

EL741. Copper Alloys for Forging

[EL741-1999/5/2007-186]



1. Scope

The criteria shall apply to the raw material of copper alloy for forging (extruding stick-wire-pipe and drawing stick-wire-pipe; hereafter referred to as "material") and the product manufactured through removing-hammering process using the raw material (hereafter referred to as "processed product"). However, the product completed by using copper alloy for forging as parts shall be excluded.

2. Definitions

2.1

"Lead free" refers to that the level of lead content is very low because lead is not added when manufacturing copper alloy, and whether to be lead free or not shall be evaluated with the test result of lead solubility in on copper alloy.

2.2

"Low lead" refers to that the level of lead content is rather low in comparison with copper alloy with the same use.

Note. It is divided into "low lead" and "lead free" according to the level of the lead content in copper alloys and the test result of lead solubility at the given solubility conditions.

2.3

"Corrosion resistance" refers to the characteristic in which demetallization can be restrained in the condition of touching water and hydrophilic fluid, and the corrosion resistance shall be evaluated with the result of average corrosion depth test on copper alloy.

2.4

"Lead free and corrosion resistance" refers to what copper alloy satisfies the characteristics of 'lead free' and 'corrosion resistance' at the same time.

2.5

“Demetallization” refers to the corrosion generated by the discrepancy in propensity of ionizing among alloy components.

2.6

“Average depth of corrosion” refers to the corrosion level of copper alloy, and to the value of depth of corrosion showed all over the test sample that is measured in the micrometer (μm) unit when corroding the sample in accordance with the method of ‘ISO 6509(Corrosion of metals and alloys - Determination of dezincification resistance of brass)’.

2.7

“Fluid contact product” refers to the processed product that contacts directly water and hydrophilic fluid such as pipe arrangement materials and valve parts when using the products.

3. Certification Criteria

3.1 Environmental Criteria

3.1.1

With respect to the life span of product that affects the consumption of resource at the use stage, corrosion resistance of copper alloys material and processed products shall satisfy the following criteria. However, non-contact fluid products out of the processed products shall be excluded.

Item	Average Corrosion Depth
Corrosion resistance (including lead free corrosion resistance) Copper Alloys	$\leq 300\mu\text{m}$ ($\leq 100\mu\text{m}$, in case of hammered one)
Other Copper Alloys	$\leq 600\mu\text{m}$

3.1.2

With respect to the release of harmful substances at the use stage and the recycling capability of product at the disposal stage, it shall satisfy the following requirements.

3.1.2.1

With respect to the amount of lead solubility in copper alloy materials and processed products, when liquating in the following conditions, the lead solubility of the effluent

shall be 'not more than 1mg/L'

Category	Conditions of elution		
	Effluent	Amount of effluent per touching area	Temperature and time
Lead free(including lead free and corrosion resistant) Copper Alloys	4% Nitric acid	2mL/cm ²	For 30 min. maintaining 95°C
Corrosion Resistant Copper Alloys	Water	2mL/cm ²	For 30 min. maintaining 95°C
Low Lead Copper Alloys	Water	2mL/cm ²	For 30 min. maintaining 60°C

3.1.2.2

With respect to materials of low lead copper alloy (limited to free-cutting brass, brass for hammering and equivalent copper alloy) and processed products, the lead amount shall be not more than 20 g/kg.

Note) 'Free-cutting brass and brass for hammering' refer respectively to C3601~C3605 series and C3712, C3771 series among alloy numbers of KS D 5101(copper and copper alloy stick).

3.1.2.3

The cadmium contents of copper alloy ingot and cast iron products shall be not more than 0.1 g/kg.

3.2 Quality Criteria

3.2.1

Materials of copper alloy shall satisfy the quality standards of the KS D 5101 (Copper and Copper Alloy Stick). However, '3.1 Environmental criteria shall be excluded.

3.2.2

Materials of copper alloy that need cutting process shall be equivalent ^{note)} to or more than the cutting capability of copper alloy correspondent to the use by alloy number (or type of internationally registered alloy) of KS D 5101 (copper and copper alloy stick) to secure the easiness of processing.

Note) 'Equivalent' refers to the level in which there is no inconvenience in cutting process though the cutting capability of material to be certified is rather short of that of standard material.

3.3 Consumer Information

3.3.1

Indication of product types in accordance with lead solubility and corrosion resistance:

“Lead free and corrosion resistant”, “Lead free”, “Low lead”, and “Corrosion resistance”

3.3.2

Indication of proper use by product types (limited to materials)

4. Test Methods

Certification Criteria		Test and Verification Methods	
Environmental Criteria	3.1.1	Test report by an accredited testing laboratory in accordance with ISO 6509 (Corrosion of metals and alloys - Determination of dezincification resistance of brass)	
	3.1.2	3.1.2.1	Test report by an accredited testing laboratory in accordance with the test methods 4.1 and 4.2
		3.1.2.2	Test report by an accredited testing laboratory in accordance with KS D 1895 (Determination of lead in copper and copper alloys)
		3.1.2.3	Test report by an accredited testing laboratory in accordance with KS D ISO 5960(Copper alloys – Determination of cadmium content – Flame atomic absorption spectrometric method)
Quality Criteria	3.2.1	Test report by an accredited testing laboratory in accordance with KS D 5101 (copper and copper alloy stick) or certificate of equivalent	
	3.2.2	Test report by an accredited testing laboratory in accordance with the test 4.1 and 4.3	
Consumer Information		Verification of submitted documents	

4.1. General Matters

4.1.1

One test sample shall be required for each applied product. Only if more than one test sample is needed, the former requirement may not be met.

