



Tube Bundle Sample Conditioning & CEMS Analyzer System Solutions



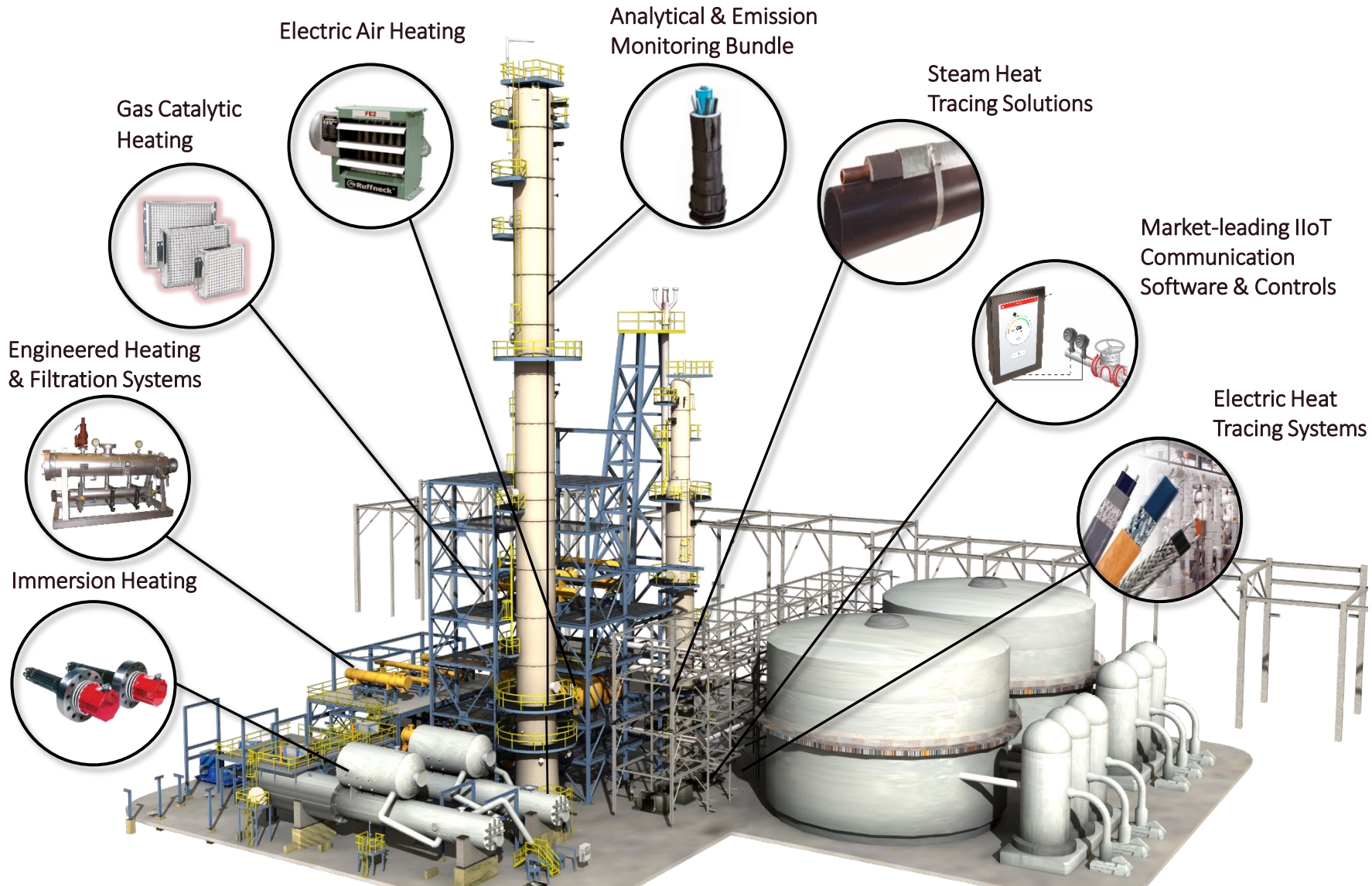
Agenda



- Thermon Overview – background and update
- Lead times/Supply Chain
- Design/Build Considerations
- Accessories/System solution
- Proper installation techniques/Site Services
- Power Blankets

Industrial Process Heating

Thermon now offers heating solutions for the external and internal maintenance of process temperatures in critical applications, while including advanced controls and communications platforms to add more value for our end customers



