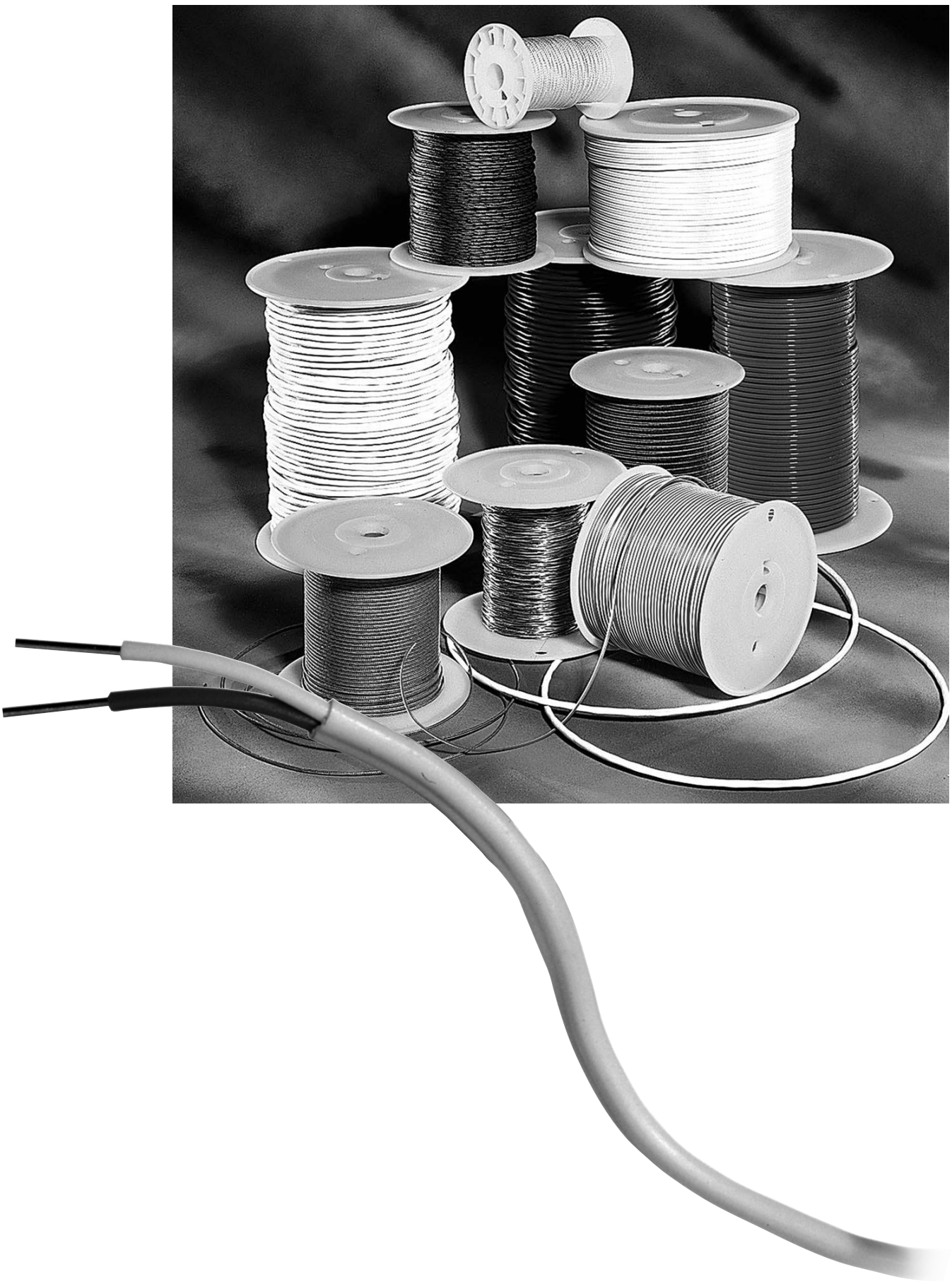
Thermocouples



SERV-RITE® Wire

Product	Description	Page
Thermocouple and Extension Wire	Single pairs of thermocouple conductors are available using a variety of insulation materials. Matched pairs with duplex insulation are color coded according to ANSI MC 96.1-1982 requirements. The operating temperature rating for thermocouple and extension wire is up to 2600°F (1427°C).	143
RTD Lead Wire	Nickel or tin plated 2, 3 and 4-wire copper conductor constructions are available in a variety of gauge sizes. All types are twisted to achieve maximum reduction of electromagnetic interferences, are available with PVC, FEP, PFA or fiberglass insulations and are color coded according to ANSI requirements.	178

General Information

Thermocouple and Extension Wire Color Codes

United States and International Color Coding

Standard ASTM E 230 color coding (United States) is used on all insulated thermocouple wire and extension wire when insulation type permits. In color coding, the right is reserved to include a tracer to identify the ASTM E 230 type. Thermocouple grade wire normally has a brown overall jacket. For Types R and S, the color codes correlate to the compensating cable normally used.

