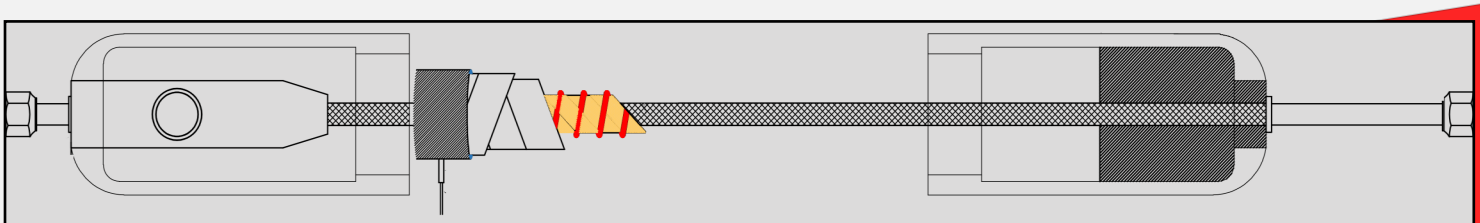
Neptech Inc.
Manufacturer of FLEXOTHERM Products

Heated Sample Lines for Accurate Gas Sampling



Series	Tube Material	Tube Size	Voltage	Sensor Type	Opertional Temperature	Exterior Sleeve Type	Port Type	Options	Line Length	Lead Length

SERIES

GT- Operates at 376°F ± 20°F (191°C ± 11°C)
GD - Operates at 257°F (125°C)
GS - Designed to Customer Supplied Specifications

TUBE MATERIAL *Page 2*

E- PTFE Teflon®
P - PFA Teflon®
F - FEP
PE - PEEK
N11 - Nylon 11 (Specify Size)
SSBT - Stainless Steel Braided PTFE
SSBT/P - Stainless Steel Braided PFA
CS - Corrugated Stainless Steel (Specify Size)
C - Custom - Not Listed (Specify Type/Size)
S - 316 Stainless Steel (Ra20)

Optional Add-Ons for SS Materials
EP - Electropolished (Ra10)
DC- Dursan® Coating
SN- Silconert® Coating

TUBE SIZE *Page 3*

Teflon® -
4/2 - 1/4" O.D. x 1/8" I.D. (0.635cm x 0.318cm)
4/3 - 1/4" O.D. x 3/16" I.D. (0.635cm x 0.476cm)
6/4 - 3/8" O.D. x 1/4" I.D. (0.953cm x 0.635cm)
6/5 - 3/8" O.D. x 5/16" I.D. (0.953cm x 0.794cm)

Stainless Steel -
4 - 1/4" O.D. x 0.035" Wall (0.635cm x 0.089cm)
6 - 3/8" O.D. x 0.035" Wall (0.953cm x 0.089cm)
8 - 1/2" O.D. x 0.035" Wall (1.27cm x 0.089cm)

VOLTAGE *Page 4-5*

Power -
A - 110 / 115 / 120 VAC
B - 208 VAC
C - 220 / 230 / 240 VAC
D - 440 / 460 / 480 VAC

Power Connector -
A - 7 Pin AMP™ (Power Pins 3-5) 10 Amp Max Load
T - Mini Twist Lock (NEMA ML2-15) (standard)
W - Straight-Blade (NEMA 5-15) (typical wall outlet)
M - Molex 3-Pin
N - None, Flying Leads
S - Special / Custom (specify NEMA code or Connector P/N)

SENSOR TYPE & PLACEMENT *Page 6*

E - E-Type Thermocouple
J - J-Type Thermocouple
K - K-Type Thermocouple
T - T-Type Thermocouple
R - RTD (Specify Type & 2 or 3 Wire)
M - Middle
N - Non-Lead Side
L - Lead Side

OPERATIONAL TEMPERATURE

Specify in Degrees_____ (please specify °F or °C)

EXTERIOR SLEEVE TYPE *Page 7*

M - Black Mesh sleeving
SF – Silicone Fire Sleeving
CT– Corrugated Tubing
AC - Armored Core Sleeving
PCT - PVC Corrugated Tubing
FH - Fire Hose Sleeving
X - PVC Helix Cover
BV - Blue Vinyl Sleeving
CR - Customer Request (Specify)

PORT TYPE

MX - MEXA (specify size, length, etc.)
4S - 1/4" (0.635cm) Tube Stub
6S - 3/8" (0.9525cm) Tube Stub
8MS - 8MM Tube Stub
FJIC - (Specify Size)
MNPT - (Specify Size)
SAN - Sanitary (Specify Size)