CEMS Umbilical



Monitoring Processes

Dilution Systems – Freeze Protection

Hot Extractive Systems – Temperature Control

SO_x, NO_x, CO, Hg and others

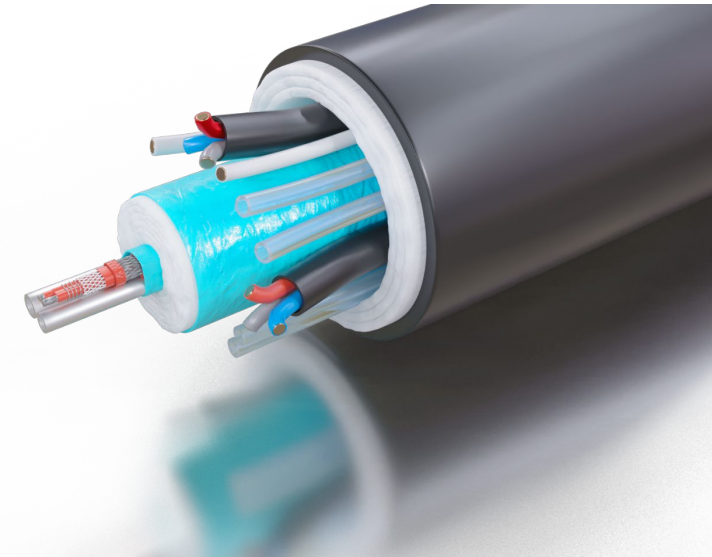


Supply Chain / Lead Time Update

Our supply team has filled the raw material shelves with the most common tubes needed, including seamless and welded stainless steel, copper, Alloy 825 and Fluoropolymer tubing. In addition, we have built up stock on our most popular heating cables, such as BSX, HTSX and HPT. Our operations management has prepared skilled and cross-trained personnel, using world class process improvement techniques, which has opened capacity for the return of our Quick-Ship-Program**.

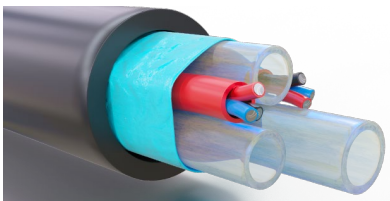
For bundle needs up to 1000 ft quantity: (For larger demand, confirm with factory)*

- Self-regulating/HPT bundles: Standard 2-3 wks. Quick-Ship 5-7 workdays \$350 fee
- SE/ME – XINS bundles: Standard 3-4 wks. Quick-Ship 1-2 weeks \$500 fee
- Light & Heavy steam trace: Standard 2-3 wks. Quick-Ship 5-7 workdays \$350 fee
- High temp., HT, HTX & HTX2: Standard 3-4 wks. Quick-Ship 1-2 weeks \$500 fee
- Price listed SL ThermoTube®: Stock-1 week
- CEMS Bundles: 4 weeks with expedite options
- SafeTrace bundles: Contact factory for available stock & lead-time



Supply Chain:

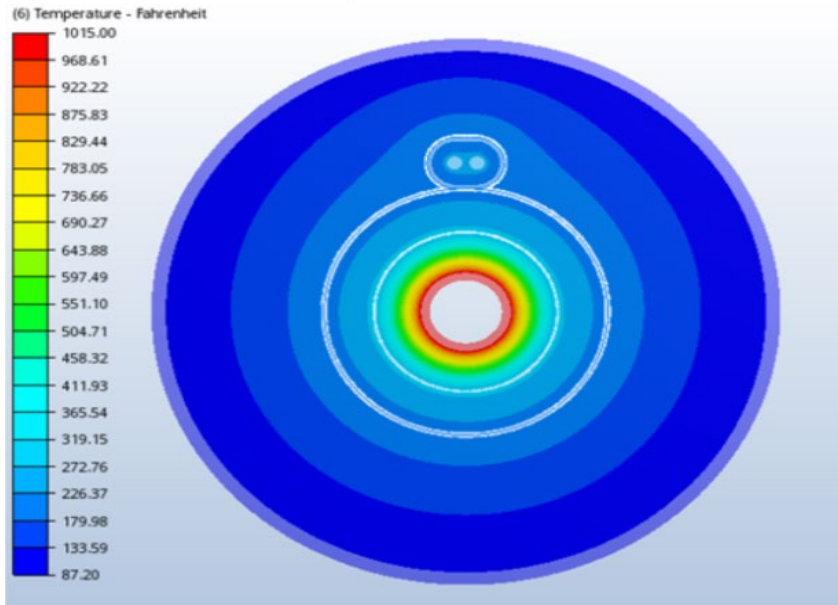
- **SS Tubing**
- **Silicon**
- **Heater cable components**
- **PFA?**



Thermal Design Challenges

- ❑ Maintain the process fluid temperature
- ❑ At the lowest specified ambient condition
- ❑ Don't overheat process fluid temperature
- ❑ At the highest specified ambient condition
- ❑ While keeping the tube bundle surface temperature within personal protection codes, 60°C or below.

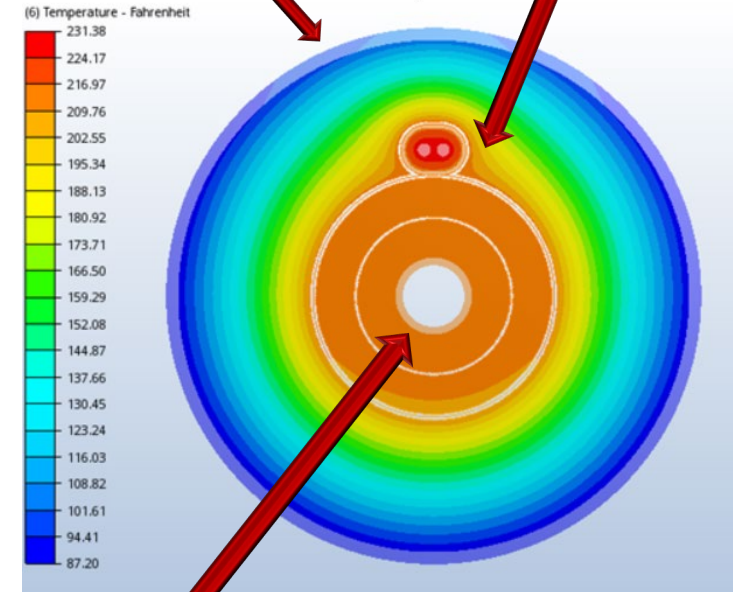
Solution: Global Temperature Profile after 2 Minutes



Keep the product surface cool to touch

Don't overheat the core

Solution: Initial Global Temperature Profile




Maintain Process Tube Temperature

Design Considerations

Critical System Design Criteria

- ✓ Tube Material & Treatments
- ✓ Tube Size
- ✓ Sample Point Installation Lengths
- ✓ Operating Voltage
- ✓ Hazardous Area Classifications
- ✓ Temperature to be Maintained
 - ✓ Low - Winter
 - ✓ High - Summer
- ✓ Max. Process Exposure Temperature

**Process Instrument/Analytical**
Request for Quote

Please provide your project details.

