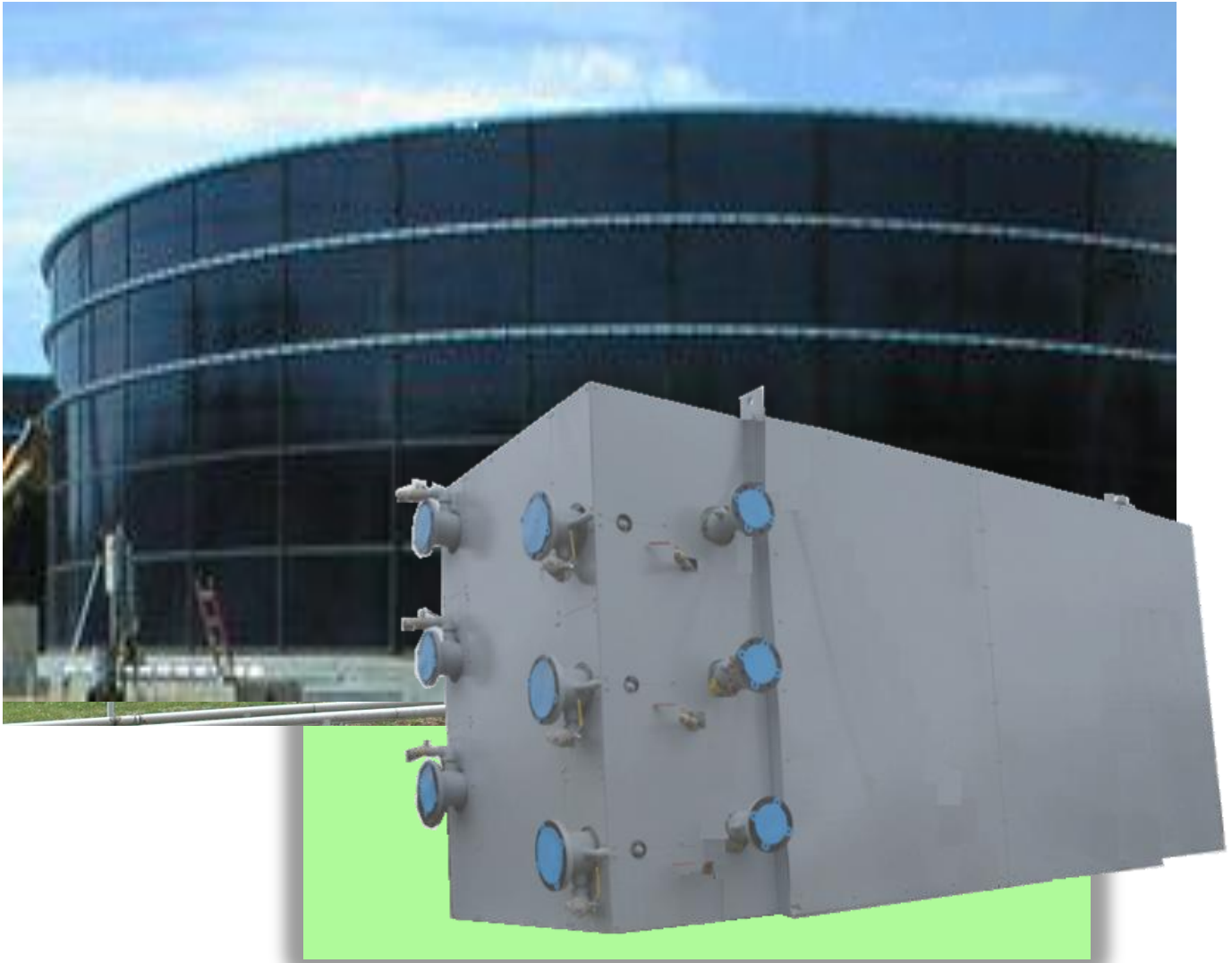


**BIO-HTX**

**Tube-in-Tube Counterflow Sludge Heat Exchangers**



*For critical applications of sludge heating or cooling.*



## Process

Anaerobic digestion of sludge converts volatile organic matter to methane and carbon dioxide. This process involves a 2-stage biological conversion of organic material. The first step involves acid-forming bacteria (acidogens) while the second stage is by methane forming bacteria (methanogens). The methane-forming bacteria feeds from the products of the first-stage bacteria.