4.1.2

Test samples shall be collected at random by eco-label certification body from products in market or those in storage at the production site.

4.1.3

The result of test shall be numerically set according to KS Q 5002 (Statistical interpretation method of the data – Part 1: Statistical description of the data).

4.2 Test Methods of Lead Solubility

Note) This method is transformed and arranged in order to apply the '6. Apparatus and vessel-packaging criteria-standard, 3.Test methods, 6.Test methods of metal product, 2) Solubility test' of Food Industry Standard to the criteria of certification.

4.2.1

Specimen

In case of picking specimen, one of the following ways may be used.

4.2.1.1

Processed product whose area of part touching water and hydrophilic fluid is measured

4.2.1.2

Test sample taken by cutting some part of processed product or material. However, the test sample taken by cutting some of processed product or material, shall be taken from the part with the same quality as the surface of processed product touching directly water and hydrophilic fluid.

4.2.2

Preparation of Test Solution

4.2.2.1

Specimen shall be used after its surface is washed with hydrophilic organic solution ^{note1)} first, rinsed well with water ^{note2)} and then dried.

Note 1) For hydrophilic organic solution, isopropyl alcohol or one with more than equivalent cleansing capability of organic material shall be used.

Note 2) For water used in the test, 'distilled water' or 'purified water with less than 2µS/cm electricity conductive level' shall be used.

Note 3) Instead of cleansing manipulation using organic solvent, it may be cleaned by using supersonic cleanser for 10 minutes. At this time, water diluting kitchen detergent shall be used as cleansing solution.

4.2.2.2

Soak the specimen in the effluent heated to 95°C (or 60°C) in the ratio of 2mL per 1cm² of surface area.

4.2.2.3

Cover it with clock plate, maintain it at 95°C (or 60°C), agitate it time to time to flow out for 30 minutes and then use it as test solution.

4.2.3

Measurement of absorbency by using atomic absorption spectrometer (AAS)

4.2.3.1

Turn on light source lamp of AAS (use lead cavity cathod lamp) and control it to appropriate electric current number. Ignite acetylene gas or hydrogen gas, control the flowing amount of gas and compressed air and then spray some of test solution respectively on flame.

4.2.3.2

Measure the absorbency at the wavelength of 283.5nm.

4.2.3.3

In case of lead standard solution, the absorbency of lead standard solution processed in the same manner as each test solution shall be measured.

Note) Prepare of lead standard solution(5µg/mL): Dissolve 159.8mg lead nitrate in 0.1N nitric acid to make it 1,000mL. Take the solution by 5mL and add 0.1N nitric acid to it to make it 100mL.

4.2.4

Lead solubility shall be calculated in accordance of the following equation.

$$\text{Amount of Lead Liquefaction } [\mu\text{g/mL}] = 5[\text{mg/mL}] \times \frac{\text{SA}}{\text{ST}}$$

ST: Peak height of standard solution

SA: Peak height of test solution

4.3 Evaluation Methods of Cutting Performance

Data such as opinion letters in which objective cutting processing worker compares and evaluates the cutting performance (cutting resistance, shape of cutting scrap and so on) by cutting processing the standard material (KS) and the material to be certified with drilling machine and shelf, shall be applied to the test of cutting capability.

5. Reasons for Certification

5.1 Copper Alloy for Lead Free-Corrosion Resistant Forging

“Lead-free, High corrosion-resistant, reduced harmful substances”

5.2 Copper Alloy for Lead Free Forging

“Lead-free, reduced harmful substances”

5.3 Copper Alloy for Corrosion-resistant Forging

“High corrosion-resistant” or “Saving resources and energy”

5.4 Copper Alloy for Low Lead Forging

“Reduced harmful substances”

Common Criteria, Notice No. 2012-36, the Ministry of Environment

1. Eco-label products must follow the following provisions with regard to the proper treatment of environmental pollution substances, such as air and water wastes and noxious chemical substances emitted in the process of manufacturing or service operation.

A. When first applying for certification, the product manufacturer should observe the environment related laws and agreements pertaining to the region where the production factory or the place of service operation is located for a period of one year prior to the date of application. Any case of violation of the penalty clause will be verified by confirming documents involved during a period of one year to the date of application. Regarding any violation not related to the penalty clause, confirmation will be made on the completion of appropriate measures.

B. A person who has received a certification of eco-labeling shall observe the environment related laws and agreements pertaining to the region where the production factory or the place of service operation is located during the period of certification. However, regarding any violation besides a penalty, confirmation will be made on the completion of appropriate measures.

2. As a general rule, information for consumers shall be indicated on the surface of the product in such a way not to be easily erased. However, in case that indication on the surface of the product is impossible or undesirable, it can be indicated on the appropriate part such as product packaging, product guidebook and user's manual that consumers can recognize. However, the service information should be indicated inside and outside of the place of service operation. In case that indication inside and outside of the place of service operation is impossible or undesirable, it can be indicated on the appropriate part such as an agreement, letter of delivery, letter of guarantee, and PR materials that consumers can recognize.

3. In order to establish fair trade and to protect consumer, the applicant for eco-label and the holder of eco-label license shall observe the Act on the Fairness of

Indication and Advertisement with respect to the environmental aspects of the product.

4. For Various standards referred in the certification criteria by target product, the latest revised edition applies at the date of application, if not specified otherwise.

5. In applying the quality related criteria for each target product, if no standard is available that can be applied as the quality criteria, the president of Korea Environmental Industry & Technology Institute (KEITI) (hereafter referred to as "president of KEITI") may establish and operate the quality criteria for the product involved after review by a competent committee.