

# HEAT EXCHANGERS

## FLUIDIZED BED SEWAGE SLUDGE INCINERATOR APPLICATIONS

Heat exchangers for sewage sludge incinerators are cylindrical tubular designs that utilize convection heat transfer to preheat fluidizing air for the purpose of saving fuel. These units have high alloy stainless steel tube bundles with expansion joints for both the tube bundle and each tube. Tube arrangement, tube material and flow pattern are based on the specifics of each individual application, including temperatures, compositions, pressure drop limits and space availability. For a typical design, the hot waste gas from the incinerator flows vertically down inside the heat exchanger tubes. Fluidizing air en route to the incinerator wind box makes multiple passes outside the tubes in a counter cross-flow pattern.



### DESIGN FEATURES

- ◆ Large diameter tubes are utilized to prevent tube clogging.
- ◆ Each tube is supplied in one piece without intermediate butt welds.
- ◆ Individual tube expansion joints are provided to absorb differential expansion.
- ◆ Any tube or tube expansion joint can be removed without major disassembly of the heat exchanger.
- ◆ Tube inserts are used in top tube sheet refractory for abrasion resistance.
- ◆ Waste gas velocity is designed to keep tubes clean but avoid abrasion.
- ◆ Materials of construction are selected to accommodate temperatures and corrosives.
- ◆ Expansion joints are protected by insulated covers.
- ◆ Upper tube sheet sits on internal support ring and is free to grow radially.
- ◆ A thermal and structural analysis is performed for each design.
- ◆ All heat exchangers are pressure tested on the shell side for gas tightness.



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