Various national and international standard agencies have adopted color codes for identifying thermocouples which generally differ from those specified in ASTM E 230. The overall extension color code is also used to identify connectors to specific thermocouple types.

Thermocouple and Extension Wire Color Codes

Overall/Positive (+)/Negative (-)

T/C Type	ASTM E 230 T/C	ASTM E 230 Extension	UK BS 1843	Germany DIN 43710	Japan JIS C1610-1981	IEC 584-3
E (overall)	Brown	Purple	Brown	Black	Purple	Violet
EP	+Purple	+Purple	+Brown	+Red	+Red	+Violet
EN	-Red	-Red	-Blue	-Black	-White	-White
J (overall)	Brown	Black	Black	Blue	Yellow	Black
JP	+White	+White	+Yellow	+Red	+Red	+Black
JN	-Red	-Red	-Blue	-Blue	-White	-White
K (overall)	Brown	Yellow	Red	Green	Blue	Green
KP	+Yellow	+Yellow	+Brown	+Red	+Red	+Green
KN	-Red	-Red	-Blue	-Green	-White	-White
N (overall)	Brown	Orange	Orange	—	—	Pink
NP	+Orange	+Orange	+Orange	—	—	+Pink
NN	-Red	-Red	-Blue	—	—	-White
R (overall)	—	Green	Green	—	Black	Orange
RP	—	+Black	+White	—	+Red	+Orange
RN	—	-Red	-Blue	—	-White	-White
S (overall)	—	Green	Green	White	Black	Orange
SP	—	+Black	+White	+Red	+Red	+Orange
SN	—	-Red	-Blue	-White	-White	-White
T (overall)	Brown	Blue	Blue	Brown	Brown	Brown
TP	+Blue	+Blue	+White	+Red	+Red	+Brown
TN	-Red	-Red	-Blue	-Brown	-White	-White

SERV-RITE Wire

Thermocouple and Extension Wire

Manufactured to Exact Specifications

Since 1914, SERV-RITE® thermocouple wire and thermocouple extension wire have been recognized for premium performance and reliability. All stock and custom wire is manufactured in Watlow's plant where materials, manufacturing equipment and quality controls are carefully selected to ensure superior uniformity.

We offers popular wires as well as custom manufactured wire using alloys and insulation types to meet specific application demands.

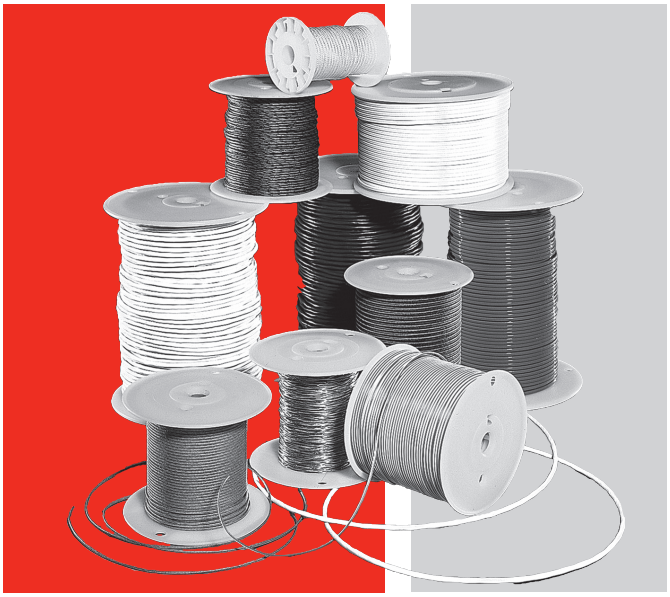
All SERV-RITE thermocouple wire and thermocouple extension wire is manufactured under rigid quality controls following ISO 9001 standards. In addition, all electromotive force (EMF) versus temperature calibration procedures follow one or more of the following standards:

- ASTM E 207
- ASTM E 220
- AMS 2750

All testing has NIST traceability. Unless otherwise specified, all SERV-RITE thermocouple wire and extension wire are supplied to meet standard tolerances of ASTM E 230. Special tolerances are also available.

