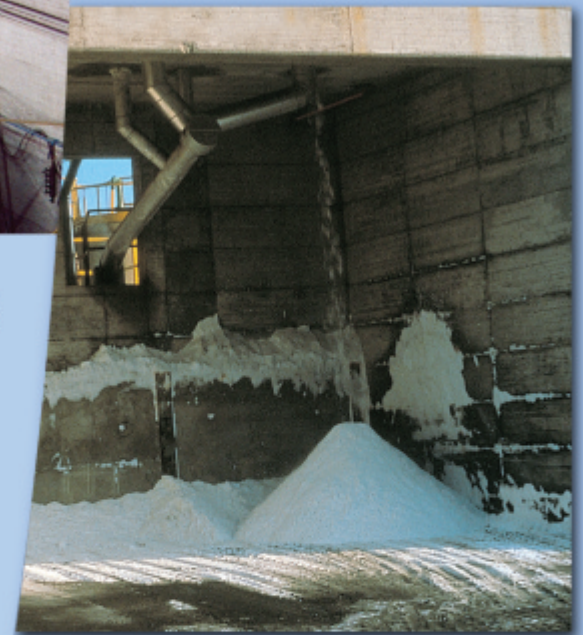


# THE STE PROCESS

## ALUMINIUM SALT SLAG RECYCLING

**From  
Secondary  
Aluminium  
Operations**



- **Direct Leaching of Slag Lumps**
- **Total Aluminium Recovery**
- **Separated Salts Recovery**  
(NaCl and KCl)
- **Low Chloride Oxides**



**Engitec** Technologies S.p.A.



## CHARACTERISTICS OF ENGITEC STE PROCESS

The STE process for the treatment of aluminium salt slag is a proprietary process of Engitec Technologies S.p.A.

The process is suitable also for small installations, so it can be installed directly at the aluminium recyclers' site.

STE allows the recovery of the aluminium and of the salt, which is re-used in the melting process, and of clean fine oxides, which can be suitable for other industrial applications as the cement manufacturing.

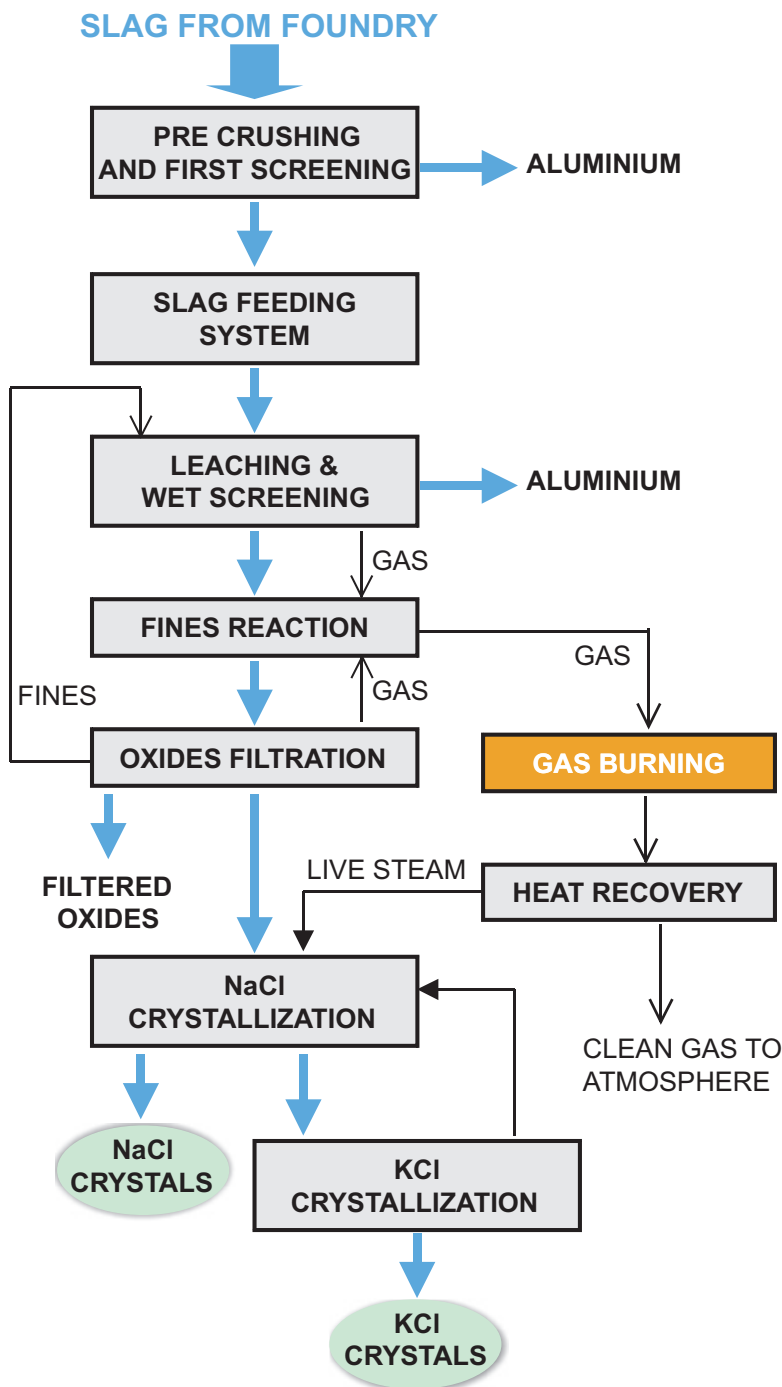
All polluting gases generated during the aluminium salt slag leaching are combusted and the heat generated is used for water evaporation and salt crystallization.

