

## Certified Reference Material FLX-141 – LD Slag

New certificate issued February 2023

### Certified Values

Parameter	Mass fraction in % <sup>1)</sup>	Uncertainty in % <sup>2)</sup>	Traceable to
Al <sub>2</sub> O <sub>3</sub>	9,42	0,23	BAM Reinstoff 2
CaO	34,94	0,42	BAM Reinstoff 3
Cr <sub>2</sub> O <sub>3</sub>	0,229	0,039	IV CGCR(3)10 LOT: S2-CR709784
Fe total	23,43	0,30	NIST SRM 693
MgO	8,30	0,20	BAM Reinstoff 6A
Mn <sub>2</sub> O <sub>3</sub>	2,57	0,11	IV CGMN10 LOT: S2-MN704240
P <sub>2</sub> O <sub>5</sub>	0,900	0,073	IV CGP10 LOT: S2-P706043
SiO <sub>2</sub>	8,73	0,22	BAM Reinstoff 1
TiO <sub>2</sub>	0,741	0,110	IV CGTI10 LOT: S2-TI708637
V <sub>2</sub> O <sub>5</sub>	0,139	0,026	IV CGV1 LOT: T2-V719184

Table1) Certified Values

1) Certified value traceable to SI unit kg/kg based on ignited Material (1h at 950 °C).

2) Total expanded uncertainty  $U_{CRM}$  calculated for a confidence interval of 95% ( $k=2$ ).

This certificate is valid, within the uncertainty specified, **until 20.09.2032**, provided the CRM is handled in accordance with instructions given in this certificate. The certification is nullified if the CRM is damaged, contaminated, or otherwise modified.

Bedburg-Hau, **27.02.2023**

**Responsible Reference Materials**

Susan Aschenbrenner

**General Manager**

Dr. Rainer Schramm

## Description of the CRM

This reference material is an industrial product and was taken directly from the production stream. The complete batch was sealed into 35 g bottles.

## Intended use

Calibration and control sample for x-ray fluorescence (XRF) analysis.

## Informational Values

Parameter	Mass Fraction in % <sup>3)</sup>	Uncertainty <sup>4)</sup>
K <sub>2</sub> O <sup>5)</sup>	0,023	-
S <sup>5)</sup>	0,145	-
LOI <sup>6)</sup>	1,61	-

Table2) Informational Values

3) Only Informational Value.

4) Total expanded uncertainty  $U_{CRM}$  calculated for a confidence interval of 95% ( $k=2$ ), if present.

5) Based on dried Material.

6) Based on original Material.

## Instructions for the correct use of the CRM

This material is moisture sensitive. This material has to be ignited for minimum 1 hour at 950°C prior use. The ignition process must result in a constant weight. The ignited material must be stored in a desiccator not longer than 24h, then reignition might be necessary. The minimum sample quantity for analysis should be 0.5g.

## Storage Information

The material has to be stored in a dry and clean environment.

## Hazardous situation

For this material an actual MSDS is available.

## Level of homogeneity

In accordance with ISO Guide 35:2017 a homogeneity study was performed. A one-way ANOVA was used to calculate the batch inhomogeneity.

## Stability

In accordance with ISO Guide 35:2017 a stability study was performed. As a result, the stability of the material was considered as fit for purpose. The uncertainty of long term stability was calculated

## Total expanded uncertainty

The total expanded uncertainty U<sub>CRM</sub> for a confidence interval of 95% (k=2) was calculated by taking into account the uncertainty of characterization  $u_{char}$ , of inhomogeneity  $u_{bb}$  and long-term stability  $u_{lts}$ .

$$U_{CRM} = k \times \sqrt{u_{char}^2 + u_{bb}^2 + u_{lts}^2}$$

## Traceability

All of the certified values derived as part of this testing program have traceability to the reference materials stated in table 1.

## Methods used

The analytical work performed to assess this material was carried out by the FLUXANA laboratory, which works according to DIN EN ISO/IEC 17025:2018.

In accordance with DIN EN ISO 17034:2017 and ISO Guide 35:2017, we use the approach stated in DIN EN ISO 17034:2017 Chapter 7.12.3. d) value transfer from an RM to a closely matched candidate RM performed using a single measurement procedure performed by one laboratory.

An example for this approach is found in [ISO 13528:2022-08 E.5](#). Using this approach, samples of the test material that is to be the new reference material are tested along with matching and/or synthetic RMs using a suitable method. The assigned values XCRM and their uncertainties UCRM are then derived from a calibration against the certified reference values of the compared RMs. Synthetic RMs are made from pure chemicals by weighing. Measurement method used: XRF with fusion as sample preparation technique.

This certificate is in conformance with ISO Guide 31:2015.