

Indirect Hot Air Driers and NO_x Emissions in the Fishmeal Industry

- a brief description with Norway as example

Indirect fired hot air dryers are used in Norway as well as other countries to produce so-called LT Meal, which is a high-quality low temperature-dried fishmeal.

The heating of the driers is generated by a burner, which can use both gas and liquid fuel in a burning chamber, the combustion gas is then passing through a mixing chamber and consequently through a gas/gas heat exchanger and finally exhausted to the chimney. In the heat exchanger, the drying air is indirectly heated by the flue gas and led to the dryer drum where also the product to be dried is added.

At the outlet of the dryer, dried fishmeal and air are separated, and following cooling and direct condensation of the moisture which has been removed from the dried product, the air is recirculated to the heat exchanger. To maintain a slight negative pressure in the dryer, some of the drying air (excess air) is removed from the circulating air and passed to the burner. This air contains several odor components (evaporated from the fish mass), which is eliminated (oxidized) by combustion in the burner.

The flue gas from the combustion has a too high temperature for the operation of the heat exchanger. Thus, as a safety measure, a part of the stack exhaust gas is recirculated to the mixing chamber in front of the heat exchanger. Another measure to reduce the combustion temperature is to operate the burner with a significantly higher excess of air than, for example, steam boilers. Typical air excess in the burner of the indirect hot air drier is 8 - 12% which is three to four times higher than in steam boilers, resulting in more formation of nitrogen oxides than typical boiler combustion with 3% O₂ from air without content of nitrous gases.

The result of the heating system being designed as described above is that it is not possible to operate the hot air dryers within the levels of nitrogen oxide emissions that form the basis of the EU rules for combustion plants.

The odor abatement in the Norwegian fishmeal industry is performed both by combustion of the excess process gases in the boilers as well as in the burners of the indirect hot air driers. According to current regulations, nitrogen oxides (NO_x) are reported at 3% oxygen level in burners, which gives a tripling of the measured values in the exhaust gas from the hot air driers, when these are measured at approx. 10% O₂.