

THERMON

CEMS & Thermal Heating Solutions



A **CECO** ENVIRONMENTAL BRAND



a degree above

WORLD LEADER IN INDUSTRIAL PROCESS HEATING SOLUTIONS



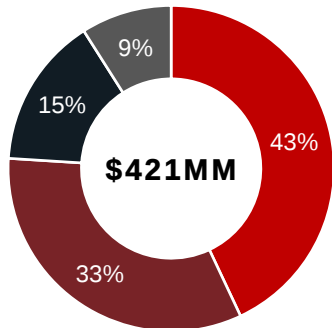
THIS IS THERMON



We provide safe, reliable and innovative mission critical industrial process heating solutions that create value for our customers

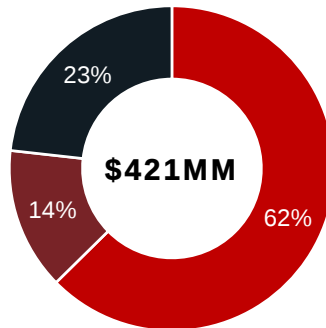
TRAILING TWELVE MONTH REVENUE

BY GEOGRAPHY



■ USLAM ■ CAN
■ EMEA ■ APAC

BY TYPE



■ Point-In-Time
■ Over Time Small
■ Over Time Large

COMPANY BACKGROUND

- Specialize in providing complete flow assurance, process heating, temperature maintenance, freeze protection and environmental monitoring solutions
- Founded in 1954, public company since 2011
- ~1,300 full-time employees
- Sales in 85 countries
- Facilities on four continents
- Industry-leading safety record

THERMON

ADDRESSABLE MARKET



A CECO ENVIRONMENTAL BRAND



A CECO ENVIRONMENTAL BRAND

PRODUCT FAMILIES

Commercial Boilers
Immersion Heaters
Circulation Heaters
Electric Heat Tracing
Heated Tube Bundles
Steam Tube Bundles
Removeable Electric Blankets
Catalytic Methane Heating

APPLICATIONS

New & Retrofit Gas-fired
and/or Steam Heating Systems

Reboilers and Vaporizers

Heating Storage Tanks
and Drums

Catalyst Regeneration

GHG Emissions Reduction

Emissions Monitoring (CEMS)

