THERMON

CEMS & Thermal Heating Solutions

a degree above

WORLD LEADER IN INDUSTRIAL PROCESS HEATING SOLUTIONS

THIS IS THERMON

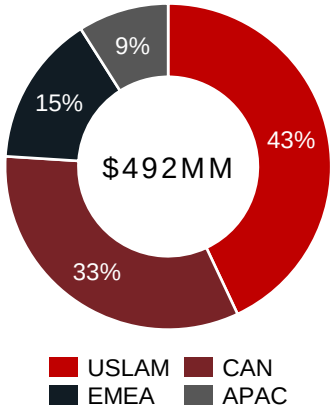
We provide safe, reliable and innovative mission critical industrial process heating solutions that create value for our customers

COMPANY BACKGROUND

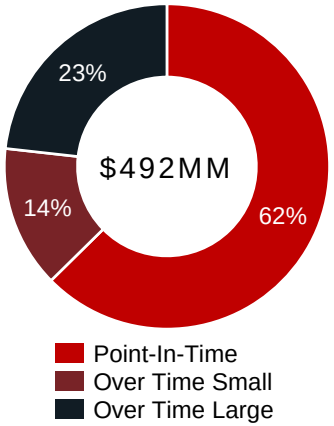
- Specialize in providing complete flow assurance, process heating, temperature maintenance, freeze protection and environmental monitoring solutions
- Founded in 1954, public company since 2011
- ~1,300 full-time employees
- Sales in 85 countries
- Facilities on four continents
- Industry-leading safety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