Performance Capabilities

- Compliance with recognized agency tolerances
- Insulation temperature ranges from -328 to 2600°F (-200 to 1427°C)
- Tolerances from ±0.5°C or ±0.4 percent
- NIST calibration certificates
- ISO 17025 Accredited Lab



Features and Benefits

Type E, J, K, N, S and T thermocouple wire
- Fit virtually all applications

Compensation extension wire
- Permits fine tuning of temperature measuring circuits

Solid or stranded wire
- Meets specific application requirements

Wide selection of insulation types
- Meets temperature, chemical, moisture and abrasion resistance objectives

Color coding
- Complies with United States, United Kingdom, German, Japanese and IEC standards

Metallic overbraids and wraps
- Enhance abrasion resistance

Stock RTD lead wire
- Meets virtually all industrial RTD applications

Thermocouple and Extension Wire

STOCKED FOR SAME DAY SHIPMENT

Stock Wire Products by Temperature

Thermocouple Wire Max. Opr. Temp.		Insulation	Part Number	Limits of Error	Description	Physical Properties		
°F	°C					Abrasion Resistance	Moisture Resistance	Chemical Resistance
2600	1427	Ceramic	K20-1-350	Standard	Brd. C. Fbr./Brd. C. Fbr. (heavy build)	Good	Fair	Good
			K20-1-355	Standard	Brd. C. Fbr./Brd. C. Fbr.	Good	Fair	Good
			K20-2-350	Special	Brd.C. Fbr./Brd. C. Fbr. (heavy build)	Good	Fair	Good
			K20-2-355	Special	Brd. C. Fbr./Brd. C. Fbr.	Good	Fair	Good
2000	1093	Vitreous Silica	K20-1-301	Standard	Brd. Sil./Brd.Sil. (heavy build)	Fair	Fair	Good
			K20-1-365	Standard	Brd. Sil./Brd.Sil.	Fair	Fair	Good
			K20-2-301	Special	Brd. Sil/Brd.Sil. (heavy build)	Fair	Fair	Good
			K20-2-365	Special	Brd. Sil./Brd.Sil.	Fair	Fair	Good
1652	900	High Temp. Fiberglass	J20-1-321	Standard	Brd. HT Gls./Brd. HT Gls.	Good	Good	Good
			J20-2-314	Special	Brd. HT Gls./TW	Good	Good	Good
			J20-2-321	Special	Brd. HT Gls./Brd. HT Gls.	Good	Good	Good
			K20-1-321	Standard	Brd. HT Gls./Brd. HT Gls.	Good	Good	Good
			K20-2-314	Special	Brd. HT Gls./TW	Good	Good	Good
			K20-2-321	Special	Brd. HT Gls./Brd. HT Gls.	Good	Good	Good
1000	538	Standard Fiberglass	E20-1-304	Standard	Brd. Gls./Brd. Gls.	Fair	Good	Good
			J20-1-304	Standard	Brd. Gls./Brd. Gls.	Fair	Good	Good
			J20-1-S-304	Standard	Brd. Gls./Brd. Gls.	Fair	Good	Good
			J20-2-304	Special	Brd. Gls./Brd. Gls.	Fair	Good	Good
			J20-3-304	Standard	Brd. Gls./Brd. Gls.	Fair	Good	Good
			J20-3-S-304	Standard	Brd. Gls./Brd. Gls./SS Brd.	Fair	Good	Good
			J24-1-304	Standard	Brd. Gls./Brd. Gls.	Fair	Good	Good
			J24-2-304	Special	Brd. Gls./Brd. Gls.	Fair	Good	Good
			J24-3-304	Standard	Brd. Gls./Brd. Gls.	Fair	Good	Good
			J28-2-305	Special	Wrp. Dbl. Gls./Brd. Gls.	Fair	Good	Good
			J30-1-305	Standard	Wrp. Dbl. Gls./Brd. Gls.	Fair	Good	Good
			J30-2-305	Special	Wrp. Dbl. Gls./Brd. Gls.	Fair	Good	Good
			K20-1-304	Standard	Brd. Gls./Brd. Gls.	Fair	Good	Good
			K20-1-S-304	Standard	Brd. Gls./Brd. Gls.	Fair	Good	Good
			K20-2-304	Special	Brd. Gls./Brd. Gls.	Fair	Good	Good
			K20-3-304	Standard	Brd. Gls./Brd. Gls.	Fair	Good	Good
			K20-3-S-304	Standard	Brd. Gls./Brd. Gls./SS Brd.	Fair	Good	Good
			K24-1-304	Standard	Brd. Gls./Brd. Gls.	Fair	Good	Good
			K24-2-304	Special	Brd. Gls./Brd. Gls.	Fair	Good	Good
			K24-3-304	Standard	Brd. Gls./Brd. Gls.	Fair	Good	Good
			K28-2-305	Special	Wrp. Dbl. Gls./Brd. Gls.	Fair	Good	Good
			K30-1-305	Standard	Wrp. Dbl. Gls./Brd. Gls.	Fair	Good	Good
			K30-2-305	Special	Wrp. Dbl. Gls./Brd. Gls.	Fair	Good	Good
			S20-5-304*	Standard	Brd. Gls./Brd. Gls.	Fair	Good	Good
			T20-1-304	Standard	Brd. Gls./Brd. Gls.	Fair	Good	Good
			T24-1-304	Standard	Brd. Gls./Brd. Gls.	Fair	Good	Good

CONTINUED

***Note:** The recommended operating temperature is limited to the extension grade alloy recommended temperature of 400°F (204°C).