Optional Add-Ons
DC- Dursan® Coating
SC - Silconert® Coating

OPTIONS *Page 8*

P - Profiled w/ Data (Specify Process)
SL - Slaved Each End
CL– Cleaned and N2 Purge
PP - Power Pass Through (Specify Wire Gauge)
TP - Thermocouple Pass Through (Specify Wire Gauge)
SR - Stainless Steel 1/16" Braided Strain Relief

LINE LENGTH & LEAD LENGTH

Customer Specification (Please specify in inches or centimeters)

Tube Material

PTFE Teflon®

PTFE (Polytetrafluoroethylene) Tubing is a high-performance fluoropolymer tubing known for its exceptional chemical resistance, wide temperature tolerance, low friction, and excellent electrical insulation properties. It is suitable for demanding industrial, medical, and laboratory applications.

PFA Teflon®

PFA (Perfluoroalkoxy Alkane) Tubing is a high-performance fluoropolymer tubing combining the superior chemical resistance of PTFE with enhanced clarity, flexibility, and melt-processability. It is ideal for applications requiring high purity, smooth flow characteristics, and excellent thermal stability.

PEEK

PEEK (Polyether Ether Ketone) Tubing is a high-performance semi-crystalline thermoplastic known for its exceptional mechanical strength, chemical resistance, and high temperature stability. It is widely used in aerospace, medical, oil & gas, and industrial applications where superior performance is required under extreme conditions.

FEP

FEP (Fluorinated Ethylene Propylene) Tubing is a melt-processable fluoropolymer offering excellent chemical resistance, high transparency, and good flexibility. It provides many of the benefits of PTFE while allowing easier extrusion and tighter dimensional control, making it ideal for fluid handling, electrical, and medical applications.

316 Stainless Steel

316 Stainless Steel Tubing is an austenitic chromium–nickel stainless steel alloy with added molybdenum, providing superior corrosion resistance compared to 304 stainless steel. It offers excellent strength, durability, and resistance to chlorides and aggressive chemical environments, making it ideal for critical industrial, pharmaceutical, marine, and food-processing applications.

Corrugated Stainless Steel

Corrugated Stainless Steel Tubing (CSST) is a flexible metal tubing manufactured from high-quality stainless steel with a continuous corrugated profile. The corrugation provides exceptional flexibility while maintaining strength, pressure resistance, and corrosion protection. CSST is widely used in applications requiring vibration absorption, thermal expansion compensation, and ease of installation.

Electropolished Stainless Steel

Electropolished Stainless Steel Tubing is high-purity stainless steel tubing that undergoes an electrochemical finishing process to remove surface contaminants and microscopic peaks. This results in an ultra-smooth, clean, and corrosion-resistant surface, making it ideal for pharmaceutical, semiconductor, food, and biotechnology applications where hygiene and cleanliness are critical.

Nylon 11

Nylon 11 (PA 11) Tubing is a high-performance bio-based polyamide derived from castor oil. It offers excellent flexibility, chemical resistance, low moisture absorption, and superior impact strength compared to other nylons. Nylon 11 tubing is widely used in automotive, pneumatic, oil & gas, and industrial fluid handling applications.

Stainless Steel Braided Teflon®

Stainless Steel Braided PTFE Hose consists of a smooth-bore PTFE (Polytetrafluoroethylene) inner core reinforced with a high-tensile stainless steel wire braid. This construction provides excellent chemical resistance, wide temperature tolerance, high pressure capability, and flexibility, making it suitable for critical fluid and gas transfer applications.

Teflon (PTFE) Tubing – Standard Sizes

Our Teflon (PTFE) tubing is designed to deliver high chemical resistance, excellent thermal stability, and smooth inner flow for a wide range of industrial, laboratory, and high-purity applications. The tubing is manufactured to precise tolerances, ensuring consistent dimensions and reliable performance.

We offer a selection of standard sizes to meet common process and fluid transfer requirements:

Outer Diameter	Inner Diameter	Metric Conversion
1/4"	1/8"	0.635 cm × 0.318 cm
1/4"	3/16"	0.635 cm × 0.476 cm
3/8"	1/4"	0.953 cm × 0.635 cm
3/8"	5/16"	0.953 cm × 0.794 cm

Stainless Steel Tubing – Standard Sizes

Our stainless steel tubing is precision manufactured to provide exceptional strength, corrosion resistance, and durability for demanding industrial and process applications. The tubing is engineered to strict dimensional tolerances to ensure compatibility with fittings and system components.

