What is PONDUS™ Thermal Hydrolysis Process (THP)?

PONDUS is an alkaline process, using low grade heat (140 °F to 160 °F) and sodium hydroxide for sludge hydrolysis. A typical PONDUS system consists of a hydrolysis reactor, hot water heat exchanger, chemical dosing station, pumps, instrumentation and controls. PONDUS reduces sludge viscosity, enhances biogas production and improves sludge dewaterability.

The PONDUS Difference

- No heat exchangers needed to cool sludge after hydrolysis to maintain an optimum digester temperature
- No pressure vessel required
  - Safer operation
  - Specialized steam operator is not necessary
  - Reduces operating and energy costs
- Combination of caustic soda (NaOH) and heated water, 140 °F to 160 °F, break down the cell walls
- Minimal equipment needed: high-efficiency heat exchanger, progressive cavity pumps and a reactor operating under at atmospheric pressure

PONDUS is Simple to Operate

PONDUS is designed to utilize low grade heat (from hot water), rather than steam, as a heat source for sludge hydrolysis. A certified steam boiler license is not required to operate the system. PONDUS’ design allows it operate the atmospheric pressure without involving a pressurized vessel. Maintaining PONDUS is easy. Typical maintenance includes: pump maintenance, heat exchanger cleaning, and sodium hydrolyzed refilling.

PONDUS Optimizes Your Sludge Treatment Process

- Reduce Viscosity of Thickened WAS up to 80%
- Reduce Anaerobic Digestion Volume up to 50%
- Reduce Biosolids Disposal Costs up to 30%
- Increase Biogas Production up to 30%
- Reduce Polymer Consumption at Dewatering up to 20%
- Reduce Digester Foaming
PONDUS is a Cost-Effective Choice

- Simple operation requires little day-to-day plant supervision
- Fully automatic process runs 24/7 year-round
- 99% uptime; minimal estimated downtime for maintenance and repairs
- Designed using standard industrial control system equipment
- Compact; small footprint solution for all sized plants

PONDUS Full Scale Installations

<table>
<thead>
<tr>
<th>Wastewater Treatment Plant</th>
<th>Location</th>
<th>Year Built</th>
<th>Plant Size (MGD)</th>
<th>Additional Gas Production</th>
<th>Note</th>
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<tbody>
<tr>
<td>Kläranlage Gifhorn</td>
<td>Gifhorn, Germany</td>
<td>2005</td>
<td>14</td>
<td>27%</td>
<td>24-hr operation</td>
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<tr>
<td>Kläranlage Ratekau</td>
<td>Ratekau, Germany</td>
<td>2007</td>
<td>13</td>
<td>38%</td>
<td>12-hr operation, Class A possible</td>
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<td>Nordhorn Kommunale Betriebe AöB</td>
<td>Nordhorn, Germany</td>
<td>2014</td>
<td>16</td>
<td>25%</td>
<td>24-hr operation, Class A possible</td>
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<td>Kläranlage Uelzen</td>
<td>Uelzen, Germany</td>
<td>2014</td>
<td>13</td>
<td>31%</td>
<td>24-hr operation</td>
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<tr>
<td>Kenosha Wastewater Treatment Plant</td>
<td>Kenosha, Wisconsin</td>
<td>2015</td>
<td>28</td>
<td>27%</td>
<td>24-hr operation since March 2016</td>
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<tr>
<td>Kläranlage Wolfsburg</td>
<td>Wolfsburg, Germany</td>
<td>2016</td>
<td>34</td>
<td>N/A*</td>
<td>24-hr operation</td>
</tr>
<tr>
<td>Löhne-Rießel Wastewater Treatment Plant</td>
<td>Löhne, Germany</td>
<td>2019 Start-Up</td>
<td>14</td>
<td>Pending Start-Up</td>
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<tr>
<td>Stadtentwässerung Göppingen</td>
<td>Göppingen, Germany</td>
<td>2020 Start-Up</td>
<td>50</td>
<td>Pending Start-Up</td>
<td></td>
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<tr>
<td>Foce Regi Lagni</td>
<td>Naples, Italy</td>
<td>2020 Start-Up</td>
<td>15</td>
<td>Pending Start-Up</td>
<td></td>
</tr>
</tbody>
</table>

* PONDUS and the anaerobic digester were implemented at the same time. There is no historical biogas production data to compare.

PONDUS Step-By-Step

[1] Thickened WAS is mixed with a small dose of [2] caustic soda (1.75 l/m³).

[3] Sludge, up to 7% total solids (TS), is heated in a loop through a high-efficiency heat exchanger. Sludge above 7% TS or high viscosity sludge can use saturated steam as a heat source.

[4] Sludge is fed into PONDUS and goes through hydrolysis. The sludge is heated with 140 °F to 160 °F water from a combined heat and power (CHP) unit or boiler. Retention time may differ in reactor zones due to varying sludge properties. The reactor operates under atmospheric pressure and is connected to the atmosphere or bio-filter. After the hydrolysis process, sludge leaves the reactor close to a neutral pH level and the remaining thermal energy can be used in the anaerobic digester [7].

[5] Thickened primary sludge and hydrolyzed sludge is mixed to achieve an ideal mesophilic temperature of the combined sludge and then pumped into the digester [7]. If needed, additional heat can be brought into the digester through a [6] heat exchanger.