Thermocouple and Extension Wire

STOCKED FOR SAME DAY SHIPMENT

Stock Wire Products by Temperature *(Continued)*

Thermocouple Wire Max. Opr. Temp. °F	Thermocouple Wire Max. Opr. Temp. °C	Insulation	Part Number	Limits of Error	Description	Physical Properties: Abrasion Resistance	Physical Properties: Moisture Resistance	Physical Properties: Chemical Resistance
800	427	Polyimide Tape	J20-1-512	Standard	Tp. P-mide/Tp. P-mide	Excellent	Excellent	Excellent
			J20-3-512	Standard	Tp. P-mide/Tp. P-mide	Excellent	Excellent	Excellent
			J24-2-511	Special	Tp. P-mide/TW	Excellent	Excellent	Excellent
			K20-3-512	Standard	Tp. P-mide/Tp. P-mide	Excellent	Excellent	Excellent
600	316	TFE Tape	J20-1-508	Standard	Tp. TFE/Tp. TFE	Good	Excellent	Excellent
			J20-2-508	Special	Tp. TFE/Tp. TFE	Good	Excellent	Excellent
			J24-1-508	Standard	Tp. TFE/Tp. TFE	Good	Excellent	Excellent
			J24-2-508	Special	Tp. TFE/Tp. TFE	Good	Excellent	Excellent
			K20-1-508	Standard	Tp. TFE/Tp. TFE	Good	Excellent	Excellent
			K20-2-508	Special	Tp. TFE/Tp. TFE	Good	Excellent	Excellent
			K24-1-508	Standard	Tp. TFE/Tp. TFE	Good	Excellent	Excellent
			K24-2-508	Special	Tp. TFE/Tp. TFE	Good	Excellent	Excellent
			T20-2-508	Special	Tp. TFE/Tp. TFE	Good	Excellent	Excellent
			T24-1-508	Standard	Tp. TFE/Tp. TFE	Good	Excellent	Excellent
			T24-2-508	Special	Tp. TFE/Tp. TFE	Good	Excellent	Excellent
550	288	PFA	J24-3-516	Standard	PFA/PFA	Good	Excellent	Excellent
			K24-2-516	Special	PFA/PFA	Good	Excellent	Excellent
500	260	FEP	E20-1-507	Standard	FEP/FEP	Excellent	Excellent	Excellent
			J16-5-509*	Standard	FEP/TWS/FEP	Excellent	Excellent	Excellent
			J20-1-507	Standard	FEP/FEP	Excellent	Excellent	Excellent
			J20-1-509	Standard	FEP/TWS/FEP	Excellent	Excellent	Excellent
			J20-2-507	Special	FEP/FEP	Excellent	Excellent	Excellent
			J20-3-507	Standard	FEP/FEP	Excellent	Excellent	Excellent
			J20-5-507*	Standard	FEP/FEP	Excellent	Excellent	Excellent
			J20-5-509*	Standard	FEP/TWS/FEP	Excellent	Excellent	Excellent
			J24-1-507	Standard	FEP/FEP	Excellent	Excellent	Excellent
			J24-2-507	Special	FEP/FEP	Excellent	Excellent	Excellent
			J24-3-507	Standard	FEP/FEP	Excellent	Excellent	Excellent
			J30-2-506	Special	FEP/FEP	Excellent	Excellent	Excellent
			K16-5-509*	Standard	FEP/TWS/FEP	Excellent	Excellent	Excellent
			K20-1-507	Standard	FEP/FEP	Excellent	Excellent	Excellent
			K20-1-509	Standard	FEP/TWS/FEP	Excellent	Excellent	Excellent
			K20-2-507	Special	FEP/FEP	Excellent	Excellent	Excellent
			K20-2-509	Special	FEP/TWS/FEP	Excellent	Excellent	Excellent
			K20-3-507	Standard	FEP/FEP	Excellent	Excellent	Excellent
			K20-5-507*	Standard	FEP/FEP	Excellent	Excellent	Excellent
			K20-5-509*	Standard	FEP/TWS/FEP	Excellent	Excellent	Excellent
			K24-1-507	Standard	FEP/FEP	Excellent	Excellent	Excellent
			K24-2-507	Special	FEP/FEP	Excellent	Excellent	Excellent
			K24-3-507	Standard	FEP/FEP	Excellent	Excellent	Excellent
			K30-2-506	Special	FEP/FEP	Excellent	Excellent	Excellent
			S20-5-507*	Standard	FEP/FEP	Excellent	Excellent	Excellent
			T20-1-507	Standard	FEP/FEP	Excellent	Excellent	Excellent

CONTINUED

***Note:** The recommended operating temperature is limited to the extension grade alloy recommended temperature of 400°F (204°C).