We offer the following selection of standard sizes to meet common process:

Outer Diameter	Wall Thickness	Metric Conversion
1/4"	0.035"	0.635 cm × 0.089 cm
3/8"	0.035"	0.953 cm × 0.089 cm
1/2"	0.035"	1.27 cm × 0.089 cm

Standard Power Options

To accommodate a wide range of operating environments and installation requirements, our heated sample systems are available with multiple standard power connection options. These options are designed to ensure reliable power delivery, ease of integration, and long-term durability across laboratory, industrial, and field applications.

Amphenol 7-Pin Connector

The Amphenol 7-pin connector is ideal for applications requiring combined power and control signals in a single interface. Its robust locking mechanism and optional sealing make it well-suited for environments subject to vibration or frequent connection cycles. This option is commonly used where heater power, temperature sensing, and control signals must be integrated through one compact connector.

Mini Twist-Lock Connector

Mini twist-lock connectors provide a secure, vibration-resistant AC power connection. The twist-lock mechanism prevents accidental disconnection during operation, making it suitable for mobile equipment or installations where mechanical stability is critical. This option is typically selected for medium- to high-power heater applications.

Straight-Blade Connector

The straight-blade connector offers a simple interface for standard installations. It is widely available and easy to service, making it a practical choice for fixed laboratory setups or controlled environments where locking is not

Molex 3-Pin Connector

Molex 3-pin connectors are used for compact, low - to medium-power DC heater applications. Their polarized design ensures correct mating, while the small form factor supports space-constrained systems. This option is commonly chosen for internally mounted or enclosed heater assemblies.

Flying Leads

Flying leads provide maximum flexibility by allowing direct wiring into customer systems. This option is particularly well-suited for high-temperature environments or custom electrical layouts where connectors are not practical. Wire gauge and insulation can be selected to match the required voltage, current, and temperature ratings.

Custom Power Interfaces

For specialized requirements, custom power connectors or interfaces can be provided. These solutions are tailored to specific electrical ratings, environmental conditions, sealing requirements, or mechanical constraints, ensuring optimal performance for unique applications.

Power Options

Choosing the correct voltage for a heated sample line is critical to ensure optimal performance, safety, and energy efficiency. The appropriate voltage depends on the length of the line, power requirements, operating temperature, and local power availability.

Voltage	Voltage Type	Typical Applications	Additional Comments
12	DC	Thermostats, small relays, landscape lighting, automotive accessories	Very common low-voltage level.
24	DC	HVAC control systems, industrial controls, irrigation systems	Better for longer wire runs than 12V.
48	DC	PLCs, sensors, actuators, industrial automation equipment	Preferred in industrial environments due to stability and compatibility with control systems.
110	AC	Residential, small industrial heaters	Common North America low-voltage supply
115	AC	North America standard for many devices	Slight variation of 110 V, often used interchangeably
120	AC	North America common standard, Portable Generators	Standard residential/commercial voltage
208	AC	Three-phase industrial power systems	Common in commercial buildings for three-phase motors and heating
220	AC	General industrial and international supply	Common international voltage
230	AC	Europe and many global locations standard	Standard voltage in Europe & Asia
240	AC	Residential and industrial heaters worldwide	High voltage for heating applications
440	AC	Industrial three-phase systems	High voltage for heavy industrial equipment
460	AC	Industrial applications (less common)	Similar to 440 V systems
480	AC	US industrial three-phase power supply	Common in heavy-duty industrial motors and heating

Standard Sensor Types

Thermocouples are widely used due to their wide temperature range, rugged construction, fast response time. They are suitable for harsh environments, including high temperatures, vibration, and corrosive atmospheres. However, thermocouples require cold junction compensation and generally provide lower accuracy and stability compared to RTDs.

Thermocouple Types	Temperature Range
TYPE-E	-270 to 1000°C -454 to 1832°F
TYPE-J	-210 to 1200°C -346 to 2193°F
TYPE-K	-270 to 1372°C -454 to 2501°F
TYPE-T	-270 to 400°C -454 to 752°F

RTD (Resistance Temperature Detector)

RTDs are known for their high accuracy, excellent repeatability, long-term stability, and good linearity. Compared to thermocouples, RTDs provide more precise measurements and are preferred in applications where accuracy is critical. However, RTDs have a slower response time, narrower temperature range.

Pt100 RTD

Pt100 RTD has a nominal resistance of 100 ohms at 0 °C. It is highly accurate and stable, making it suitable for precision temperature measurement. Pt100 sensors are commonly used in industrial and laboratory environments where reliable and repeatable measurements are required.

Pt1000 RTD

Pt1000 RTD has a nominal resistance of 1000 ohms at 0 °C, providing a higher output signal compared to Pt100. This higher resistance makes Pt1000 less sensitive to lead wire resistance, allowing for accurate measurements over longer cable lengths and in electrically noisy environments.