Instrumentation and Process
Analysis

MARKETS

Biofuels

Carbon Capture & Storage

Thermal Energy Storage

Green and Blue Hydrogen

Battery Power/EV's/Recycling

Nuclear, Steam and Gas
Turbine Power

Wind Power

Solar Power

PROCESS HEATING, WINTERIZATION AND FREEZE PROTECTION

COMPLETE SOLUTIONS



Ruffneck™

Hazardous Location Space Heating

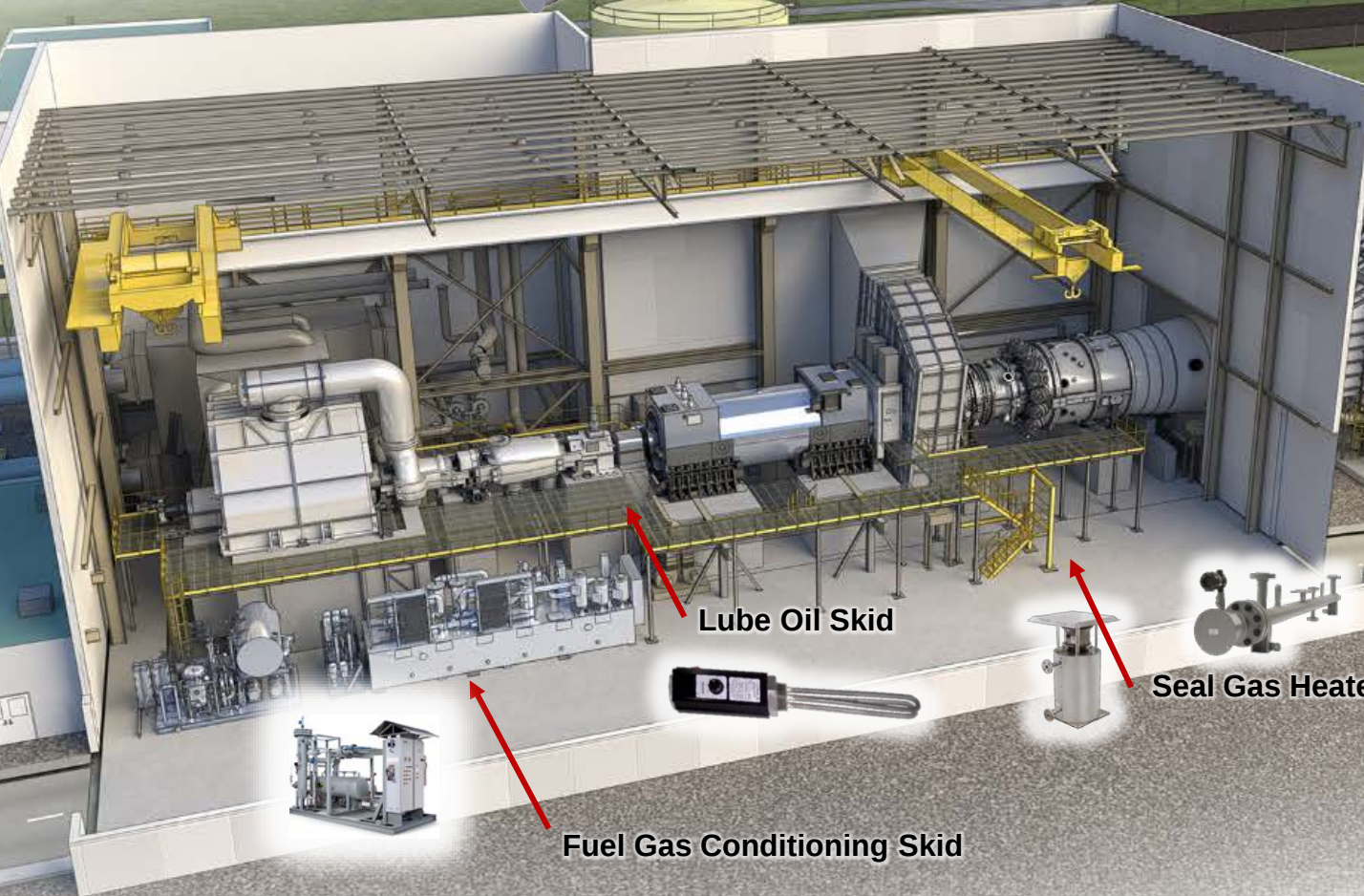


**Water Treatment
& Tank Heating**

**Ammonia Vaporization for
SCR and NOx Emissions**



**CEMS
Bundle**



Lube Oil Skid



Fuel Gas Conditioning Skid



Seal Gas Heaters



**Lp / Mp & Hp.
Steam
Instrument
Bundles**

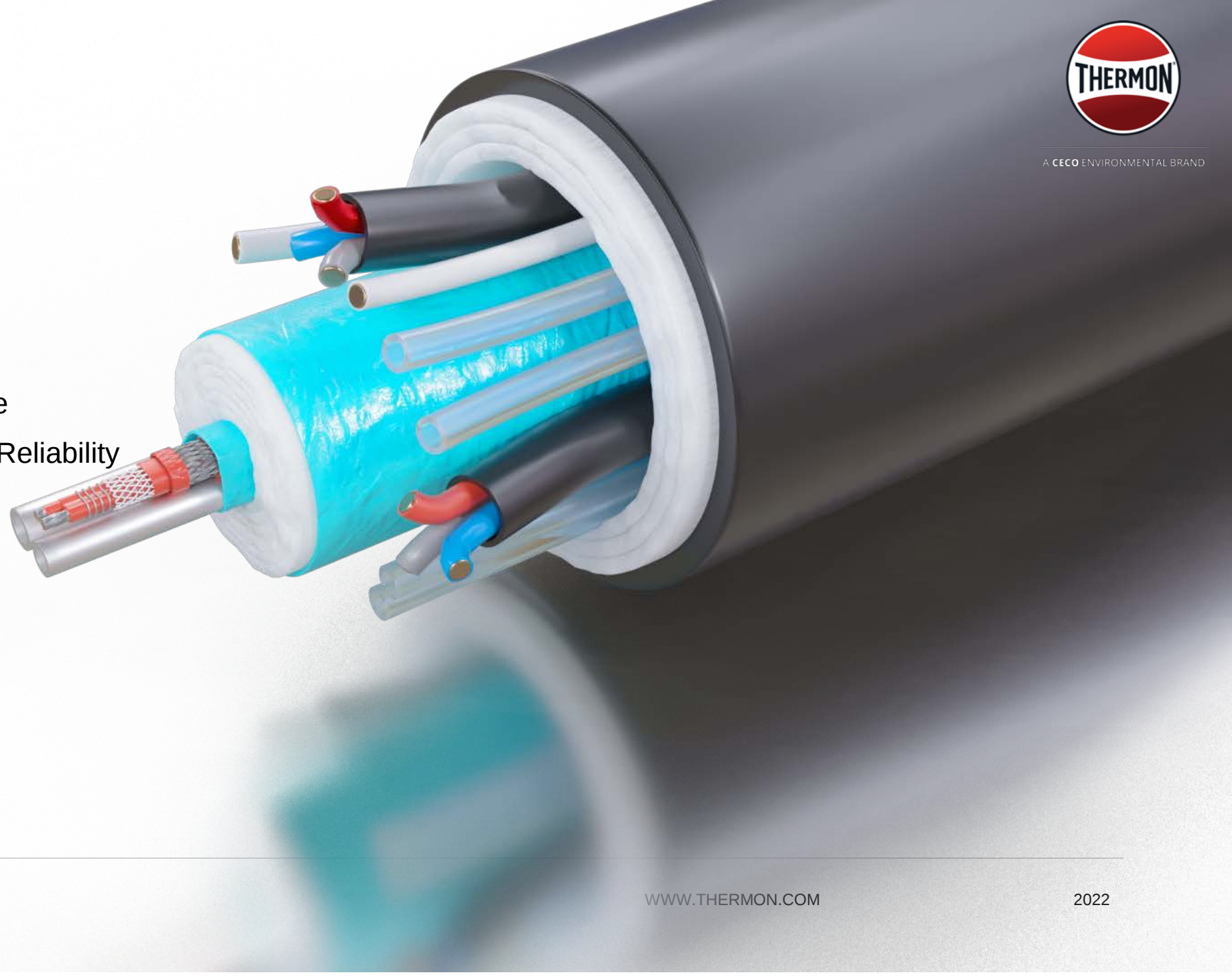


Enclosure Heating



Analyzer ACCURACY CONSIST OF

- Thermal Heater Selection
- High Quality Tubing
- Thermal Insulation Performance
- Temperature Sensor Control & Reliability



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Premiere Heating Solutions



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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

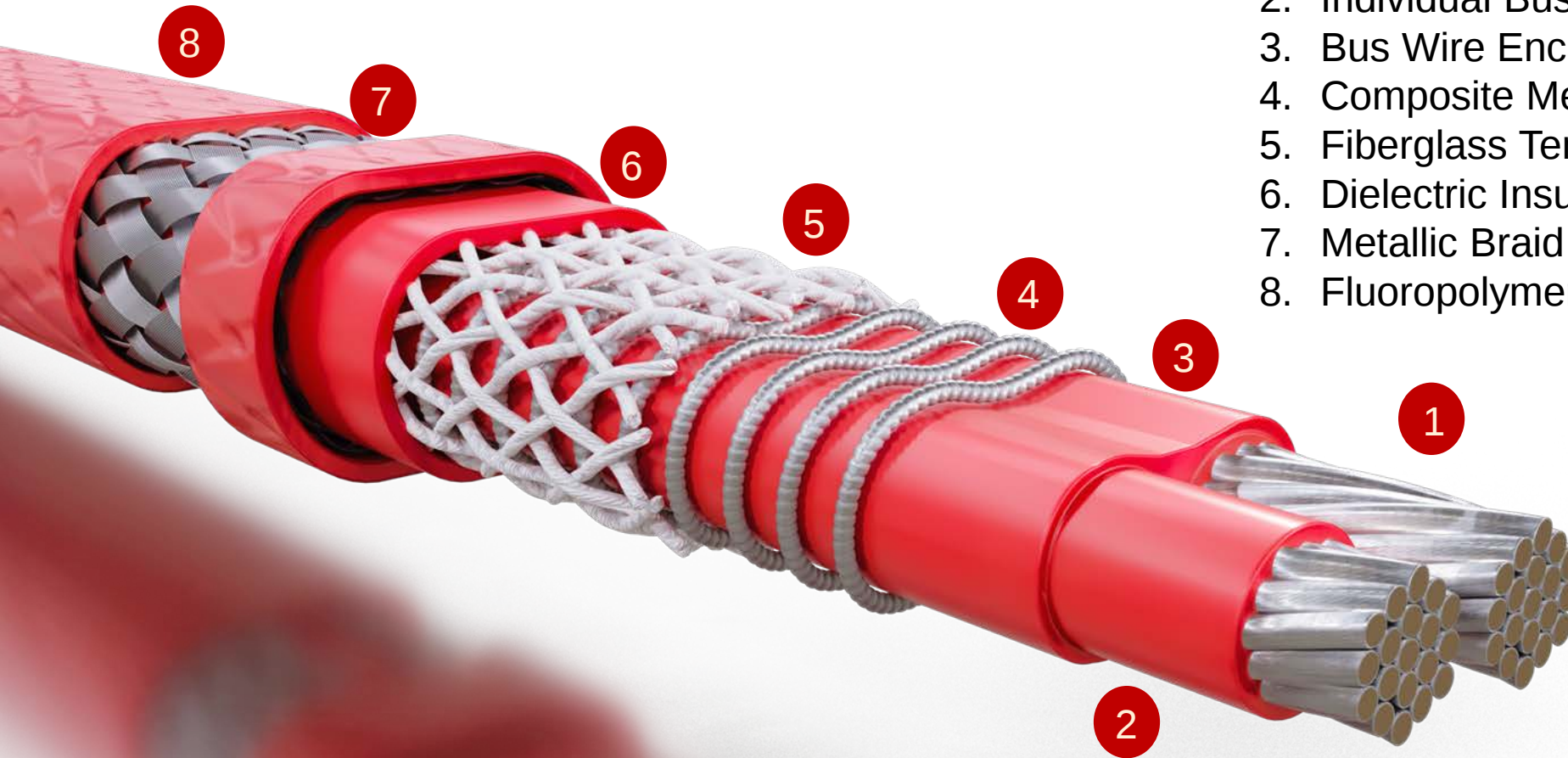
- Max. Maintain Temp: 410°F (210°C)
- Max. Exp. Temp.: 500°F (260°C) (power-off)
- Fluoropolymer Jackets
- Up to 20 watt/ft & 240 Ratings
- Ordinary & Haz., Location Ratings
- Cut-To-Length in Field



HPT & HPT-XR™ Power-Limiting



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1. Bus Wires- 12 AWG
2. Individual Bus Wire Insulation Layer
3. Bus Wire Encapsulation Layer
4. Composite Metal Alloy Fiber
5. Fiberglass Tensile Support Braid
6. Dielectric Insulation Layer
7. Metallic Braid
8. Fluoropolymer – Outer Jacket

ELECTRIC HEAT TRACING COURSE

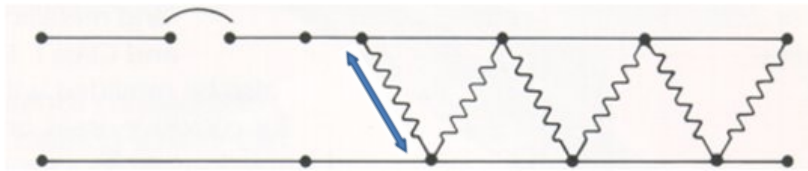


A CECO ENVIRONMENTAL BRAND

PARALLEL CABLES Power Limiting or Constant Watt

POWER LIMITING (PTC) / CONSTANT WATT (ZTC)

