



HEAT TRACING SYSTEMS



Raychem

tyco | Thermal Controls

Self Regulating Heat Tracers

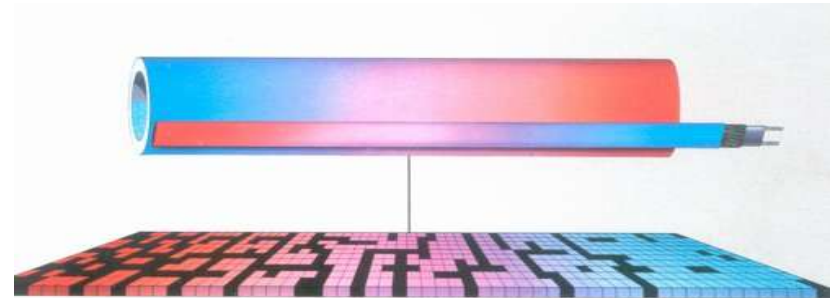
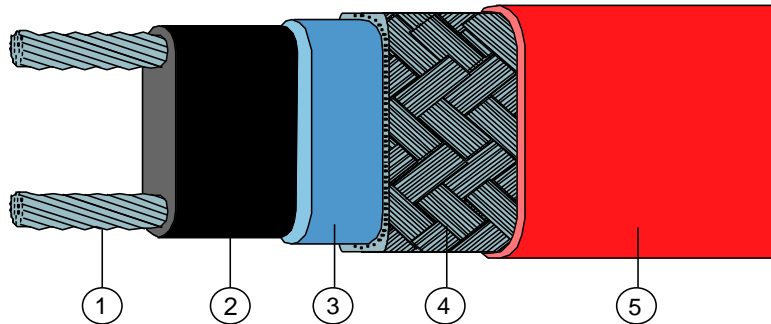


- ✓ Maintain the temperature on the surface of pipes or vessels.
- ✓ Provide a heat flow equal to the heat losses to the environment through the insulation.
- ✓ They are fixed on the surface of pipes or vessels, under the insulation.

Heat Tracers Structure & Principle of operation

enia

SELF REGULATION

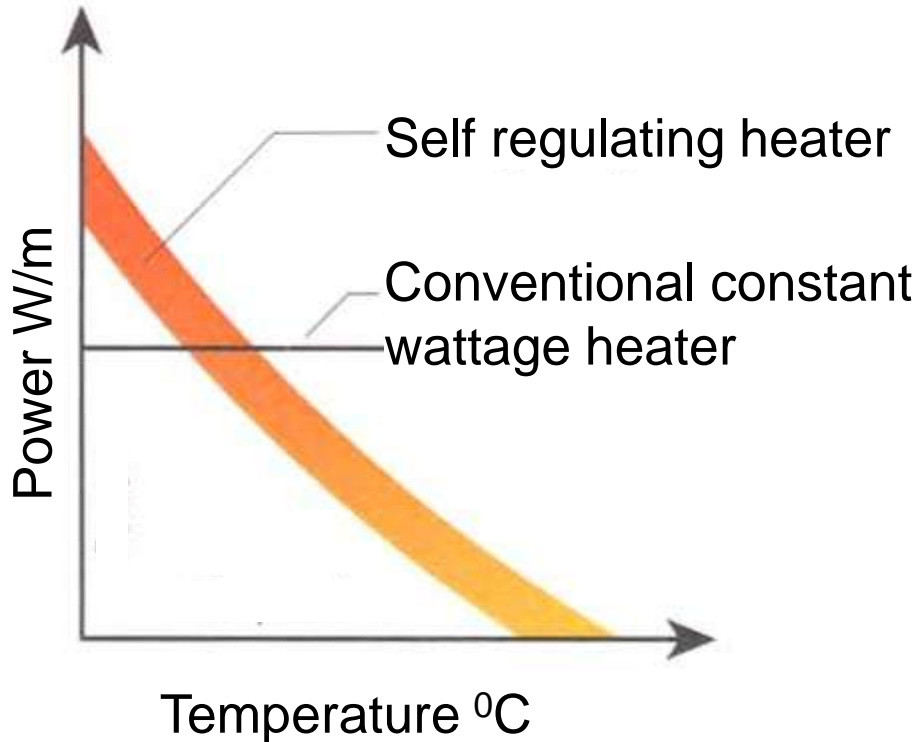


1. Power supply conductors
2. Heating element (conductive polymer)
3. Internal insulating jacket
4. Grounding braid
5. External insulation (PP or Teflon)

- As the surface temperature increases the power is reduced.
- At cold spots the heating tape emits more power. At hot spots the emitted power is reduced

Power is a Function of Surface Temperature

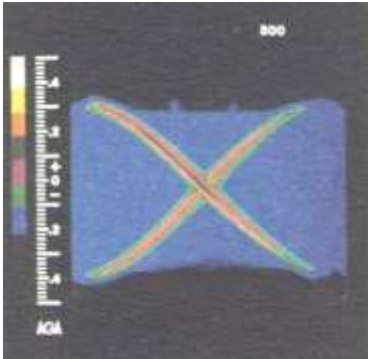
enia



- ✓ The temperature is maintained, within tight limits, at each point along the pipe length, \rightleftharpoons irrespective of ambient temperature fluctuations or the quality of the insulation.
- ✓ Surface **overheating** or **hot spots** are avoided.
- ✓ Power saving is achieved.
- ✓ Thermostat is not necessary. The self regulating heating tapes behave as if there is a thermostat at each point along their length.