TRAILING TWELVE MONTH REVENUE

BY GEOGRAPHY



BY TYPE



THERMON
ADDRESSABLE MARKET

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

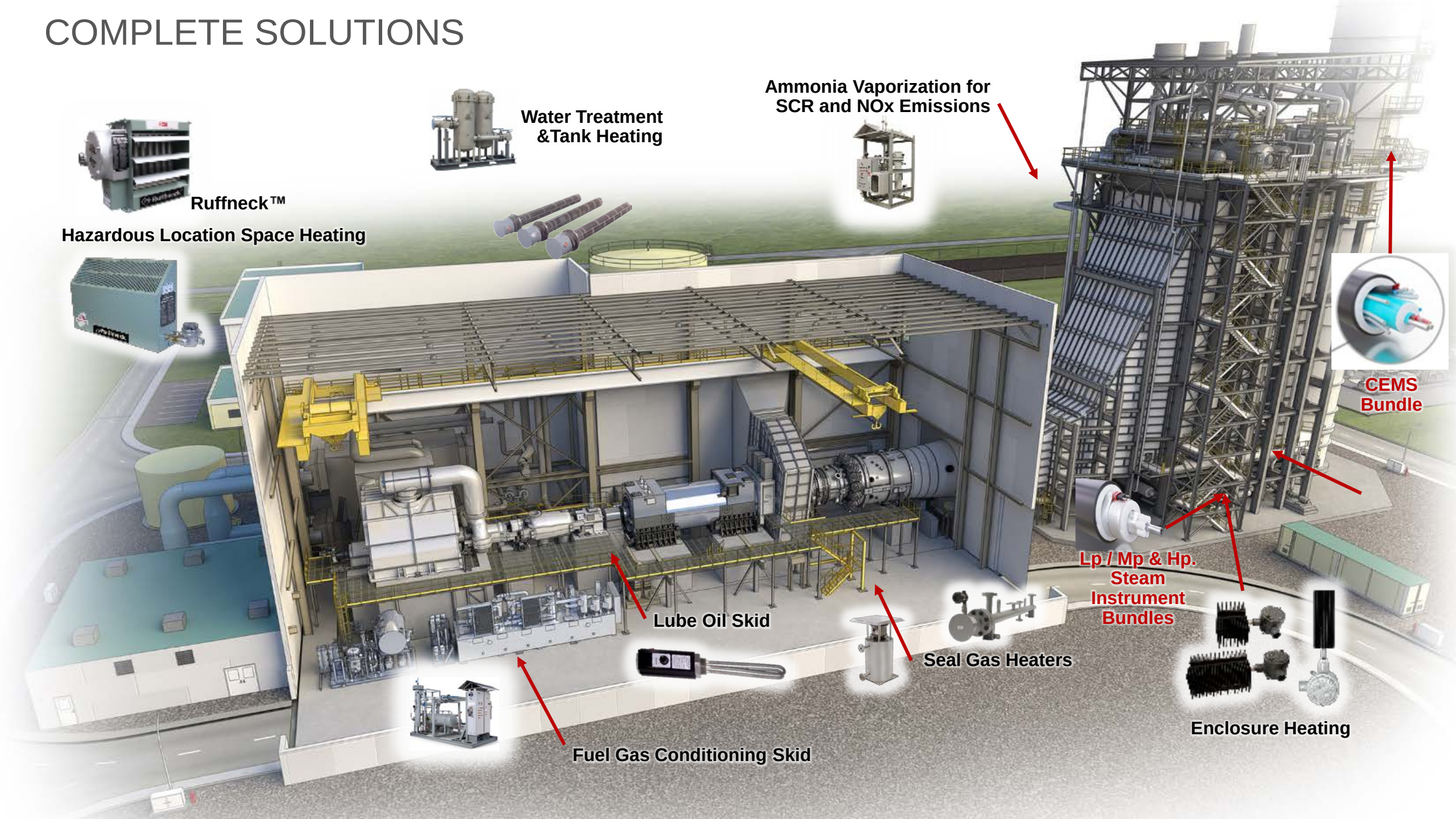
Nuclear, Steam and Gas Turbine Power

Wind Power

Solar Power

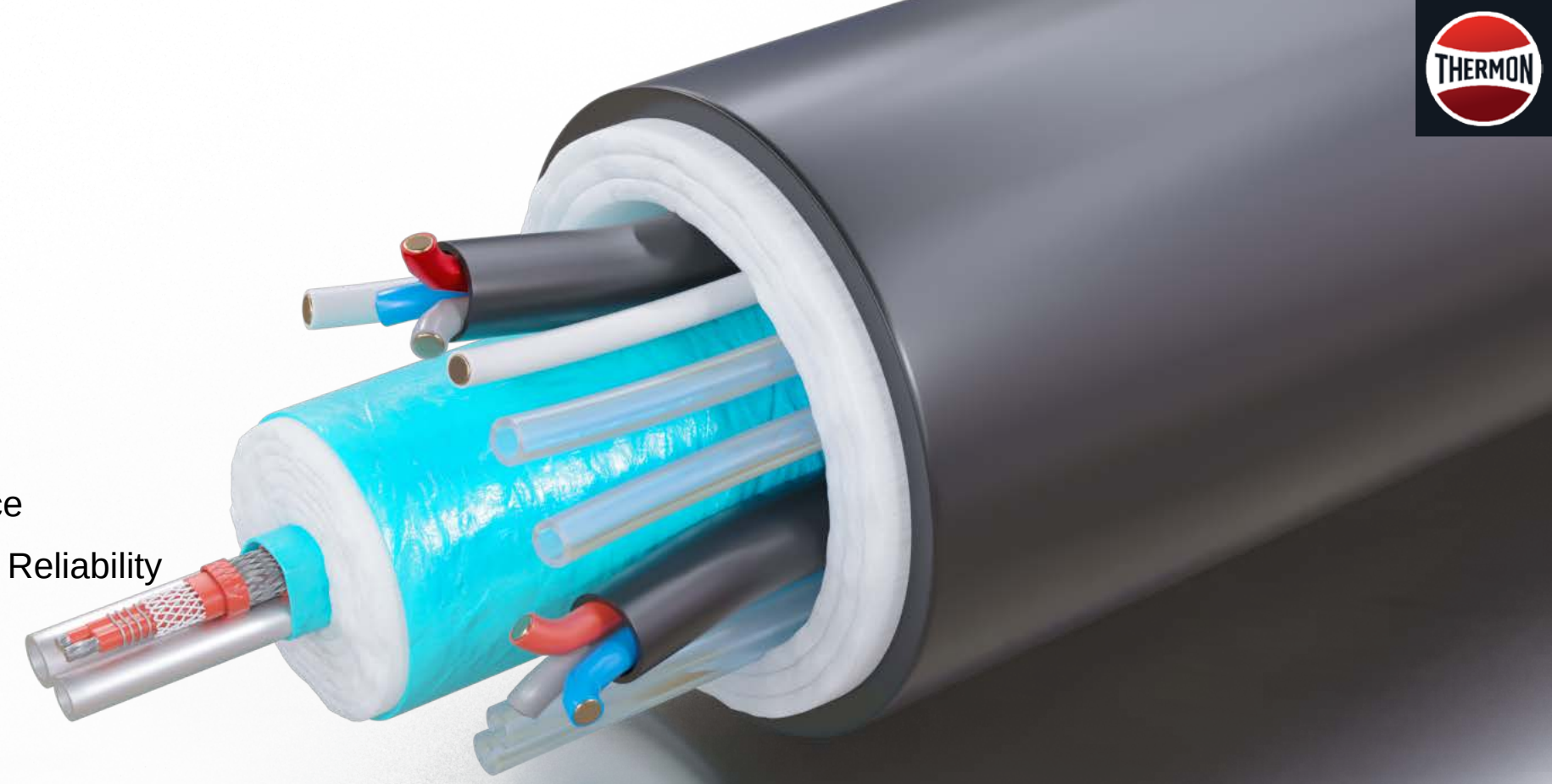
PROCESS HEATING, WINTERIZATION AND FREEZE PROTECTION

COMPLETE SOLUTIONS



ANALYZER ACCURACY CONSISTS OF

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



Premiere 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

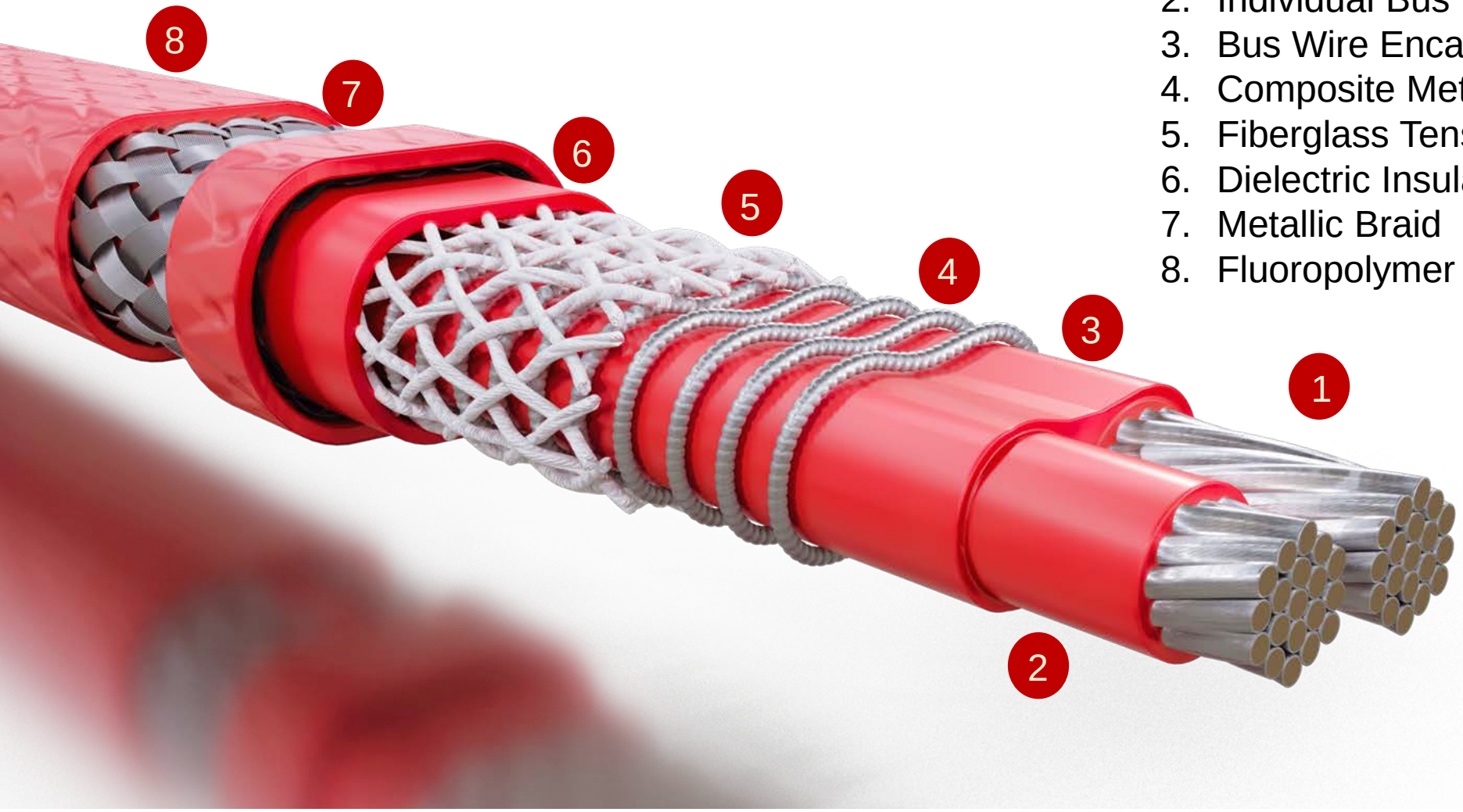
HTSX SELF-REGULATING

- 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

HPT & HPT-XR™ Power-Limiting

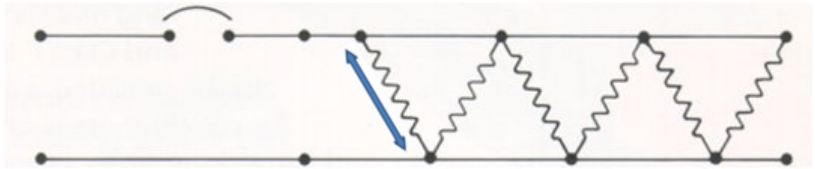


1. Bus Wires- 12 AWG &10AWG
2. Individual Bus Wire Insulation Layer
3. Bus Wire Encapsulation Layer
4. Composite Metal Alloy Fiber
5. Fiberglass Tensile Support Braid
6. Dielectric Insulation Layer
7. Metallic Braid
8. Fluoropolymer – Outer Jacket

PARALLEL CABLES Power Limiting or Constant Watt

POWER LIMITING (PTC) / CONSTANT WATT (ZTC)

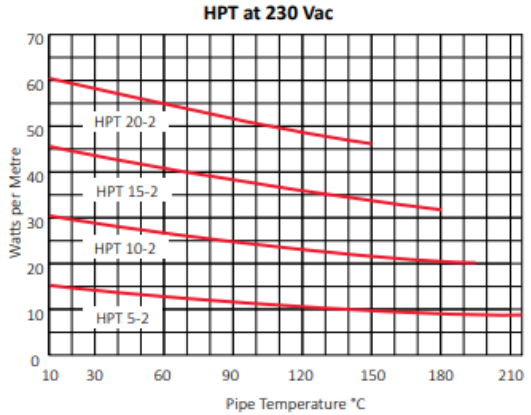
- A heating cable that reduces its power output as temperatures rise, but does not have high “inrush” currents

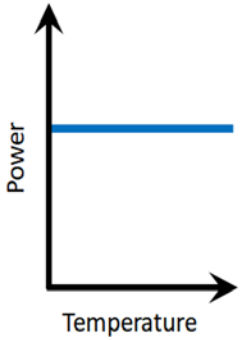


“Independent circuit”

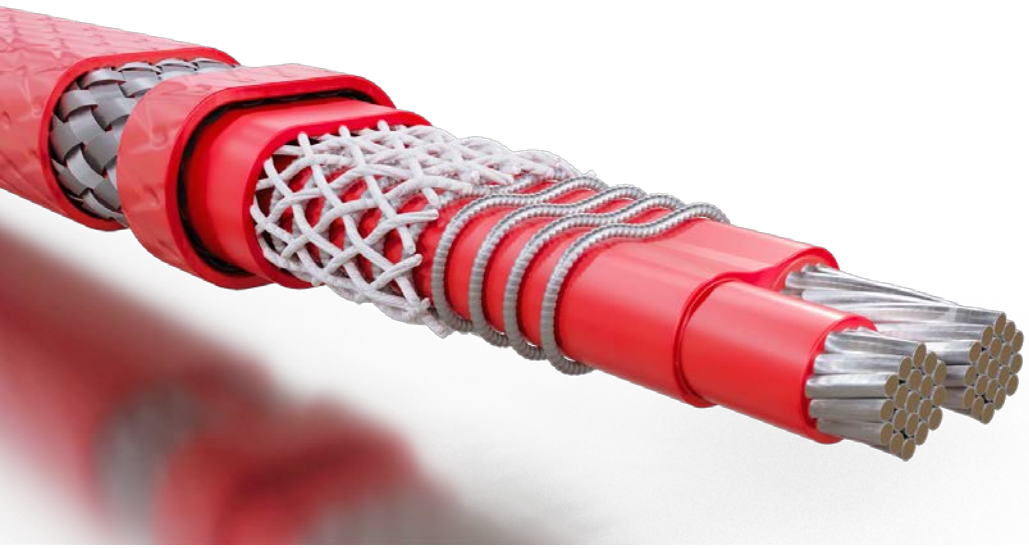
- Watts/ft output not affected by length
- Both are “zone-type” parallel heat cable but with a (PTC) for HPT and (ZTC) for FP

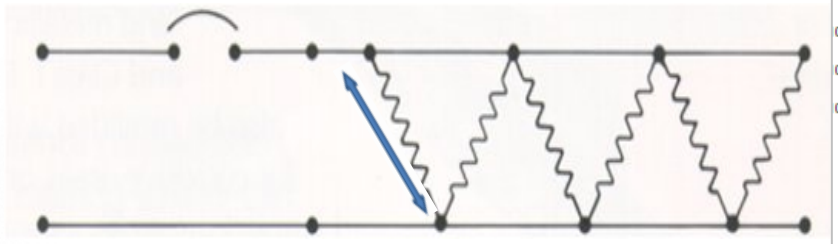
* PTC: Zone Type Cable with Positive Temperature Coefficient
* ZTC: Zone Type Cable Constant Temperature