Name:

Design Conditions
Length(s) Required: m ☒ ft. Max. Exposure Temp. ($T_{p,exp}$): °C ☒ °F
Maintain Temperature (T_p): °C ☒ °F Process Medium:
Low Ambient Temperature (T_a): °C ☒ °F Max Process Temp Limit ($T_{p,max}$): °C ☒ °F
☐ Indoors ☒ Outdoors

Heating Cable Specifications
Type of Cable Preferred:
Overjacket type: ☐ Polyolefin ☒ Fluoropolymer
Available Voltage (Vac):
Hazardous Area Classification:
T-Class:

Control Required?
☐ Yes ☐ Thermostat
☒ No ☐ Electronic Control
☐ Existing

Process Tube Specification
Number of Heated Tubes:
Number of Nonheated Tubes:
Tube Diameter(s) O.D.: 1. 2. 3. 4. 5.
Tube Wall Thickness: 1. 2. 3. 4. 5.
Tube Material: 1. 2.
Seamless or Welded: 1. 2.

Fluid Tracer Specification
Heating Media: Tube Diameter O.D.: mm ☐ in.
Media Temperature: °C ☒ °F Tube Wall Thickness: mm ☐ in.
Media Pressure (PSIG): Tube Material:
Number of Tracer Tubes: Seamless or Welded:

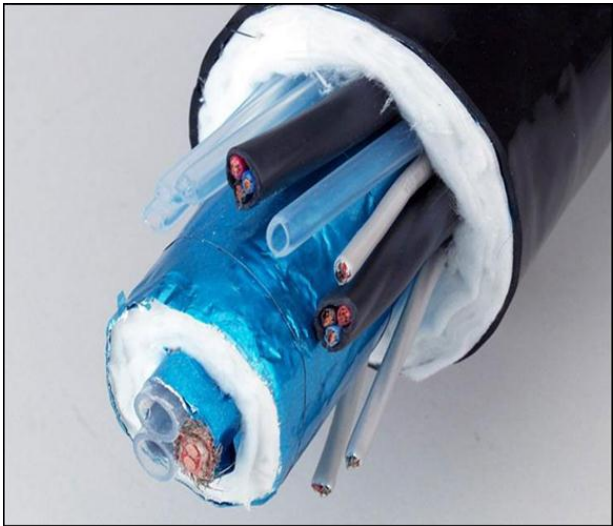
Accessories
Extra Wires:
Bundle Overjacket Type:
Factory Installed Sensors:


Comments

Design Considerations continued

Optional Design Needs

- ✓ Embedded RTD or Thermocouple
- ✓ Instrument wires for remote valve control.
- ✓ Power wire needs for probe heaters and/or sample conditioning support
- ✓ Unheated tubes for blowback & calibration of the analyzer





Process Instrument/Analytical
Request for Quote

Please provide your project details.

Name:

Design Conditions
Length(s) Required: ☐ m ☒ ft.
Maintain Temperature (T_p): °C ☒ °F
Low Ambient Temperature (T_a): °C ☒ °F
☐ Indoors ☒ Outdoors

Max. Exposure Temp. (T_{p exp}): °C ☒ °F
Process Medium:
Max Process Temp Limit (T_{p max}): °C ☒ °F

Heating Cable Specifications
Type of Cable Preferred:
Overjacket type: ☐ Polyolfin ☒ Floropolymer
Available Voltage (Vac):
Hazardous Area Classification:
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☐ Yes ☐ Thermostat
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Accessories
Extra Wires:
Bundle Overjacket Type:
Factory Installed Sensors:

Comments

Design Circuit Report – CompuTrace IT

Circuit Report & BOM

Close

Print

Export

CompuTrace IT Version 1.0.8 *
Circuit Report & BOM - Electric
3/6/2008 2:32:58 PM

Project		Identification		Operating Temperatures	
Job Name		Record	1	Maintenance Temperature	300 °F
Project No.		Reference Number		Op. Temperature	300 °F
Project Ref.				Op. Temperature Hi	300 °F
Designer				Op. Heater Temperature	393 °F
Job No.				Op. Heater Temperature Hi	393 °F
				Max Heater Temperature	510 °F

Note: Bundle performance values are based on the use of Thermon products, not valid for other manufacturer's products

