

Eclipse Product: ER Heater with Eclipse RatioMatic Burner and Exothermics Heat Exchanger

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Application: Indirect fired hot air generator for mill-drying of hydrated lime

Customer required 80% thermal efficiency. Eclipse guaranteed 85% efficiency and actually delivered 90% efficiency.

Description:

Power plants, waste incinerators and many industrial processes generate flue-gases which often contain pollutants, such as sulphur dioxide (SO₂) and hydrochloric acid (HCl), as well as heavy metals, dioxins and furans. Depending on the process which is used and the nature of the gases generated, lime products in the form of dry powder are highly efficient re-agents used to capture these pollutants.

In lime production, the mill-dryer is fed with a moist, hydrated lime (Ca(OH)₂) from the slaking reactor. The 20-30% free water in the lime feed needs to be reduced below 0.7%.

Because hydrated lime needs to be dried very quickly, a flash drying process

is applied. A low CO₂ content in the drying gas is also required to limit any reaction with the hydrated lime. Therefore, the drying air must not contain exhaust gases (CO₂) for which indirect heating is required.

For the production of hot air (approx. 18,300 Nm³/h; 370°C; 2440 kW), it is necessary to install an indirect firing system using natural gas with a heat exchanger of >80% effectiveness.

The process air fan which is located before the heat exchanger is designed to provide atmospheric pressure after the heat exchanger.

Control loops:

A) Drying air temperature.

A temperature sensor placed after the mill-dryer monitors the drying air



Front View of Unit Showing Combustion System

temperature (correlated to moisture of final product). This signal controls natural gas flow at the burner in the hot air generator.

B)Drying air volume. The drying air flow rate is monitored before the heat exchanger. To ensure a minimal air velocity in the system, the suction fan (after the product bag filter), controls the drying air volume.

Operation Time: The plant is in operation 24 hours a day, 20 shifts per week, 52 weeks per year. Almost constant availability of the equipment is needed.

Eclipse Solution:

Eclipse was contacted by a major lime manufacturer to make a proposal to provide the required flow and temperatures at a thermal efficiency of 80%. The Eclipse proposal was based upon the availability of a combined heat exchanger and combustion technology with a guaranteed 85% thermal efficiency. For this project, Eclipse delivered a complete ER model packaged heater unit including a variable speed drive (VSD) on the recirculation fan. The VSD enables a smooth trimming of the required flue gas recirculation volume. In order to prevent transport damage, it was decided to install the outside insulation at the job site. The unit had been test fired at the Eclipse Gouda facility before shipment to ensure a smooth commissioning.

Customer Benefits:

The equipment was installed and commissioned by Eclipse as planned. During actual operation, the thermal efficiency of the heater reached 90%, even higher than the Eclipse guarantee. The positive outcome of this project resulted in the delivery of additional heaters to other company facilities.



Installing Insulation



Off-loading unit at job site.