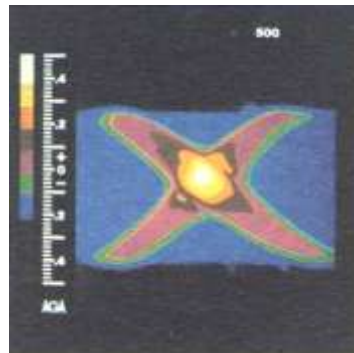
Safe Operation

Thermal imaging at the point of crossing of two heat tracers



Self regulating heating tape by enia

No hot spot



Conventional constant wattage heater

Hot Spot

Risk of overheating or fire

- With the self regulating heater we ensure that:
 - › The liquid inside the pipe or the vessel will never overheat and deteriorate.
 - › There is no possibility of overheating at the points that the heating tapes cross (for example valves, pipe supports and other fittings).
 - › Overheating at these points may have catastrophic consequences like heater damage or even fires!

Long Lifetime

enia



- Practically unlimited lifetime when operated according to the design values.
- It has been proved in the field that after **25 years of continuous operation** at the **maximum allowable temperature** the self regulating heating tapes maintain at least **80%** of their initial heating capacity.
- Their reliability has been proved in thousands of applications, in harsh environmental conditions, all around the world and bear the quality seal of

tyco / Thermal Controls

Raychem

Robust Construction - Easy Installation

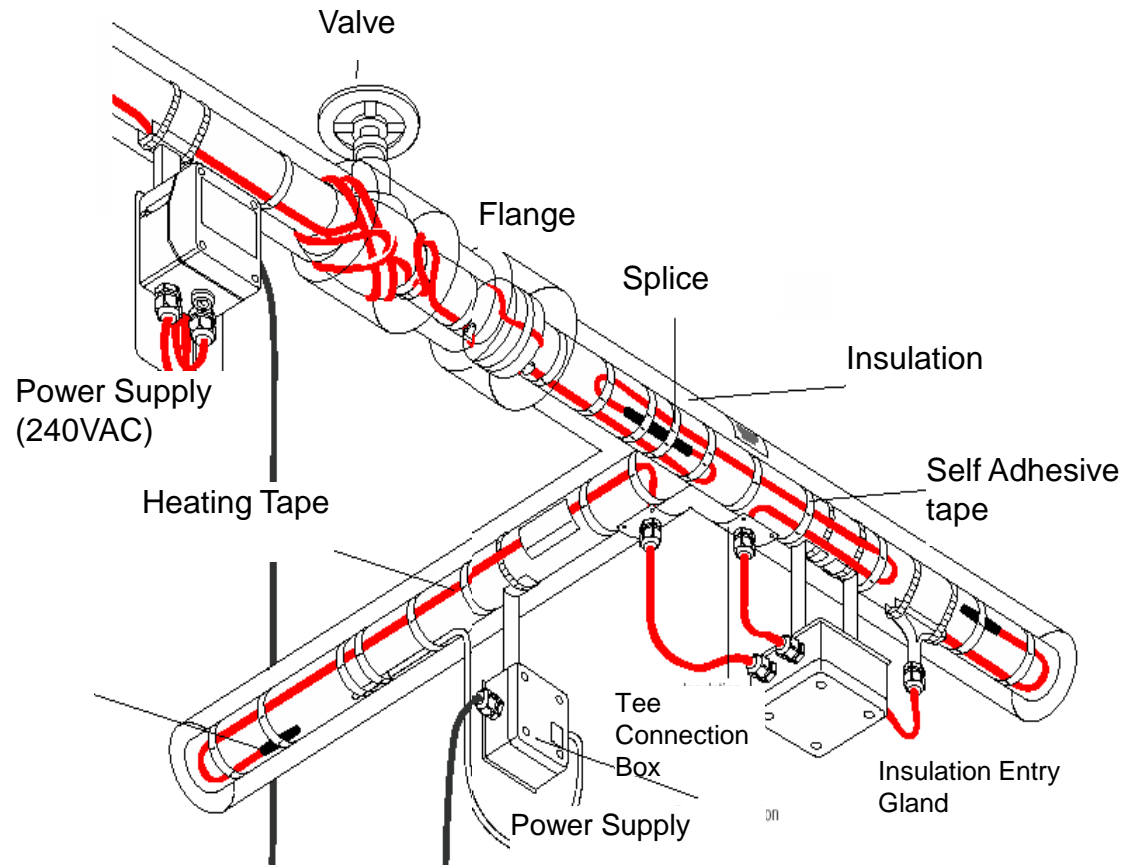
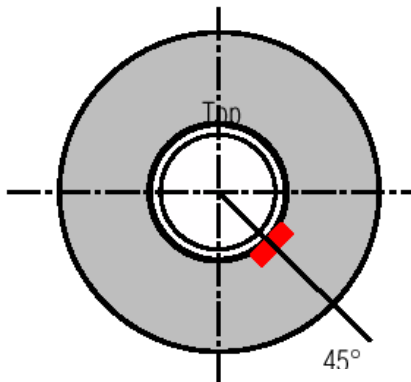
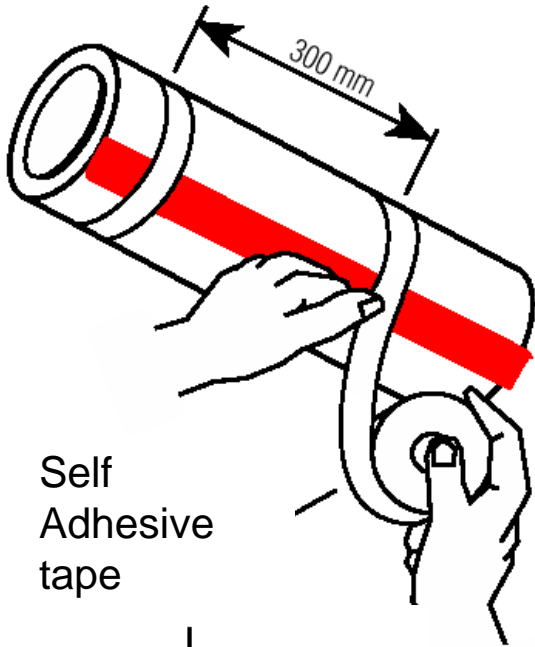
enia