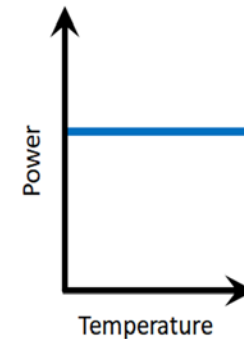
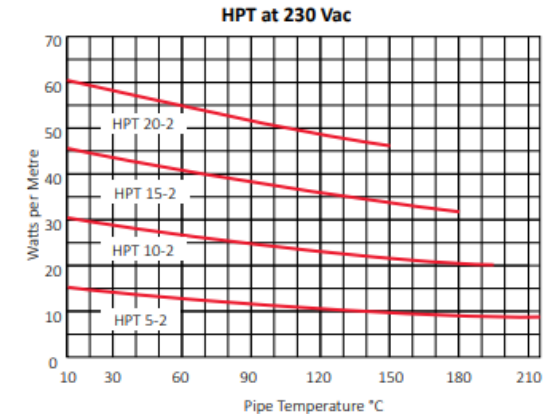
- A heating cable that reduces its power output as temperatures rise, but does not have high “inrush” currents



“Independent circuit”

- Watts/ft output not affected by length
- Both are “zone-type” parallel heat cable but with a (PTC) for HPT and (ZTC) for FP

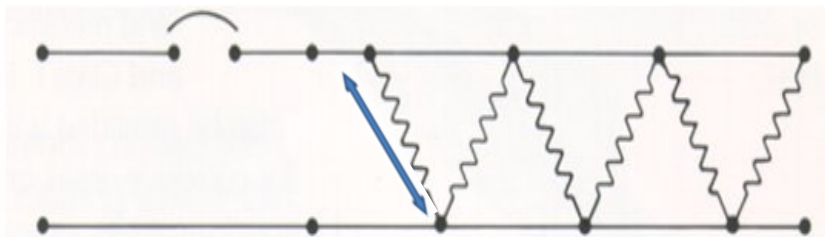
- * PTC: Zone Type Cable with Positive Temperature Coefficient
- * ZTC: Zone Type Cable Constant Temperature



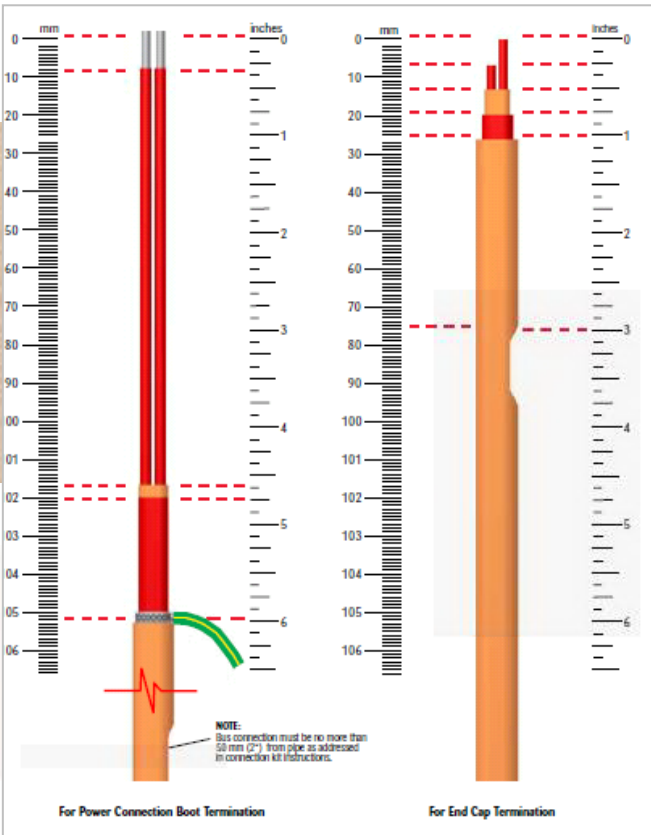
HPT & HPT-XR™ Power-Limiting



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"Independent circuit"



Self-Regulating Heating Cable



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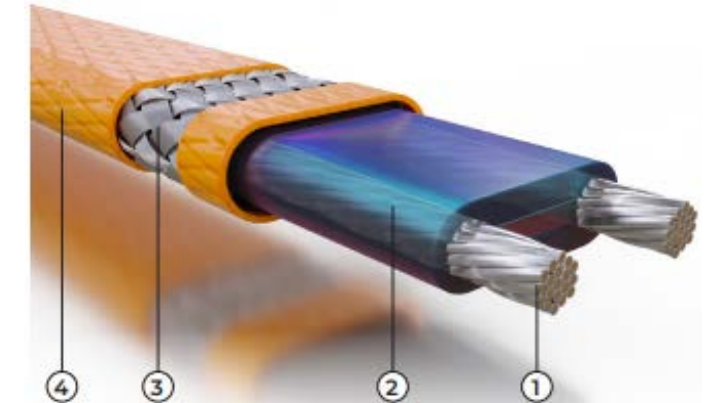
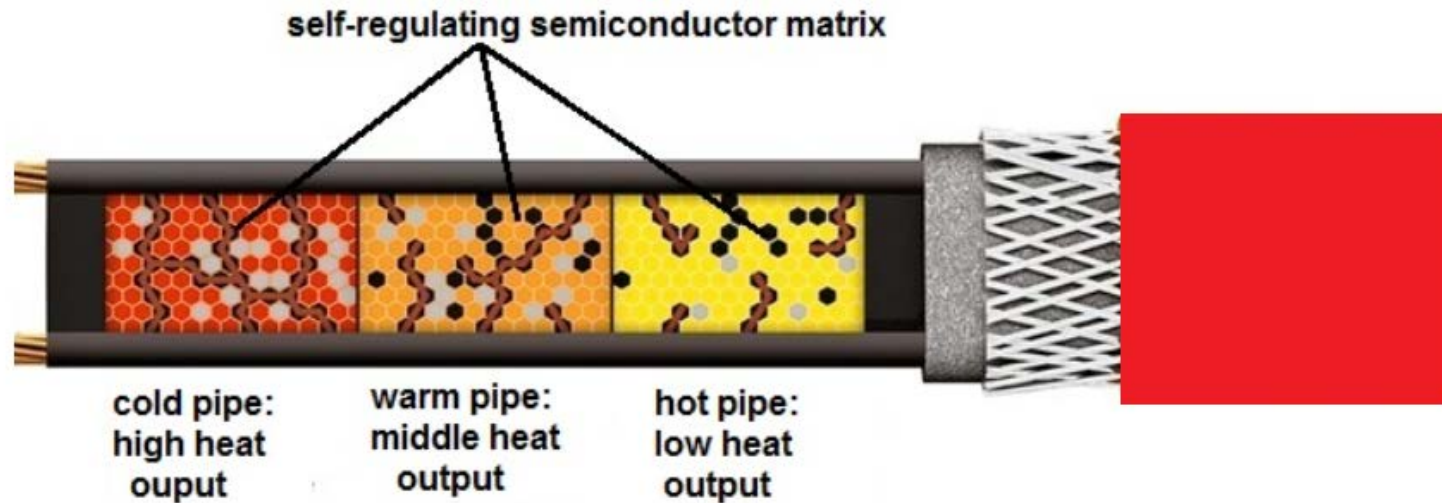
1. Bus Wires
2. Conductive Polymer Core
3. Insulation Polymer-Inner Jacket
4. Metallic Braid
5. Polymer – Outer Jacket

ELECTRIC HEAT TRACING COURSE

Self Regulating – How it works



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CONSTRUCTION

1. Nickel-plated copper bus wires 1.3 mm² (16 AWG)
2. Semiconductive heating matrix and fluoropolymer dielectric insulation
3. Nickel-plated copper braid
4. Fluoropolymer overjacket provides additional protection to core, insulation, and braid where exposure to chemicals or corrosives is expected.