Thermocouple and Extension Wire

STOCKED FOR SAME DAY SHIPMENT

Stock Wire Products by Temperature *(Continued)*

Thermocouple Wire Max. Opr. Temp. °F	Thermocouple Wire Max. Opr. Temp. °C	Insulation	Part Number	Limits of Error	Description	Physical Properties: Abrasion Resistance	Physical Properties: Moisture Resistance	Physical Properties: Chemical Resistance
500	260	FEP	T20-1-509	Standard	FEP/TWS/FEP	Excellent	Excellent	Excellent
			T20-2-507	Special	FEP/FEP	Excellent	Excellent	Excellent
			T20-3-507	Standard	FEP/FEP	Excellent	Excellent	Excellent
			T24-2-507	Special	FEP/FEP	Excellent	Excellent	Excellent
			T30-2-506	Special	FEP/FEP	Excellent	Excellent	Excellent
221	105	PVC	E20-5-502*	Standard	PVC/PVC	Good	Excellent	Good
			E20-5-510*	Standard	PVC/TWS/PVC	Good	Excellent	Good
			J16-5-502*	Standard	PVC/PVC	Good	Excellent	Good
			J16-5-510*	Standard	PVC/TWS/PVC	Good	Excellent	Good
			J20-5-502*	Standard	PVC/PVC	Good	Excellent	Good
			J20-5-510*	Standard	PVC/TWS/PVC	Good	Excellent	Good
			J20-7-502*	Standard	PVC/PVC	Good	Excellent	Good
			J20-7-510*	Standard	PVC/TWS/PVC	Good	Excellent	Good
			J24-1-505	Standard	PVC/Ripcord	Good	Excellent	Good
			J24-2-505	Special	PVC/Ripcord	Good	Excellent	Good
			K16-5-502*	Standard	PVC/PVC	Good	Excellent	Good
			K16-5-510*	Standard	PVC/TWS/PVC	Good	Excellent	Good
			K20-5-502*	Standard	PVC/PVC	Good	Excellent	Good
			K20-5-510*	Standard	PVC/TWS/PVC	Good	Excellent	Good
			K20-7-502*	Standard	PVC/PVC	Good	Excellent	Good
			K20-7-510*	Standard	PVC/TWS/PVC	Good	Excellent	Good
			K24-1-505	Standard	PVC/Ripcord	Good	Excellent	Good
			K24-2-505	Special	PVC/Ripcord	Good	Excellent	Good
			S20-5-502*	Standard	PVC/PVC	Good	Excellent	Good
			S20-5-510*	Standard	PVC/TWS/PVC	Good	Excellent	Good
			T16-5-510*	Standard	PVC/TWS/PVC	Good	Excellent	Good
			T20-5-502*	Standard	PVC/PVC	Good	Excellent	Good
			T20-5-510*	Standard	PVC/TWS/PVC	Good	Excellent	Good
			T20-7-502*	Standard	PVC/PVC	Good	Excellent	Good
			T24-1-505	Standard	PVC/Ripcord	Good	Excellent	Good
			T24-2-505	Special	PVC/Ripcord	Good	Excellent	Good
RTD Lead Wire								
1000	538	Standard Fiberglass	RT3-24-8-705	N/A	Brd. Gls./TW/Brd. Gls.	Fair	Good	Good
500	260	FEP	RT3-22-8-704	N/A	FEP/TW/FEP	Excellent	Excellent	Excellent
221	105	PVC	RT3-22-4-701	N/A	PVC/TW/PVC	Good	Excellent	Good

***Note:** The recommended operating temperature is limited to the extension grade alloy recommended temperature of 400°F (204°C).

Thermocouple and Extension Wire

STOCKED FOR SAME DAY SHIPMENT

Heat Treat Thermocouple Wire

Thermocouple Wire Max. Opr. Temp.		Insulation	Part Number	Limits of Error	Description	Physical Properties		
°F	°C					Abrasion Resistance	Moisture Resistance	Chemical Resistance
1800	982	High Temp. Fiberglass	K20-2-321-CAL	Special	Brd. HT Gls./Brd. HT Gls. Calculated from 200-1800°F (93-982°C), every 200°F (93°C)	Good	Good	Good
2200	1204	Vitreous Silica	K20-2-301-CAL	Special	Brd. Vit. Sil./Brd. Sil. Calculated from 200-2200°F (93-1204°C), every 200°F (93°C)	Fair	Fair	Good
2200	1204	Ceramic	K20-2-350-CAL	Special	Brd. C. Fbr./Brd. C. Fbr. from 200-2200°F (93-1204°C), every 200°F (93°C)	Good	Fair	Good

Legend

Brd. = Braided
Gls. = Fiberglass
TWS. = Twisted and shielded
HT = High temperature
Tp. = Taped
P-mide = Polyimide
Cbl. = Cable
TW. = Twisted
Wrp. = Wrapped
Dbl. = Double
Cot. = Cotton
C.Fbr = Ceramic fiber
Sil. = Vitreous silica
Pr. = Pair
Std. = Standard
Spc. = Special

Thermocouple and Extension Wire

Ordering Information

How to Order

Include the following information when ordering SERV-RITE thermocouple and extension wire:

Calibration
- E, J, K, N, S or T

Gauge size
- AWG gauge

Solid or stranded conductors
- Stranded conductors are seven strand constructions. If other configurations are required, please contact the factory.