- Heat tracers can be cut to the required lengths at the field.
- A complete line of connection, termination and support components is available.
- After the initial installation they can be expanded or modified without problem.
- They can be removed and reused.

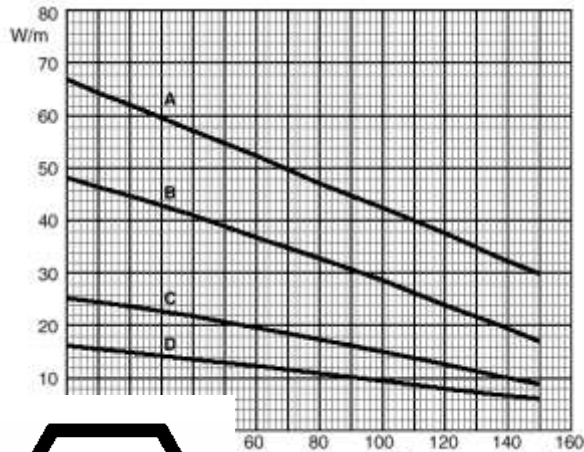
Easy Installation – Complete Line of Installation Components

enia

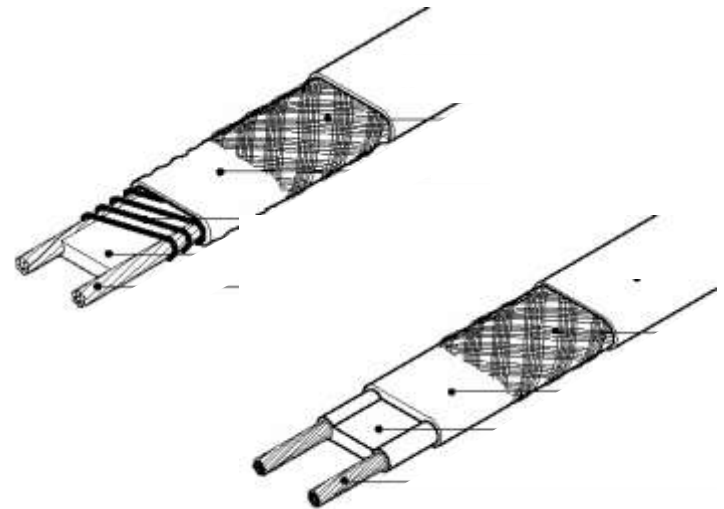
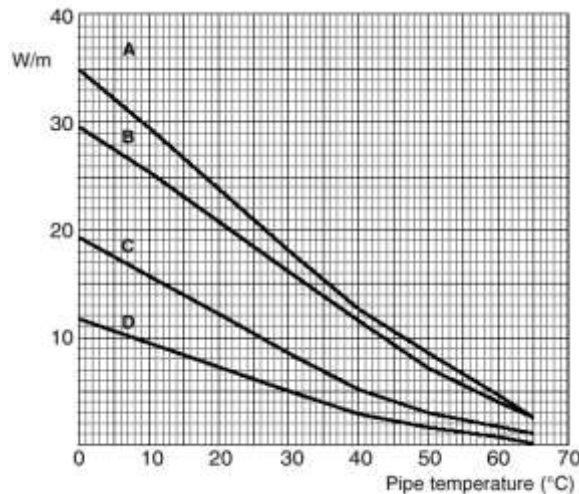