Bundle		Product & Environment		Heater Performance Data	
Design Heat Loss	11.57 W/ft	Min. Ambient Temperature	-20 °F	Heater Type	HPT 20-2 OJ
Bundle Length	100. ft	Startup Ambient Temperature	0 °F	Heater Output	11.81 W/ft
Bundle OD	2.6 in	Max. Ambient Temperature	104 °F	Voltage	220 Vac
Jacket Type	ATP	Wind Speed	25 mph	Total Applied Power/Heat	1,377 Watts
Number of Tubes	1	Max. Exposure Temperature	35 °F	Startup Current	11.6 A
Tube 1	3/8 in	Max Product Temperature	400 °F	Operating Current	6.3 A
Tube 1 Material	C = PFA Teflon	Area Classification	Non-hazardous	Number of Power Points	1
Tube 1 Wall Thickness	0.062 in	T-Class	N/A	Circuit Length	101 ft
Tube 2	N/A in	Control Method	Tube Sensing	Circuit Breaker Size	30 A
Tube 2 Material	N/A	Control Setpoint	N/A	Circuit Breaker Type	QOB
Tube 2 Wall Thickness	N/A in				
Tube 3	N/A in				
Tube 3 Material	N/A				
Tube 3 Wall Thickness	N/A in				

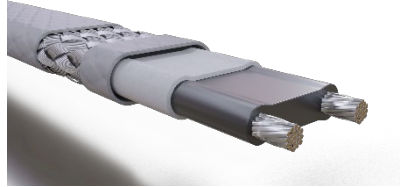
Catalog Number	Description	Quantity	Units	Unit Pricing	Unit/Extended Pricing
SE-3C1-57-7-ATP-062-XINS(2.6)	(1) 3/8" PFA Teflon / HPT 20-2 OJ		100 ft		
FAK-7	Termination seal kit, (material for approximately 6 terminations)	1	Each		
PETK-3D	Circuit fabrication kit	1	Each		

The Engine of Thermal Success Premier Heating Solutions



BSX SELF-REGULATING

- Max. Maintain Temp: 150°F (65°C)
- Max. Exp. Temp.: 185°F (85°C) (power-off)
- Polyolefin or Fluoropolymer Jackets
- Up to 10 watt/ft & 277V Ratings
- Ordinary & Haz., Location Ratings
- Cut-To-Length in Field



HTSX SELF-REGULATING

- Max. Maintain Temp: 302°F (150°C)
- Max. Exp. Temp.: 400°F (205°C) (power-off)
- Fluoropolymer Jacket
- Up to 20 watt/ft & 277V Ratings
- Ordinary & Haz., Location Ratings
- Cut-To-Length in Field



HPT POWER-LIMITING

- Max. Maintain Temp: 410°F (210°C)
- Max. Exp. Temp.: 500°F (260°C) (power-off)
- Fluoropolymer Jackets
- Up to 20 watt/ft & 240 Ratings
- Ordinary & Haz., Location Ratings
- Cut-To-Length in Field

