance levels.

b) The test pressure for air tightness inspection of steel tube is 1.55MPa~1.73MPa. The shortest holding time is 5min. The pressure in the pipe shall not drop. When the steel tube that has passed the eddy current defect detection inspection is further tested for air tightness, the lower limit of the test pressure is 0.6MPa.

5.7 Surface quality

The inner and outer surfaces of the steel tube shall be clean and smooth. There shall be no harmful defects that affect the use.

5.8 Inner surface cleanliness

Steel tube shall be checked for cleanliness of the inner surface. Residues on internal surface cleanliness shall not exceed 0.16g/m^2.

5.9 Outer plating layer

5.9.1 The requirements of the copper plating layer of the steel tube and the choice of the outer surface corrosion protection layer are determined by the supplier and the purchaser through negotiation.

NOTE: The copper plating layer on the surface of the steel tube is the product of the steel tube manufacturing process, not the protective layer of the steel tube. The requirements for the copper layer on the surface of the steel tube shall be negotiated by the supplier and the purchaser.

5.9.2 Required by the purchaser, the outer surface of automotive steel tube can be galvanized or coated with other corrosion protection layers. Refer to Annex D for the galvanized corrosion-resistant protective layer on the outer surface of the steel tube.

6 Test methods

6.1 The size and shape of the steel tube shall be measured one by one with a

composed of steel tubes of the same heat number, the same designation, and the same specification. The number of steel tubes in each batch does not exceed 100km.

7.3 Sampling quantity

The sampling quantity for various performance inspections of each batch of steel tubes shall meet the requirements of Table 5.

7.4 Rules for reinspection and determination

The rules for reinspection and determination of steel tubes shall comply with GB/T 2102.

8 Packaging, marks and quality certificate

8.1 Strip steel tubes shall be bundled into bundles. Each bundle shall be wrapped with moisture-proof paper or plastic tape (bag), and then wrapped with plastic woven tape or sack. It can also be wrapped in moisture-proof paper or plastic tape (bag) and packed into a special wooden (iron) box.

8.2 The coiled steel tubes shall be wrapped with moisture-proof paper or plastic tape (bag), and then wrapped with plastic woven tape or sack. It can also be wrapped in moisture-proof paper or plastic tape (bag) and packed into a special wooden (iron) box.

8.3 Both ends of the steel tube shall be dust-proof. It can be plugged, capped, sleeved or flattened.

8.4 Special packaging methods can be negotiated between the supplier and the purchaser.

8.5 The mark and quality certificate of the steel tube shall meet the requirements of GB/T 2102.

Annex C

(normative)

Test method for cleanliness of inner surface

C.1 Sample

C.1.1 The total length of the steel tube sample shall not be less than 12m. It can be divided into multiple-section operations. The length of each section should be greater than 1.5m.

C.1.2 Prevent dust and debris from entering the tube when sampling. Clean the end of the tube after sampling.

C.2 Solvents

C.2.1 Use refined chloroform, trichloroethylene or carbon tetrachloride as solvent.

C.2.2 The solvent volume is 100mL.

C.2.3 Pay attention to environmental protection when using solvents.

C.3 Methods

C.3.1 Use solvent to clean the inner surface of all samples.

C.3.2 Pour the cleaned solvent into a clean container with a known weight. Use a steam or low-temperature electric furnace to heat the container to evaporate the solvent. And dry at a temperature of 100°C~110°C until the steam is completely removed (be careful not to overheat the container to prevent carbonization of the residue) before weighing.

C.3.3 The weight of the sample is subtracted from the previous two times to obtain the residual weight of the sample. Calculate the number of grams of residue per square meter of cleanliness of the inner surface of the steel tube.

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

------ The End ------