Thermocouple or extension grade
- Determine if it will be used for the actual sensor or only to “extend” the signal at lower temperatures.

Standard or special limits of error

This will determine the accuracy of the sensor. Limitsof error are determined by testing at a pre-defined our standard test point. To guarantee limits of error at other temperature points, please contact the factoryto arrange special testing

Insulation on singles and duplex
- The insulation material used is usually chosen to fit the environment where the sensor will be used.

Color coding
- Unless specified, all color coding is to ASTM E 230 standards.

Spool lengths

Spool length requirements should be specified.We strives to maintain a policy of shipping 1,000foot spools. However, if not specified, random lengthsmay be shipped. If special packaging is required,please contact the factory

Variation in quantity

We follows the industry standard of shipping and invoicing at plus or minus ten percent of the cost forany ordered item. If requirements dictate anythingother than plus or minus ten percent, contact thefactory for potential additional charges

Overbraid options
- Options for overbraid are shown below.

Overbraid selection code
- S–Stainless steel wire braid

  C–Tinned copper wire braid

  N–Alloy 600 wire braid

Options are listed on each page. Special requirements and testing are available at additional cost. Contact the factory for details. These include:

Shielding
- Some constructions are available with shielding possibilities.

Calibration Tests
- If calibration is required, please specify temperatures.

Certificate of Compliance
- These may be provided for various specifications. When ordering, please provide specification requirements.

Special Requirements
- Please contact the factory for any requirements not listed above.

Availability

Stock constructions: Many constructions are available for same day shipment

Stock constructions with options: Shipment is usually within five working days or less

Stock constructions requiring calibration or other laboratory services: Shipment is usually within five working days or less

Thermocouple and Extension Wire

Technical Data

How to Select Wire to Meet Requirements

The following information will explain some of the nomenclature associated with thermocouple wire and thermocouple extension wire. By reading this information, orders can be placed quickly and accurately.

Thermocouple Wire or Thermocouple Extension Wire

There are some significant differences between wire used to actually measure temperature and wire used to carry a millivoltage signal to an instrument.

The most obvious difference is the color-code used to identify the wire itself. In most instances, thermocouple grade wire is identified by its overall brown color. Exceptions in the SERV-RITE wire product line are the very high temperature yarns such as those used in the SERIES 301 and 350. Of course, the overall color code is not used if there is no overall covering, as in SERV-RITE wire SERIES 505, 511 and 314.

The functional differences between the two wires are that thermocouple "extension" wire is not calibrated above 400°F (204°C). The temperature rating of the insulations used on some extension grade wire exceeds 400°F (204°C) temperature to allow the wire to survive occasional contact with hot parts or furnace walls.

Terms used in the tables of this section:

Single Conductor Insulation

Identifies insulation type used on individual thermoelements. Certain part numbers use a combination of insulations. When there is a combination, insulations are listed in order of application.

Duplex Conductor Insulation

Lists the overall insulation when one is used. Constructions which have no overall insulation use this area to describe the duplexing method—i.e. twisting, "ripcord", etc

Temperature Rating

Most constructions are rated for both continuous use and for single reading applications. Continuous use temperature is considered to be the highest temperature a particular construction will survive indefinitely. The single reading temperature is the highest temperature at which the construction will perform and continue to produce an accurate reading. However, after exposure to the single reading temperature, the wire will exhibit less flexibility and/or abrasion resistance. Therefore, it is not likely that the wire could be removed from the application and then reused.

ASTM E 230 Color Code

Generally, SERV-RITE wire has color codes wherever possible. Exceptions are high temperature yarn constructions such as the SERIES 301 and 350. Color coding of the SERIES 511 and 512 is accomplished by including a colored thread or "tracer" under the tape.

Physical Properties

Abrasion Resistance is rated fair, good, or excellent and is based on the wall thickness of the construction and how well it survives with other insulations of similar thicknesses. The 511 SERIES receives an excellent rating because the thin wall of polyimide tape will survive better than almost any other insulation applied in the same wall thickness. The "absolute" abrasion resistance of a construction will depend not only on the type of insulation, but on thickness at which it is applied.

