# KIT XRF-FB _Reference Cement

# METHOD : Control and calibration XRF with fused bead

SNL is currently developing different calibration kits for your XRF & XRD with two sets of kits

## USAGE

1. KIT XRF-FB" allows you to calibrate your XRF on a range of components with a wide measurement band. It is available in two versions:

- **SNL-XRF-FB Cem I** for the analysis of Cem I and Cem II/A cements
- **SNL-XRF-FB Cem II+** for cement analysis with more than 10% additions.

2. XRF-component KIT" allows for control of different dosages of the same component on a wide measurement band

- **Chlorine**
- **SO3 and Alkalis**
- **P205**

## AVANTAGES OF SNL XRF-FB KIT

SNL-XRF-FB reference materials, exclusively developed and produced by SNL, provide a robust foundation for precise and high-performance XRF calibration using fused beads.

When applied according to the SNL technical guide, they enable laboratories to control critical parameters such as sample-to-flux ratios, fusion cycles, and inter-element effects. This ensures accurate, replicable, and entirely traceable calibrations, fully compliant with industrial standards.

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Using the KIT-XRF-FB for calibration allows comparison of reference values after making a fused bead on your own machine.  This ensures calibration without correction, as opposed to using a reference fused bead that has been made on another machine.

⚠ *Warning: SNL XRF Fused Bead Reference Materials are not suitable for use with XRF pressed pellet methods; using them in this context can result in inaccurate calibrations and control values due to significant matrix effect differences, ultimately compromising the reliability of analytical results. It is essential to understand that the mineralogy of each produced and purchased material is highly specific. The fused bead method is the only approach that effectively eliminates mineralogical and matrix-related variability, ensuring accurate and consistent XRF calibration. Please refer to the requirements specified by your XRF equipment suppliers for further guidance.*

## 1- Description

The XRF Fused Beads Reference Materials “SNL-XRF-FB CEM I” consist of 7 homogenized and stable cement samples that have been rigorously validated through international interlaboratory testing.

These samples serve as essential reference materials for ensuring and maintaining the accuracy of X-ray Fluorescence (XRF) calibrations during routine laboratory operations. They enable continuous monitoring and detection of calibration drifts by using recommended control charts.

The KIT **« SNL-XRF-FB CEM I »** is specifically designed for the analysis of CEM I and CEM II/A cements containing less than 10% of additional constituents

The KIT « **SNL-XRF-FB CEM II+ »** is specifically designed for the characterization of cement with a higher proportion of constituents (10% and above), such as other CEM II/B, CEM III types and other high blended cement.

Each of the inter-laboratory campaigns involves more than 150 international cement laboratories, as well as XRF suppliers and some accredited laboratories. The logic of the ISO 5725-2: 2019 “Accuracy (trueness and precision) of measurement methods and results Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method” is applied to each step of the elaboration process (excluding Grubbs and Cochran tests replaced by the "interquartile method").

## 2- SNL XRF Fused Bead Reference Samples Characteristics

The properties of the seven SNL XRF Fused Bead Reference Cement Samples represent the most accurate estimates of their true values. These reference values are derived from the statistical evaluation of results obtained by all participants in the Round Robin Tests, with outliers excluded, according to robust statistical methods. Each value is accompanied by an estimate of measurement uncertainty, including both the combined standard uncertainty and the expanded uncertainty (typically at a 95% confidence level).

For chemical analysis, it is important to note that most participating laboratories calibrate their instruments using Certified Reference Materials (CRMs) with metrologically traceable certified values.

Consequently, the assigned values of the SNL XRF Fused Bead Reference Samples inherit a level of traceability to the International System of Units (SI) through an unbroken metrological chain.

The SNL XRF Fused Bead Reference Samples are developed and certified by the principles and guidelines outlined in ISO Guide 35: Reference Materials — Guidance for Characterization and Assessment of Homogeneity and Stability. Comprehensive characterization has been performed using robust analytical methods across multiple international laboratories. Statistical assessments confirm homogeneity and long-term stability of the samples. The assigned reference values are accompanied by combined and expanded uncertainties, estimated in full compliance with the Guide’s requirements. This rigorous approach ensures that the SNL XRF Fused Bead materials are fit for use as reliable and metrologically traceable reference standards in cement chemical analysis and XRF calibration.

## 3- Packaging

The material is preserved in hermetically sealed 10-gram glass containers, selected for their chemical inertness and impermeability. Storage under controlled temperature and humidity conditions ensures long-term stability by preventing exposure to moisture, airborne contaminants and physicochemical degradation, as per the ISO Guide 35 recommendations for the handling and storage of reference materials.

## 4- Instructions for handling, storage, and use

The SNL XRF Fused Bead Reference Sample must be stored under temperature-controlled conditions, as specified by relevant local standards, for example, 20 ± 2°C, as per EN standards, or 23 ± 2°C, as per ASTM standards—due to the hygroscopic nature of the cement powder. Once the hermetically sealed samples are opened, they should be tested immediately to minimize exposure to atmospheric moisture. Sample preparation procedures must strictly follow the protocols outlined in the applicable local standards.

## 5. Characteristics of the 7 "SNL XRF Fused Bead Reference Samples"

The reference samples provide a significant range for each parameter, as illustrated below.

| | SNL-XRF-FB-01 | SNL-XRF-FB-02 | SNL-XRF-FB-03 | SNL-XRF-FB-04 | SNL-XRF-FB-05 | SNL-XRF-FB-06 | SNL-XRF-FB-07 |
|---|---|---|---|---|---|---|---|
| LOI (%) | 4,18 | 1,48 | 2,88 | 1,28 | 1,12 | 1,39 | 1,96 |
| SiO2 (%) | 19,67 | 22,31 | 19,74 | 20,85 | 21,27 | 20,23 | 19,72 |
| Al2O3 (%) | 3,61 | 2,98 | 4,39 | 3,94 | 3,85 | 5,24 | 4,84 |
| Fe2O3 (%) | 4,58 | 2,27 | 2,49 | 4,70 | 4,48 | 2,00 | 3,54 |
| CaO (%) | 62,91 | 67,19 | 64,07 | 62,93 | 64,61 | 65,77 | 64,24 |
| MgO (%) | 0,68 | 0,84 | 1,37 | 2,14 | 1,00 | 1,13 | 1,59 |
| SO3 (%) | 2,97 | 2,28 | 3,51 | 2,86 | 2,28 | 3,06 | 2,34 |
| K2O (%) | 0,64 | 0,16 | 0,65 | 0,37 | 0,54 | 0,28 | 0,75 |
| Na2O (%) | 0,12 | 0,10 | 0,15 | 0,29 | 0,12 | 0,19 | 0,25 |
| P2O5 (%) | 0,36 | 0,06 | 0,20 | 0,14 | 0,25 | 0,57 | 0,31 |
| Total | 99,72 | 99,67 | 99,45 | 99,50 | 99,52 | 99,86 | 99,54 |

*Table 1 : Reference Samples Values « SNL-XRF-FB CEMI »*

## 6. Composition du KIT XRF-FB :

- ✓ Case of 7 samples in hermetically sealed glass containers of about 15ml.
- ✓ Certificates of each sample
- ✓ Vibrant spatula.
- ✓ Identification stickers for the beads
- ✓ Manual of good calibration practices. This manual is the exclusive SNL property and can't be given to any third party or purchased separately from SNL XRF-FB KIT.