Skin Effect Heating System
Skin Effect Heating - Introduction

- Skin Effect heating is simply another way to heat a pipeline process, using electricity.
- Proven technology that has been used for many years.
- Primarily for long runs of pipe – up to 15 miles in length
- Only needs one Power Supply Connection Point
- Conduction efficiently transfers heat energy into pipe
- Zero residual voltage on pipe or tube – will not interfere with cathodic protection
- Can be applied to above ground, buried, or submerged lines
Skin Effect Heating – What is it?

- Impedence on a tube creates heat energy that flows to Pipe and Process Fluid
- Conductive Heat is transferred to the Pipe / Process Fluid
- Electricity flows on inside of tube, so zero potential
Skin Effect Heating – Components

6 Main Components

- Control Panel
- Transformer
- Sensor(s)
- Skin Effect Cable
- Tubing
- Junction Boxes
Skin Effect Heating - Advantages

- Long Runs – up to 15 miles!
- Single End Power Supply
- Can be used for pipe maintenance or heat up (state change) – 300 deg. F process temp.
- Little maintenance – no disturbing insulation
- Long life – Cable is protected
- No major alteration to customer piping
- Can be used above ground, buried, or submerged
- Third Party – ATEX, FM
Skin Effect Heating - Comparison

Comparison Table for Pipeline Heating

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<tbody>
<tr>
<td>Heating Cable (MI)</td>
<td>Temperature Maintenance &amp; Fluid Heat up</td>
<td>Metal Only</td>
<td>900 deg F</td>
<td>1,100 deg. F</td>
<td>1000 ft</td>
<td>Med</td>
<td>High</td>
<td>High</td>
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<tr>
<td>Impedance</td>
<td>Temperature Maintenance &amp; Fluid Heat up</td>
<td>Metal Only</td>
<td>1,800 deg. F</td>
<td>only limited by piping used</td>
<td>2500 ft</td>
<td>High</td>
<td>Med</td>
<td>Low</td>
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<tr>
<td>Skin Effect</td>
<td>Temperature Maintenance &amp; Fluid Heat up</td>
<td>Metal Only</td>
<td>302 deg. F</td>
<td>482 deg. F</td>
<td>15 Miles</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
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*Maximum Maintenance Temperature for CWM depends on Cable watt density - consult CWM catalog page for max temps for each watt density cable

Primary Benefits over other Technologies

- One Circuit – up to 15 miles from Single Point
- Low Maintenance – little chance of damaging cable, no need to remove insulation

Downsides – Customized for application

- Leadtimes – not an off-the-shelf product
- Initial Cost – Engineering Design and Support
Skin Effect Heating – Market & Applications

Petrochemical industries:
- Preheating of heavy fuel oils,
- Tracing of high viscosity fluids,
- High temperature gas heating

Chemical industries:
- Forced convection evaporators,
- Gaseous in line reactors,
- High temperature gas heating,
- Melamine plants.

Textile industries:
- Tracing of molten polymer pipes

Food industry:
- Heating of oil for fried foods,
- Tracing of molten chocolate pipes

Cables manufacturing:
- Tracing of compound pipes,
- Tracing of polymer pipes,
- Vulcanisation furnaces

Manufacturing of dry cells and batteries:
- Tracing of compound pipes

Paper and packing industry:
- Tracing of hot-melt pipes

Waste and recovery:
- Supercritical water heaters,
- Very high pressure boilers

Pharmacy and fine chemicals:
- Decontamination plants,
- Tracing of crystallizing products,
- Pilot plant HTM units,
- Tracing of thermosensitive products.

Aluminium production:
- Tracing of compound pipes

Confidential
Advantages of Electric Heat

■ **Clean Operation & Lower Installation Costs** – No pollution stacks, fuel lines, or holding tanks.

■ **Accurate Temperature Control** – Point of use can allow 0% to 100% accurate turndown, without re-routing of existing steam lines.

■ **Minimal Maintenance** – No combustion controls that need adjusting; easily replaceable, if needed.

■ **Lowered Safety Concerns** – No open Flames.

■ **Controlled Costs** – Low fluctuations in electricity prices.
Continuous Improvements
and Commitment to
Product and Customer Base