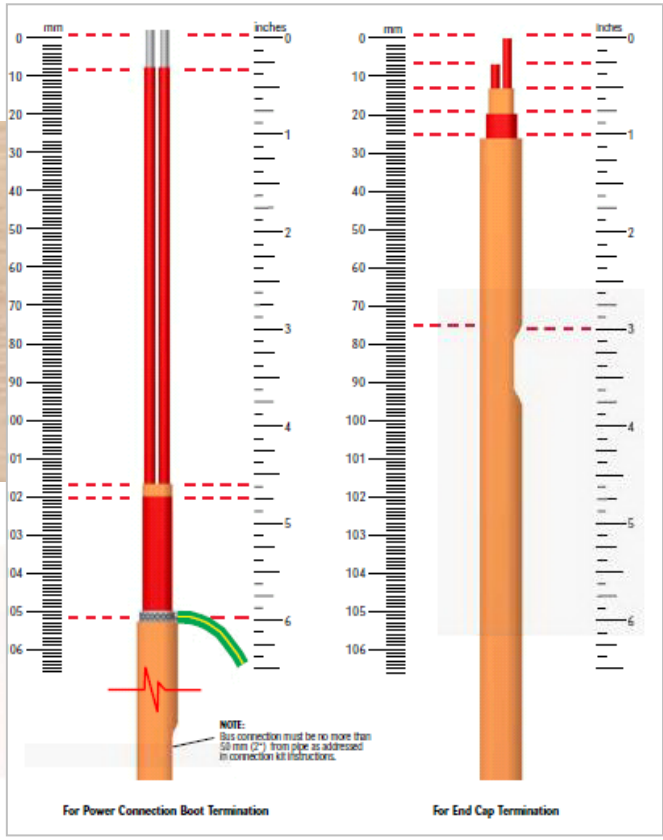


HPT & HPT-XR™ Power-Limiting





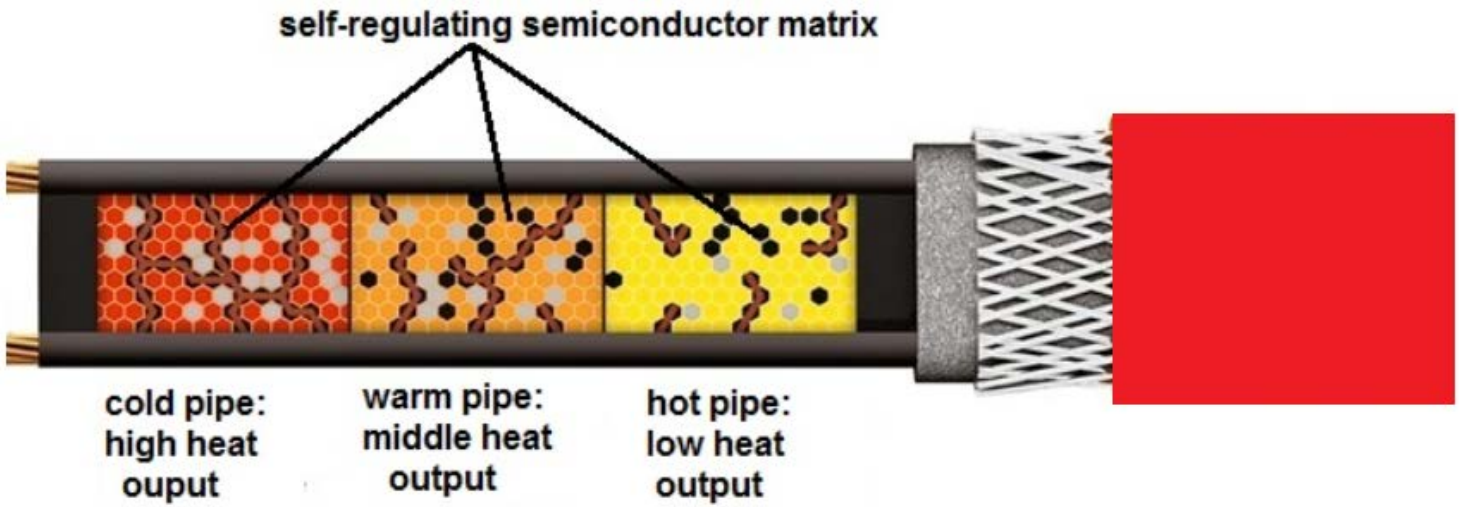
"Independent circuit"

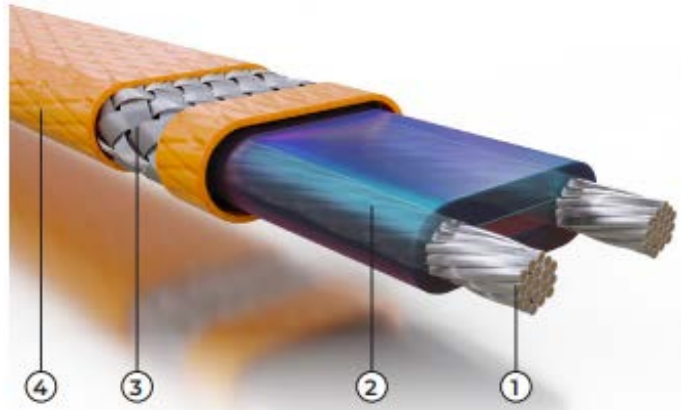


Self-Regulating Heating Cable

1. Bus Wires
2. Semi-Conductive Heating Matrix
3. Inner Fluoropolymer Insulation
4. Metallic Braid
5. Fluoropolymer – Outer Jacket

Self Regulating – How it works





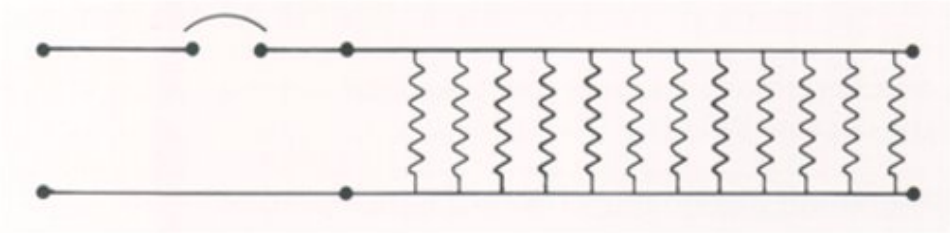
CONSTRUCTION

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.

Self-Regulating

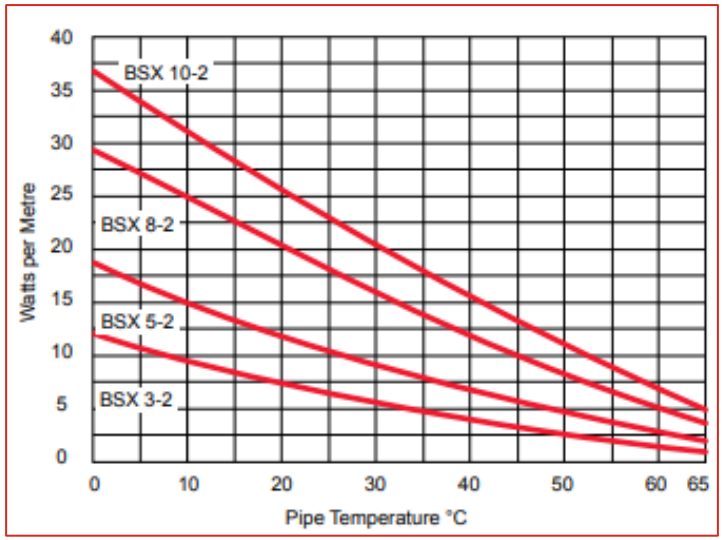
SELF REGULATING (PTC)

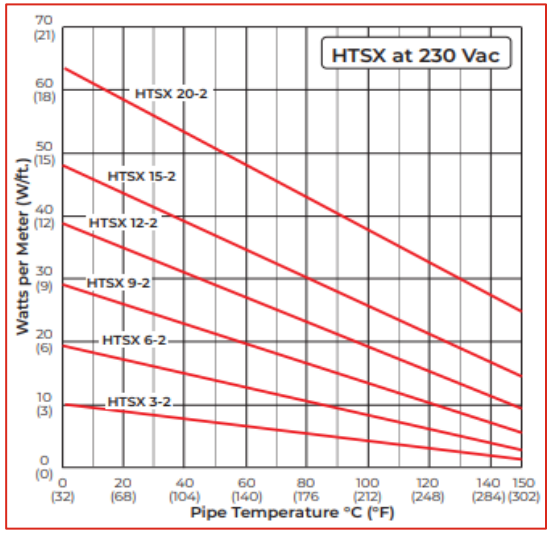
A heating cable that reduces its power output as temperatures rise



