
INTERNATIONAL STANDARD



795

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**Aluminium and aluminium alloys – Determination of
copper content – Oxalyldihydrazide photometric method**

Aluminium et alliages d'aluminium – Dosage du cuivre – Méthode photométrique à l'oxalyldihydrazide

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up has the right to be represented on that Committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

Prior to 1972, the results of the work of the Technical Committees were published as ISO Recommendations; these documents are now in the process of being transformed into International Standards. As part of this process, Technical Committee ISO/TC 79 has reviewed ISO Recommendation R 795 and found it technically suitable for transformation. International Standard ISO 795 therefore replaces ISO Recommendation R 795-1968 to which it is technically identical.

ISO Recommendation R 795 was approved by the Member Bodies of the following countries :

Austria	Hungary	Spain
Belgium	Korea, Rep. of	Sweden
Brazil	India	Switzerland
Bulgaria	Ireland	Turkey
Canada	Israel	U.S.A.
Chile	Italy	U.S.S.R.
Czechoslovakia	Netherlands	Yugoslavia
Egypt, Arab Rep. of	Norway	
France	Poland	
Germany	South Africa, Rep. of	

The Member Body of the following country expressed disapproval of the Recommendation on technical grounds :

United Kingdom

The Member Bodies of the following countries disapproved the transformation of ISO/R 795 into an International Standard :

Switzerland
United Kingdom

Aluminium and aluminium alloys – Determination of copper content – Oxalyldihydrazide photometric method

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies an oxalyldihydrazide photometric method for the determination of copper content in aluminium and aluminium alloys.

The method is applicable to the determination of copper content between 0,002 and 0,8 % (*m/m*).

The method is not completely applicable in the special case of alloys with silicon contents exceeding 1 % (*m/m*), for which it should be modified as described in the annex.

2 PRINCIPLE

Attack with hydrochloric acid.

Formation between pH 9,1 and pH 9,5, in the presence of acetaldehyde, of the violet-coloured copper-oxalyldihydrazide complex, the optimum pH range being obtained by adding a controlled amount of ammonia.

Photometric measurement at a wavelength of about 540 nm.¹⁾

3 REAGENTS

During the analysis, use only reagents of recognized analytical reagent grade and only distilled water or water of equivalent purity.

3.1 Hydrochloric acid, ρ 1,19 g/ml, approximately 12 N.

3.2 Hydrofluoric acid, 40 % (*m/m*), ρ approximately 1,15 g/ml.

3.3 Nitric acid, ρ 1,23 g/ml, approximately 7,4 N.

Take 50 ml of nitric acid, ρ 1,40 g/ml, approximately 15 N, and make up the volume to 100 ml with water.

3.4 Sulphuric acid, ρ 1,48 g/ml, approximately 17,5 N solution.

Cautiously pour 50 ml of sulphuric acid, ρ 1,84 g/ml, approximately 35,6 N, into water and after cooling make up the volume to 100 ml.

3.5 Hydrogen peroxide, 36 % (*m/m*), ρ 1,12 g/ml, approximately 120 volumes.

3.6 Ammonia solution, ρ 0,90 g/ml, approximately 14,4 N.

3.7 Citric acid, 500 g/l solution.

Dissolve 500 g of citric acid ($C_6H_8O_7 \cdot H_2O$) in water and make up the volume to 1 000 ml.

3.8 Acetaldehyde, 400 g/l solution.

In a 1 000 ml volumetric flask, place 400 g of acetaldehyde (CH_3CHO), cool to approximately 5 °C, slowly add cooled distilled water (at about 5 °C), and make up the volume to 1 000 ml.

Store at a temperature of about 15 °C.

NOTE – Since heat is produced when water and acetaldehyde are mixed, and since acetaldehyde is very volatile (boiling point 21 °C), it is recommended that the vessel in which the mixing takes place should be cooled by cold water.

3.9 Oxalyldihydrazide, 2,5 g/l solution.

Dissolve 2,5 g of oxalyldihydrazide ($C_2H_6N_4O_2$) in warm water (40 to 50 °C) and, after cooling to 20 °C, make up the volume to 1 000 ml. Filter if necessary.

3.10 Copper, standard solution, corresponding to 1 g of Cu per litre.

3.10.1 In a tall-form beaker of suitable capacity (for example 400 ml), dissolve 1 g of electrolytic copper (not less than 99,95 %) in 10 ml of nitric acid (3.3) to which 20 ml of water have been added. Cover with a watch-glass. When completely dissolved, evaporate on a water bath until crystallization commences. Take up with water, transfer to a 1 000 ml volumetric flask, rinse and after cooling make up the volume to 1 000 ml with water.

1 ml of this solution contains 1 mg of copper.

Alternatively

3.10.2 Dissolve 3,929 6 g of copper(II) sulphate pentahydrate crystals ($CuSO_4 \cdot 5H_2O$) in water and make up the volume to 1 000 ml.

1 ml of this solution contains 1 mg of copper.

1) Aluminium is complexed by citric acid. Alloying elements or impurities present in aluminium and its alloys do not interfere.