No. AS1302214 N PURCHASE SPECIFICATION

Article name

PHOSPHOROUS DEOXIDE COPPER SEAMLESS TUBE	TRIAL	Production

1. List of quoted standards

JIS standards

JIS H 3300 " Copper and copper alloy seamless Pipes and Tubes
JIS H 0321 " General Rules for Inspection of Non-ferrous Metal Materials"
JIS H 0501 " Methods for Estimating Average Grain Size of Wrought Copper and Copper-Alloys"
JIS H 0502 " Method of Eddy Current Test for Copper and Copper-Alloy Pipes and Tubes"
JIS Z 2241 " Method of Tensile Test for Metallic Materials"
JIS Z 2245 " Method of Rockwell Superficial Hardness Test"

Purchase Specification

AS23B0058 "Methods for Refrigerant Piping,ProcessingandAssembly":ForRA
AS2300261 " Assembly and processing standardofrefrigerantpipingandhalf-finished products for R407C – R410A"
:For PA
ASB040004 " REQUIREMENTS RELATED TO SPECIFICCHEMICALSUBSTANCES"
ASB030013 "Machine oils to process tubes inside"

1. Scope of application

This specification applies to the phosphorous deoxidized copper seamless tubes to be used for piping in general, distributor tubes and headers of air conditioning and heating equipment at Daikin Industries Ltd.

2. Applicable standard

This standard is in accordance with JIS H3300 "Copper and Copper Alloy Seamless Pipes and Tubes".

The individual requirements for parts to be manufactured using these materials shall be in accordance with each part standard.

3. Standard specification

The specification of phosphorous deoxidized copper seamless tubes is as follows:
However, the items not specified shall be in accordance with JIS H3300 phosphorous deoxidized copper seamless tubes C1220T.

1. Class and designation

Alloy No.	C1220
Designation	C1220T
Temper Grade	O, 1/2H, H
Name	Phosphorous deoxidized seamless tubes

Method of indication of drawings

[Example] C1220T-O ø 6.4 . x t0.8 .
Class of tube Nominalsize Wall thickness

2. Appearance
Finish of the tube shall be fine and uniform. Flaws and pinholes detrimental to the use are unacceptable.

In addition, the tube inside and outside shall be clean and thoroughly dry.

3. Chemical composition

Chemical composition (%)	
Cu	P
99.90 or more	0.015 ~ 0.040

4. Mechanical properties

ΔAd ded ΔAdded

Designation	Outerdiameter [mm]	Wall thickness [mm]	Tensile strength [N/mm]	Elongation [%]	Rockwell hardness [HR30T]
C1220T-O	4 or more, 250 or less	0.25 or more, 30 or less	205 or more	44 or more, 59 or less	_____
C1220T-1/2H	4 or more, 250 or less	0.25 or more, 25 or less	245 to 325	_____	45 or more, 55 or less
C1220T-H	25 or less	0.25 or more, 3 or less	315 or more	_____	60 or more, 70 or less
	more than 25, 50 or less	1.5 or more, 6 or less			
	more than 50, 100 or less	1.5 or more, 6 or less			
	more than 100, 200 or less	2 or more, 6 or less	275 or more	_____	
	more than 200, 350 or less	3 or more, 8 or less	255 or more	_____	

Note)1. The value of tensile strength shall be at a temperature between 5 and 35℃.
2. The mechanical properties of those whose dimensions are outside of the specified range shall beinaccordance with the agreement between the parties of delivery concerned.

5. Crystal grain size
The crystal grain size of C1220T-O shall be 0.025 ~ 0.060 mm.

6. Dimensions and tolerance

(1) Tube dimensions and tolerance
Tube dimensions and tolerance shall be in accordance with JIS H 3300 Section 4.2 Standard dimensions, Section 4.3 Tolerance of diameter, Section 4.4 Tolerance of wall thickness. The matters related to the dimensions and tolerances outside of the standard specification shall be in accordance with agreement between the parties of delivery concerned.

(2) Tolerance of roundness

Note) Roundness:
It is the ratio of the differential between the maximum and minimum diameters measured on the random section of a tube against the designated outside diameter.

Thickness/outside diameter	Tolerance
0.01 or more 0.03 or less	3% or less of outside diameter 0.05 or
More than 0.03 less	2% or less of outside diameter 0.10 or less
More than 0.05	1.5% or less of outside diameter (*) 1.5% or less of
More than 0.10	outside diameter (*)

(*) if the calculated value is 0.1 mm is less, the tolerance shall be 0.1 mm.

Note) 1. These tolerances do not apply to the tubes of which temper grade is O.
2. The tolerance of those whose ratio of thickness/outside diameter is outside of the specified range shall be in accordance with the agreement between the parties of delivery concerned.

(3) Tolerance of length

Length [mm]	Tolerance [mm]		
	Outside diameter 25mm or less	outside diameter more than 25 mm to 100 mm or less	Outside diameter more than 100 mm
600 or less	0 ~ +2	0 ~ +3	0 ~ +3
More than 600 1800 or less	0 ~ +3	0 ~ +3	0 ~ +6
More than 1800 4200 or less	0 ~ +6	0 ~ +6	0 ~ +6
More than 4200 9000 or less	0 ~ +10	0 ~ +10	0 ~+10

Note) 1. The tolerance of those whose dimensions is outside of the specified range shall be in accordance with agreement between the parties of delivery concerned.

(4) Maximum value of bend Note) Bend: Depth of arc to the total length

Length [mm]		Maximum value [mm]
1000 or more	2000 or less	5
More than 2000	2500 or less	8
More than 2500	3000 or less	12

Note) 1. These values apply to the straight tubes of outside diameter of 6 mm or more up to 90 mm or less and do not apply to those of which temper grade is O.