Great Variety of Self Regulating Heaters – Suitable for any Application

enia

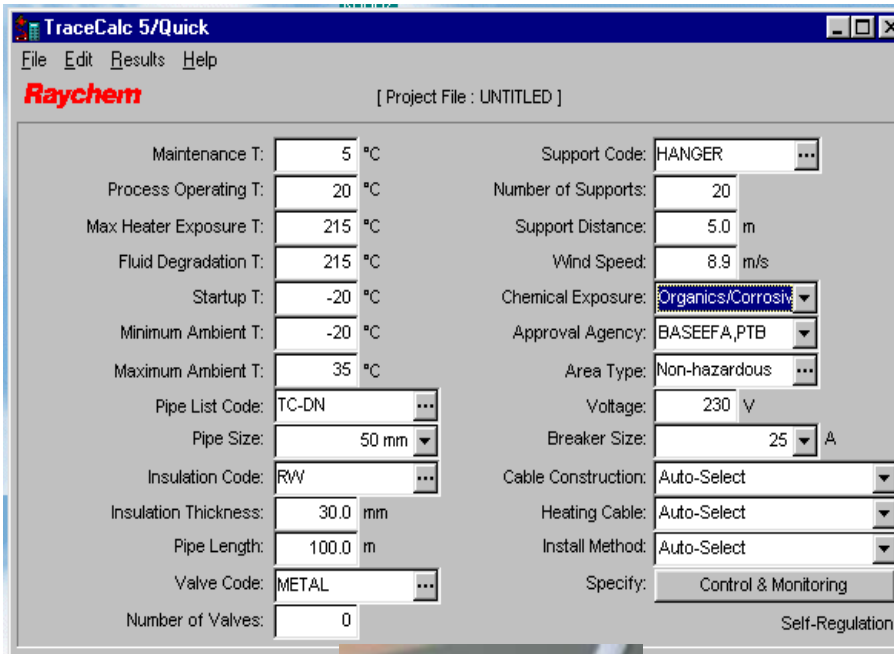


- From 10W/m up to 70W/m at 0°C.
- Max operating temperature up to 150°C (up to 215°C for intermittent operation).
- Certified for Explosion Proof Areas (Ex).



Design and Technical Support

enia



The screenshot shows the TraceCalc 5/Quick software interface. The title bar reads "TraceCalc 5/Quick" and the menu bar includes "File", "Edit", "Results", and "Help". The "Raychem" logo is visible in the top left, and the project file is "UNTITLED". The interface is divided into two columns of input fields:

Parameter	Value	Unit
Maintenance T:	5	°C
Process Operating T:	20	°C
Max Heater Exposure T:	215	°C
Fluid Degradation T:	215	°C
Startup T:	-20	°C
Minimum Ambient T:	-20	°C
Maximum Ambient T:	35	°C
Pipe List Code:	TC-DN	
Pipe Size:	50 mm	
Insulation Code:	RW	
Insulation Thickness:	30.0	mm
Pipe Length:	100.0	m
Valve Code:	METAL	
Number of Valves:	0	
Support Code:	HANGER	
Number of Supports:	20	
Support Distance:	5.0	m
Wind Speed:	8.9	m/s
Chemical Exposure:	Organics/Corrosive	
Approval Agency:	BASEEFA,PTB	
Area Type:	Non-hazardous	
Voltage:	230	V
Breaker Size:	25	A
Cable Construction:	Auto-Select	
Heating Cable:	Auto-Select	
Install Method:	Auto-Select	
Specify:	Control & Monitoring	
Self-Regulation:		



enia will make a detailed thermal losses calculation and will provide a documented detailed design for every application.

The Technical Department of **enia** will undertake training, installation and commissioning for any application.

