



# INSTITUTE OF NON-FERROUS METALS

Analytical Chemistry Department

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## CERTIFICATE OF ANALYSIS

*Manganese - copper*

*The average results of chemical analyses in wt %*

Element No.	CK 1	CK 2	CK 3	CK 4	CK 5	CK 6
Mn	1,06	1,51	1,78	1,91	2,30	2,64
Pb	0,0021	0,0062	0,0098	0,017	---	---
Ni	0,44	0,38	0,27	0,13	0,011	0,073
Fe	0,029	0,11	0,17	0,26	0,29	0,40
Si	0,049	0,091	0,033	0,0025	0,011	0,21
Sn	0,13	---	0,075	0,042	0,0048	0,025
Zn	0,24	0,14	0,095	0,065	0,033	0,034
As	0,013	0,010	0,0095	0,0055	0,0015	0,0039
Sb	0,0049	0,0015	0,0026	0,0041	0,0051	0,0052
Ag	0,012	0,0094	0,0066	0,0041	---	0,0012
P	0,0011	0,0022	0,0043	0,0056	---	0,013
Cu	the rest	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.	CK 1	CK 2	CK 3	CK 4	CK 5	CK 6
Mn	0,026	0,015	0,032	0,029	0,014	0,034
Pb	0,026	0,00031	0,0014	0,00090	---	---
Ni	0,0089	0,012	0,0072	0,0050	0,0013	0,0016
Fe	0,0012	0,0042	0,0041	0,0061	0,0070	0,0074
Si	0,0033	0,0038	0,0017	0,00097	0,0070	0,0056
Sn	0,0064	---	0,0022	0,0012	0,00072	0,00038
Zn	0,011	0,0051	0,0027	0,0023	0,00058	0,0023
As	0,0012	0,0017	0,000059	0,00020	0,0012	0,00018
Sb	0,00041	0,00014	0,000040	0,00017	0,00070	0,000052
Ag	0,00096	0,00038	0,00030	0,00021	---	0,000021
P	0,00064	---	0,00032	0,00032	---	0,00088

*Analytical methods applied:*

- Mn - spectrophotometric, atomic absorption and spectral with ICP;*
- Fe - spectrophotometric, atomic absorption and spectral with ICP;*
- Ni - spectrophotometric, atomic absorption and spectral with ICP;*
- Pb - polarographic, atomic absorption after co-precipitation on carrier;*
- Si - gravimetric and spectral with ICP;*
- Sn - spectrophotometric, atomic absorption after co-precipitation, spectral with ICP;*
- Zn - polarographic, atomic absorption, spectral with ICP;*
- As - spectrophotometric, atomic absorption, spectral with ICP and distillation;*
- Sb - spectrophotometric, atomic absorption after co-precipitation;*
- Ag - atomic absorption, spectral with ICP;*
- P - spectrophotometric, titration and spectral with ICP.*

*The chemical analyses have been carried out in three industrial laboratories and at two institutes: IMN Gliwice and ICM Płowdiw.*

*The set consists of 6 reference materials in form of discs 40 mm in diameter and 30 mm in height.*