



# INSTALLATION PROFILE

## Heat Exchanger *Water/Sludge*

### GERVAIS FAMILY FARM, INC. Enosburg Falls, Vermont

The Methane digester at Gervais Family Farm handles manure from a large dairy operation, milking approximately 1,000 cows. When the cows are in the parlor being milked the alleys in the barns are scraped in to a holding pit at the end of the pen. The barns are bedded with dry digested solids, as opposed to sawdust that was used prior to installation of the digester.

The manure, which is at about 10-12% dry solids concentration, passes through a Boerger ([www.boergerusa.com](http://www.boergerusa.com)) Multichopper and is pumped by a Boerger Rotary Lobe Pump through a hot water-to-manure heat exchanger and in to the digester.

One insulated, mixed plug-flow digester operating at a mesophilic temperature of 101 degrees F is used to produce methane from the manure. The digester has a volume of approximately 650,000 gallons. At the design manure flow of 15.3 gallons per minute, this is a hydraulic retention time in the digester of approximately 30 days. A vertical gas mixing system agitates the digester contents. The digested sludge is pumped from the end of the digester to a solids separator as manure is pumped to the digester.

A concentric tube, **Walker Process®** Type E hot water-to-manure heat exchanger heats the manure and maintains the digester temperature at 101 degrees F. The exchanger has a minimum heat transfer rating of 572,000 BTU/hr. The hot water flows at approximately 50 gallons per minute and 155 degrees F to the exchanger, while the manure flow is 15.3 gallons per minute to the exchanger. The hot water supply temperature is adjusted to control the manure outlet temperature.

The digested solids are separated and dried for use as animal bedding. The liquid off-flow tends to

retain most of the manure's nutrient value and can be field spread. The solids are well stabilized and have the typical odor of mesophilically-digested solids.

An oil-fired Buderus ([www.buderus.net](http://www.buderus.net)) boiler having a gross output rating of 768,000 BTU/hr can provide hot water at 155 degrees F for the hot water-to-manure exchanger and to dry digested solids in the event the digester gas production is insufficient or the generator set is off-line.

The digester gas produced, which is not metered, has a heating value of approximately 600 BTU per cubic foot and is treated and fired in a Martin Machinery electric generator equipped with a Gauscor gas engine, rated 200 KW, which converts it to electricity. The electricity produced by the generator set offsets most of the farm's consumption, and is produced in parallel with the Village of Enosburg Falls Water & Light Department ("Enosburg") system so power can be sold to Enosburg. The generator set's heat exchanger recovers waste heat from the engine and supplies hot water for the hot water-to-manure heat exchanger and to dry digested solids for the production of bedding material. Any residual heat is rejected to the atmosphere through an external radiator.

Any digester gas produced in excess of that used in the generator set is wasted to a flare. This would usually occur only if the generator set was down for one reason or another.

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