



INSTITUTE OF NON-FERROUS METALS

Analytical Chemistry Department

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CERTIFICATE OF ANALYSIS

Al brasses MA 77

The average results of chemical analysis in wt %

Element	No.	WO 1	WO 2	WO 3	WO 4
Al		1,40	1,77	2,14	2,50
As		0,057	0,041	0,014	0,030
Fe		0,13	0,049	0,028	0,022
Mg		0,00068	0,0068	0,0046	0,013
Bi		0,00028	0,0016	0,0046	0,0094
Ni		0,0045	0,027	0,10	0,067
Mn		0,014	0,15	0,051	0,074
Cd		0,013	0,032	0,038	0,0064
Pb		0,15	0,098	0,053	0,020
Sn		0,012	0,058	0,0071	0,13
Sb		0,0077	0,0013	0,0036	0,0059
Cr		0,011	0,0092	0,0026	0,00034
P		0,0025	0,0086	0,0056	0,013
Si		0,044	0,014	--	0,0016
Cu		79,09	77,88	77,63	76,21
Zn		the rest	the rest	the rest	the rest

Director of the Institute

Prof. Ph.D. Zbigniew Smieszek

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

Element	No.	WO 1	WO 2	WO 3	WO 4
Al		0,018	0,010	0,012	0,015
As		0,0018	0,0013	0,00074	0,0016
Fe		0,0027	0,0011	0,00069	0,00057
Mg		0,00002	0,00011	0,00010	0,00038
Bi		0,000021	0,000089	0,00014	0,00016
Ni		0,00019	0,00027	0,0040	0,00061
Mn		0,00077	0,0054	0,0016	0,00051
Cd		0,00036	0,00088	0,0011	0,00013
Pb		0,0047	0,00077	0,0011	0,00064
Sn		0,00069	0,0014	0,00012	0,0043
Sb		0,00014	0,00012	0,00011	0,00011
Cr		0,00047	0,00010	0,00011	0,000018
P		0,00016	0,000089	0,000045	0,00057
Si		0,00081	0,0012	--	0,00012
Cu		0,14	0,068	0,043	0,031

Analytical methods applied:

Al - inductively coupled plasma, atomic absorption

AS - inductively coupled plasma, atomic absorption

Fe - inductively coupled plasma, atomic absorption

Mg - inductively coupled plasma, atomic absorption

Bi - inductively coupled plasma, atomic absorption

Si - weight method, spectrophotometric

Ni - inductively coupled plasma, atomic absorption

Mn - inductively coupled plasma, atomic absorption

Cd - inductively coupled plasma, atomic absorption

Pb - inductively coupled plasma, atomic absorption

Sn - inductively coupled plasma, atomic absorption

Sb - inductively coupled plasma, atomic absorption

Cr - inductively coupled plasma, atomic absorption

P - inductively coupled plasma, spectrophotometric

Cu - titration method, electrolysis

The chemical analyses have been carried out in two industrial laboratories (WM "Dziedzice", HMN "Szopienice") and in the laboratory of the Institute of Non-Ferrous Metals. Al brasses CRMs were made by melting of all components in the coreless induction furnace and by casting into special cast iron moulds. Final product of CRMs has been manufactured in form of discs 39 mm in diameter and 35 mm height.