The acidogenic bacteria are relatively temperature insensitive. The methanogenic bacteria, however are very temperature sensitive and a temperature change of 2 °F (1 °C) can put them into thermal shock (inactivity). Under these conditions the methane-forming bacteria cannot reduce the organic acids produced by the acid-forming bacteria. If the methane-forming bacteria are not quickly revived by the establishment of normal operating temperature {in the mesophilic range of 86 – 100 °F (30 – 35 °C)}, the alkalinity in the digester will be quickly consumed, the pH will drop and the methane-forming bacteria will die. The sludge heat exchanger is therefore a critical component in the operation of the digester. It must be very reliable and require minimal maintenance.

**Napier-Reid's Heat Exchangers are time tested and trusted for the critical application of heating or cooling digester sludge. Over 250 NR sludge heat exchangers have been installed since 1956.**



**Sludge Heat Exchanger with & without front cover**

**Design Heat Transfer: 2,650,000 BTU/hr**



## Advantage of Napier-Reid's BIO-HTX SHE



### Process:

- Highly efficient counter-flow design for high heat transfer efficiency.
- Heat transfer rate includes an allowance for fouling on both the water and sludge side. This ensures heat transfer will be at design after many years of operation.
- As the sludge pipe cross sectional area is constant, pipe blockage is prevented.
- Sludge tube can pass any solids that will pass through the sludge inlet.
- Sludge tube and water jacket share no common seals or connection points. Cross-contamination or hidden leaks are eliminated.
- Structurally or hydraulically not affected by sudden thermal shocks.
- Can be used to heat or cool digester sludge.
- Suitable for water to sludge, and sludge-to-sludge heat transfer.
- Wide range of heat exchangers, for heat transfer of 100,000 to 8,000,000 BTU/hr.
- Full technical support of Napier Reid: from preliminary design to commissioning.

### Design & Equipment:

- Designed and manufactured to ASME Sec. VIII Div.1
- Design eliminates problems associated with multiple flanges and loose connections.
- Sludge and water tubes are factory tested to 150 psi (1034 kPa).
- All gaskets and seals are rated for an operational range of  $-30$  to  $+230$  °F ( $-34$  to  $110$  °C).
- Fully insulated with 3" (75mm) of fiberglass and covered with 14 gauge steel panels.
- Sludge tubes can be inspected without draining the water jacket.
- All tubes can be removed from both ends of the heat exchanger.
- Hold-down anchor plates and lifting lugs provided.
- Sludge and water tubes can be carbon steel (SA 106 Gr. B / SA 53 Gr.B ) with or without hop dip galvanizing, or stainless steel, based on requirement.

### Instrumentation and Automation:

- Pressure and temperature gauges connections provided at every inlet and outlet connections to monitor the process.
- Other instrumentation and automation can be provided as required.

### Space and O&M Cost:

- Can be custom built to suit the existing layout and fit in available footprint and space.
- Orientation of inlet and outlet pipes to suit the piping plan.
- High heat transfer efficiency leading to low operation cost.
- Easy to disassemble and assemble, for inspection or cleaning (if required).
- Zero or negligible maintenance required. Existing units have been running for over 15 years without any major maintenance.



## Application of Napier-Reid's BIO-HTX SHE



- Municipal Wastewater Treatment Plants
- Industrial Wastewater Treatment Plants



▲ **BIO-HTX Heat Exchanger**  
**City of Pembroke, Kingston, ON**  
Design Heat Transfer:  
1,870,000 BTU/hr

**BIO-HTX Heat Exchanger**  
**ROPEC, City of Ottawa, ON** ▶  
Design Heat Transfer:  
5,118,212 BTU/hr

### About Napier - Reid

Over 50 years of excellence in water & wastewater treatment

Napier-Reid is located in the greater Toronto area in the Province of Ontario, Canada. We supply engineering services and process equipment for water and wastewater treatment.

We have the technology, resources and experience to design, manufacture and implement innovative water and wastewater treatment solutions worldwide. We have completed over 3000 projects since our inception in 1950. This stands as a testament of our ongoing commitment of providing the highest quality service, products and after sales support in the industry. Our capabilities include engineering, manufacturing, installation and field support. We have in-house personnel for complete mechanical, electrical and instrumentation process and control system design. As a manufacturer, our designs focus on cost-effective solutions, simplicity of installation and ease of maintenance.

Napier-Reid has developed an excellent team with many years of experience. We have a well-deserved reputation for innovation, service and integrity. A significant portion of Napier-Reid's revenue comes from export to regions such as the Caribbean, Central America, South America, Middle East, Eastern Europe, Africa, and Asia. Some of these projects are financed by Canadian government or International financing institutes. As a Canadian manufacturer, we are eligible for Canadian governmental funding and EDC export credit. We have the capability to handle a large range of projects, from engineering, equipment supply, installation, start-up, to turnkey projects. Let Napier-Reid be your solution for water and wastewater purification.



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