

C E R T I F I C A T E

SET OF CZECHOSLOVAK CERTIFIED REFERENCE MATERIALS

No: 12 – 1 – 10 Sinter Plant Flue Dust

No: 12 – 1 – 11 Foundry Flue Dust

No: 12 – 1 – 12 Waste Incineraton Fly Ash

These CRMs were prepared and certified in strict compliance with ISO GUIDE 35:1989 (E) and other ISO REMCO documents.

Candidate materials were collected during regular operation. They were sieved to obtain fraction below 0.1 mm and homegenized. They passed preliminary homogeneity test according to paragraph 5.3.2. of cited ISO GUIDE 35.

Homogenized material was divided into 30 g units in glass bottles. Both between samples and within sample homogeneity was tested according to paragraph 5.3.3. of ISO GUIDE. No inhomogeneity was found significant for the minimum analytical portion 0.2 g.

The certification was based on the interlaboratory programme carried out by 18 national and foreign laboratories. Several independent standardized analytical methods were used for each certified constituent. They included INAA, FAAS, ETAAS, hydride and cold vapor AAS, electrochemical methods, spectrophotometry, for matrix constituents XRF spectrometry, titrimetry and gravimetry as well. The interlaboratory programme was conducted and results evaluated in compliance with parts 8. and 9.3 of ISO GUIDE 35.

The uncertainty is expressed as 95% confidence interval of the certified value. It is based on laboratory means variation and expert extimate of other possible sources of uncertainty and valid for analytical portions above 0.2 g.

The informative values are given for these constituents with results not meeting the interlaboratory programme requirements (e.g. the minimum number of accepted laboratory means, acceptable uncertainty e.t.c.).

Environmentally relevant elements in $\mu\text{g} / \text{g}$ (ppm)

	No: 12 - 1 - 10	No: 12 - 1 - 11	No: 12 - 1 - 12
Ag	(1)	-	18 ± 3
As	(8)	(8)	45 ± 4
Ba	(150)	160 ± 27	$3\,600 \pm 260$
Be	-	-	(8)
Cd	5 ± 2	(3)	60 ± 6
Co	31 ± 3	8 ± 2	23 ± 3
Cr	189 ± 19	$3\,910 \pm 233$	731 ± 34
Cu	76 ± 9	27 ± 6	375 ± 16
Hg	-	-	$7,8 \pm 0,6$
Mo	(4)	(10)	(10)
Ni	47 ± 6	36 ± 9	198 ± 8
Pb	56 ± 2	(25)	1389 ± 163
Sb	(3)	-	(67)
Se	-	-	4 ± 1
Sn	(40)	(43)	(815)
Sr	(50)	(58)	(233)
V	(33)	56 ± 9	69 ± 8
Zn	86 ± 7	50 ± 11	$10\,450 \pm 760$

The values in brackets and without uncertainty are informative only and must not be used in any Quality Assurance procedure.

Matrix constituents in mass %

	No: 12 - 1 - 10	No: 12 - 1 - 11	No: 12 - 1 - 12
Al₂O₃	$1,64 \pm 0,05$	$4,00 \pm 0,11$	$11,92 \pm 0,11$
CaO	$12,80 \pm 0,30$	$6,77 \pm 0,24$	$13,68 \pm 0,11$
CO₂	$5,39 \pm 0,19$	$8,60 \pm 0,29$	$11,05 \pm 0,19$
Fe₂O₃	$60,95 \pm 0,095$	$3,18 \pm 0,11$	$4,44 \pm 0,19$
K₂O	$0,28 \pm 0,02$	$1,23 \pm 0,06$	$3,23 \pm 0,22$
MgO	$7,59 \pm 0,16$	$2,22 \pm 0,06$	$3,41 \pm 0,07$
MnO	$0,16 \pm 0,01$	$0,03 \pm 0,005$	$0,46 \pm 0,03$
Na₂O	$0,15 \pm 0,02$	$4,11 \pm 0,11$	$2,56 \pm 0,04$
P₂O₅	-	-	$0,14 \pm 0,02$
SiO₂	$9,80 \pm 0,14$	$65,58 \pm 0,44$	$41,78 \pm 0,25$
SO₃	$2,22 \pm 0,05$	$1,15 \pm 0,07$	$2,22 \pm 0,09$
TiO₂	$0,075 \pm 0,006$	$0,23 \pm 0,006$	$1.14 \pm 0,03$

Matrix constituents are given for information only, they are not certified.

Certified on 22. December 1992

Otakar Blahož
manager
for producer

Igor Brezina
director
for certifying body