

## ELECTRICAL HEATING SYSTEM FOR PROCESS PIPEWORK

**INTELLIGENT, PROGRAMMABLE PROCESS HEATING SYSTEM THAT PROVIDES ACCURATE TEMPERATURE CONTROL FOR WARMING BOTH SINGLE WALLED AND DUAL-WALLED PROCESS PIPEWORK**

The patented **Limpet** electrical heating system has now been adapted for heating process pipework in the process industries, notably in the confectionary sector. This revolutionary system is called 'CATTs' (Cascade And Thermodynamic Transportation System) and can be used on new process pipework or retrofitted to traditional, dual-walled, water-jacked pipework. With the removal of any water, the risk of microbe or chemical contamination is eliminated. The user also can monitor and control product temperatures on each individual pipe spool from a local control panel. Energy consumption is a fraction of that of equivalent water-heated systems.

### Applications

- Process industries
- Confectionary, notably chocolate, sugars and fats
- Food
- Beverage
- Pharmaceutical

### How CATTs works on dual-walled pipework

When retro-fitted to dual walled pipework, the jacket is first drained of its water and the inlet/outlet water ports are plugged, sealing in the air. When heated by CATTs, the air molecules become excited and their kinetic energy transmits the heat to the inner pipe. This system has proven to work extremely well on dual-walled pipework giving a homogenous thermal profile.

# CATTS FEATURES

The main features of the **CATTS** process pipe heating system are as follows:

## Construction:

- The CATTS heating system consists of several major components:
  - The **Limpet** heater unit, with two PID control loops linked in a cascade mode connected to sensors internally and externally on the outside of the pipe or in a thermowell, thus measuring the product temperature and feeding thermal energy into the system as required.
  - A Profinet link allowing units to be daisy chained on the network and be individually accessed and set up using a local IP address.
  - The heat transfer system, which consists of an aluminium extrusion running the length of the pipe spool and the Limpet TTS system (thermodynamic transportation system) that transmits heat along the entire length of the pipe spool, giving an even temperature throughout.
  - A profiled aluminium extrusion that matches the diameter of the pipework and transmits heat from the heat transfer system into the pipe. Suitable for both single-walled and dual-walled pipework.
  - Stainless steel cladding containing sealed, food-safe polyurethane foam. This significantly reduces heat losses and also prevents any vermin or microbe infestation.
  - Each heating circuit can heat up to between 80m to 100m of pipework. The power and signal cables are then fed back to a control panel (see details below).

## Installation:

- The system is designed to be 'plug and play'. Each heater section will come pre-assembled and will only require attaching to the pipework and then the power and control cables connected to the next heating unit in the circuit. Each heater is supported by custom-made stainless steel pipe clamps or standard wall brackets.
- CATTS is designed to be fitted to new or existing single-walled pipework or retrofitted to existing water-jacketed, dual-walled pipework.
- Both the power and signal cables run internally along the extrusions, thus eliminating the need for expensive cable trays. The units are connected to each other by short jumper leads around the pipe connectors; these can be of any standard type, including RJT, tri-clover and standard flanges.
- With insulation, it is not normally necessary to heat bends and corners, as heat will conduct from the heated sections. However, if it is required, special, custom heating units can be added.
- The control panel can be installed in any convenient location near the pipe run.

## Control System:

- Each pipe spool heater is individually controlled and monitored from a central control panel.
- Each control panel is simple and contains a small PLC with Profinet module, a HMI screen (with password protection from the entire heating system can be monitored), and a 4-pole 16A MCB per 100m feed.
- Each Limpet heater will be set as a 'slave' unit and that can communicate with the master PLC for all operating parameters (PID, set points, maximum temperatures, etc.). The temperature on each heater can be individually controlled, or the whole system set at the same temperature.

