



INSTITUTE OF NON-FERROUS METALS

Analytical Chemistry Department

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CERTIFICATE OF ANALYSIS

Sn - Zn - Pb bronze

The average results of chemical analyses in wt %

Element ^{No.}	BB 1	BB 2	BB 3	BB 4	BB 5	BB 6
Pb*	1,55	2,64	6,73	6,14	5,18	3,52
Sn*	8,10	7,11	3,36	2,58	4,11	5,47
Zn*	3,90	4,70	6,23	8,11	7,21	5,40
Mn	0,081	0,12	0,0012	0,020	0,054	0,15
Sb	0,60	0,49	0,052	0,21	0,31	0,62
Ni	0,061	0,097	0,421	0,317	0,49	0,23
Bi	0,032	0,024	0,0021	0,011	0,018	0,041
Fe	0,33	0,28	0,058	0,058	0,14	0,31
Si	0,037	0,055	0,0044	0,018	0,028	0,083
Al	0,019	0,032	0,0021	0,0062	0,0145	0,040
As	0,086	0,12	0,0079	0,029	0,051	0,16
P	0,055	0,085	(0,014)	0,030	0,037	0,12
Cu	84,82	84,09	83,64	82,84	82,25	83,54

* present but not certified for discs ϕ 40 mm

Director of the Institute

Prof. Ph.D. Zbigniew Śmieszek

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

Element ^{No.}	BB 1	BB 2	BB 3	BB 4	BB 5	BB 6
Pb	-	-	-	-	-	-
Sn	-	-	-	-	-	-
Zn	-	-	-	-	-	-
Mn	0,0032	0,010	---	0,00049	0,0021	0,0085
Sb	0,013	0,0097	0,0035	0,0085	0,018	0,017
Ni	0,0036	0,0074	0,0065	0,0056	0,030	0,0053
Bi	0,0024	0,0026	0,00024	0,0011	0,0015	0,0045
Fe	0,0094	0,011	0,0012	0,0039	0,0088	0,010
Si	0,0018	0,0021	---	0,0014	0,0012	0,0057
Al	0,00053	0,0014	---	0,00033	---	---
As	0,0026	0,0047	0,00037	0,00077	0,0016	0,0082
P	0,0025	0,0049	---	0,0014	0,0024	0,009
Cu	0,15	0,19	0,15	0,11	0,15	0,089

Analytical methods applied:

- Pb* - complexometry, atomic absorption, polarography
- Sn* - iodometry, atomic absorption, gravimetric
- Zn* - complexometry, atomic absorption, polarography
- Mn* - atomic absorption, spectrophotometry with MnO_4^- , titration
- Sb* - atomic absorption, bromometry, spectrophotometry
- Ni* - gravimetric, atomic absorption, photometric with dimethylglyoxime
- Bi* - spectrophotometric with xylene orange
- Fe* - atomic absorption, photometric with rhodanate, complexometric
- Si* - gravimetric, photometric with ammonium molybdenate
- Al* - spectrophotometric with eriochromocyanin
- As* - spectrophotometric in form of arsenic-molybdenum blue, iodometry
- P* - titration, colorimetry
- Cu* - electrolysis with determination of the remaining copper ions by means of atomic absorption

The chemical analyses have been carried out in three industrial laboratories and at the Institute of Non-Ferrous Metals. The set consists of 6 reference materials in form of discs 40 mm in diameter and 28 mm high.