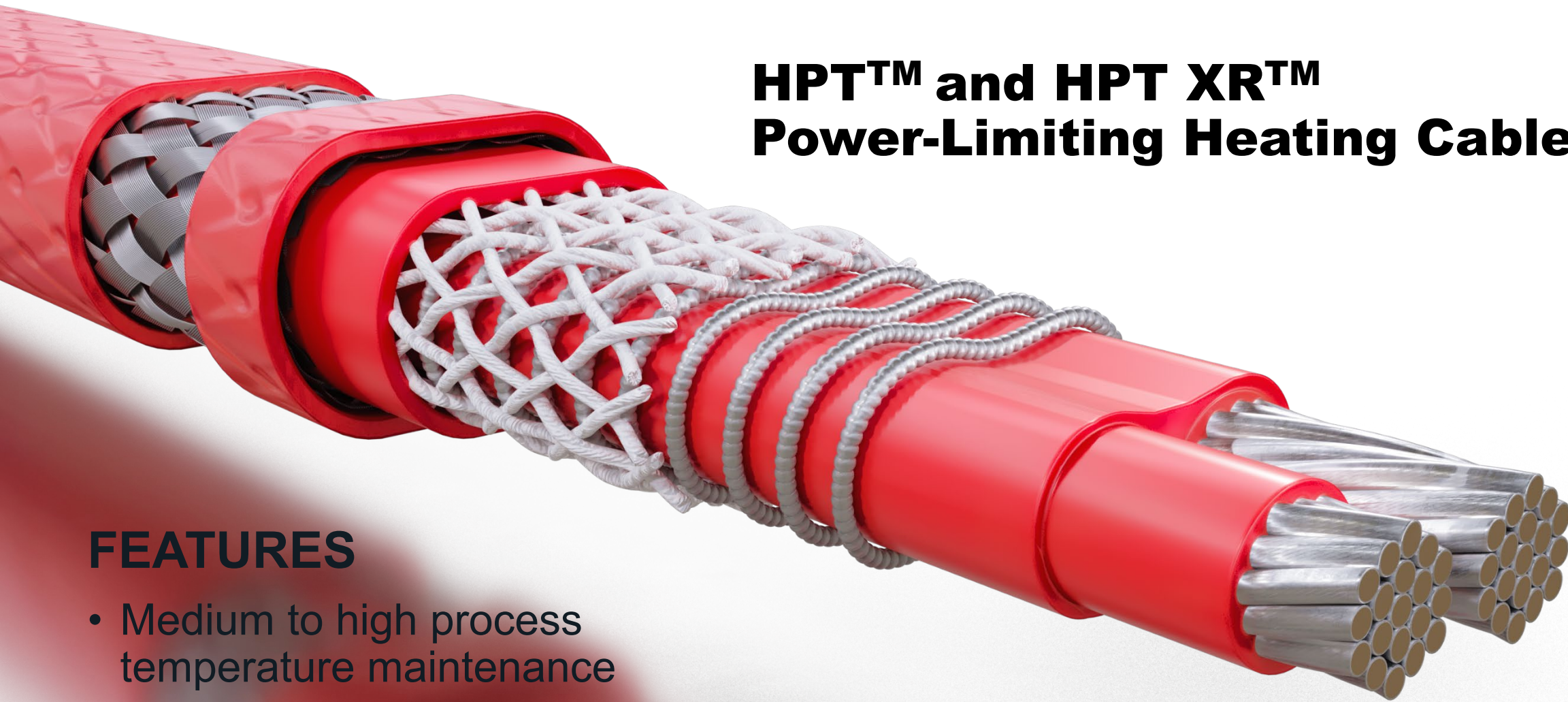


MIQ CONSTANT WATT

- High Temp Mineral Insulated Cable
- Not Cut-to-Length
- Maintain up to 500°C (932°F)
- Max exposure 600°C (1,112°F)
- Ordinary & Haz., Location Ratings
- Metallic outer cover



HPT™ and HPT XR™ Power-Limiting Heating Cable



FEATURES

- Medium to high process temperature maintenance
- Steam clean/purge
- Certified for use in ordinary (nonclassified) areas and in potentially explosive atmospheres

Tubing Standards

- ☐ 316/316L Dual Certified UNS S31603
- ☐ Seamless or Welded
- ☐ ASTM A269/A213 EAW
- ☐ 90 HRB Max – Fully Annealed
- ☐ NACE MR0175-MR0103
- ☐ 100% PMI Certified by Heat Number at the Mill.
- ☐ 100% Hydrostatic Tested per A1016/A1016M
- ☐ MTR's Available upon request with orders. No charge
- ☐ Full – PMI test reports available at an additional charge, per % of lot-number.
- ☐ EP – Electropolishing ASTM B912
- ☐ 30 μ -in Ra ID to 10 μ -in Ra ID
- ☐ Chemical Passivation
- ☐ Sulfinert Treatments

Long Coil Length



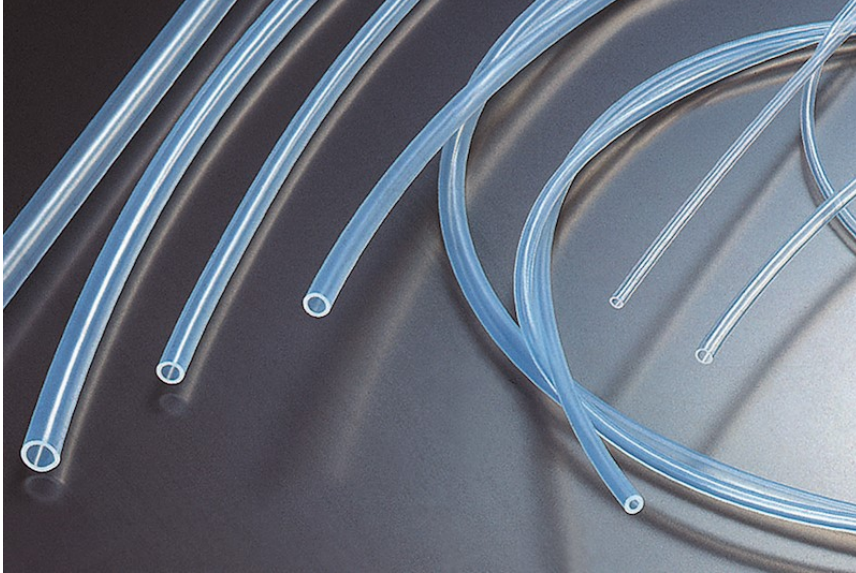
20 ft Stick Length



Electropolished



Tubing Selection



100% Pure Fluoropolymer Tubing

PTFE

- Temperature Rating: 500°F Continuous
- Flexible
- Low Permeability
- **Excellent** Chemical Resistance
- Shorter Length Limitation
- Semi-Opaque

FEP

- Temperature Rating: 400°F Continuous
- Good Flexibility
- Low Permeability
- Good Chemical Resistance
- Long Lengths
- **Excellent** Clarity

PFA

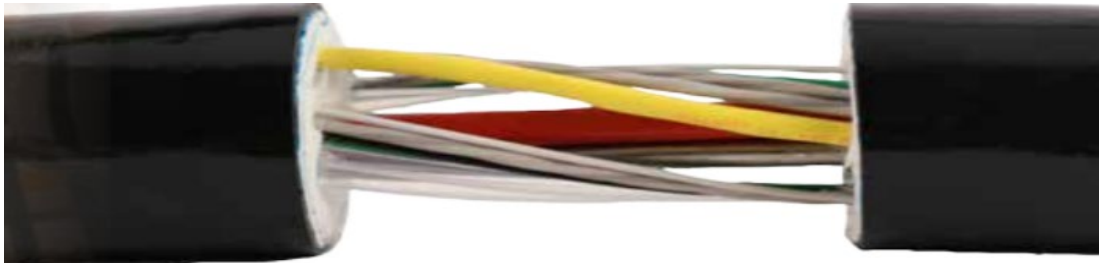
- Temperature Rating: 500°F Continuous
- Good Flexibility
- Lower Permeability than FEP
- **Excellent** Chemical Resistance
- Long Lengths
- Translucent