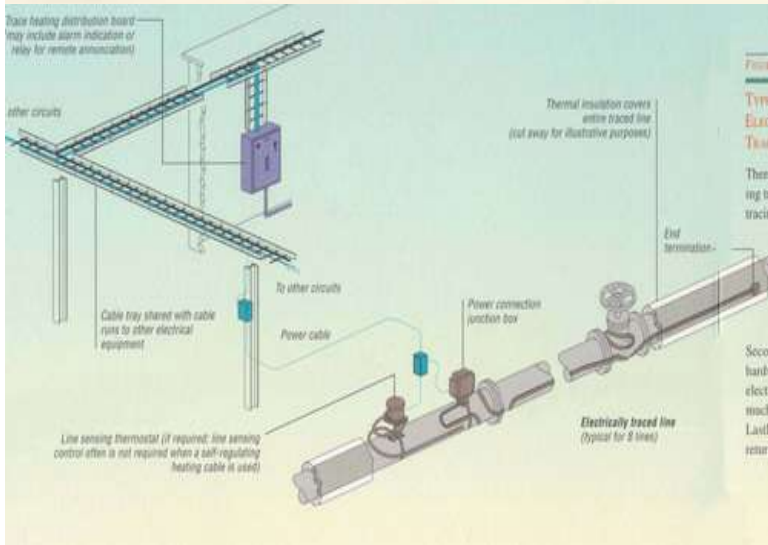
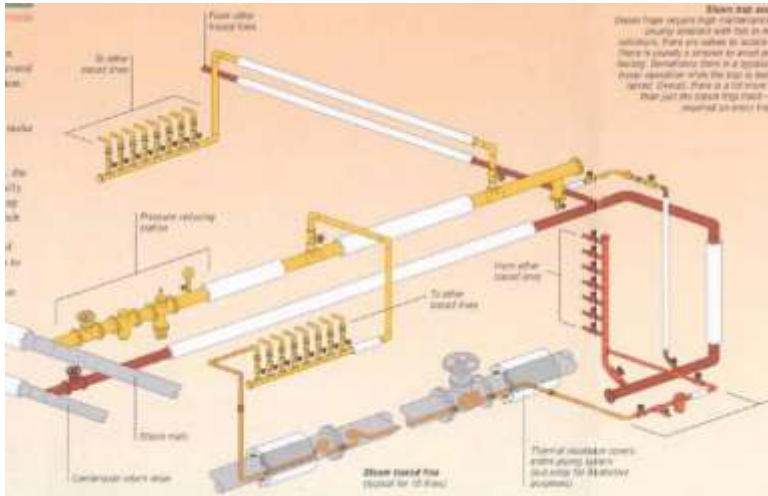
A written warrantee will be provided if requested.

Required Data



- Pipe nominal diameter(s). Pipe material.
- Pipe configuration & lengths (straight run, branches etc. In the case of complex pipe configuration please provide drawings).
- Fittings number & type (valves, flanges, instruments etc).
- Type and spacing of pipe supports.
- Dimensions and configuration of vessel(s) (if applicable).
- Type and thickness of insulation (if not available we can propose for the optimum insulation).
- Required maintenance T (tracers are principally used in order to maintain the temperature of a stagnant fluid. If heating up is required please specify initial & final T, c_p of fluid, time to heat).
- Min & max ambient T at the site.
- Max allowable T of fluid (if applicable).
- Max T of the pipe if heated from another source (ex. Steam purging).
- Safe or Ex- rated area & Ex rating if applicable (this affects only the type of power supply boxes, branching boxes, thermostats etc).
- Points of availability of 240VAC low voltage supply.

Comparison with Steam Tracing



- Lower installation cost :
 - There are no steam pipes and condensate return pipes, valves, steam traps etc
- Lower operation and maintenance cost:
 - No heat losses from leaking steam and condensate return pipes, steam traps and other components. No insulation damage from steam or condensate leakages.
- Short installation time. No specialized piping crews required.

enia will undertake a complete and documented comparison if required.

Self Regulating Heaters - Applications

enia



- Temperature maintenance for pipes and vessels in order to maintain the liquid fluid (for example heavy fuel oil).
- Freeze protection of water pipes.
- Avoidance of condensations.
- Residential floor heating.
- Freeze protection of ramps or stairs.
- Snow melting on roofs.
- Freeze protection of train rail changes or power rails.