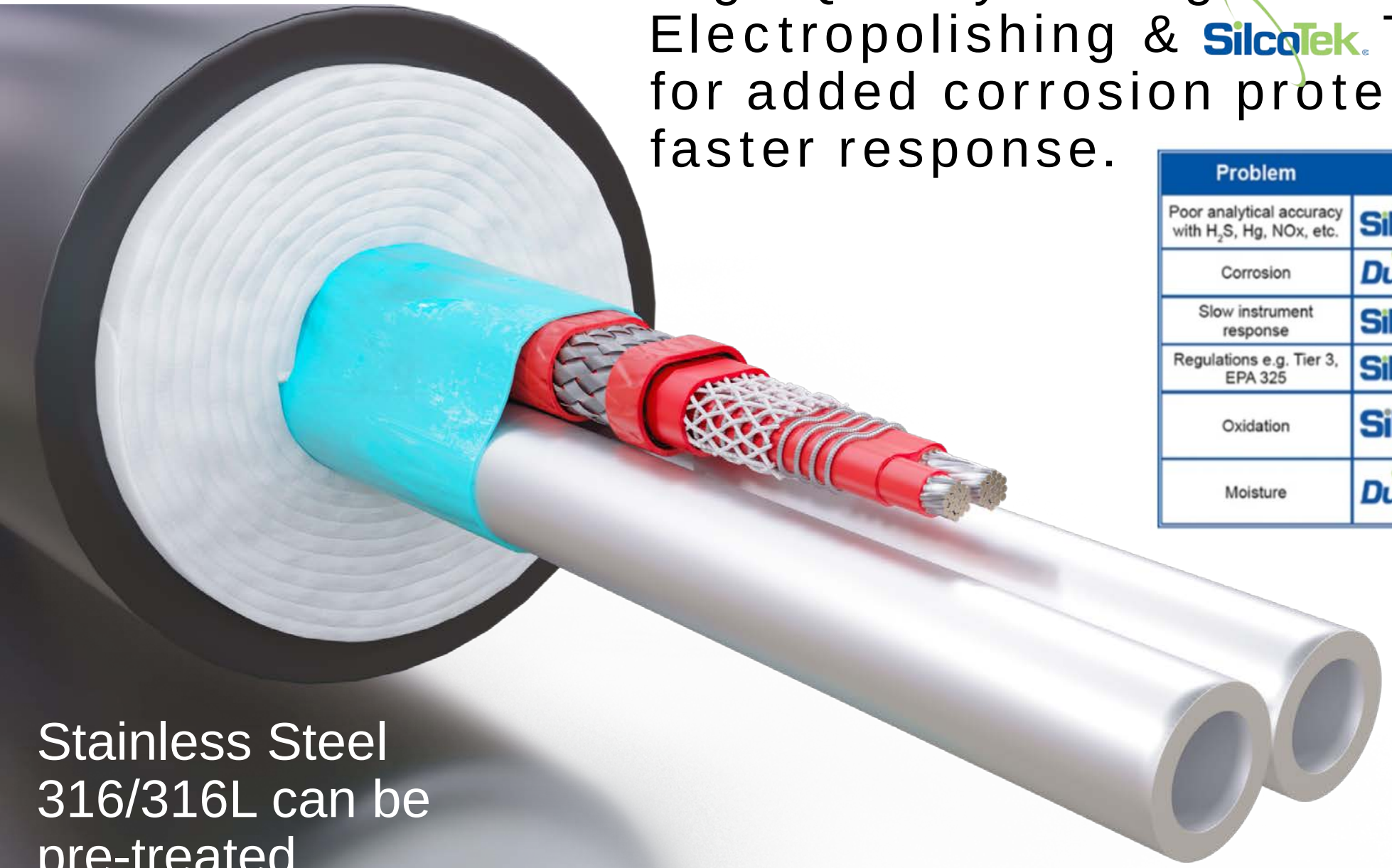
- The heat is produced in a carbon matrix
- Watt/Ft output not affected by length.

- True parallel heating cable
- Commonly called “SR” cable





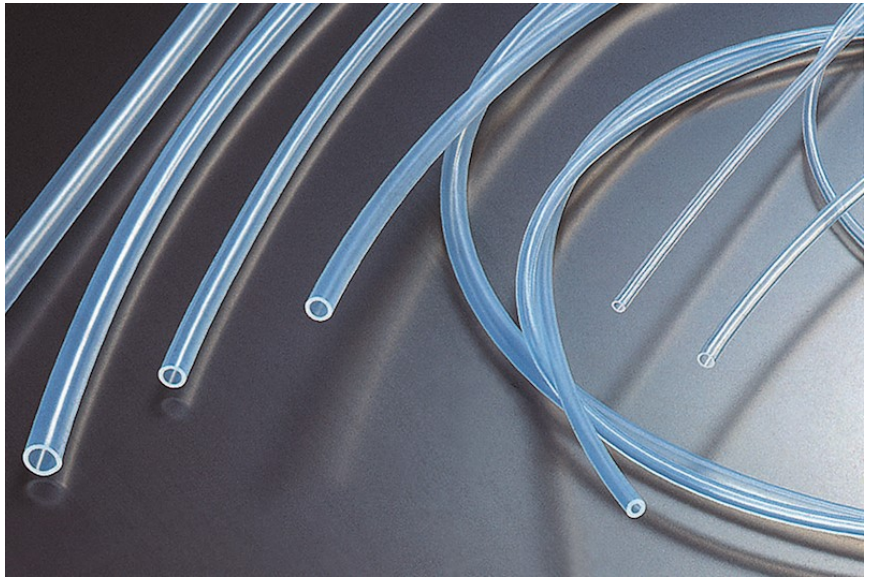
High Quality Tubing with Electropolishing & SilcoTek® Treatments for added corrosion protection and faster response.



Problem	Solution	Result
Poor analytical accuracy with H_2S, Hg, NOx, etc.	SilcoNert®	Improved sampling reliability and throughput
Corrosion	Dursan®	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	Dursan®	Reduced contamination, corrosion, and sample loss

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

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

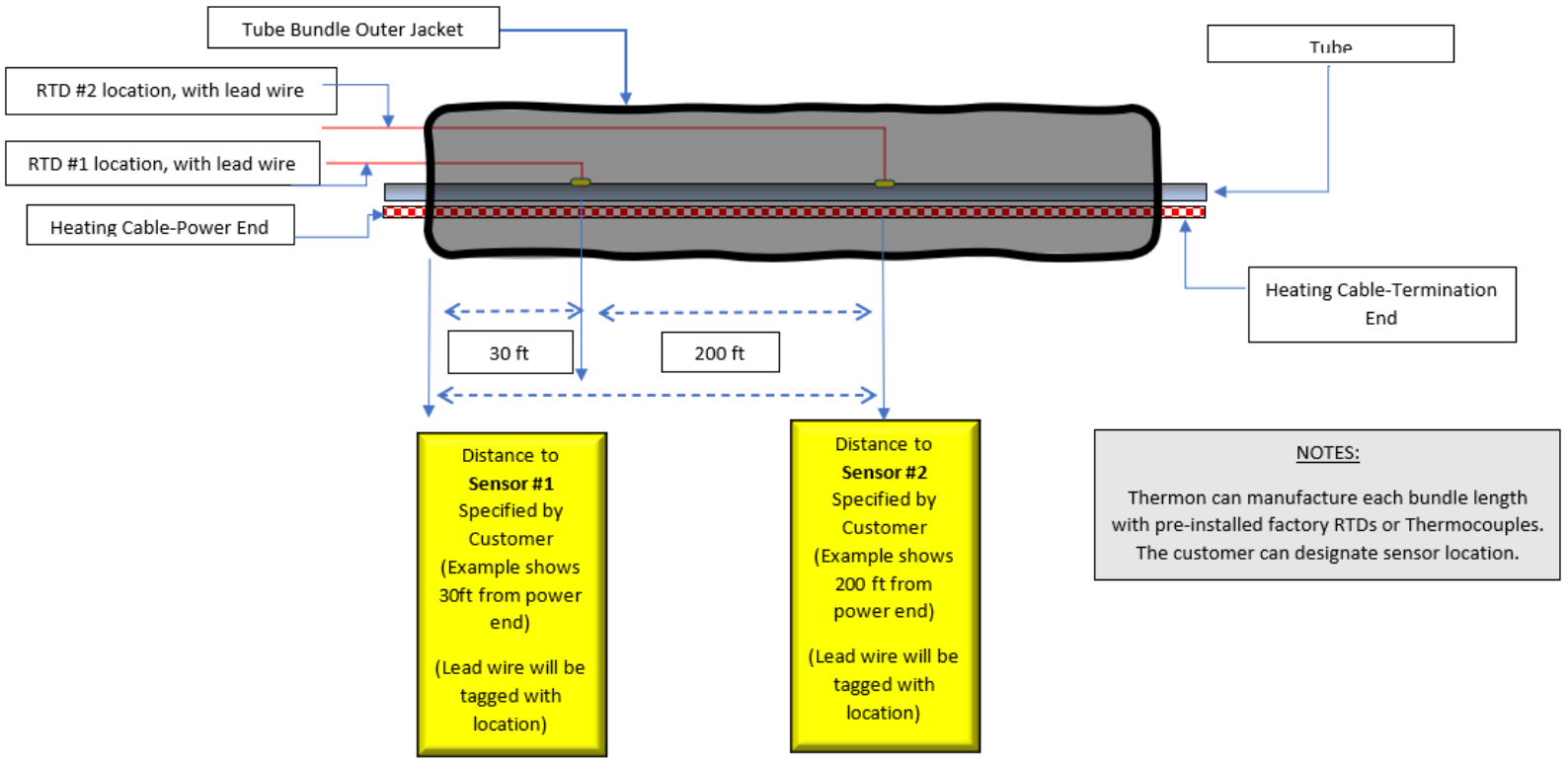
- Temperature Rating: 500°F Continuous
- Good Flexibility
- Lower Permeability than FEP
- Excellent Chemical Resistance
- Long Lengths
- Translucent

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

Temperature Sensors

Factory Installed Temperature Sensor Example



NOTES:

Thermon can manufacture each bundle length with pre-installed factory RTDs or Thermocouples. The customer can designate sensor location.