UHP PFA

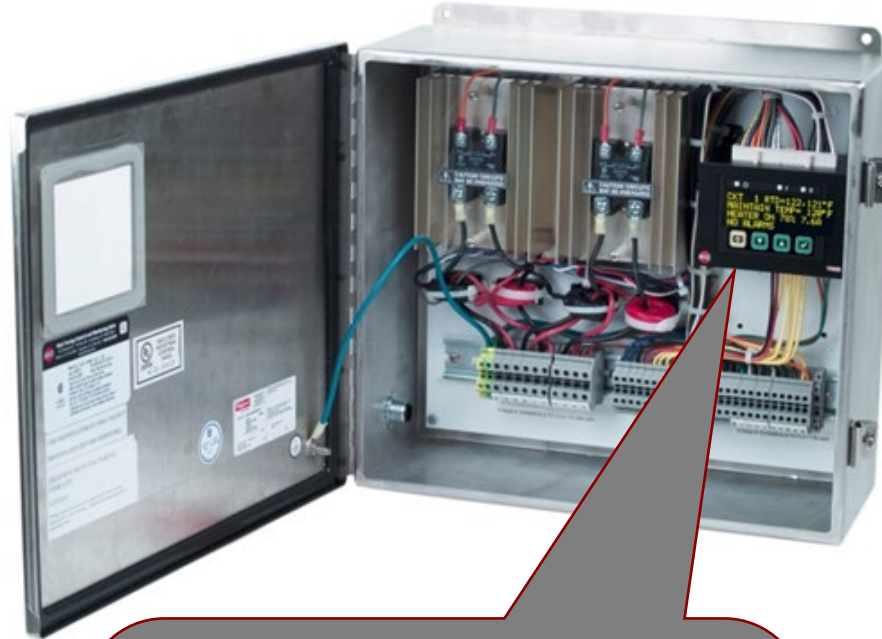
- Temperature Rating: 500°F Continuous
- **Excellent** Flexibility
- **Highest** Thermal Stability
- **Lowest** Permeability (even with HCL)
- **Excellent** Chemical Resistance
- Long Lengths
- **Highest** Purity Levels
- Translucent

Cabled 360° - Ideal Engineered Thermal Performance

- ☐ Ease of Bending in any Plane or Direction
- ☐ Provides Stress Relief for Components in Bundle
- ☐ Reduces Likelihood of Kinks and Cold or Hot-Spots
- ☐ Better Thermal Performance
- ☐ Reduced Bend Radius in All Directions



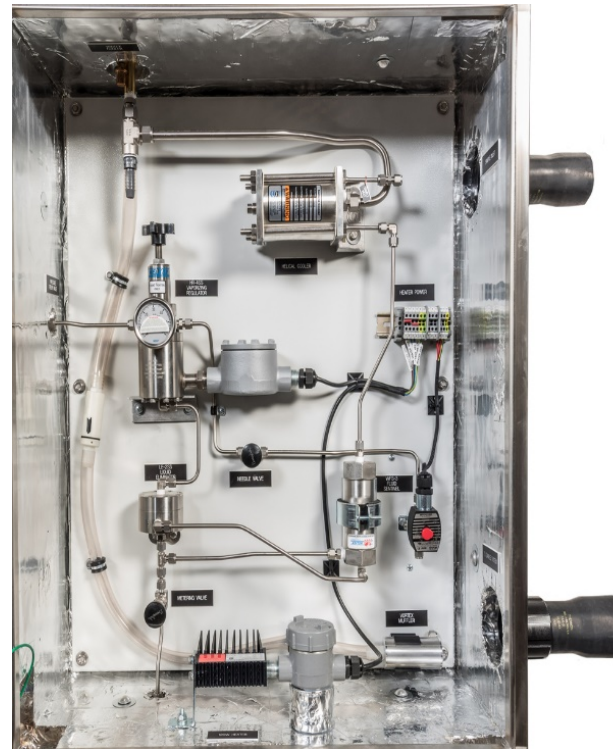
Complete Control & Monitoring Solution



Top In Class Installation Systems



Before Terminator



After Terminator



High-Temperature Bundle Seal Kit

Designed for high temperature,
continuous steam pu
applications.



Kit Contents . . .



Item	Quantity	Description
1	1	A. High Temperature Tubing Bundle End Seal B. Tube Fitting (Single or Dual Tube) C. Heat Trace Fitting (if required)
2	1	Foam Insulation (2' Strip)
3	1	Self Vulcanizing Tape (Roll)
4	1	Graphite Packing Material
5	*	Heat Trace Grommet (if required)
6	*	Single Tube Washer (where required)
7	*	Dual Tube Washer (where required)