ELECTRIC HEAT TRACING COURSE

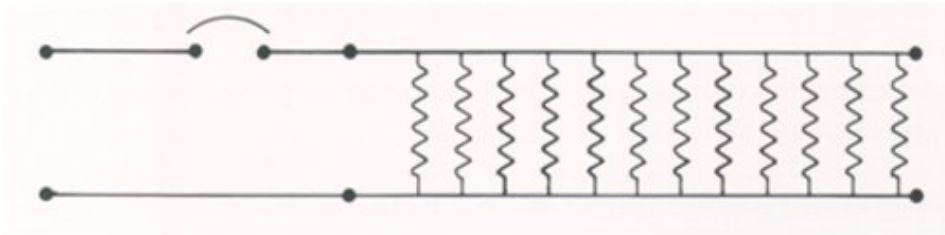


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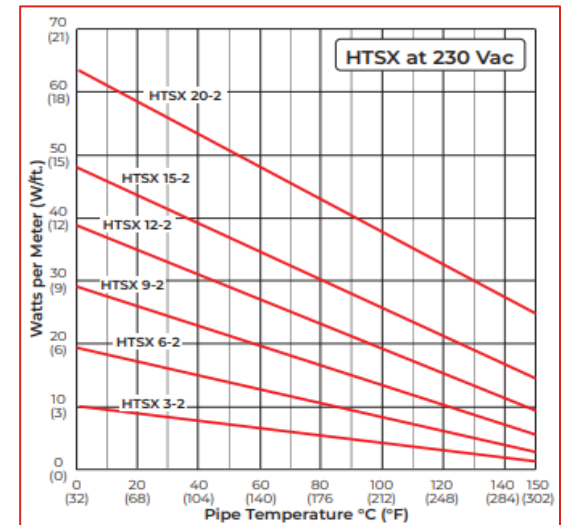
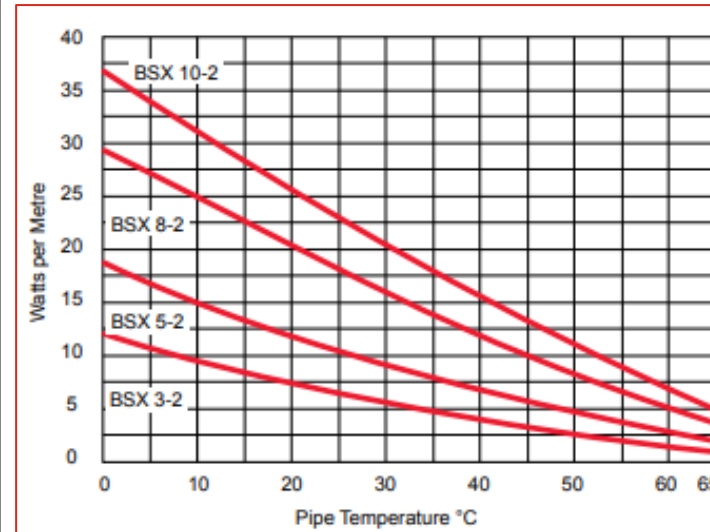
Self-Regulating

SELF REGULATING (PTC)

A heating cable that reduces its power output as temperatures rise



- The heat is produced in a carbon matrix
- Watt/Ft output not affected by length.
- True parallel heating cable
- Commonly called “SR” cable



High Quality Tubing with Electropolishing & SilcoTek® Treatments for added corrosion protection and faster response.

Problem	Solution	Result
Poor analytical accuracy with H ₂ S, Hg, NOx, etc.	SilcoNert.	Improved sampling reliability and throughput
Corrosion	Dur-san.	Longer lifetimes and lower costs
Slow instrument response	SilcoNert.	Drastically faster signals and higher efficiency
Regulations e.g. Tier 3, EPA 325	SilcoNert.	Assured compliance with accurate results
Oxidation	Silcolloy.	Sustained appearance and performance in extreme conditions
Moisture	Dur-san.	Reduced contamination, corrosion, and sample loss

Stainless Steel 316/316L can be pre-treated.



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Tubing Selection



100% Pure Fluoropolymer Tubing



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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

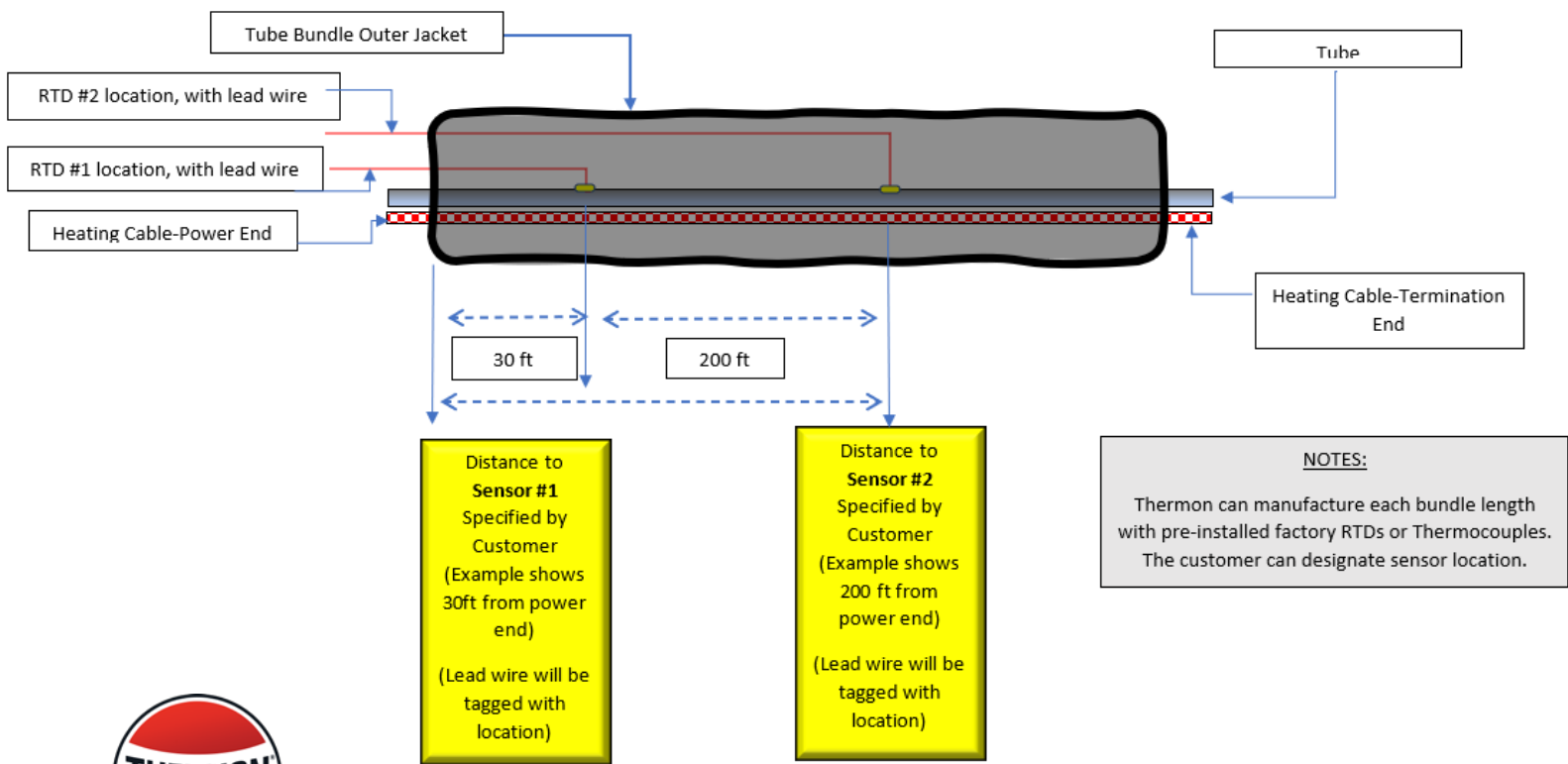
- Temperature Rating: 500°F Continuous
- Good Flexibility
- Lower Permeability than FEP
- **Excellent** Chemical Resistance
- Long Lengths
- Translucent

