INSTITUTE OF NON-FERROUS METALS

Analytical Chemistry Department
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CERTIFICATE OF ANALYSIS

Ni-brass

The average results of chemical analyses in wt %

No. / Element	WM 1	WM 2	WM 3	WM 4	WM 5
Ni	5,03	6,66	6,09	5,36	4,68
Al	0,083	0,050	0,033	0,0080	0,0012
Fe	0,011	0,022	0,077	0,13	0,22
Mn	0,38	0,53	0,19	0,011	0,0024
Co	0,021	0,017	0,011	0,0099	0,0021
P	0,0018	0,023	0,0052	0,0057	0,016
Mg	0,0054	0,019	0,0042	0,0027	0,00056
Pb	0,018	0,011	0,0073	0,0044	0,0020
As	0,00026	0,0030	0,0053	0,0072	0,0089
Cd	0,0046	0,022	0,0024	0,0021	0,00077
Sb	0,00098	0,013	0,0043	0,0059	0,0068
Sn	0,0036	0,011	0,098	0,075	0,035
Si	0,0026	0,0067	0,037	0,071	0,094
Bi	0,011	0,014	0,0055	0,0029	0,00070
S	0,017	-----	0,0073	0,0058	0,0030
C	0,0044	0,0052	0,0058	0,0072	0,0090
Cu	69,06	68,41	69,85	71,10	68,99
Zn	25,35	24,18	23,57	23,19	25,90

Director of the Institute

Prof. Ph.D. Zbigniew Śmieszek

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

No. / Element	WM 1	WM 2	WM 3	WM 4	WM 5
Ni	0,060	0,041	0,064	0,066	0,058
Al	0,0042	0,0014	0,0015	0,00049	0,00019
Fe	0,00058	0,0014	0,0015	0,0060	0,0080
Mn	0,0085	0,0038	0,0060	0,00080	0,00028
Co	0,0011	0,0017	0,0011	0,00043	0,00016
P	0,00026	0,0026	0,00030	0,00025	0,0014
Mg	0,00053	0,00060	0,00015	0,00010	0,000073
Pb	0,00097	0,00071	0,00020	0,00030	0,00018
As	0,000031	0,00022	0,00041	0,00030	0,00036
Cd	0,00022	0,00075	0,00021	0,00014	0,000049
Sb	0,000047	0,0010	0,00019	0,00063	0,00062
Sn	0,00044	0,0011	0,0025	0,0051	0,0014
Si	0,00020	0,00028	0,0036	0,0035	0,0027
Bi	0,00064	0,00090	0,00033	0,00028	0,000038
S	0,0012		0,00032	0,00026	0,00033
C	0,00061	0,00020	0,00068	0,00067	0,00067
Cu	0,089	0,16	0,20	0,15	0,084
Zn	---	---	---	---	---

Analytical methods applied:

Ni - atomic absorption, gravimetric, OES - ICP

Al - atomic absorption, OES - ICP, spectrophotometric

Fe - atomic absorption directly and after co - precipitation on Lanthanum carrier, OES - ICP

Mn - atomic absorption, OES - ICP

Co - atomic absorption, spectrophotometric, OES - ICP

P - titration, spectrophotometric, OES -ICP

Mg - atomic absorption, OES - ICP

Pb - atomic absorption after co - precipitation on Fe(OH)3, OES - ICP

As - spectrophotometric, atomic absorption after co - precipitation on Fe(OH)3, OES – ICP

Cd - atomic absorption, OES - ICP

Sb - atomic absorption after co - precipitation on Fe(OH)3 at pH 4, OES - ICP

Sn - spectrophotometric, atomic absorption

Bi - atomic absorption after co - precipitation on $Fe(OH)_3$ at pH 4, OES - ICP

Si - spectrophotometric after extraction, gravimetric

S - method of combusting and infrared determination of SO_2, OES-ICP, titration with alkali solution

C - gasometric

Cu - electrolysis

The chemical analyses have been carried out in two industrial laboratories and at the Institute of Non-Ferrous Metals by two parallel methods.
The Ni-brass SRM were made by melting of all components in the coreless induction furnace and by casting into special cast iron moulds preventing elimination of segregation of the components during solidification.
The set consists of 5 standard reference materials in form of discs 40 mm in diameter and 25 mm in height.