



INSTITUTE OF NON-FERROUS METALS

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CERTIFICATE OF ANALYSIS

Al bronzes

The average results of chemical analyses in wt %

Element	No.	BF 1	BF 2	BF 3	BF 4	BF 5
Fe		(6,2)	(5,4)	4,50	3,25	2,44
Al		10,90	9,96	9,58	9,12	8,35
Ni		2,49	3,54	4,43	5,24	6,03
Pb		0,23	0,15	0,11	0,059	0,014
Si		0,26	0,25	0,20	0,097	0,028
Sn		0,011	0,081	0,17	0,25	0,35
Mn		0,0059	0,12	0,28	0,39	0,50
Zn		0,57	0,40	0,27	0,10	0,018
As		0,061	0,050	0,038	0,022	0,0039
Sb		(0,0022)	(0,013)	0,028	0,037	0,048
Bi		0,00042	0,0025	0,0039	0,0057	0,010
P		(0,012)	0,053	0,098	0,13	0,16
Cu		the rest	the rest	the rest	the rest	the rest

Director of the Institute

Prof. Ph.D. Zbigniew Śmieszek

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

Element	No.	BF 1	BF 2	BF 3	BF 4	BF 5
Fe		---	---	0,076	0,083	0,089
Al		0,054	0,069	0,089	0,089	0,087
Ni		0,064	0,056	0,071	0,10	0,077
Pb		0,0055	0,0066	0,0074	0,0022	0,0013
Si		0,011	0,011	0,014	0,0099	0,0011
Sn		0,000073	0,0029	0,0096	0,011	0,0037
Mn		0,00052	0,0083	0,012	0,016	0,0068
Zn		0,010	0,0071	0,013	0,011	0,0012
As		0,0050	0,0013	0,0023	0,0011	0,00021
Sb		---	---	0,0031	0,0027	0,0051
Bi		0,000039	0,00043	0,00040	---	0,0011
P		0,00080	0,0054	0,0090	0,010	0,012

Analytical methods applied:

- Fe* - atomic absorption, spectral with ICP, volumetric with kalium dichromate
- Al* - complexometric, atomic absorption, spectral with ICP
- Ni* - gravimetric, atomic absorption, spectral with ICP
- Pb* - atomic absorption after separation on $Fe(OH)_3$
- Si* - spectrophotometric with ammonium molybdenate, spectral with ICP
- Sn* - atomic absorption
- Mn* - atomic absorption, spectral with ICP
- Zn* - atomic absorption, spectral with ICP
- As* - spectrophotometric with ammonium molybdenate
- Sb* - atomic absorption, atomic absorption after separation on MnO_2
- Bi* - atomic absorption after separation on $Fe(OH)_3$
- P* - titration

The chemical analyses have been carried out in three institute laboratories (IMN Gliwice, FNE Freiberg, ICM Płowdów) and three industrial laboratories.

The set consists of 5 reference materials in form of discs 40 mm in diameter and 25 mm in height.