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

Temperature Sensors

Factory Installed Temperature Sensor Example



RATINGS/SPECIFICATIONS

RTD lead wire	22 AWG Nickle-clad copper conductors, PFA jacket, aluminum Kapton sheild and drain (do not cut drain wire)
RTD lead length.....	as required
RTD type.....	3-wire platinum thin film
RTD resistance.....	100 ohms at 0°C (32°F)
RTD tolerance	IEC 60751 Class B
Temperature coefficient	.00385 Ohms/Ohms- °C
Maximum sensor temperature.....	260°C (500°F)
Sensor housing material	304 stainless steel
Bulb dimensions.....	6.35 mm dia. x 69.8 mm long (¼" x 2¾")



CONSTRUCTION

- 1 Lead Wire
- 2 RTD Sensing Bulb



Product Design & Installation Video



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Heated Sample Line



Installation

**On-Going
Maintenance
& Inspection**

Spares & Storage



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Installation

UNPACKING AND INSPECTION

- Do not use box cutter knife to unpack
- Check bundle P/N on label & compare it to printed P/N on bundle.
- Probe end off 1st
- Test Heating Cable



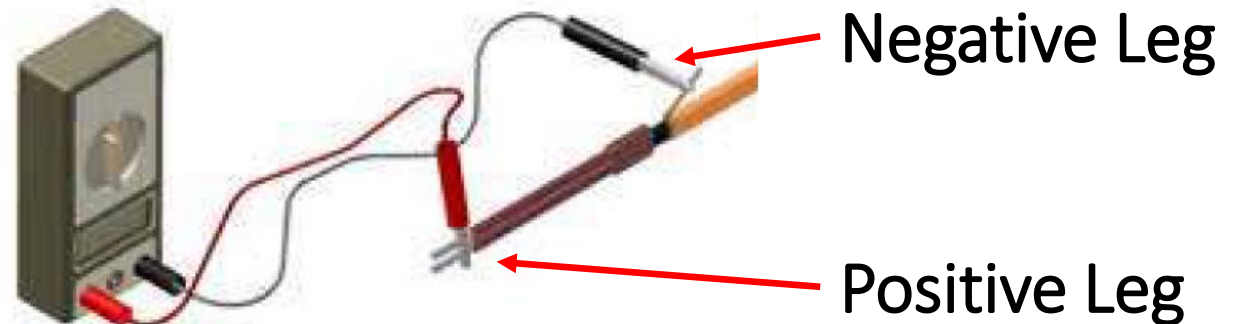
Product Arrival



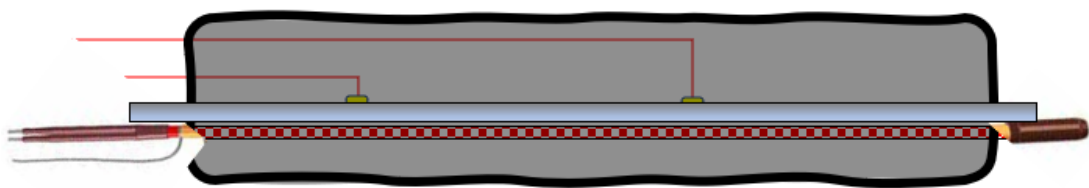
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1. **Inspect material for damage that may have occurred during shipping. Report it to the carrier.**
2. **Identify the part number on the shipping labels to the product to ensure the correct items and quantity/lengths have been received.**
3. **For electric trace: Prior to pulling from shipping reel, complete an electrical integrity test.**

Use at least a 500 Vdc megohmmeter (megger) between the heat trace bus wires and metallic braid. IEEE 515 and IEC 60079-30 recommend test voltage of 2500 Vdc and a minimum resistance of 20 megohms reading. (record to field test report)



Heating Cable Power & Termination Kits



PETK

Power and End Termination Kit

INSTALLATION PROCEDURES

☐ PETK-1D

for BSX, RSX, VSX

☐ PETK-2D

for KSX, HTSX

☐ PETK-3D

for HPT, FP

Order separately to be used in conjunction with
Thermon connection kits



PETK Power and End Termination Kits (per cable)

PETK-1D	for BSX, RSX, VSX
PETK-2D	for KSX, HTSX
PETK-3D	for HPT, FP

Kit Contents . . .



①



②



③



④



⑤

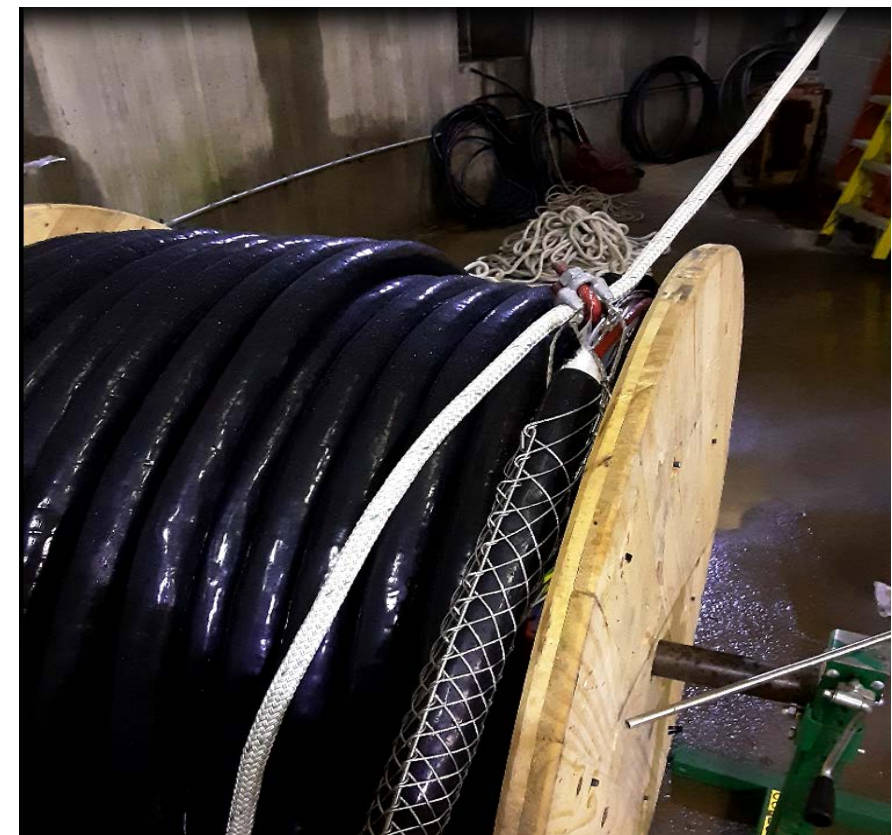


⑥

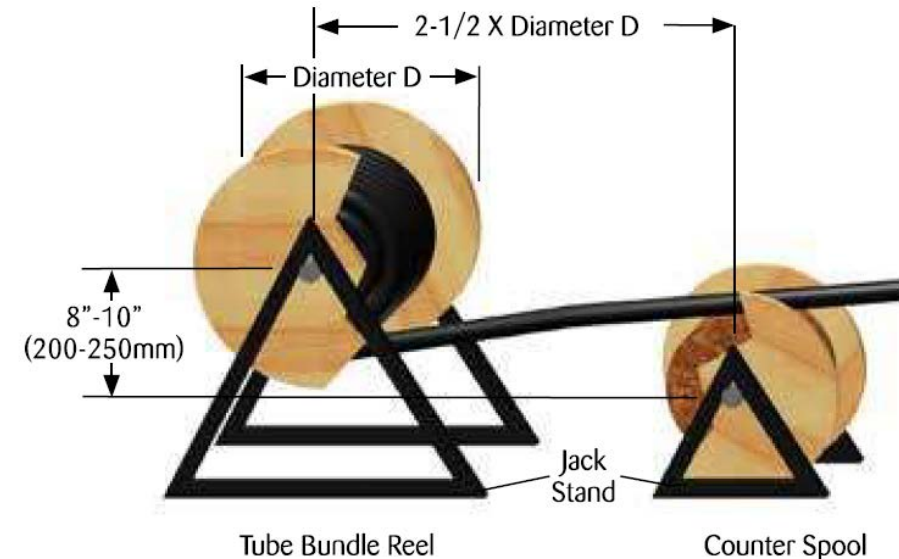
Item	Quantity	Description
1	1	RTV Tube
2	1	Power Connection Boot
3	1	End Cap
4	1	Tape Strip (PETK-3D Only)
5	1	End Termination Caution Label
6	1	GRW-G Grommet (For PETK-3D Terminator kits only)