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

Heated Sample Line

Installation

On-Going Maintenance & Inspection

Spares & Storage

Installation

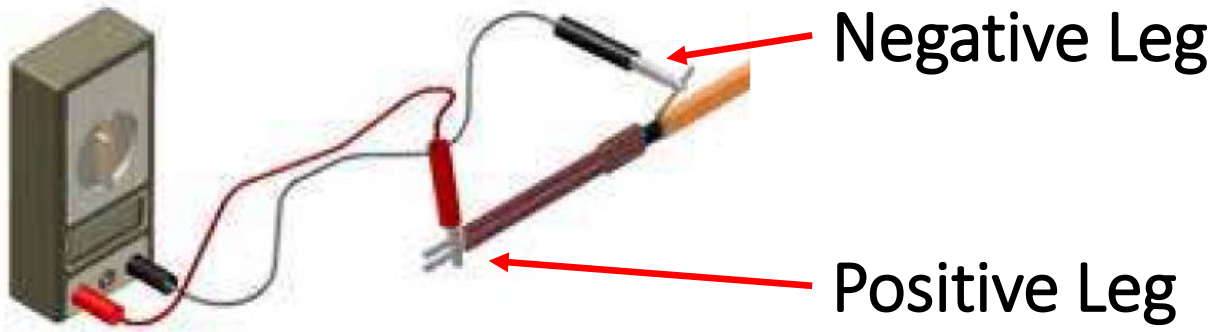
UNPACKING AND INSPECTION

- Do no 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

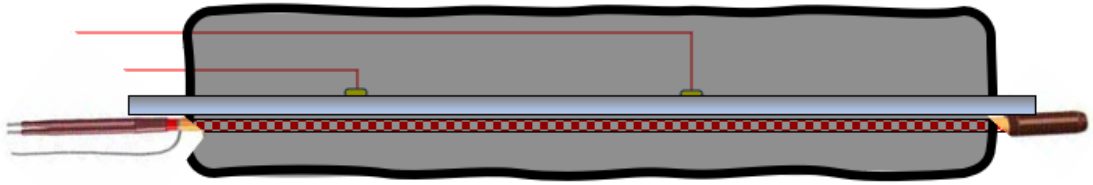
Product Arrival

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 . . .

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)

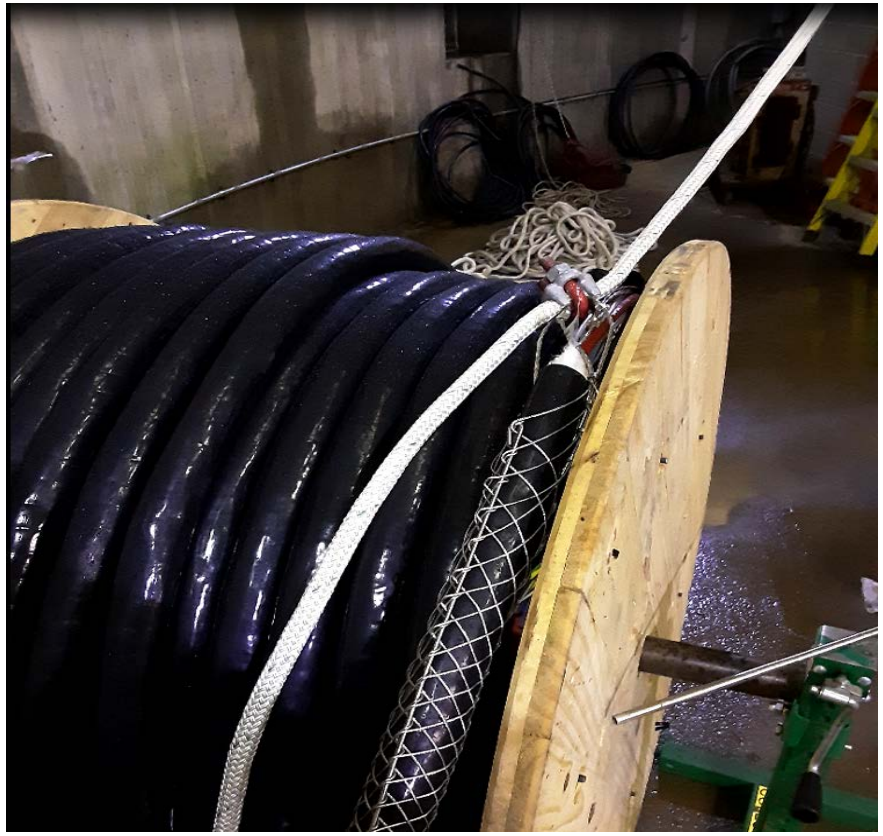
Pulling from reel and routing

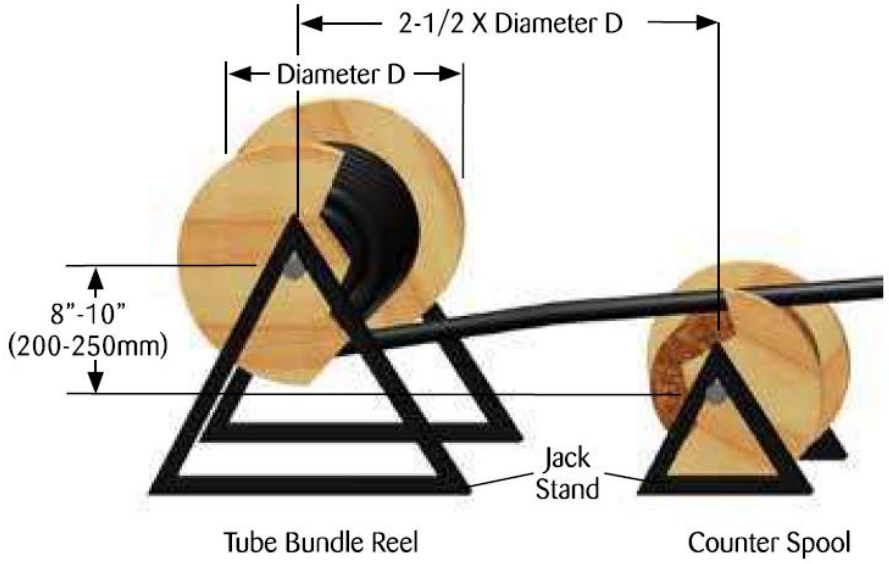
1. **Understand the intended routing plan and clamping positions prior to pulling. (avoid spooling on and off reel)**

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)





Pulling & Hanging Supports

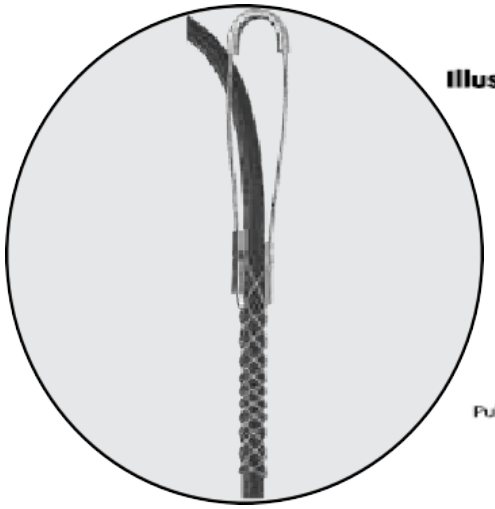
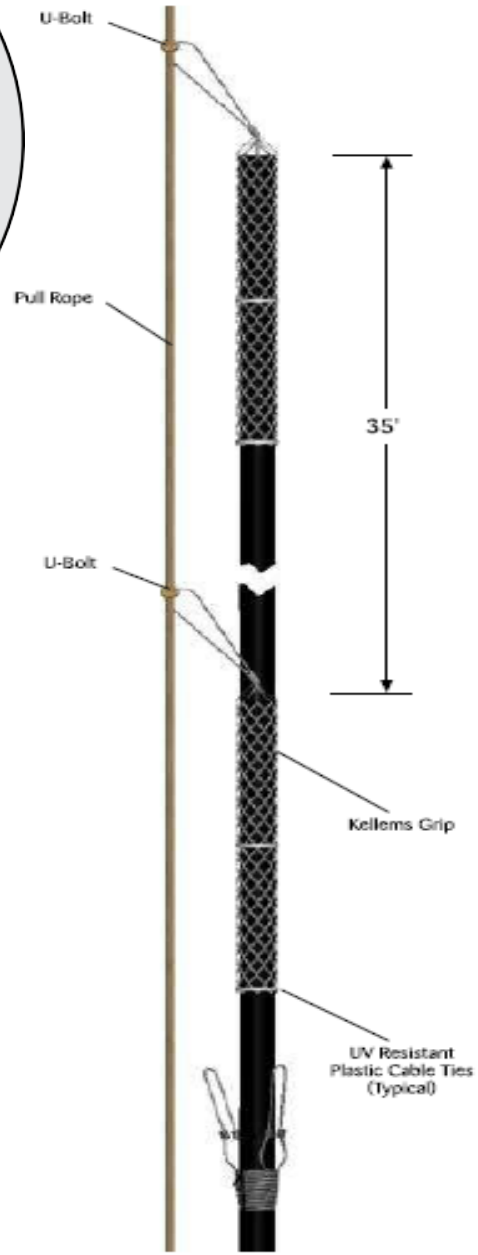
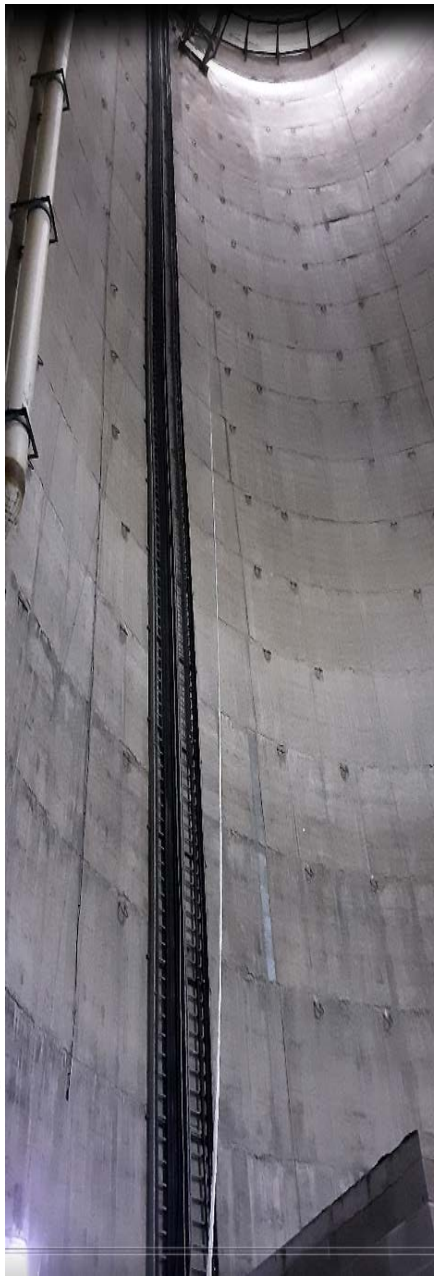