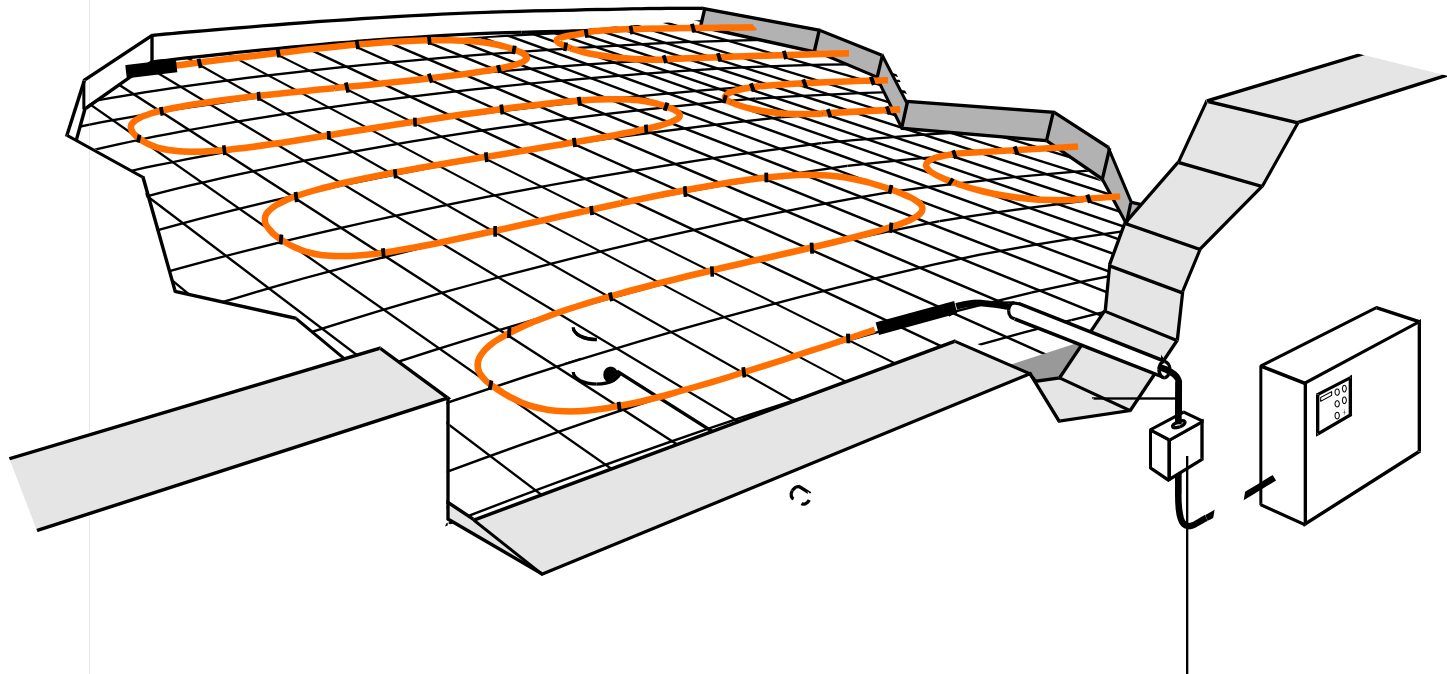
Freeze Protection for Buildings

- Car access ramps.
- Ramps for people with special needs.
- Critical parts of roads.
- Stairs.
- Roofs and gutters.



Protection of Cold Room Floor

Low temperatures may cause the humidity under the cold rooms floor to freeze, expand and damage the concrete floor

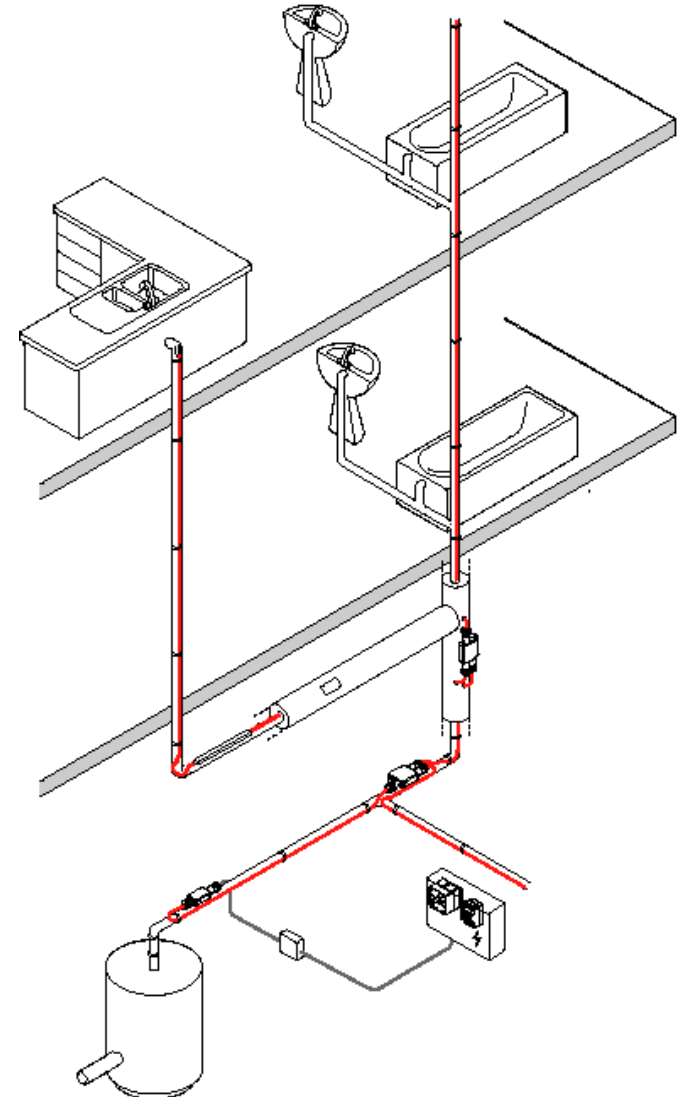


Hot Sanitary Water Lines

enia

Self regulating heating tapes of **enia** change the design philosophy of sanitary hot water systems

- Conventional design:
 - Double pipes (feeder and return) plus circulation pump
- **enia's** solution:
 - Single pipe with self regulating heating tape.



