

Metal and Quality LLC
Certified Reference Material
Certificate of Chemical Analysis
CA021
Copper



APPLICABILITY

Certified Reference Materials of Copper CA021 is intended for verification of analytical methods, for calibration of analytical instruments based on inert gas fusion methods

MEAN VALUES OF LABORATORIES

Lab. No.	Mass fraction in %
	O
1	0,000587
2	0,000592
3	0,000670
4	0,000692
5	0,000694
6	0,000704
7	0,000720
8	0,000729
9	0,000778
10	0,000790
11	0,000790
12	0,000800
13	0,000800
14	0,000840
15	0,000897
M(M)	0.000739
s(M)	0.000086

M(M) - Mean of intralaboratory means

s(M) - Standard deviation of the mean values of laboratories

CERTIFIED VALUES (mass fraction in %)

Element	O
Certified	0.00074
Uncertainty C(95%)	0.00005

Indicative content of Hydrogen is about 0.00019%

Uncertainty C(95%) estimated as the half-width confidence interval of Student's t-distribution, when n is the number of laboratory means

$$C(95\%) = \frac{t \cdot s(M)}{\sqrt{n}}$$

SPECIFICATION	Reference material made of copper as prepared for analysis pins with protective nickel coated diameter of 4.0 mm, weighing 1.0 gram
TRACEABILITY	The characterization of material has been achieved by means interlaboratory experiment in accordance to ISO Guide 35:2006. In each laboratory applied the methods of analysis of their choice
HOMOGENEITY	The homogeneity was evaluated according to ISO Guide 35:2006 (7.7.Evaluating a homogeneity study) and DSTU GOST 8.531:2002 "Reference materials of composition of solid and disperse materials. Ways of homogeneity assessment"
DELIVERY	Packing – 50 pins in glass bottle and Certificate
DATE OF ISSUE	October 2014
VALID	October 2032
SAFETY	CRM CA021 and packing does not contain explosives and radioactive substances and substances which might influence health and the environment
NOTE	Reference material should be stored in a tightly closed bottle in a dry place. When the bottle is opened for analysis, it should be stoppered immediately after use.

Samples extracted from the bottle using clean metallic tweezers and placed directly into a carefully cleaned weigher and boat devices of analyzer

PARTICIPATING LABORATORIES

Alchevsk Iron & Steel Works, Ukraine
 Azovelectrostal PJSC, Ukraine
 Asovstal Iron & Steel Works, Ukraine
 Dneprospetsstal (DSS) OJSC, Ukraine
 Energomashspetsstal (EMSS) OJSC, Ukraine
 E.O. Paton Electric Welding Institute, Ukraine
 Metpromservis LTD, Ukraine
 OSCAR Production Group, Ukraine
 Ukrainian Special Steels Institute (USSI) SE, Ukraine
 Zaporizhstal Steel Works, Ukraine
 Element Materials Technology, USA
 Institute for Ferrous Metallurgy (IMZ), Poland
 ENVIFORM a.s., Czech Republic
 LECO European Technical Centre Prague, Czech Republic
 ŽĎAS a.s., Czech Republic

THE METHODS USED

Inert gas fusion: chromatography with thermal conductivity (USSI), with infrared absorption - the rest laboratories

CRM CA021 registered in the Register of the Ministry of Industrial Policy of Ukraine under number GSZU 3-234-2014(1)

CONTACTS

Metal and Quality, LLC
 37 Nezalezhnoi Ukrain Street, Zaporozhye City, Ukraine
 Tel/fax: +38 061 717 1800
rm@rm.co.ua
<https://rm.co.ua>