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

GB/T 17791-2017

Replacing GB/T 17791-2007

**Seamless copper and copper alloy tubes for air conditioning
and refrigeration equipment**

空调与制冷设备用铜及铜合金无缝管

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1 Scope

China's national product standard for the seamless copper tube that carries refrigerant. It specifies the requirements, the test methods, the inspection rules, the packaging, marking, transport, storage and quality certificate, and the content of the purchase order or contract for seamless copper and copper alloy tubes used in household air conditioners, refrigerators and freezers, small and medium central air conditioning, and refrigeration equipment. Refrigerant tube is a component with an unusual failure economics. It is cheap, it is used by the kilometre, and a single pinhole empties the charge, kills the appliance and cannot be repaired in the field. So the standard is written around the defects that produce pinholes rather than around bulk strength. Wall thickness and its uniformity come first - a tube thinned on one side by an eccentric mandrel fails there under pressure cycling and vibration. Then the inner surface: residual drawing lubricant, carbon film and oxide left inside the tube contaminate the refrigerant circuit, break down the compressor oil and block the capillary, so the standard sets the residual carbon and cleanliness limits and how they are measured. Then the mechanical condition, since the tube must be soft enough to bend and flare during assembly without cracking, which the drift-expanding and flattening tests demonstrate, while being strong enough for the working pressure - and the harder refrigerants raise that pressure considerably. Dimensional tolerance and straightness matter because the tube is fed into automatic bending and brazing machinery. The final chapter, on what a purchase order must state, is not filler: for a product supplied in dozens of alloy,

temper, size and coil combinations it is what prevents the wrong tube arriving. Issued on 12 July 2017 and in force since 1 February 2018, it replaces GB/T 17791-2007.

This standard specifies the requirements, test methods, inspection rules, packaging, marking, transportation, storage, quality certificates and purchase orders (or contracts) of seamless copper and copper alloys tube for air conditioner and refrigeration equipment. This standard applies to seamless copper and copper alloys tube (hereinafter referred to as tubes) for household air conditioners, refrigerators (freezers), small and medium-sized central air conditioners, refrigeration equipment.

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 228.1-2010 Metallic materials - Tensile testing - Part

3.1 Product classification

3.1.1 Designation, status and specification The designation, status and specifications of the tubes shall meet the requirements of Table

1. The dimensions of the inner and outer diameters of the tube coils shall meet the requirements of Table 2.

3.1.2 Marking example The product marking is expressed in the order of product name, standard number, designation (or code), status and specification.

3.3 Dimensions and allowable deviation

3.3.1 The external dimensions of the tube and its allowable deviation shall meet the requirements of Table 3 and Table 4.

3.9 Cleanliness

3.9.1 The internal surface residues (total amount) of soft annealing (O60) and light annealing (O50) tubes shall meet the requirements of Table 11.

3.9.2 Residues on the inner surface of copper tubes for refrigerators shall meet the requirements of Table 12.

3.10 Surface quality The inner and outer surfaces of the tube shall be clean and bright; there shall be no harmful defects that affect the use.

4 Test method

4.1 Chemical composition The analysis of the chemical composition of the tube shall be carried out in accordance with the provisions of GB/T 5121 (all parts) or YS/T482. The arbitration shall be carried out in accordance with the provisions of GB/T 5121 (all parts).

4.4 Flaring test The flaring test of the tube is carried out in accordance with the provisions of GB/T 242.

4.5 Flattening test The flattening test of the tube is carried out according to the requirements of GB/T 246.

4.6 Eddy current flaw testing The eddy current flaw testing of the tube shall be carried out in accordance with the provisions of GB/T 5248.

4.7 Grain size The grain size inspection of the tube shall be carried out according to the requirements of YS/T 347.

4.8 Hydrogen embrittlement test The hydrogen embrittlement test of the tube is carried out according to the closed bending method in GB/T 23606. The repeated bending method in GB/T 23606 is used for arbitration; the number of bending is at least 6 times.

4.9 Cleanliness The inspection of internal surface residues (total) of tubes with an outer diameter of ≤ 30 mm shall be carried out in accordance with Appendix A.

4.10 Surface quality Visually inspect the surface quality of the tube.

5.1 Inspection and acceptance

5.1.1 The product shall be inspected by the supplier, to ensure that the product quality meets the requirements of this standard and the purchase order (or contract). Meanwhile it shall fill in the quality certificate.

5.2 Group-batching The tubes shall be submitted for acceptance in batches; each batch shall be composed of the same designation, state, specification and processing method; the weight of each batch shall not exceed 10000 kg.

5.3 Inspection items The tube shall be inspected for chemical composition, external dimensions and allowable deviations, mechanical properties, flaring test, eddy current flaw detection, grain size, cleanliness residue (total), oil content, moisture and surface quality whilst it is exit-factory.

5.4 Sampling Sampling shall meet the requirements of Table

13. The sampling method is carried out in accordance with the provisions of YS/T 668.

6.1 Marking

6.1.1 Product marking The following marks shall be marked on the qualified tubes.

6.1.2 Packaging box marking The packaging box mark of the tube shall comply with the requirements of GB/T 8888.

6.2 Packaging

6.2.1 The packaging of tubes shall meet the requirements of GB/T 8888. The coil shall be sealed after being filled with protective gas.

6.3 Transport, storage and quality certificate The transport, storage and quality certificate of the tube shall meet the requirements of GB/T 8888.