



INSTITUTE OF NON-FERROUS METALS
Analytical Chemistry Department

CERTIFICATE OF ANALYSIS
Cupro-nickel NC series

The average results of chemical analyses in wt %

Element No.	NC 1	NC 2	NC 3	NC 4	NC 5
Ni	23,17	24,21	24,68	25,39	25,82
Al	-	0,0219	0,229	0,332	0,0749
Cd	0,0142	0,0189	0,0120	0,0049	0,0018
S	0,0709	0,0837	(0,0202)	0,0022	-
Sn	0,0374	0,0457	0,0171	0,0087	0,0044
Si	0,0854	0,196	0,0609	0,0197	0,0198
Zn	0,776	0,508	0,244	0,0099	0,0152
Co	0,0062	0,0115	0,0282	0,101	0,151
Fe	0,0501	0,290	0,106	0,426	0,369
Sb	0,0024	0,0049	0,0084	0,0113	0,0161
P	0,0147	-	0,0312	0,0113	0,0222
Mg	0,0016	0,0024	0,0561	0,0170	0,0861
As	0,0056	0,0104	0,0167	0,0251	0,0427
Mn	0,552	0,413	0,148	0,0172	0,0623
Pb	0,0025	0,0021	0,0027	0,0120	0,0409
Bi	0,0011	0,0046	0,0077	0,0117	0,0213
C	0,0320	(0,0026)	(0,0036)	0,0500	0,0050
Cu	The rest	The rest	The rest	The rest	The rest

Gliwice 2008

Director of the Insitute

Prof. Ph.D. Zbigniew Śmieszek

The uncertainty in wt % at the probability level of 0,05

Element No.	NC 1	NC 2	NC 3	NC 4	NC 5
Ni	0,09	0,18	0,14	0,070	0,060
Al	-	0,0007	0,0070	0,012	0,0018
Cd	0,0006	0,0008	0,0008	0,0003	0,0003
S	0,0033	0,0020	-	0,0003	-
Sn	0,0018	0,0016	0,0007	0,0005	0,0003
Si	0,0018	0,0022	0,0007	0,0014	0,0011
Zn	0,0025	0,0090	0,0022	0,0038	0,0008
Co	0,0004	0,0007	0,0013	0,0024	0,0060
Fe	0,0010	0,0024	0,0028	0,0090	0,0070
Sb	0,0002	0,0007	0,0003	0,0004	0,0006
P	0,0007	-	0,0008	0,0006	0,0013
Mg	0,0002	0,0003	0,0035	0,0023	0,0026
As	0,0002	0,0004	0,0006	0,0014	0,0005
Mn	0,012	0,0070	0,0017	0,0003	0,0024
Pb	0,0001	0,0002	0,0004	0,0005	0,0029
Bi	0,0001	0,0002	0,005	0,0008	0,0013
C	0,003	-	-	0,0070	0,0005
Cu	-	-	-	-	-

Analytical methods applied:

Ni - DMG gravimetric,

- electrolysis separation,

Al - atomic absorption,

- AES-ICP,

Cd - atomic absorption,

- AES-ICP

S - method of combusting and infrared determination of SO₂,

- AES-ICP,

Sn - spectrophotometric,

- atomic absorption,

Si - spectrophotometric (blue colour) after extraction,

- gravimetric, AES - spark

- Zn - atomic absorption,
- AES-ICP,
- Co - atomic absorption,
- AES-ICP,
- Fe - atomic absorption directly and after coprecipitation on lanthanum carrier,
- AES-ICP,
- Sb - atomic absorption after coprecipitation on $\text{Fe}(\text{OH})_3$ at pH 4,
- AES-ICP,
- P - spectrophotometric by molybdenum yellow complex,
- AES-ICP,
- Mg - atomic absorption,
- AES-ICP,
- As - atomic absorption after coprecipitation on $\text{Fe}(\text{OH})_3$
- spectrophotometric,
- AES-ICP,
- Mn - atomic absorption,
- AES-ICP,
- Pb - atomic absorption after coprecipitation on $\text{Fe}(\text{OH})_3$
- AES-ICP,
- Bi - atomic absorption after coprecipitation on $\text{Fe}(\text{OH})_3$,
- AES-ICP,
- C - method of combusting and infrared determination of CO_2 .
- AES-spark.

The chemical analyses have been carried out in four laboratories from Poland and Universal Scientific Laboratory PTY LTD from Australia, by various parallel methods. The cupro-nickel CRM were made by melting of all components in the coreless induction furnace and by casting into special cast iron moulds protecting elimination of segregation of the components during solidification. Homogeneity testing were made taking into account over 30% of the material produced. Investigation were carried out using atomic emission spectrometry method with low voltage spark. Homogeneity was estimated statistically with application of the test F. The set consists of 5 standard certified reference materials in form of discs 40 mm in diameter and ~30 mm height.

Application for:

- *atomic emission spectrometry with low voltage argon spark,*
- *XRF spectrometry.*

Certified Reference Materials NC series is stable in time

Sale:

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