



Integrated technology for the recycling of smelting gases and sustainable production of frits and enamels (FRIT-REC)

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INFORMATION ON THE ECO-INNOVATIVE SOLUTION PROVIDER

This eco-innovative solution is the output from the project titled “Frit-Rec” co-funded by the European Commission within the framework of the Competitive and Innovation Program. This solution has been developed by EMO FRITE LTD, Slovenia.

SHORT DESCRIPTION OF THE ECO-INNOVATIVE SOLUTION

The innovation focuses on the processing of frits and enamels, typically for the enamel and ceramic industries. It consists of introducing a dry-neutralization process step for smelting gases and a filtering system to separate the raw material residues from the by-product, micronized fluoride lime (MFL). The by-product is used as a substitute for the raw material in frit and enamel production (closed manufacturing) or as a new raw material for specialized ceramic compounds. The innovation is the implementation of a filtering system and the regulating and monitoring of a system that promotes a stable and constant quality of the by-product (MFL).

INDUSTRIAL SECTOR – MARKET SEGMENT AND ACTUAL APPLICATION IN INDUSTRY

32 Stone, Clay, Glass, and Concrete Products

INDUSTRIAL CLASSIFICATION - NACE CODE;

23 Manufacturing of other non-metallic mineral products

1. DESCRIPTION OF ECO-INNOVATIVE SOLUTION

Technical aspects of the eco-innovative solution

The solution consists of the optimization and modification of the main processes in frits production. These are the inflow of gases, the filtration step, the reactor for neutralization and the separating step. The key innovations are twofold. Firstly, the redesign of the separation unit, in order to allow the dust present in the smelting gases to be captured through a filtering system for the cold and hot filtration. Secondly, the application of flue gas dry-neutralization in the process. This technique is based on the reaction between fluoride gases that arise during the melting of the frits and lime, through the chemical reaction of neutralization to produce MFL. The key feature is that the feed rate of the micronized lime injected in the reactor varies depending on the HF concentration in the flue gases. The application of both innovations ensures an optimal reaction rate and material consumption resulting in the formation of homogenized MFL that can be used as a raw material. Another advantage is that the final product is more stable and has less raw material impurities from the kiln.

Economic and environmental benefits of the eco-innovative solution

The implementation of the solution depends on the current state of technology. The type of fuel and burner in place are important for the production of the frits. The system requires the use of oxygen burners. To achieve a yearly production of 2,500 - 5,000 tons of frits, the estimated costs of the solution are approx. 450,000€.

The return on investment depends on the energy costs and the costs for the disposal of hazardous waste. Indicative payback time is 4.5 years, based on energy costs in Europe. Savings will be mainly achieved by an 80% reduction in hazardous wastes (fluorine) compared to existing solutions and the re-use of the homogenized MFL as a raw material. There is no associated additional water consumption.

2. AVAILABILITY OF THE ECO-INNOVATIVE SOLUTION AND BUSINESS PARTNERSHIP

Market readiness, Trade mark, existing market coverage, commercialization strategy

The solution is only implemented at one industrial site in Slovenia. There is no trade mark available

Requirements to adapt the solution to the local market and potential applications/market size

There are no particular infrastructure requirements besides the use of oxygen burners.

On-site after-sales services support and the technical assistance requirements

After sale support will be provided from Slovenia.

Targeted local business partners

Enamel manufacturers

Type of local business partnership sought

No restrictions as there is no patent in place; consultant based support.