Pulling from reel and routing

1. Understand the intended routing plan and clamping positions prior to pulling. (avoid spooling on and off reel)
2. Identify the part number on the shipping labels to the product to ensure the correct items and quantity/lengths have been received.
3. For electric trace: Prior to pulling from shipping reel, complete an electrical integrity test.
 - Use at least a 500 Vdc megohmmeter (megger) between the heat trace bus wires and metallic braid. IEEE 515 and IEC 60079-30 recommend test voltage of 2500 Vdc and a minimum resistance of 20 megohms reading. (record to field test report)



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Pulling & Hanging Supports

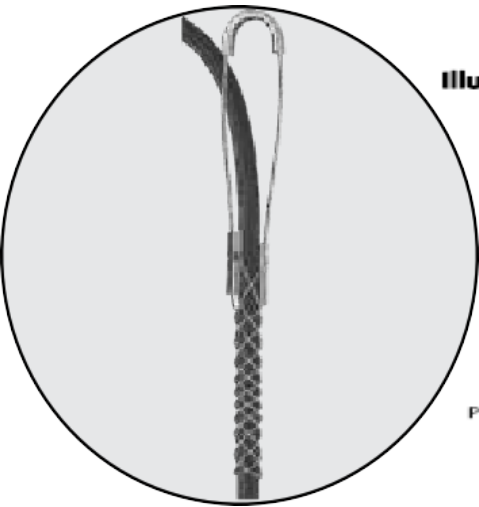
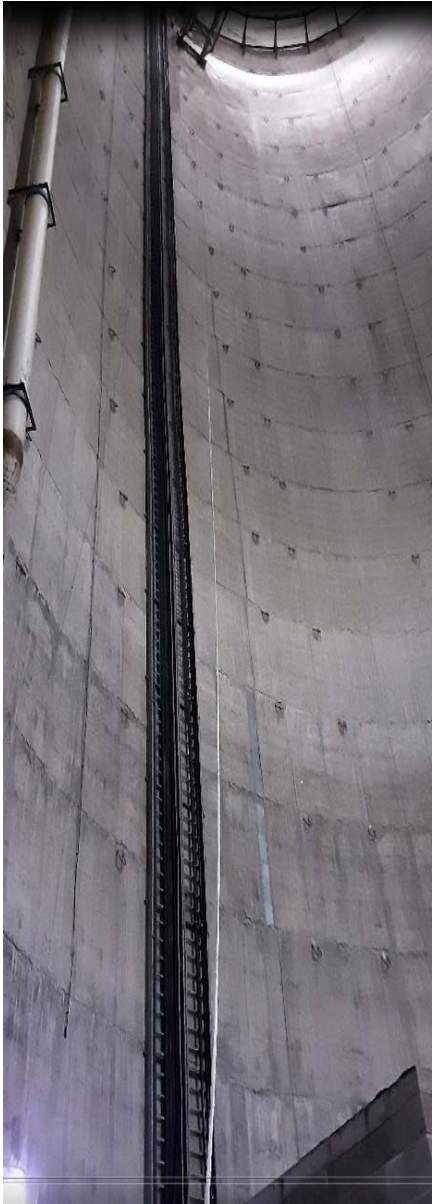
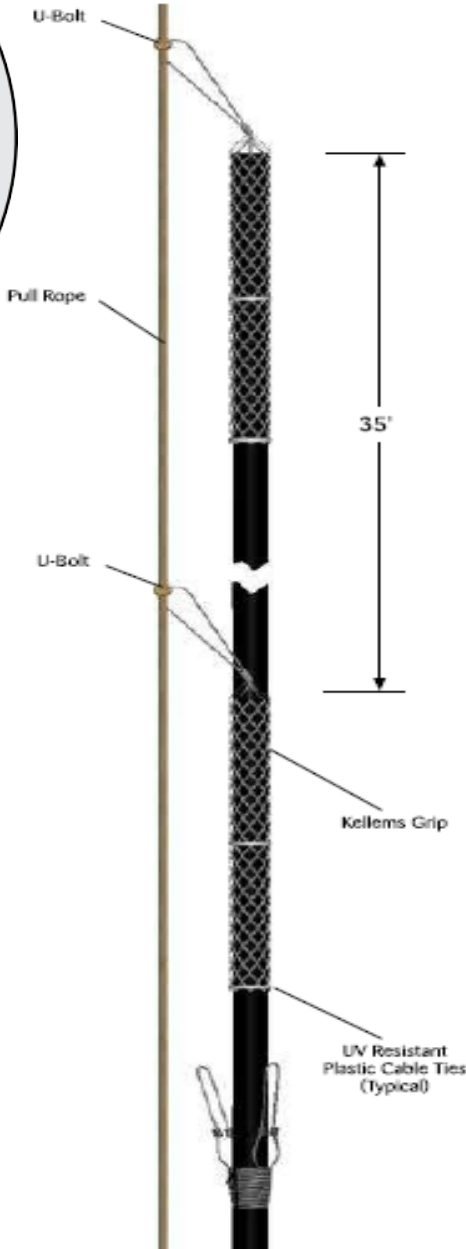


Illustration D: Pulling Detail



Standard Duty Support Grips Double Eye, Closed Mesh				
Kellems Catalog Number	Bundle Diameter Range inches(mm)	Breaking Strength lbs. (N)	Pulling Eye Length inches (mm)	Mesh Grip Length inches (mm)
02401005	1.00"-1.24" (25.4-31.5)	2,670 (11,877)	5" (127)	14" (355.6)
02401006	1.25"-1.49" (31.7-37.8)	4,490 (19,972)	5" (127)	15" (381.0)
02401007	1.50"-1.74" (38.1-44.2)	4,490 (19,972)	5" (127)	17" (431.8)
02401008	1.75"-1.99" (44.4-50.5)	5,000 (22,241)	6" (152.4)	19" (482.6)
02401009	2.00"-2.49" (50.8-63.2)	8,940 (39,767)	6" (152.4)	21" (533.4)
024010010	2.50"-2.99" (63.5-75.9)	8,940 (39,767)	6" (152.4)	23" (584.2)
024010011	3.00"-3.49" (76.2-88.6)	12,000 (53,379)	8" (203.2)	25" (635.0)
024010012	3.50"-3.99" (88.9-101.3)	12,000 (53,379)	8" (203.2)	27" (685.8)

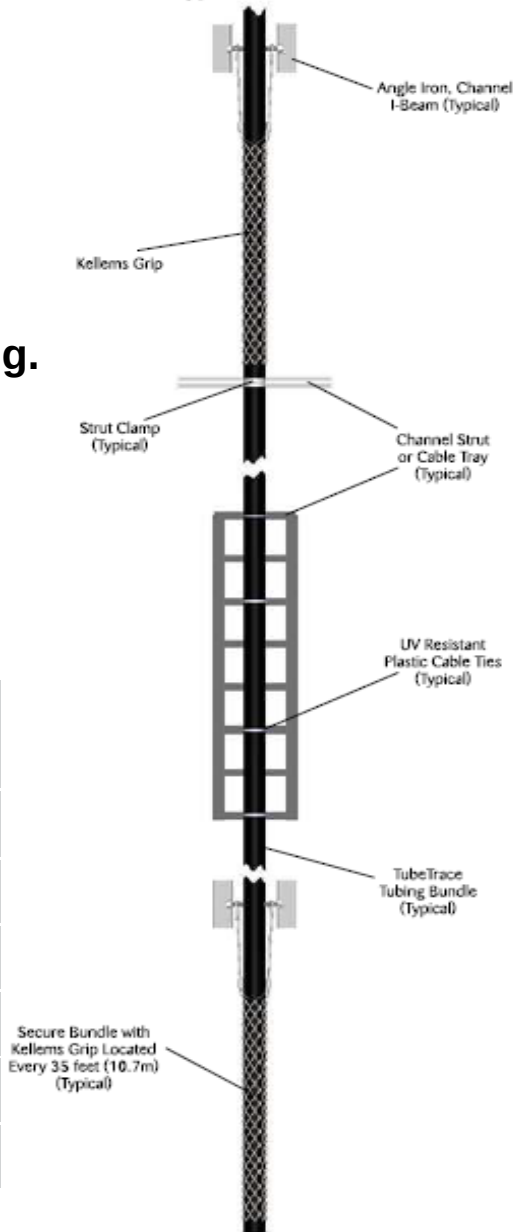
Clamping Bundle for Support

- 1. Horizontal Supports:
Every 5 to 6 ft
- 2. Vertical Supports:
Every 10 to 15 ft
- 3. Connection Point Supports:
Within 18" of any connection point or transition fitting.
- 4. Bend Supports:
6" to 10" outside of any bend. (Not within the bend)