* Quantity will vary depending upon specific kit type

- Multiple Bends – Multiple Directions

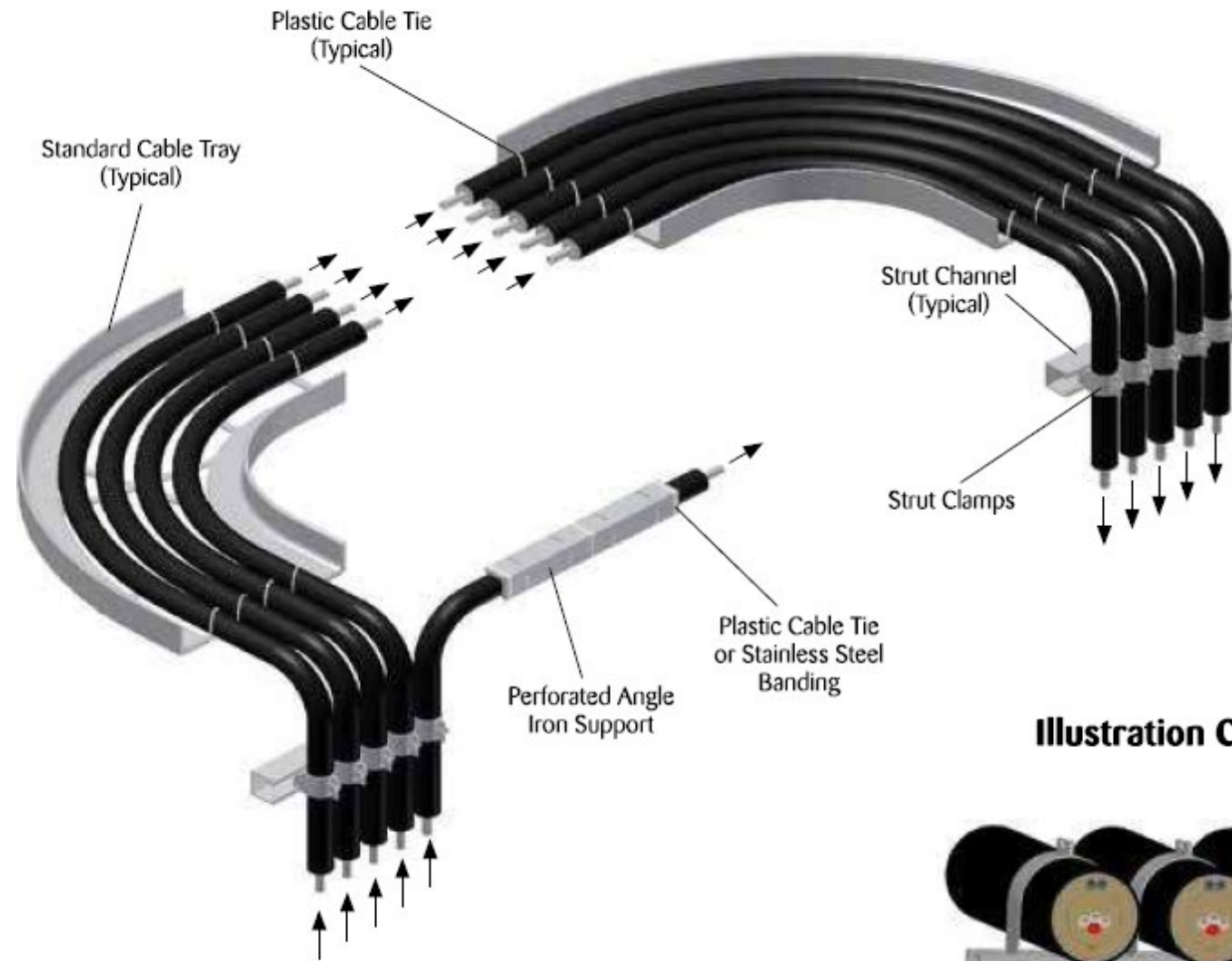
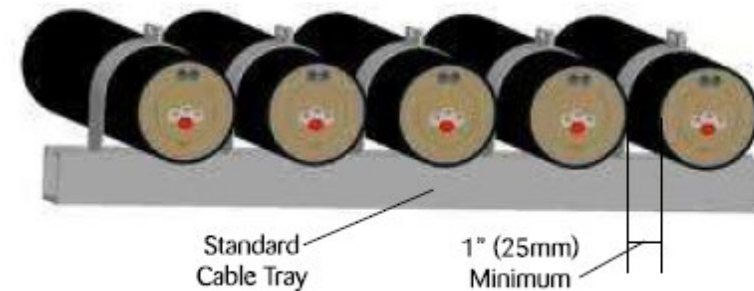
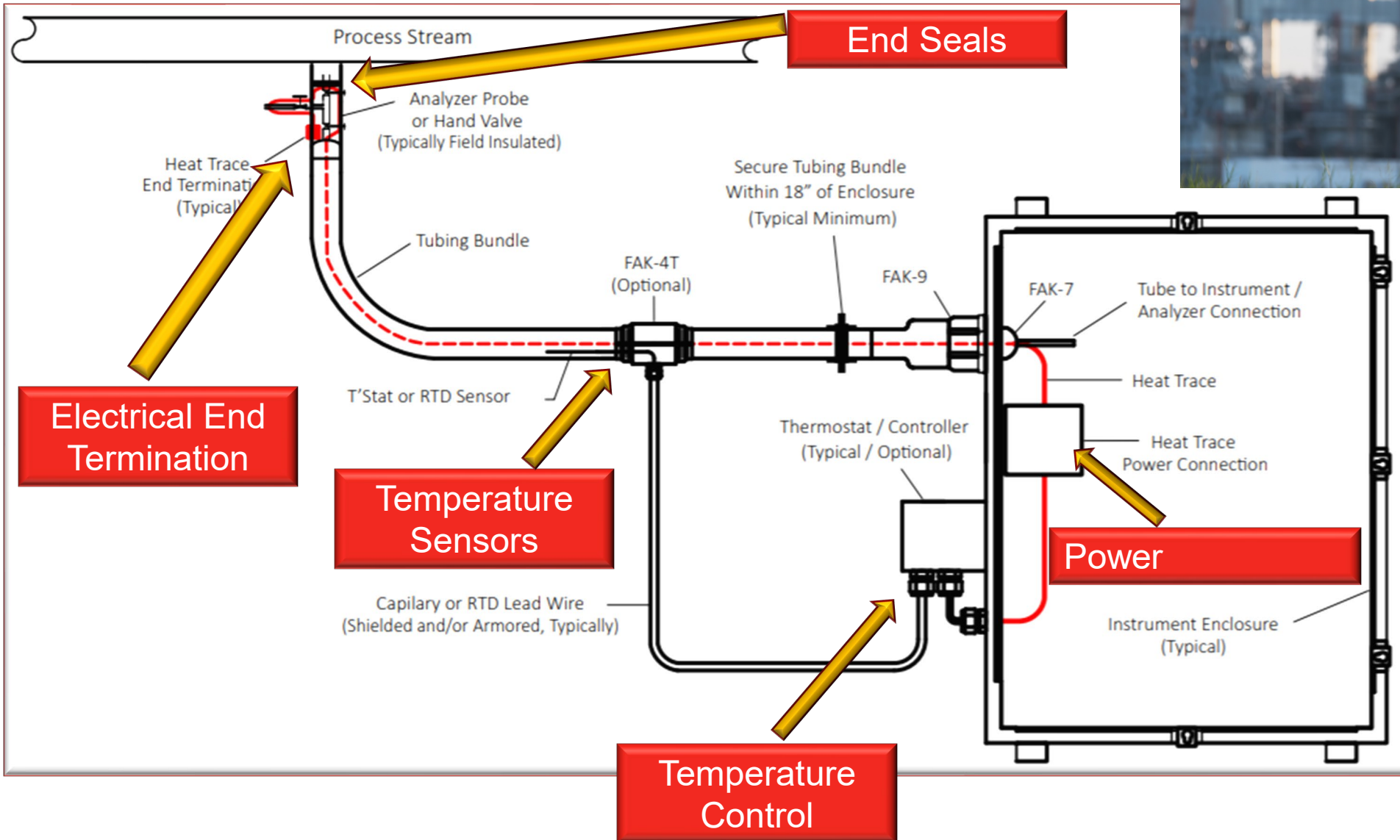


