

# Copper quality certificates (Bundesanstalt für Materialforschung Berlin, Germany)



Reference number 1.1/6129  
 Copy 2 of 3  
 Customer: Falk-Porsche-Technik-GmbH  
 Mr. Falk Porsche  
 Popowstraße 11  
 09116 Chemnitz  
 GERMANY  
 Date of order: 2008-05-08  
 No. of order: n.a.  
 Date of sample delivery: 2008-05-08  
 Date of testing: 2008-05-21/22  
 Place of testing: BAM Federal Institute for Materials  
 Research and Testing, Berlin-Adlershof  
 Description of the samples: Copper plate

#### Task of testing:

- Preparation of sub-samples for chemical analysis
- Chemical survey analysis concerning oxygen and metals
- Informative comparison of measurement results with DIN EN 1978:1998

#### Analytical procedures

Carrier Gas Hot Extraction (CGHE):  
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#### Glow Discharge Mass Spectrometry (GD-MS):

Ag, Al, As, Au, B, Ba, Be, Bi, Cd, Ce, Cl, Co, Cr, Cs, Dy, Er, Eu, Fe, Ga,  
 Gd, Ge, Hf, Ho, I, In, Ir, La, Li, Lu, Mg, Mn, Mo, Na, Nb, Nd, Ni, Os, P,  
 Pb, Pd, Pr, Pt, Rb, Re, Ru, S, Sb, Se, Si, Sm, Sn, Sr, Ta, Tb, Te, Th, Ti, Tl,  
 Tm, U, V, W, Y, Yb, Zn and Zr

#### Preparation of sub-samples for chemical analysis

Cubic pieces of about 1.4 g where prepared by sawing from one edge of the copper plate.

For GD-MS analysis from one edge of the copper plate a piece of 50 mm x 50 mm was prepared. The surface was turned on a lathe.

Not used sample material will be stored for 1 year. The results described in the test report are only valid for the investigated material. For publications of the test report or abstracts a written consent of the Federal Institute for Materials Research and Testing (BAM) is necessary.

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TEST REPORT



Test report No. 1.1/6129

#### Performing of the test procedures

##### Carrier gas hot extraction

The samples were etched before analysis for 1 min in 20 ml 30 % HCl and after washing for 3 min (HNO<sub>3</sub>, H<sub>3</sub>PO<sub>4</sub>, glacial acetic acid: 1+1+1). After subsequent washing in water and methanol the samples were dried in warm air. Analysis was performed using LECD TC-438 with EF500. Calibration was performed using Fe<sub>2</sub>O<sub>3</sub> (Ultramicrobalance). BAM-379/1 was used as control sample.

##### GD-MS

Analysis was performed using an ELEMENT GD. Presputtering was performed to remove surface contamination. The subsample was analysed on 3 different spots. Quantification was performed using the concept of Standard-Relative-Sensitivity-Factors, although synthetic copper standards have been measured in the same series.

#### Test results

The mass fraction of oxygen in the subsamples was found to be below the limit of determination of 5 mg/kg.

The mass fractions of the following elements in the subsamples were found to be below 0.01 mg/kg: Al, B, Ba, Be, Cd, Ce, Cs, Dy, Er, Eu, Gd, Ge, Hf, Ho, I, In, Ir, La, Li, Lu, Na, Nb, Nd, Pr, Pt, Re, Ru, Os, Sm, Sr, Ta, Tb, Th, Ti, Tl, Tm, U, V, W, Y, Yb and Zr.

With an uncertainty of factor two (coming from the concept of Standard-Relative-Sensitivity-Factors) on the reported values, the mass fractions (in mg/kg) of the following elements were found in the subsamples:

Ag	8.8	Fe	1.90	P	0.25	Si	0.05
As	0.12	Ga	0.03	Pb	0.84	Sn	0.33
Au	0.08	Mg	0.05	Pd	0.08	Te	0.14
Bi	0.10	Mn	1.22	Rb	0.01	Zn	0.33
Cl	0.01	Mo	0.01	S	8.7		
Co	< 0.01	Na	< 0.01	Sb	0.94		
Cr	0.04	Ni	0.21	Se	0.28		

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#### Interpretation

The values observed, are not inconsistent with material numbers CR001A and CR002A in "Copper and copper alloys - Copper cathodes" DIN EN 1978:1998.