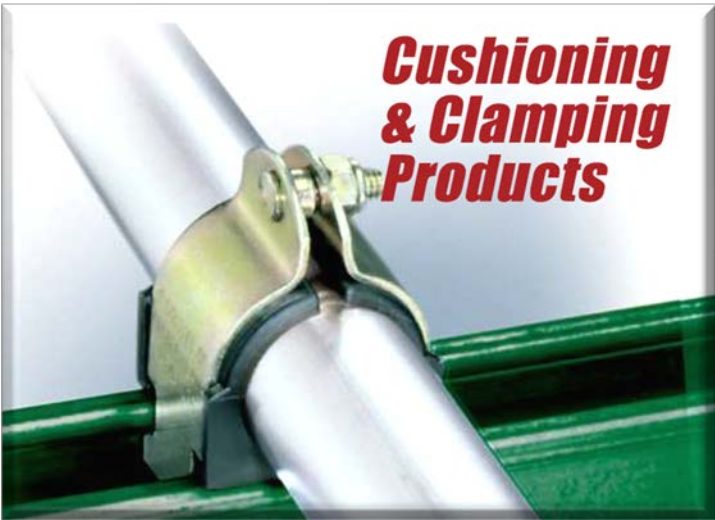
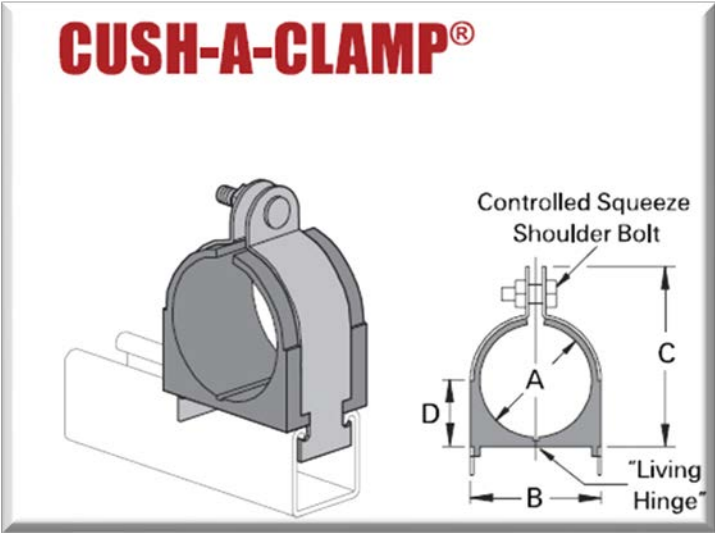
Table 2: Strut Clamp Selection

Nominal Bundle O.D. in (mm)	Strut Clamp Size in (mm)
1 (25)	1-1/4 (32)
1-1/4 (32)	1-1/2 (38)
1-5/8 (41)	2 (51)
2-5/8 (67)	2-1/2 (64)
3-3/8 (86)	3 (76)
3-5/8 (92)	3-1/2 (89)

Illustration E: Typical Vertical Attachment



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KELLEMS GRIPS USED TO LIFT AND FOR PERMANENT SUPPORT



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Bending & Spacing

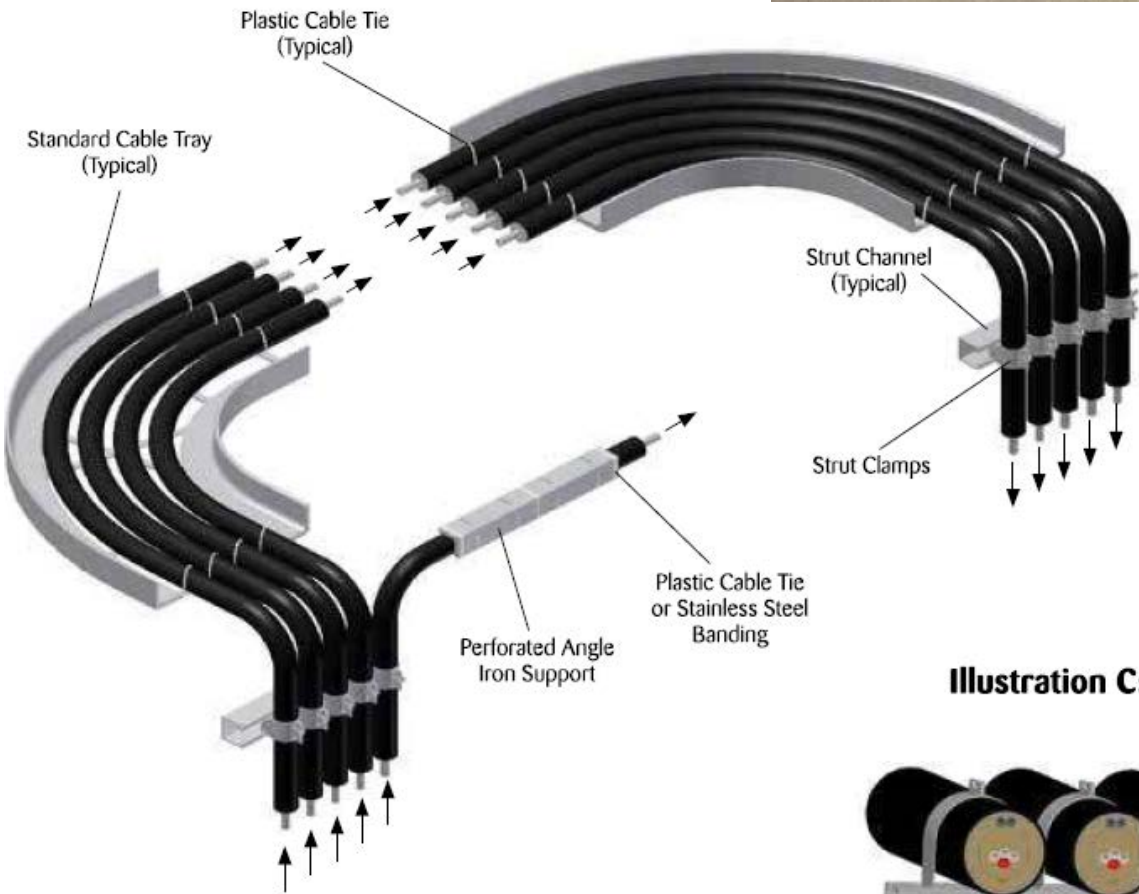
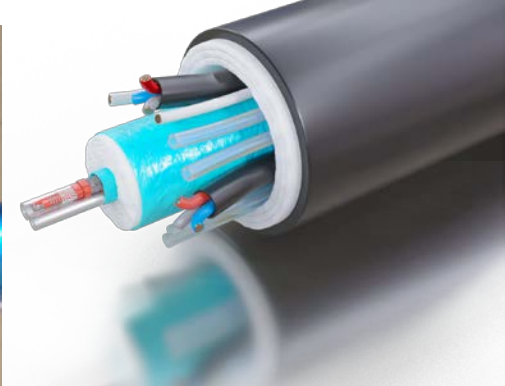
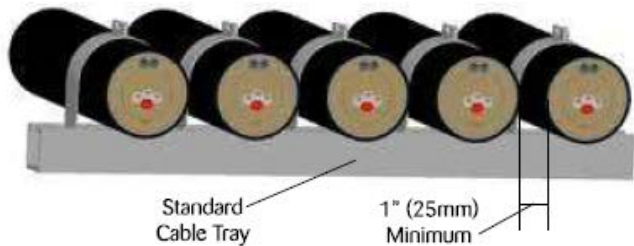