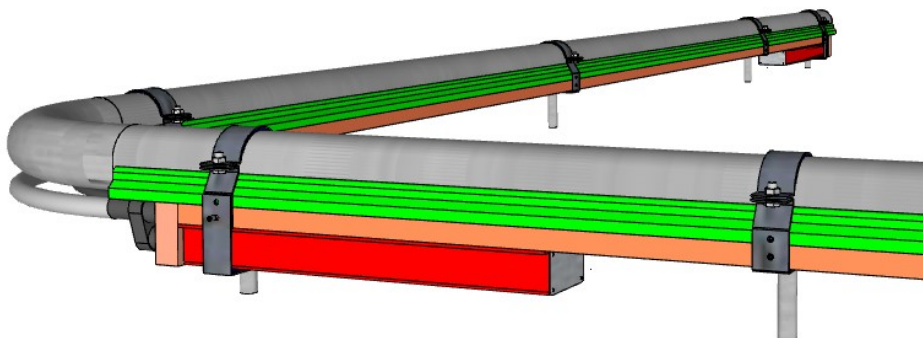
## Operation:

- Adjustable temperature range up to 80°C/100°C (variant dependent) to an accuracy of  $\pm 1.5^\circ\text{C}$ .
- 100Vac to 230Vac power supply.
- There are two 16A parallel feeds. These can heat up to between 80m to 100m of pipework.

## Robust Construction:

- The aluminium body provides good heat conduction and even temperature distribution over the heating plate.
- The product is sealed to ensure that all the connections and components are waterproof.

## Insulated Cover:



## CATTS ADVANTAGES OVER WATER-JACKETED PIPEWORK

The **CATTS** process pipe heating system has several major advantages over conventional water-jacketed heating systems:

- 'Plug and play' installation with no need for cable trays.
- Can be used on new systems or retrofitted to existing dual-walled pipework.
- Accurate PID temperature control along the entire pipe length, with the ability to monitor and control the temperature of each individual pipe spool to an accuracy of  $\pm 1.5^{\circ}\text{C}$ .
- Password protected central control system, so that only authorised personnel can made adjustments to the heating system. Can be interfaced to the factory network for alarms and event logging
- Eliminates the risk of microbe or chemical contamination, as no water is involved in the heating.
- Can melt out solid chocolate.
- Requires up to 90% less power over existing heating systems.
- Competitive capital cost.
- Huge reduction in operational costs, particularly as it eliminates the need to carry out regular monitoring of product for contamination.
- Highly reliable, robust and well-proven components with no moving parts.
- IP67 rated.
- Simple replacement of a heating unit in the unlikely event of failure.
- 5-year warranty on all components.
- Eliminates the need for boiler and heat exchanger installations and certifications.

## TECHNICAL INFORMATION

- Dimensions:
  - The heaters can fit pipe spool lengths ranging from 300mm up 3m.
  - The **Limpet** heaters can vary in length from 250mm to 400mm, depending upon the length of the pipe spool being heated.
  - The maximum depth of the heater is 60mm below the base of the pipe.
  - The heat transfer adaptor block is 86mm wide. The width of the secondary, profiled adaptor blocks will depend upon the pipe diameter.
- Weight: approximately 6kg/m, depending upon the pipe diameter. The section with the Limpet on weighs approximately 8kg/m.
- Profinet enabled, other protocols will be adopted later.
- Voltage: 100Vac to 240Vac.
- Power rating: up to 100W/m for melt-out and between 8W/m and 20W/m (with insulation) for temperature maintenance (depending upon operating temperature). There are two 16A circuits in each heating system drawing up to 7.4kW per system. Normal temperature maintenance operation will require between 600W and 1,500W, depending upon the pipe size.
- Temperature range:  $0^{\circ}\text{C}$  to  $80^{\circ}\text{C}$  or  $100^{\circ}\text{C}$ , variant dependent.
- Ambient:  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$ .
- Colour: Limpet bodies are red; the remainder is a brushed aluminium finish. Cladding is gloss stainless steel.