Illustration D: Pulling Detail





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

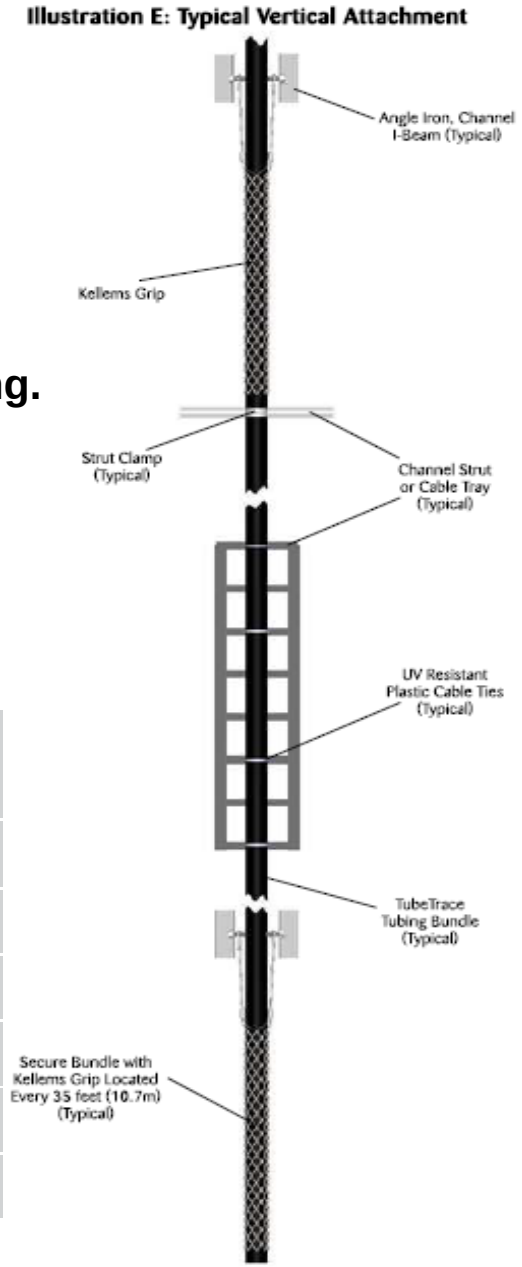
2. **Vertical Supports:**
   Every 10 to 15 ft

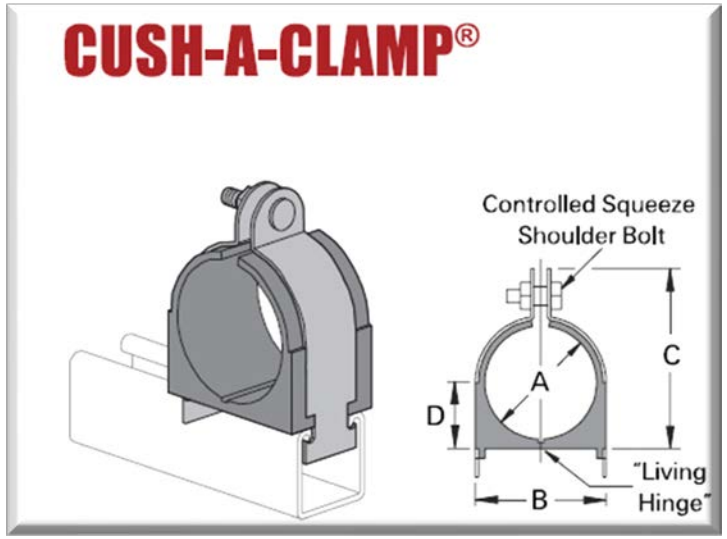
3. **Connection Point Supports:**
   Within 18” of any connection point or transition fitting.

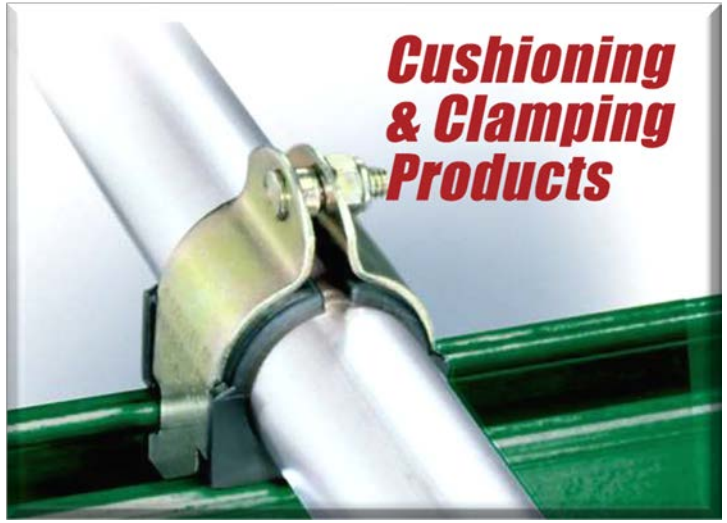
4. **Bend Supports:**
   6” to 10” outside of any bend. (Not within the bend)

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)

