

## Notes On Basic Trace Heating System Design

### Required Information

- Tank, Pipe or Other Object Size & Material
- Location (inside, outside, exposed to extremes of temperature or any relevant information)
- Contents (could the contents be damaged by high or Low temperature)
- Thermal Insulation Thickness & Type (never use insulation containing sulphur)
- Supply Voltage (usually 110v or 230v)
- Minimum Ambient Temperature
- Maintain Temperature (frost protection usually +3°C to +5°C)
- Area Classification (Safe None Hazardous or Hazardous Area / Intrinsically Safe)

### Pipe Heat Loss Calculation

$$\text{Watts / Meter} = \Delta t^{\circ}\text{C} \times K_e \times \text{Normalised loss Factor (BS6351)} \times 1.25$$

### Tank Heat Loss Calculation

$$\text{KW Required} = \frac{\text{Surface Area (m}^2\text{)} \times K_e \times \Delta t^{\circ}\text{C}}{\text{Thermal insulation thickness (mm)}} \times 1.25$$

### Heat Raise Calculation

$$\text{KW Hours Required} = \frac{\text{Weight Kg} \times \text{Specific Heat} \times \text{Temperature Raise}}{859.8}$$

$\Delta t^{\circ}\text{C}$  = Maintain temperature - minimum ambient temperature  
 $K_e$  = Thermal conductivity of insulation material

### Operation

Once a electrical supply has been connected to a trace heating system all that is required is the thermostat is set to the required temperature.

### IMPORTANT NOTE FOR TEMPERATURE MAINTENANCE:

IF THE THERMOSTAT IS SENSING THE SURFACE TEMPERATURE OF A PIPE OR TANK, THE CONTENTS MAY NOT BE AT THE SAME TEMPERATURE, TO OVERCOME THIS THE THERMOSTAT SHOULD BE TURNED UP A FEW DEGREES AT A TIME AND LEFT FOR A FEW HOURS THEN THE CONTENT TEMPERATURE TESTED, CARRY OUT THIS OPERATION UNTIL THE CONTENTS IS AT DESIRED TEMPERATURE. THIS IS NOT ALWAYS NECESSARY IN MOST TRACE HEATING APPLICATIONS BUT IT IS A IMPORTANT CONSIDERATION.

### Maintenance Of A Constant Wattage Systems

Visual Inspection of Indication lamps if fitted to thermostat, make sure power is on and trace heating is switching.

Remember that first section of Heating Tape is usually the cold lead and will not feel warm.

Electrical resistance and insulation resistance tests can be carried out as required.

Testing should be measured under normal dry conditions and before connection to the thermostat. Insulation test is by means of a tester using d.c. Voltage within the range 80 v to 500v. The insulation resistance should be not less than 0.1mΩ.Km. Unit resistance should be within 10% of nominal value.

$$\text{Watts} = \frac{\text{rated volts} \times \text{rated volts}}{\text{Resistance}}$$

### Maintenance Of A Self Regulating Heating Tape Systems

Visual Inspection of Indication lamps if fitted to thermostat, make sure power is on.

Feel any exposed heating tape this should feel warm.

Insulation resistance tests can be carried out as required (Resistance Cannot Be Tested).

Testing should be measured under normal dry conditions and before connection to the thermostat. Insulation test is by means of a tester using d.c. Voltage within the range 80 v to 500v. The insulation resistance should be not less than 0.1mΩ.Km.