Illustration C: Typical Installation



Bending & Spacing



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- 1. Bend Radius:
General Rule Bundle OD x 6"
- 2. No Kinks in Jacket

Table 1: Bend Radius

Nominal Bundle O.D. inch (mm)	Minimum Bend Radius inch (mm)	Nominal Weight lbs/ft (kg/m)
Electrical Traced Bundles		
1.3 (33)	6 (152)	0.32 (.476)
1.4 (36)	7 (178)	0.5 (.744)
1.5 (38)	7 (178)	0.6 (.893)
1.7 (43)	8 (203)	0.7 (1.04)
1.8 (46)	9 (228)	0.8 (1.19)
1.9 (48)	10 (254)	0.9 (1.34)
2.1 (53)	11 (279)	0.95 (1.41)
2.2 (56)	12 (305)	1.00 (1.49)
2.3 (58)	12 (305)	1.10 (1.64)
3.0 (76)	16 (406)	1.75 (2.60)
3.1 (79)	16 (406)	1.85 (2.75)
3.5 (89)	20 (508)	2.10 (3.13)

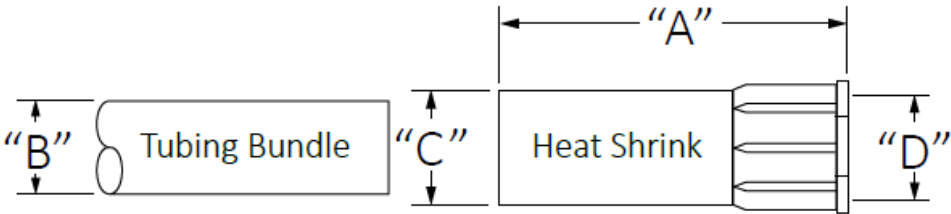


Shelter and Enclosure Entry Seals

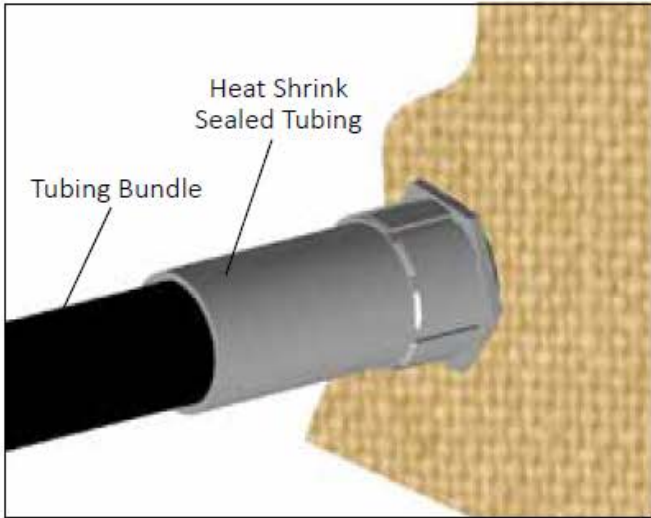
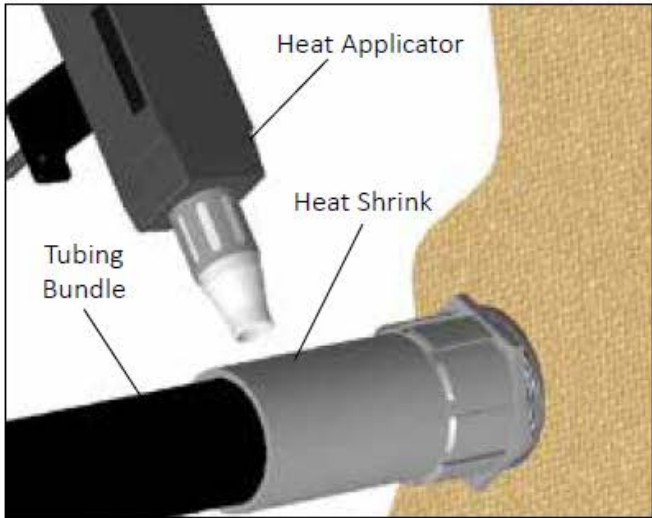
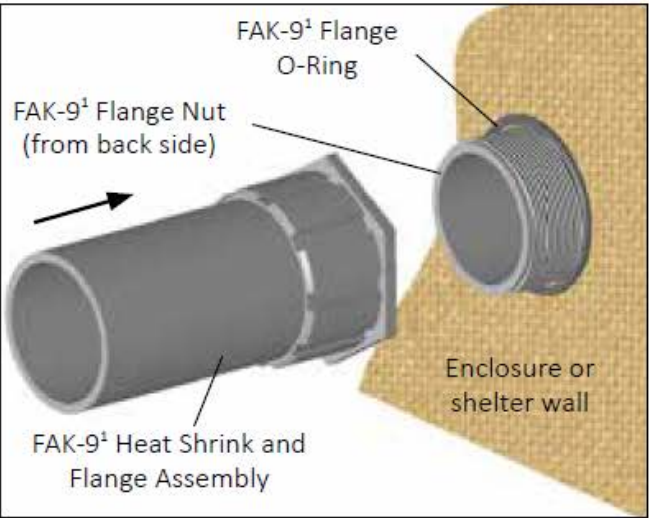


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FAK-9: Sizing and Selection Chart



Catalog No.	"A" Overall Nom. Length in. (mm)	"B" TubeTrace Max. O.D. in. (mm)	"C" I.D. After Shrinkage in. (mm)	"D" Drill Size in. (mm)	Product Max. Exposure Temp. °F (°C)
FAK-9S	4.00 (101.6)	1.60 (40.6)	0.75 (19.0)	2 (51.0)	275 (135)
FAK-9	6.00 (152.4)	2.10 (53.3)	0.75 (19.0)	2.375 (60.325)	275 (135)
FAK-9L	7.00 (177.8)	2.90 (73.4)	1.43 (36.3)	3.5 (89.0)	275 (135)
FAK-9LX	11.50 (292.1)	3.75 (95.0)	1.50 (38.1)	4.5 (115.0)	275 (135)



On-Going Maintenance & Inspection

SEMI-ANNUAL REVIEW (MINIMUM)

- Check End Seals
- Check Clamped Areas for Jacket Cracks
- Run Megger Test
- Clean & Purge Tubes



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CLEAN & PURGE TUBES

- Purge low level citric acid
 - (Distilled water & citric acid)
- Flush with distilled water
- Dry filtered air/dry nitrogen
 - 125psi at ambient temperature



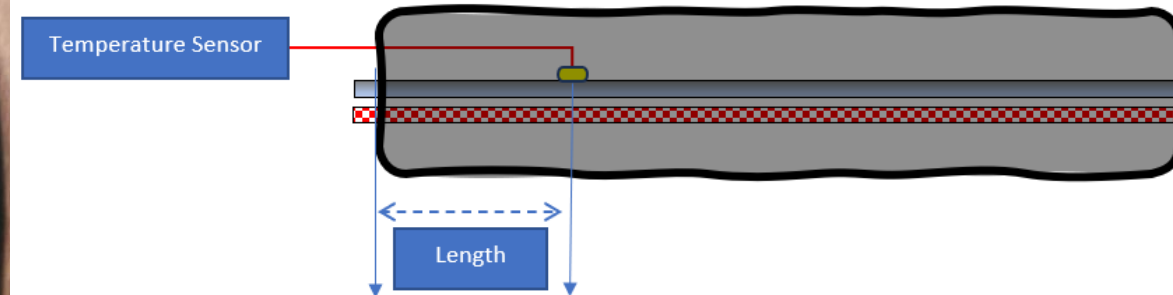


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Spares & Storage

EMERGENCY SPARES

- Product can be cut-to-length
- Extra tube or conductors, use as spares.
- Store in dry ambient controlled shelter
- Store out of direct sun contact
- Keep ends capped



THANK YOU



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