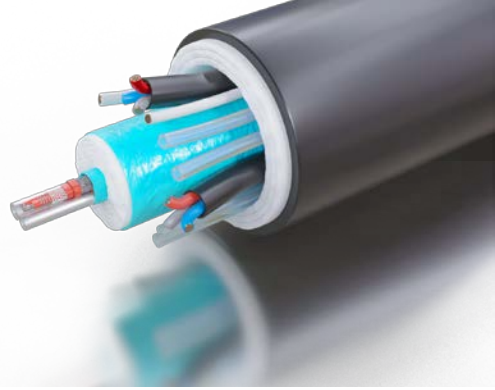






KELLEMS GRIPS
USED TO LIFT AND FOR PERMANENT SUPPORT

Bending & Spacing



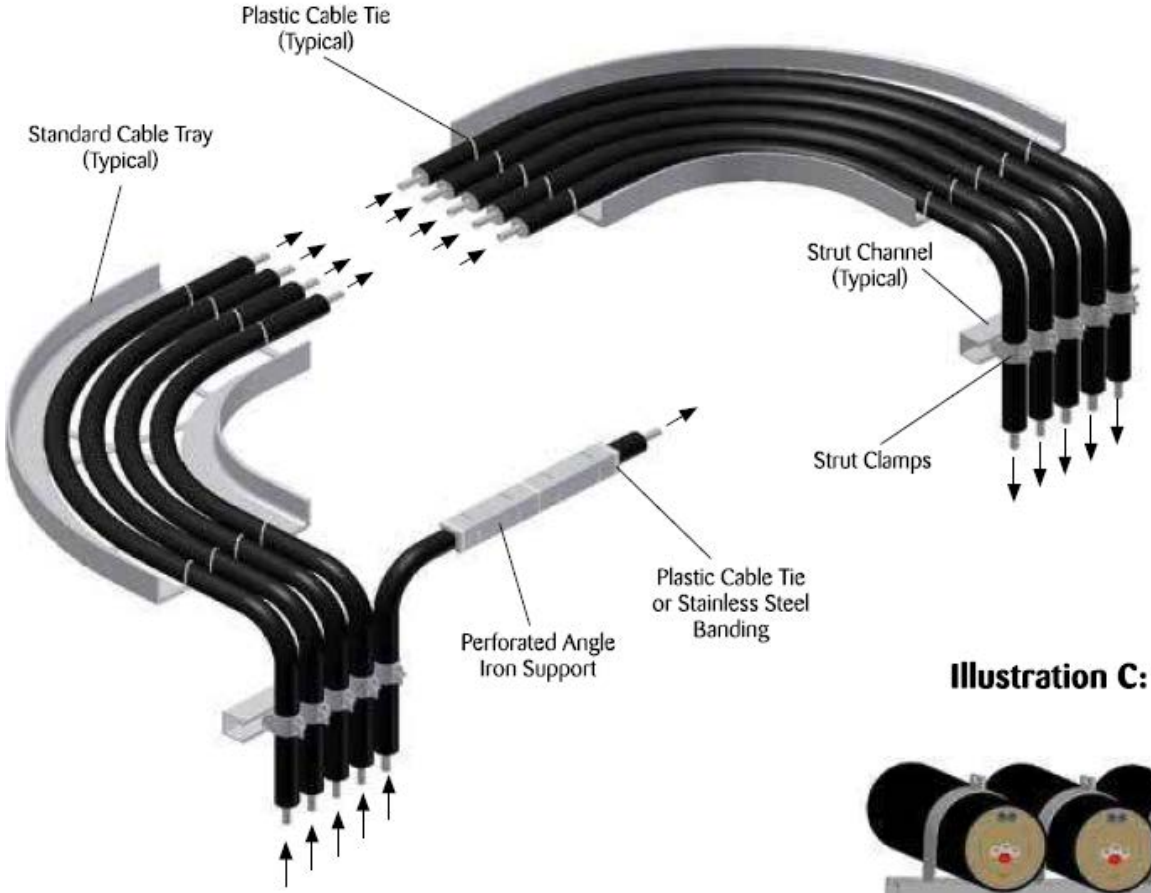
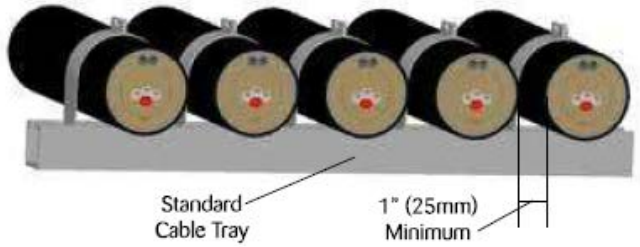
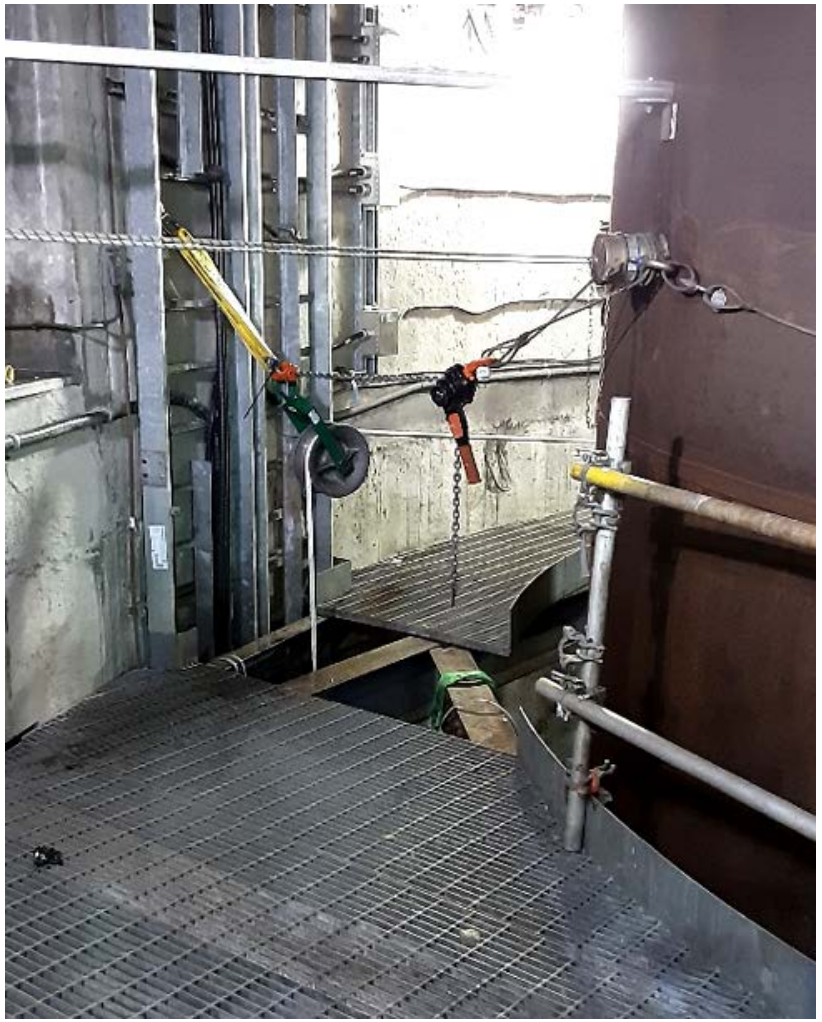


Illustration C: Typical Installation





Bending & Spacing

1. **Bend Radius:**
   General Rule Bundle OD x 6”

2. **No Kinks in Jacket**

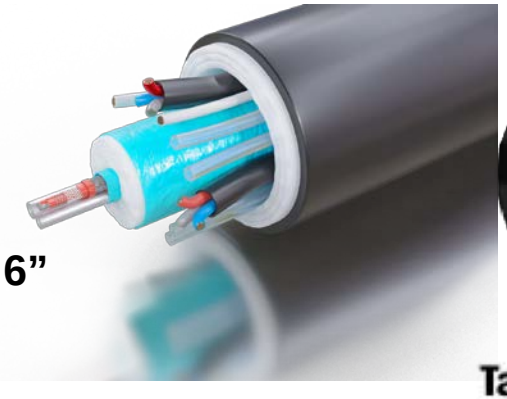
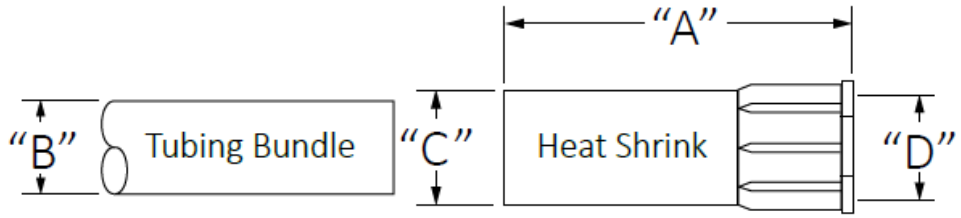


Table 1: Bend Radius

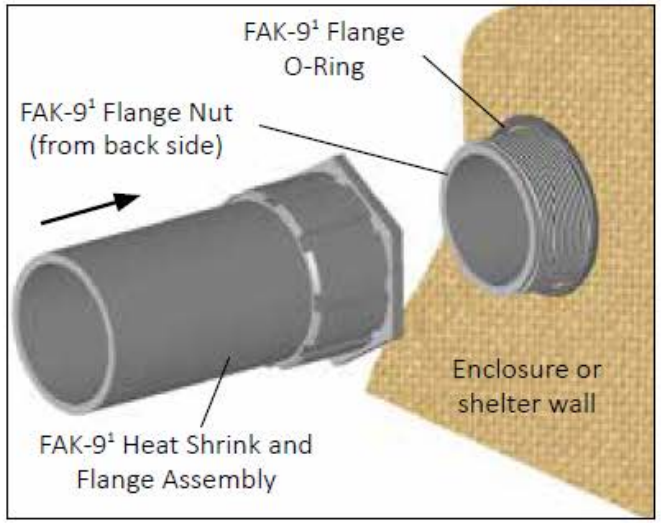
Nominal Bundle O.D. inch (mm)	Minimum Bend Radius inch (mm)	Nominal Weight lbs/ft (kg/m)
Electrical Traced Bundles		
1.3 (33)	6 (152)	0.32 (.476)
1.4 (36)	7 (178)	0.5 (.744)
1.5 (38)	7 (178)	0.6 (.893)
1.7 (43)	8 (203)	0.7 (1.04)
1.8 (46)	9 (228)	0.8 (1.19)
1.9 (48)	10 (254)	0.9 (1.34)
2.1 (53)	11 (279)	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)