No liquid effluents are released from the plant and the gaseous emissions are kept within regulatory limits.

- Salt recovery is highly efficient (99%).
- The recovered oxides have a low chloride content (below 0,2 %) and are environmentally safe and well accepted by the cement industry.
- The process involves low labour requirement.



# PROCESS OVERVIEW



## SLAG TREATMENT

The slag as produced in the aluminium foundry is pre-crushed in a mill (impactor or jaw crusher). The big lumps of aluminium are separated by screening, then the pre-crushed slag is directly leached in the water by a milling operation in special drums. From the resulting slurry the remaining Al grains are washed, separated by means of a rotating screen and finally dried to obtain an highly valuable metal (>80% recovery efficiency). The oxides slurry is filtrated on a continuous vacuum belt filter, where the oxides cake is deeply washed from the chlorides. The resulting cake has a very low chloride content (<0.2%) suitable for industrial application, as the cement production. Upon request an inertization unit is available for the reduction to <0.1% of the gas volumetric aluminium content.

## GAS BURNING

The Gas Burning ensures the thermo-destruction of all the pollutants collected from every sources inside the plant. The gas evolved during leaching, together with the gas released from the other controlled points, are conveyed and burnt in a special designed combustor, where the pollutants (mainly hydrogen, ammonia, phosphine and methane) are transformed into water and clean gases. The heat produced to destroy the pollutants is recovered to produce live steam, which is finally used to run the crystalliser for the salt production.

## SALTS RECOVERY

A single or a multistage crystalliser unit is designed to recover the salt in form of crystals. The energy source is the steam generated by the thermo-destruction of the gases produced during the leaching. The crystalliser may be designed either for the production of only NaCl or NaCl and KCl separated.



## PRODUCTS

The plant operating in steady conditions gives the following products and by-products:

### ALUMINIUM LUMPS

Metal content: > 80% b.w. on dry basis

### ALUMINIUM GRAINS

Metal content: > 80% b.w. on dry basis

### INERT OXIDE

Chloride content: < 0.2% b.w.

### ALKALINE SALTS

NaCl and KCl suitable for immediate re-use

## EFFLUENTS

- LIQUID EFFLUENTS  
No liquid effluents are released from the process.
- SOLID EFFLUENTS  
No solid effluents are released by the plant.
- GASEOUS EFFLUENTS  
The plant releases only the burnt process gases from the stack, having composition which meets all the regulations worldwide.

## ENERGY CONSUMPTION

Values referred to 1 ton of slag:

- fuel : 2.5 x 10<sup>6</sup> kJ
- electric power: 170 kWh