2. The maximum value of tubes exceeding 3000 mm shall be 12 mm or less to 3000 m at any random place of the total length.

3. The maximum value of those whose dimensions are outside of the specified range shall be in accordance with agreement between the parties of delivery concerned.

7. Contamination control ΔAdded

Thevalue of contamination shall be40 mg/10 m or less.

Note) After the machine oil test is conducted by Daikin to evaluate the capability of attacking refrigerant and refrigerating oil (sealed tube test), only oils that satisfy the criteria shall be available and their name shall be specified in the manufacturing specification. If machine oil not yet evaluated is intended to be used, its name, the sample (approx. 500cc) of residual oil produced during manufacturing process shall be immediately submitted to the Quality Control Department.

8. Residual control ΔAdded

Outside diameter	value of residual
16 mm or less	25 mg/m2 or less
more than 16 mm	38 g/m2 or less

Test conditions

4. (1) Detailsoftest

The testshown below shall be carried out with the fabricated tubes and the results shall be checkedifthey satisfy the details if the above item"3. Standard Specification" or the criteria accordingtoJIS.

Chemical analysis	In accordance with JIS H 3300 clause 5.1 ChemicalAnalysis
Tensile test	In accordance with JIS Z 2241 Method of Tensile Test of Metals
Flaring test	It shall be carried out if the outside diameters is 100 mm or less In accordance with JIS H 3300 clause 5.5 Flaring Test
Grain test	The longitudinal section shall be tested in accordance with JIS H0501
Flattening test	It shall be carried out if the outside diameter is 50 mm or less In accordance with HIS H 3300 clause 5.6 Flattening Test
Eddy current test	It shall be carried out if the outside diameter is 50 mm or less In accordance with JIS H 3300 clause 5.7 Eddy Current Test and JIS H 0502 Eddy Current Test of Copper and Copper alloy Tubes
Rockwell hardness test	According Note 2)
Measurement of residual oil	According to AS23B0058 Clauses 4 to 7 "Method and Procedure for Measuring Contamination of Piping Parts by Gravimetric Method"

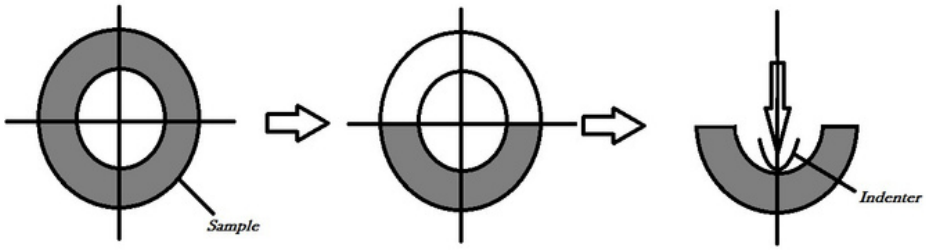
Note 1) Flaring and flattening tests

1. These tests shall not apply to the tubes of temper grade ½ and H
2. If either one of the tests is carried out with the tubes of temper grade O, no cracks shall occur on the upper surface.

Note 2) Rockwell hardness test ΔAdded

The test shall be in accordance with JIS Z 2245 “Method of Rockwell and Rockwell Superficial Hardness Test”.

The sample shall be pressed against the sample from the pipe inside. (Figure below)



(2) Test piece

The tensile test, the grain test, the flaring test, the flattening test and the Rockwell hardness test shall be carried out with the tubes of the same class, temper grade and section dimension. In principle, one test piece shall be picked out at random from every 100 pieces (if the mass if 100 pieces us less than 2000 kg, it shall be 2000kg). If a fraction comes out, one piece shall be picked out from this fraction as a test piece.

The eddy current test shall be carried out with the tubes of the same class, temper grade and section dimension. The number of the test piece equivalent to 0.2% of the total number shall be picked out at random for this test.

5. Inspection

(1) Dimension inspection related to the above item 3. Standard Specification

(2) The other general matters shall be in accordance with JIS H0321 “General Rules for Inspection of Non-ferrous Materials”

6. Indication

The following items shall be indicated in the tubes by each packing, each bundle and each roll or eacg product according to the proper method.

(1) Class, Grade and Temper Grade or their designations

(2) Dimensions

(3) Serial No.

(4) Manufacture’s name or its code

7. Test report

An inspection report (including test and inspection results) regarding the requirements of this standard shall be prepared in accordance with the form shown on the next page.

8. Maintenance of quality ΔAdded

Since these products are used for pressure containing parts, the maintenance of quality is important Therefore, the following items are required:

5-1. Even after the start if its delivery, the tests descried in the clauses 3 (1) to (6) shall be carried out with every lot and confirm that the quality of the materials used is maintained.
The test results of each lot shall be prepared in the form specified by Daikin and submitted every 3 month and whenever requests.

5-2. With regard to the clause 3 (7) to (8) ΔAdded the test results shall be stated in the delivery specification (AD). However, whether a test per every lot is required or not even after the start of its delivery shall be discussed with the Quality Control Dept.

5-3. The description of submitting the test results in accordance with the clause 5-1 shall be stated in the "Inspection Agreement" and attached to the delivery specification (AD).

9. Miscellaneous ΔAdded

5-1. Whenever a change of the content arises, it shall be amended after the consultation between both the parties.

5-2. Whenever the fabrication of the configuration exceeds the workability specified by JIS, the issue shall be individually solved between the piping fabricator and the material manufacturer.

5-3. Whenever a problem regarding the usage of the delivered product arises, it shall be immediately discussed and solved.