

FEATURES

- A reaction between ammonia and sulfuric and/or phosphoric acid
- Effective use of the heat of reaction to evaporate water
- Utilization of the reaction temperature and pressure to create a molten product for controllable granulation in the drum
- Interchangeable sections to minimize downtime on replacement of wear sections
- Reactor designed to integrate effectively with agglomeration drum and supplemental ammonia and steam sparger equipment
- Available in various materials of construction

OVERVIEW

The pipe reactor, or pipe cross reactor is an acid-base reaction vessel that can be integrated into a granulation drum for the production of some fertilizer products. Initially developed to produce ammoniated phosphate fertilizer, in the right setting, can **add significant value** to an operation.

The pipe reactor has been shown to substantially reduce plant energy costs by utilizing the reaction heat as the primary method of drying, reducing the burden on the dryer.

HOW IT WORKS

The pipe reactor accepts phosphoric or sulfuric acid into one side of the pipe, while gaseous or liquid ammonia is fed into the reaction chamber. The result, either ammoniated phosphate or ammonium sulfate, is a hot "melt" of superheated product.

The contained heat of the reaction from the pipe reactor "flashes off" the initial moisture, greatly reducing the dryer fuel requirement for the plant.

THE PIPE REACTOR ADVANTAGE

Pipe reactors can deliver significant value by reducing plant energy costs and improving fertilizer production.

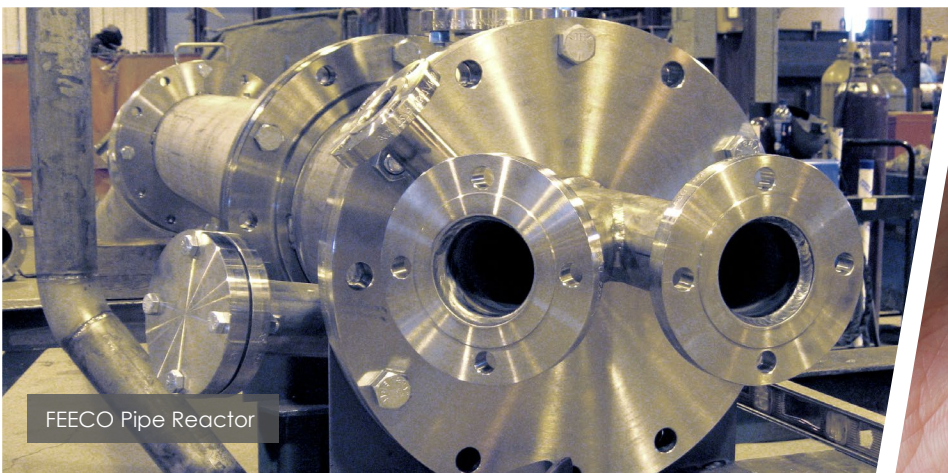
ORGANIC APPLICATIONS

Additional value exists for novel organic-based fertilizer production, where, in addition to removing odor, pipe reactors offer customizable nutrient fortification. Feedstock rates can be adjusted to control nutrient grade. In organic settings, the pipe reactor can be integrated into either a granulation drum or a pug mill (paddle mixer).

APPLICATIONS

- Mono-Ammonium Phosphate (MAP)
- Di-Ammonium Phosphate (DAP)
- Ammonium Sulfate
- High Reaction Grades of NPK

Pipe reactors can be designed into a new system, or retro-fitted into an existing one, with the option to replace the pre-neutralizing stage.



FEECO Pipe Reactor



Ammonium Sulfate pellets created in the FEECO Innovation Center using pipe reactor granulation