Sensor Placement

Non-Lead Side

The non-lead side, also known as the hot junction or sensing tip, is the actual temperature-measuring point of the thermocouple. This end must be placed directly at the location where temperature is to be measured.

Lead Side

The lead side is where the thermocouple wires connect to the measuring instrument (transmitter, PLC, indicator). This end is known as the cold junction or reference junction.

Exterior Sleeving Type

Black Mesh Sleeving

The tight braid construction covers fully and provides excellent surface abrasion resistance for assemblies exposed to excessive wear. The smooth nylon fibers and tight construction also reduce abrasion damage caused by hoses and harnesses rubbing against the inside wall of the sleeving. Max Temperature Rating 255°F

Silicone Firesleeve

Silicone Firesleeve is a high-temperature, fire-resistant protective sleeving designed to protect sample lines, hoses, and cables from extreme heat, flame exposure, and mechanical damage. It is especially suitable for use in heated sample lines and analyzer systems operating in harsh industrial environments.
Max Temperature Continuously at 500°F, Resistant to 2,200°F

Armor Cover Sleeving

Armor Cover Sleeving offering high strength while maintaining flexibility. Armor Cover Sleeving is used as the outermost protective layer in sample line assemblies where mechanical damage, or physical abuse is a concern. Max Temperature Rating 500°F.

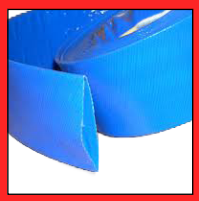
PVC Corrugated Tubing

The corrugated design provides mechanical protection against crushing and abrasion, while the PVC material offers chemical resistance to many oils, acids, and alkaline solutions. PVC Corrugated Tubing is ideal for indoor and light-duty outdoor applications where moderate temperature resistance is sufficient. While also being light weight. Max Temperature Rating 150°F.

Fire Hose Sleeving

Fire hose sleeving is a strong outer protection option because it's durable, and resistant to abrasion, moisture, and harsh environments. It's especially useful for protecting cables or hoses in demanding conditions like industrial or automotive settings. However, it can be bulky and less flexible than other sleeving, so it's best suited for heavy-duty applications. Max Temperature 180°F.

Blue Vinyl



Blue vinyl sleeving is well-suited for washdown applications because it provides a smooth, waterproof outer layer that resists moisture, dirt, and general wear. It's easy to clean, helps protect the inner hose from abrasion and contamination, and holds up well in environments where frequent rinsing or sanitation is required. Max Temperature 140°F.

PVC Helix Cover

PVC Helix sleeving is a durable external protective covering designed to shield your hoses from abrasion, moisture, UV exposure, and general wear. Max Temperature 150°F.

Standard Line Ends

Tube Stubs

Tube stub ends are designed to allow direct connection to compression fittings, unions, or bulkhead fittings while maintaining temperature integrity and minimizing cold spots. Stub ends are manufactured to customer-specified lengths and are available in both metric and English size options.

Additional Options

Profiling with Data Sheet

Neptech Inc. will profile your heated sample line and provide a data sheet for your records. Profiling verifies that the temperature remains above the dew point along the entire length of the line, preventing condensation and preserving sample integrity. This is critical for emissions monitoring and process analysis.

Slaved Each End

Each end of the sample line is slaved to ensure precise and secure connections to analyzers or process points. This guarantees alignment, minimizes thermal loss, and maintains the integrity of the heated sample path.

Power Pass Through

The power pass-through provides a safe and efficient means of supplying electrical power to the heated sample line, ensuring consistent temperature along its entire length. This prevents cold spots, maintains sample integrity, and supports reliable gas or vapor transport from the process point to the analyzer, all without compromising the line's insulation or outer jacket.

Thermocouple Pass Through

The thermocouple pass-through allows a temperature sensor to be integrated directly into the heated sample line without compromising insulation or thermal integrity. It provides accurate, real-time temperature monitoring along the line, ensuring consistent heating, preventing condensation, and maintaining sample integrity for emissions monitoring and process analy-

SilcoNert® Coating

SilcoNert® Coating is an inert, corrosion-resistant coating for sample lines that prevents adsorption and reaction of sensitive gases, ensuring accurate and reliable sample delivery.

Dursan® Coating

Durasan® coating is a high-performance protective layer designed to enhance durability, hygiene, and resistance in industrial environments.

Stainless Steel Braided Stain Relief

Stainless Steel Braided Strain Relief provides mechanical protection for heated sample lines and cables, preventing kinks, bending, or damage while maintaining flexibility and durability in demanding process environments.