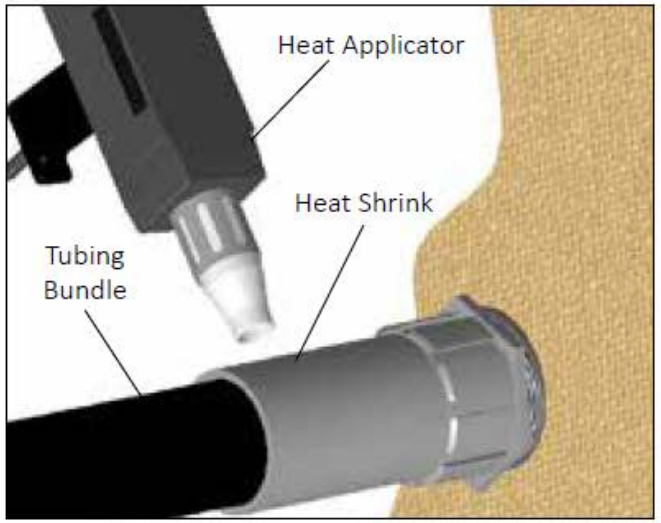
Shelter and Enclosure Entry Seals

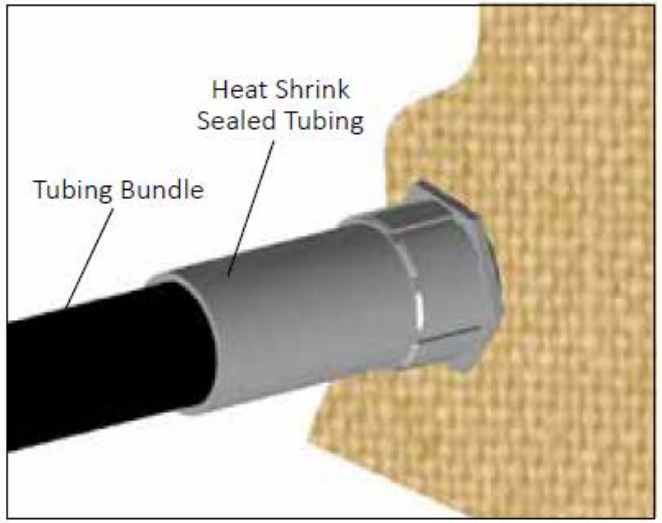
FAK-9: Sizing and Selection Chart



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

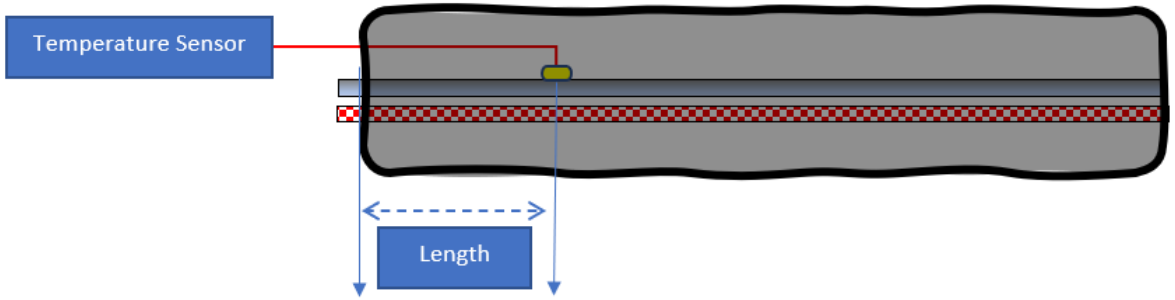
CLEAN & PURGE TUBES

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

Spares & Storage

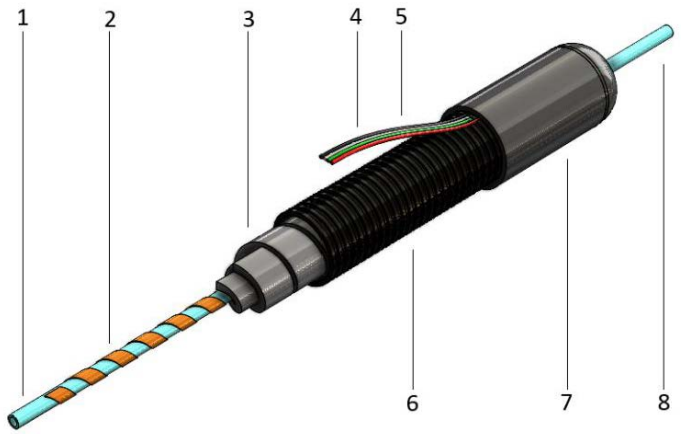
EMERGENCY SPARES

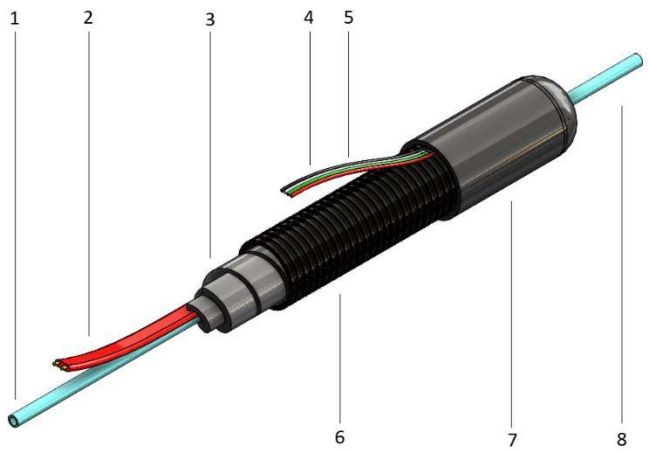
- Product can be cut-to-length
- Extra tube or conductors, use as spares.
- Store in dry ambient controlled shelter
- Store out of direct sun contact
- Keep ends capped

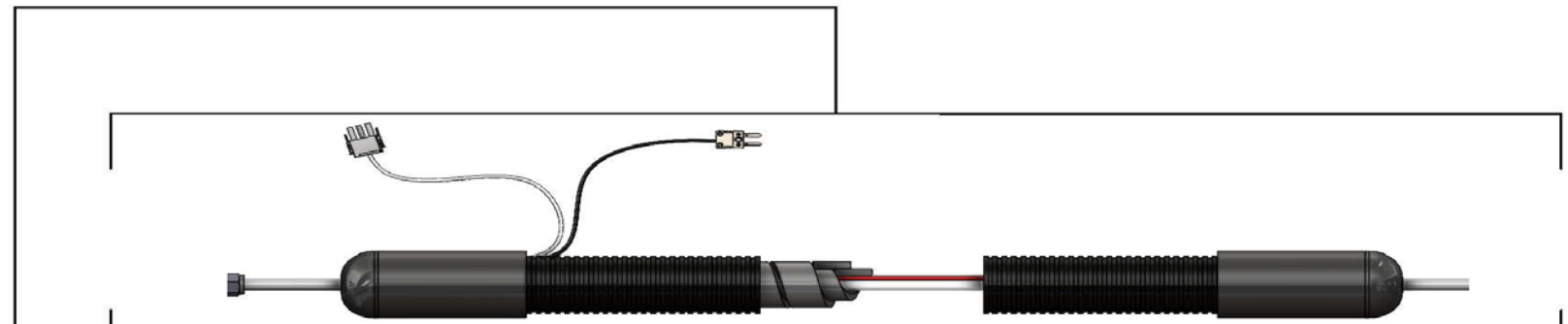


Introducing Thermon 1000 and 2000 Series Heated Sample Lines

- Greater Flexibility
- Higher Maintain Temperatures
- Smaller Profile
- Finished Ends
- True Plug and Play







HSL | 300 | HS | T12 | C12 | A3 | P36/S36 | M1/K1 | 276 | 3C35 | 62-7 | RTD120 | AN | CP | HS | T12 | C12 | A3

Line Type
HSL= Heated Sample Line

Overall Length (in)

Power End Termination
HS=Heat Shrink
HCO=heat shrink w/ cable outlet
X=Special

Tube Lead Length (Power End)
T#=tube (in.)

Heater Cable Lead Length
C#=Cable (length in.)

Tube Fitting
0 = None
A= A fitting type
B= B fitting type
C = C fitting type
X= Special

Power Wire Lead Length/ Sensor Wire Lead Length
P#=Power lead (in.)
S#=Sensor lead (in.)

Power Cable Plug
L1= Leviton plug style 1
L2= Leviton plug style 2
M1= Molex plug style 1
M2= Molex plug style 2
A1= Amphenol plug style 1
A2= Amphenol plug style 2
X= Special

Sensor Cable Plug
0 = None
SA1 = Amphenol plug style 1

Heated Length (in)

Process Tube OD
1 = 3/8"
2 = 1/4"
3 = 3/8"
4 = 1/2"
5 = 5/8"
6 = 3/4"
8 = 1"

Process Tube Material
A = 316 SS Welded
B = #122 Copper
C = PFA Teflon2
D = Monel3
E = Titanium
F = 316 SS Seamless
G = 304 SS Welded
H = 304 SS Seamless
J = Alloy C276
K = Alloy 825
L = Alloy 20
M = FEP Teflon
N = Nylon
P = Polyethylene

Process Tube(s) Wall Thickness
028 = .028"
030 = .030"
032 = .032" (Copper Only)
035 = .035"
040 = .040" (Plastic Only)
047 = .047" (Plastic Only)
049 = .049"
062 = .062" (Plastic Only)
065 = .065"
083 = .083" (SS Only)

Heat Tracing Type (See Heat Trace Application Below). Contact Thermon for TubeTrace SE/ME instrument tubing bundles with alternative heat trace options such as parallel constant watt and series constant watt.

Self-Regulating Heat Trace

40 = BSX 3 W/ft. 120 Vac
41 = BSX 3 W/ft. 240 Vac
42 = BSX 5 W/ft. 120 Vac
43 = BSX 5 W/ft. 240 Vac
44 = BSX 8 W/ft. 120 Vac
45 = BSX 8 W/ft. 240 Vac
46 = BSX 10 W/ft. 120 Vac
47 = BSX 10 W/ft. 240 Vac
90 = VSX-HT 5 W/ft. 120 Vac
91 = VSX-HT 5 W/ft. 240 Vac
92 = VSX-HT 10 W/ft. 120 Vac
93 = VSX-HT 10 W/ft. 240 Vac
94 = VSX-HT 15 W/ft. 120 Vac

60 = HTSX 3 W/ft. 120 Vac
61 = HTSX 3 W/ft. 240 Vac
62 = HTSX 6 W/ft. 120 Vac
63 = HTSX 6 W/ft. 240 Vac
64 = HTSX 9 W/ft. 120 Vac
65 = HTSX 9 W/ft. 240 Vac
66 = HTSX 12 W/ft. 120 Vac
67 = HTSX 12 W/ft. 240 Vac
68 = HTSX 15 W/ft. 120 Vac
69 = HTSX 15 W/ft. 240 Vac
70 = HTSX 20 W/ft. 120 Vac
71 = HTSX 20 W/ft. 240 Vac

Power-Limiting Heat Trace

50 = HPT 5 W/ft. 120 Vac
51 = HPT 5 W/ft. 240 Vac
52 = HPT 10 W/ft. 120 Vac
53 = HPT 10 W/ft. 240 Vac
54 = HPT 15 W/ft. 120 Vac
55 = HPT 15 W/ft. 240 Vac
56 = HPT 20 W/ft. 120 Vac
57 = HPT 20 W/ft. 240 Vac

Sensor Type & Length (in)
RTD#= Resistance Temp. Detector (length in.)
TCK#: Type K thermocouple (length in.)
TCJ#: Type J thermocouple (length in.)

Insulation Type
AN= Aramid Nomex
SIL=Silicon insulation

Outer Jacket Type
CP= Corrugated Polyamide
WP= Weaved Polyamide
SIL= Siliconwrap

End Termination (Non-Power End)
HS=Heat Shrink
HCO=heat shrink w/ cable outlet
X=Special

Tube Lead Length (Power End)
T#=tube (in.)

Heater Cable Lead Length
C#=Cable (length in.)

Tube Fitting
0 = None
A= A fitting type
B= B fitting type
C = C fitting type
X= Special


THANK YOU