Berlin, 2008-05-27

Federal Institute for Materials Research and Testing (BAM)

Division 1.1  
 Inorganic analytical chemistry,  
 Reference materials

by order

Dr. S. Recknagel  
 Acting head of Division



Working group 1.15  
 Primary calibration  
 materials; trace analysis

by order

Dr. H. Kipphardt  
 Head of working group



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**BAM**Bundesanstalt für  
Materialforschung  
und -prüfung**Test report No. 1.1/6279**1<sup>st</sup> copy of 2 copies

**Customer:** JV "Falk-Porsche-Technik  
GmbH/Deutsche Kabel-AG Taschkent"  
Bogishamol 276  
100058 Taschkent/Usbekistan

**Date of order:** 2011-04-06

**No. of order:** n.a.

**Date of sample delivery:** 2011-04-06

**Date of testing:** 2011-04-21/22

**Place of testing:** BAM Federal Institute for Materials  
Research and Testing, Berlin Adlershof

**Description of the samples:** Copper wire rod 17 mm

**Task of testing:**

- Preparation of sub-samples for chemical analysis
- Chemical survey analysis concerning oxygen and metals
- Informative comparison of measurement results with DIN EN 1978:1998

**Analytical procedures**

Carrier Gas Hot Extraction (CGHE):

O

Glow Discharge Mass Spectrometry (GD-MS):

Ag, Al, As, Au, B, Ba, Be, Bi, Cd, Ce, Cl, Co, Cr, Cs, Dy, Er, Eu, Fe, Ga,  
Gd, Ge, Hf, Ho, I, In, Ir, La, Li, Lu, Mg, Mn, Mo, Na, Nb, Nd, Ni, Os, P,  
Pb, Pd, Pr, Pt, Rb, Re, Ru, S, Sb, Se, Si, Sm, Sn, Sr, Ta, Tb, Te, Th, Ti, Tl,  
Tm, U, V, W, Y, Yb, Zn and Zr**Preparation of sub-samples for chemical analysis**Cubic pieces of about 1.0 g where prepared by sawing from one edge of  
the copper wire.

For GD-MS the copper wire was used after pressing and etching.

**Performing of the test procedures**Carrier gas hot extractionThe samples were etched before analysis for 1 min in 20 ml 30 % HCl and  
after washing for 3 min (HNO<sub>3</sub>, H<sub>3</sub>PO<sub>4</sub>, glacial acetic acid: 1+1+1). After  
subsequent washing in water and methanol the samples were dried in  
warm air. Analysis was performed using LECO TC-436 with EF500.

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Not used sample material will be stored for 1 year.

The results described in the test report are only valid for the investigated material.

For publications of the test report or abstracts a written consent of the Federal Institute for Materials  
Research and Testing (BAM) is necessary. Safety in technology and chemistry**TEST REPORT**

Calibration was performed using Fe<sub>2</sub>O<sub>3</sub> (Ultramicrobalance). BAM-379/1 was used as control sample.

**GD-MS**

Analysis was performed using an ELEMENT GD. Presputtering was performed to remove surface contamination. The subsample was analysed on 2 different spots. Quantification was performed using the concept of Standard-Relative-Sensitivity-Factors, although synthetic copper standards have been measured in the same series.

**Test results**

The mass fraction of oxygen in the subsamples was found to be below the limit of determination of 5 mg/kg.

The mass fractions of the following elements in the subsamples were found to be below 0.01 mg/kg: Al, B, Ba, Be, Cd, Ce, Co, Cs, Dy, Er, Eu, Ga, Gd, Ge, Hf, Ho, I, In, Ir, La, Li, Lu, Mo, Na, Nb, Nd, Pd, Pr, Pt, Rb, Re, Ru, Os, Sm, Sn, Sr, Ta, Tb, Th, Ti, Tl, Tm, U, V, W, Y, Yb and Zr.

With an uncertainty of factor two (coming from the concept of Standard-Relative-Sensitivity-Factors) on the reported values, the mass fractions (in mg/kg) of the following elements were found in the subsamples:

Ag	7.4	Cr	0.12	P	0.25	Si	0.03
As	0.13	Fe	5.0	Pb	1.1	Te	0.15
Au	0.15	Mg	0.06	S	11	Zn	2.2
Bi	0.015	Mn	2.3	Sb	0.84		
Cl	0.1	Ni	0.40	Se	0.48		

**Interpretation**

The values observed, are not inconsistent with material numbers CR001A and CR002A in "Copper and copper alloys - Copper cathodes" DIN EN 1978:1998.


Berlin, 2011-04-21

Federal Institute for Materials Research and Testing (BAM)

Division I.1

Inorganic analytical chemistry;  
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Acting head of Division



Working group I.15

Primary calibration  
materials; trace analysis

by order



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Head of working group