Freeze protection of rails



- Special heating tapes and components, suitable for installation on rail changes, in order to prevent snow / ice accumulation that may inhibit their operation.
- Design capabilities, full range of installation, connection and control components.
- Long maintenance-free lifetime.

Self Regulating Heating Tapes from enia

enia



- Reliability
- Safety
- Easy Installation
- Long Lifetime
- Full Technical Support
- Warranty

- The ***Self Regulating Heaters*** have a limit in their maximum length.
- This is due to the “***parallel wire***” power supply principle (the voltage drops along the length of the heater).
- Typical continuous lengths are in the range of 100-200m. With a power supply box and the heaters running left and right, the requirement for power supply points is increased to 200-400m.
- ***This is not enough for long pipelines*** (some Km!).
- The solution is the ***STS (Skin - Effect Tracing System)***.

STS – Skin Effect – Heat Tracing System

enia

- The **STS System** can be designed for:
 - Circuit lengths up to 25Km.
 - Power output up to 150W/m.
 - Maintain Temperature up to 200 °C.
 - Exposure Temperature up to 250 °C.

This is the Ideal System for Oil Pipelines



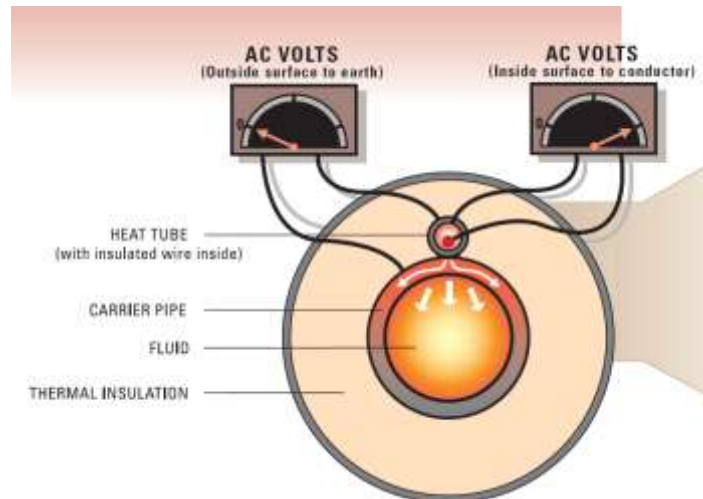
STS System – Principle of Operation



- The **STS System** consists of a thermally rated, electrically insulated wire, inside a ferromagnetic heat tube.
- An AC voltage source is connected between the heat tube and the insulated wire at the power connection end.
- The insulated wire is connected to the heat tube at the termination end.
- AC current flows down the wire, returning on the inside surface of the tube.
- Heat is generated in the ferromagnetic tube by Skin Effect.
- The power supply (voltage, frequency, amperage) is custom designed.
- A load balancer is provided, if required, in order to equilibrate the loads on the 3 phases.