Illustration C: Typical Installation

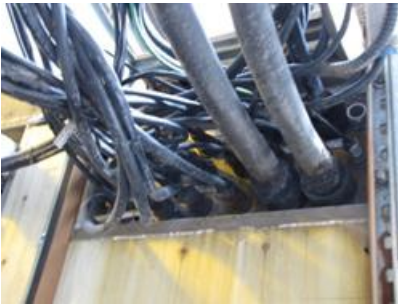


Installation Road Maps



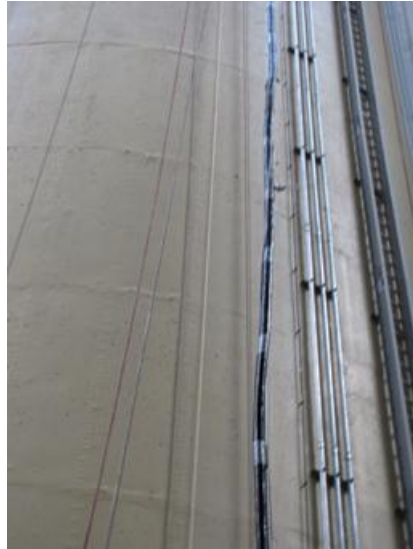
Proper Installation, Care and Maintenance

- ❖ Don't take the line for granted
- ❖ Don't leave the umbilical ends exposed
- ❖ Don't exceed the bend radius – tubes will kink
- ❖ Don't tie multiple bundles together
- ❖ Don't over-tighten the supports – expansion/contraction
- ❖ Don't forget to terminate. Follow proper heater and tubing terminations
- ❖ Don't forget to test the heater. Megger test the heater prior to and after install
- ❖ Don't forget to record and save the information – test results, manufacturer, line information, etc.
- ❖ Don't assume that everything is always alright, do periodic inspections of the products



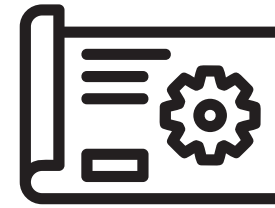
TYPICAL CEMS INSTALLATION DETAILS

PULLING SAMPLE LINE UP THE STACK USING A





Thermon System Support

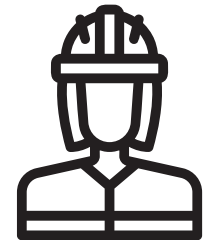


THERMAL DESIGN ENGINEERING

THERMON



INSTALLATION TRAINING



SITE SUPERVISION



FIELD INSTALLATION SERVICE

GAS CYLINDER HEATERS



We use propane in a large volumes - over ½ ton each night per event. Each of our cylinders are wrapped with a Powerblanket® Gas Cylinder Heater, extending the allowable duration at least 60%. This equates to hundreds of usable lbs. of propane per night.

SHANNON STILLMAN | PYRO ENGINEER THOR PRODUCTIONS

WHY CHOOSE POWERBLANKET?

Increase performance and efficiency of gas cylinders

- Save money by optimizing gas and material usage
- Eliminate unnecessary refills in cold weather

FEATURES:

Insulated full-wrap design

- UL/CSA safety certifications

AVAILABLE SIZES:

20 GALLON
30 GALLON
40 GALLON
100 GALLON
420 GALLON
500 GALLON
1000 GALLON



powerblanket®
www.powerblanket.com





THANK YOU