FLX-2003-02-COA

DIN EN ISO 17034:2017

Certified Reference Material
FLX-2003 – Iron Ore Concentrate

New certificate issued September 2026

Certified Values

Parameter	Mass fraction in %[1)]	Uncertainty in %[2)]	Traceable to
Al2O3	0,274	0,032	EURONORM CRM No. 690-1
CaO	0,332	0,034	EURONORM CRM No. 690-1
Fe2O3	96,11	0,67	EURONORM CRM No. 690-1
MgO	1,28	0,07	EURONORM CRM No. 690-1
Mn3O4	0,057	0,013	EURONORM CRM No. 690-1
NiO	0,031	0,010	EURONORM CRM No. 690-1
SiO2	1,49	0,08	EURONORM CRM No. 690-1
TiO2	0,278	0,032	EURONORM CRM No. 690-1
V2O5	0,223	0,027	EURONORM CRM No. 690-1

Table1) Certified Values

1) Certified value traceable to SI unit kg/kg based on ignited sample ignited material.
2) Total expanded uncertainty U_{CRM} calculated for a confidence interval of 95% (k=2).
Decimal place revised

The sum of all oxides is **100,17 %**. This includes informational values and excludes LOI.

This certificate is valid, within the uncertainty specified, **until 31.07.2035,** 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, **02.09.2026**

Responsible Reference Materials

Dr. Rainer Schramm

Quality Management

Ch. Winkels-Herding

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 30 g bottles. This material is normally used as raw material for iron making.

Intended use

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

Informational Values[3)]

Parameter	Mass Fraction in %	Uncertainty[6)]
Co3O4[4)]	0,016	0,003
Cr2O3[4)]	0,015	0,005
Fe2+[5)]	22,34	0,38
K2O[4)]	0,018	0,004
Na2O[4)]	0,022	0,003
P2O5[4)]	0,014	0,002
SO3[4)]	0,013	0,005
ZnO[4)]	0,002	0,001
LOI[7)]	-2,90	0,03

Table2) Informational Values

3) Values taken from PT FXRV-2024-04.
4) Based on ignited material (1h 950°C).
5) Based on dried material (1h 105 °C).
6) Total expanded uncertainty Us calculated for a confidence interval of 95% (k=2).*
7) LOI=loss on ignition min. 2 hours at 950°C. 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 2 hours 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 0,8 g. For XRF use, ignited samples should be prepared as a fused bead, e.g. in accordance with **ISO 9516-1:2003**.

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 33405:2024 a homogeneity study was performed. A one-way ANOVA was used to calculate the batch inhomogeneity.

Stability

In accordance with ISO 33405:2024 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_{CRM} 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}.

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

Traceability

All of the certified values derived as part of this testing program have traceability to the reference material 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 ISO/IEC 17025:2018.
In accordance with ISO 17034:2017 and ISO 33405:2024, we use the approach stated in 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 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 X_{CRM} and their uncertainties U_{CRM} 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 33401:2024.

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