RECP Best Practices Catalogue

Reduction of the SO2 emissions by recycling the exhaust air

Developed within the framework of MED TEST II

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

switchmed

The SwitchMed Programme is funded by the European Union

Best Practice - Reduction of the SO2 emissions by recycling the exhaust air

SECTOR:	**Chemical and Pharmaceutical**
SUBSECTOR:	Manufacture of soap and detergents
PRODUCTS	Sulphonic acid, SLES (sodium laureth sulphate), Sodium silicate
CATEGORIES	Process control or modification
APPLICABILITY	Process

COMPANY SIZE	40

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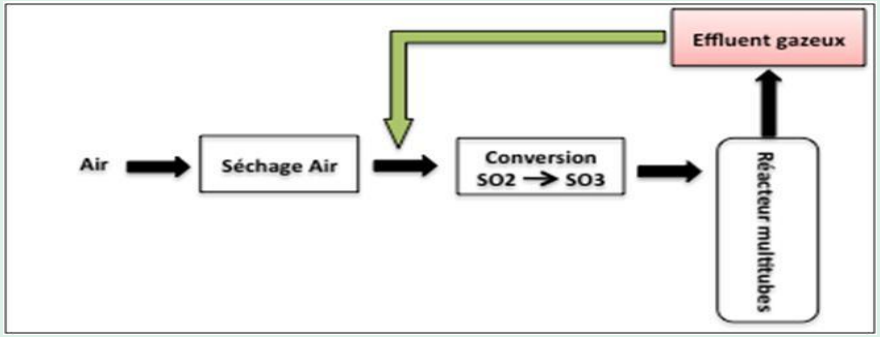
Description of the Problem (Base Scenario):	The gaseous effluent leaving the chimney contains an SO_2 content exceeding 10 times the permitted normative threshold (the limit threshold is 500 mg/m^3 for a flow not to exceed 5 kg/hour): • Density of SO_2 = 2.63 kg/m^3 • Density of air = 1,225 kg/m^3 • The SO_2 rate in emissions (10 times the norm) = 5,000 mg/m^3 of air The weight of SO_2 lost is: 8,000 kg/hour/1,225 kg/m^3 x 5,000 mg/m^3 = 32.65 kg/h.It also consists of a large mass of dry air (treated)
Description of the Solution	Recycling this air at the catalytic conversion tower from SO_2 to SO_3 will allow the oxidation reaction of residual SO_2 in this air to return to the atmosphere. In addition, this action offers the opportunity to recycle air from the chimney as an oxidising reagent for the conversion of SO_2 to SO_3 and thus also saving some of the the energy provided for the air treatment (compression, transfer and drying) before reaction. The principle of this reaction is shown by the flow sheet below. 

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Economic Gain	The recovery with respect to the allowable limits will be 27.65 kg/h. The gains are threefold: • A sulphur savings of 50% of this quantity, 13.8 kg/h,or for a production time on the order of 1,000 hours, a gain of 13.8 tons/year and € 3,024/year (€ 219/ton) • A gain on the compressed air not required (8,000 kg/h/1,225 kg/m^3 x 100 Wh/m^3 compressed air) x 1,000 hours/year = 653,000 KWh/year, or about € 58,500/year • emission treatment savings for compliance with standards, or (Quantity of air x treatment cost/Kg) approximately 8,000 Kg/h x Treatment cost/Kg estimated at € 0.009/kg x 1,000 hours/year = € 72,000/year For estimated overall gains of the order of € 135,000/year
Environmental Gain	Eradication of air pollution allowing the company to comply with the requirements of environmental regulations. Reduction of SO_2 emissions by 27.65 tons/year Energy savings of 653 MWh/year Reduction of GHG emissions by 470 tons of CO_2e
Health and Safety Impact	This measure has a positive impact on the health and safety of the company's personnel

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Investment & Financial Indicators	The investment amount will be the acquisition cost of the pump and the ducting. A detailed study of the recycling system will validate the investment cost we estimated at around € 45,000
Suppliers	The necessary equipment will essentially consist of a recirculation pump and ducting sized according to the flow rate to be recycled. Local suppliers can provide this type of services including equipment
Other aspects	Not Applicable
Implementation and new indicator	The implementation of the action is being validated with the parent company