Moisture Resistance ratings are given for wire in the "as received" condition. In the case of fiberglass insulated wire, moisture resistance is achieved by using impregnations or spirally applied tapes called moisture barriers. The impregnations and/or tapes will burn off at temperatures below the upper useful operating temperatures of the fiberglass. The thermoplastic insulations (PVC and fluoroplastics) and polyimide insulated constructions will maintain their moisture resistance up to their "continuous" temperature rating.

Chemical Resistance ratings are applied as they relate to most common chemicals. These ratings apply to insulation types and not necessarily to the type of impregnation used. Contact the factory for specific applications.

Thermocouple and Extension Wire

Technical Data (Continued)

Metallic Overbraids and Wraps

Although standard SERV-RITE wire products are designed to yield a high degree of abrasion resistance, it is sometimes necessary to add an additional metallic covering to further enhance this property. Following are available overbraids and wraps.

Stainless Steel Wire Braid (S)

This most popular over-braid uses 300 series stainless steel and is available on virtually all standard SERV-RITE wire offerings. It is an economical method to extend the life of thermocouple and extension wire. Several of Watlow's standard wire items are available from stock with a stainless overbraid. Non-stock items are available as a special order.

Alloy 600 Wire Braid (N)

Most commonly specified on high temperature SERV-RITE wire yarn insulations, the Inconel® braid offers a higher operating temperature than the series 300 stainless steel overbraid. When this braid is specified on SERV-RITE SERIES 350, the performance of the material is only surpassed by metal-sheathed cables. Consult the factory for availability on specific wire items.

Tinned Copper Wire Overbraid (C)

When there is a possibility of electrical interference in the area of the thermocouple installation, it may be necessary to shield the wire from electrical "noise." Several our standard products use aluminized tapes as an intrinsic shield. If shielding is needed on other constructions, a tinned copper shield can be specified as a special order.

Ordering Information

Example Part Number - Typical code number J20/1/304 becomes J20/1/S/304

① ANSI Letter Designation	②③ B & S Guage	④ Conductor Type/ Tolerance	⑤ Metallic Overbraid/ Wrap Type	⑥⑦⑧ Insulation Type
J	20	1	S	304

①	ANSI Letter Designation (Calibration)
J =	Type J

②③	B & S Guage
20 =	20 gauge solid

④	Conductor Type/Tolerance
1 =	Thermocouple grade, solid wire, standard tolerance
2 =	Thermocouple grade, solid wire, special tolerance
3 =	Thermocouple grade, stranded wire, standard tolerance
4 =	Thermocouple grade, stranded wire, special tolerance
5 =	Extension grade, solid wire, standard tolerance
6 =	Extension grade, solid wire, special tolerance
7 =	Extension grade, stranded wire, standard tolerance
8 =	Extension grade, stranded wire, special tolerance

⑤	Metallic Overbraid/Wrap Type
S =	Stainless steel
N =	Alloy 600
C =	Tinned copper

⑥⑦⑧	Insulation Type
304 =	Type 304 SS

Thermocouple and Extension Wire

High-Temperature Vitreous Silica Braided Thermocouple Wire SERIES 301 and 365

Both the SERIES 301 and 365 use vitreous silica yarn as the insulation on both the conductors and duplex. This yarn retains its flexibility after exposure to high temperatures. Because this insulation has no binders or impregnations, it may "flower" when stripped.

The vitreous silica yarn's greater purity performs better at high temperatures than other fibrous glass products. Testing indicates that "contamination" will compromise this material's upper use temperature. For this reason, our standard offering is supplied without color coding or impregnations. The SERIES 365 construction is a cost-effective, medium insulation build of the popular heavy duty SERIES 301 construction.

For higher temperatures consider SERIES 350.

Performance Capabilities

- Continuous temperature rating: 1800°F (982°C)
- Vitreous silica braided yarn insulation
- Available with an optional metallic overbraid for additional abrasion resistance

Applications

- Heat treating
- Oven and furnace
- Survey and load

Specifications

Continuous use temperature
- 1800°F (980°C)

Single use temperature
- 2000°F (1093°C)

Resistance properties
- Moisture: Fair
- Chemical: Good
- Abrasion: Fair

Popular Constructions

Grade	AWG	Wire Type	Insulation	Limits of Error	Type K
Thermocouple	20	Solid	Heavy	Standard	**K20-1-301**
		Solid	Heavy	Special	**K20-2-301**
		Solid	Heavy	Standard	**N20-1-301**
		Solid	Heavy	Special	**N20-2-301**
		Solid	Heavy	Special	**K20-2-301-CAL***
		Solid	Medium	Standard	**K20-1-365**
		Solid	Medium	Special	**K20-2-365**
		Solid	Medium	Standard	**N20-1-365**
		Solid	Medium	Special	**N20-2-365**

***** Calibrated from 200 to 2200°F (93 to 1204°C), every 200°F (93°C). Only available in this construction.
Note: Bolded products are stocked.