STS System – Principle of Operation

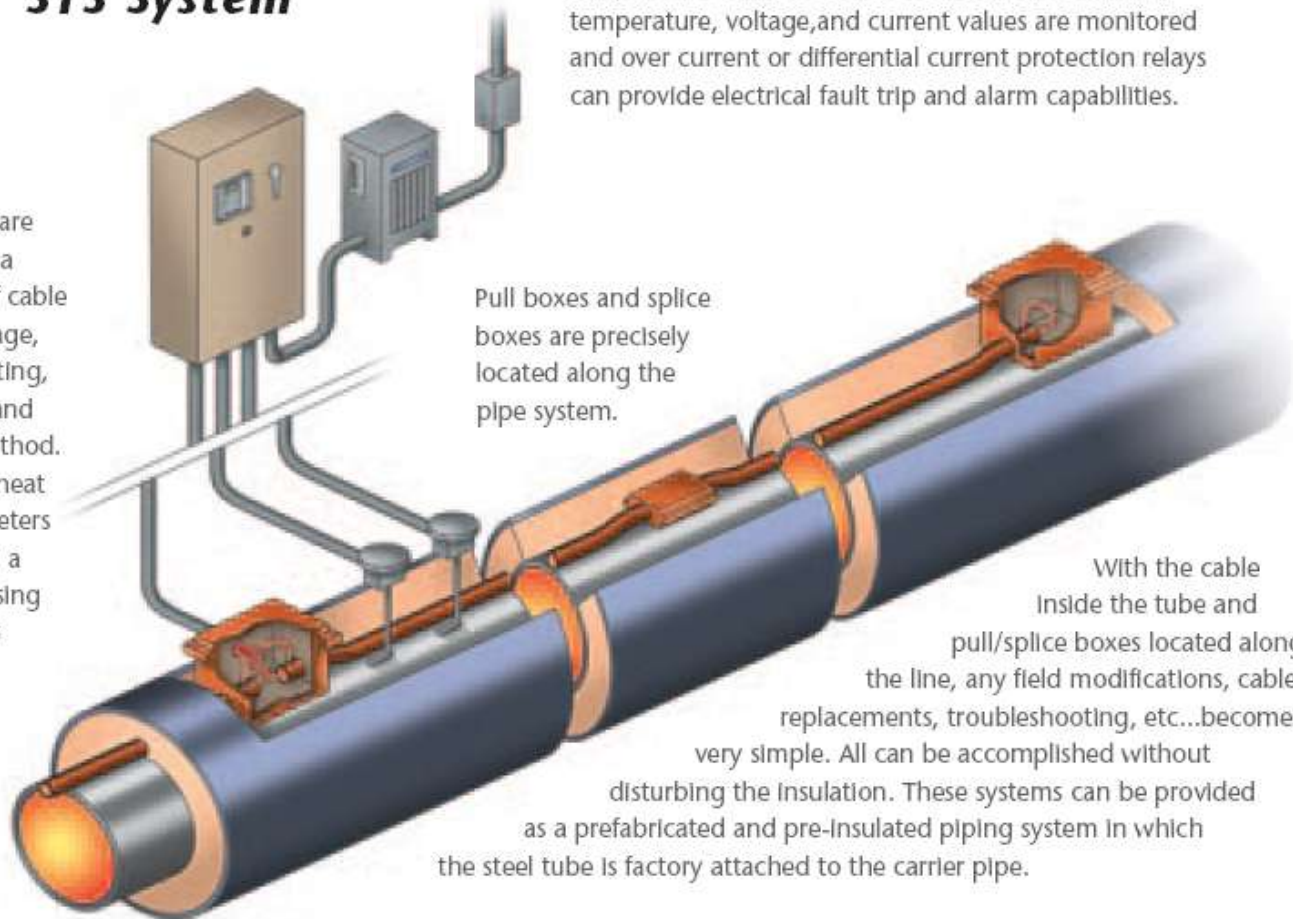
- The **STS System** is electrically safe. As the current flowing through the **STS** heat tube is concentrated on the internal surface of the tube (due to the Skin Effect phenomenon), there is virtually no measurable voltage on the outer surface of the **STS** tube.
- Heat is also generated due to the resistance of the heat tube and the **STS** wire and through eddy currents in the heat tube.
- As the heat tube is welded on the process pipe and within the insulation system, heat is efficiently transferred into the process pipe.



STS System – Lay Out

STS System

Circuit lengths are determined by a combination of cable size, cable voltage, temperature rating, heat tube size and attachment method. It is feasible to heat up to 25 Kilometers (15 miles) from a single source using supply voltages approaching 5,000 volts.



Control of the system is accomplished by solid-state temperature controls with RTDs as sensors. Standard temperature, voltage, and current values are monitored and over current or differential current protection relays can provide electrical fault trip and alarm capabilities.

Pull boxes and splice boxes are precisely located along the pipe system.

With the cable inside the tube and pull/splice boxes located along the line, any field modifications, cable replacements, troubleshooting, etc...becomes very simple. All can be accomplished without disturbing the insulation. These systems can be provided as a prefabricated and pre-insulated piping system in which the steel tube is factory attached to the carrier pipe.

STS System – Advantages



- **LONGLINE CAPABILITY**
 - Circuit lengths up to 25Km from a single power source.
- **SUITABLE FOR UNDERWATER APPLICATIONS**
- **SAFE**
 - Fully grounded system with zero potential on pipe surface.
- **ENGINEERED**
 - Systems are custom designed in accordance with ANSI/IEEE 844, NEC 426/427 and plant standards.
 - Temperature profile plotting capabilities.
- **ACCURATE CONTROL**
 - Closed loop control with redundant temperature sensing.
- **RUGGED & RELIABLE**
 - The entire circuit is enclosed within rugged heat tubes and steel boxes.
- **MAINTENABLE**
 - Pull & Splice boxes simplify access to the system, without disturbing the insulation.
- **SYSTEM DESIGN AND MATERIALS BY**



STS System – Applications

enia



Oil Pipelines



Subsea / Submerged Lines



Snow & Ice Prevention



Tank Foundation Heating



Prefabricated / Preinsulated Lines



ENIA S.A. 6 Pagaiou Str., GR-15123
Nea Filothei, Athens
Greece
Tel: +30 210 6754801
Fax: +30 210 6754804
info@enia.gr
www.enia.gr