Wire Specifications

AWG	Nominal Conductor Size		Nominal Insulation Thickness: Conductor		Nominal Insulation Thickness: Overall		Nominal Overall Size		Approximate Shipping Weight	
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	lbs/1000 ft	(kg/km)
20①	0.032	(0.813)	0.018	(0.457)	0.015	(0.381)	0.098 x 0.154	(2.49 x 3.91)	15	(22.4)
18①	0.040	(1.020)	0.018	(0.457)	0.015	(0.381)	0.110 x 0.180	(2.79 x 4.57)	19	(28.3)
16①	0.051	(1.290)	0.016	(0.406)	0.015	(0.381)	0.118 x 0.198	(3.00 x 5.03)	25	(37.3)
20②	0.032	(0.813)	0.015	(0.381)	0.012	(0.305)	0.090 x 0.140	(2.29 x 3.56)	13	(19.4)

①SERIES 301, ②SERIES 365

Ordering Information

Part Number

① ASTM E 230 Calibration	② ③ AWG	④ Conductor Type/ Tolerance	⑤ ⑥ ⑦ Insulation Type

①	ASTM E 230 Calibration
K =	Type K
N =	Type N

② ③	AWG
20 =	20 gauge solid

④	Conductor/Type Tolerance
1 =	Thermocouple grade, solid wire, standard tolerance
2 =	Thermocouple grade, solid wire, special tolerance

⑤ ⑥ ⑦	Insulation Type
301=	Heavy build
365=	Medium build

. **Note:** Minimum order sizes apply for non-stock constructions

Thermocouple and Extension Wire

Fiberglass Braided Thermocouple and Extension Wire SERIES 304

The uniform quality and availability of the SERIES 304 make it the ideal wire for general applications requiring moderate abrasion and moisture resistance, wide temperature capabilities and economy.

Each conductor is covered with a color coded glass braid. This braid is impregnated to enhance abrasion resistance and reduce fraying. The insulated single conductors are laid parallel and covered with another layer of woven glass. A final impregnation is then applied to the glass.

For higher temperatures, consider SERIES 321.

Performance Capabilities

- Continuous temperature rating: 900°F (482°C)
- Fiberglass braided yarn insulation
- Available with an optional metallic overbraid for additional abrasion resistance

Applications

- Heat treating
- Oven
- General use

Specifications

Continuous use temperature
- 900°F (482°C)

Single use temperature
- 1000°F (540°C)

Resin retained to 400°F (204°C)

Resistance properties
- Moisture: Good
- Chemical: Good
- Abrasion: Fair

Popular Constructions

Grade	AWG	Wire Type	Limits of Error	Type K	Type J	Type T	Type E
Thermocouple	20	Solid	Standard	**K20-1-304***	**J20-1-304***	**T20-1-304**	**E20-1-304**
		Solid	Special	**K20-2-304**	**J20-2-304**	T20-2-304	E20-2-304
		Stranded	Standard	**K20-3-304***	**J20-3-304***	T20-3-304	E20-3-304
	24	Solid	Standard	**K24-1-304**	**J24-1-304**	**T24-1-304**	
		Solid	Special	**K24-2-304**	**J24-2-304**	T24-2-304	
		Stranded	Standard	**K24-3-304**	**J24-3-304**		
Extension	20	Solid	Standard				

***** These constructions stocked with a **stainless steel overbraid** (order overbraid by adding "-S" in front of construction type (i.e. K20-1-S-304).
Note: Bolded products are stocked.

Wire Specifications

AWG	Nominal Conductor Size		Nominal Insulation Thickness				Nominal Overall Size		Approximate Shipping Weight	
			Conductor		Overall					
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	lbs/1000 ft	(kg/km)
24	0.020	(1.508)	0.005	(0.127)	0.006	(0.152)	0.045 x 0.072	(1.14 x 1.83)	7	(10.4)
24 S* (7/32)	0.024	(1.610)	0.005	(0.127)	0.006	(0.152)	0.048 x 0.080	(1.22 x 2.03)	8	(11.9)
20	0.032	(1.813)	0.005	(0.127)	0.006	(0.152)	0.056 x 0.096	(1.42 x 2.44)	9	(13.4)
20 S* (7/28)	0.038	(1.965)	0.006	(0.152)	0.006	(0.152)	0.064 x 0.112	(1.63 x 2.84)	10	(14.9)

* "S" denotes stranded wire: e.g., "20 S (7/28)" is seven strands of 28 gauge wire to make a 20 gauge stranded conductor.

Thermocouple and Extension Wire

Fiberglass Braided Thermocouple and Extension Wire SERIES 304 (Continued)

Ordering Information

Part Number

① ASTM E 230 Calibration	② ③ AWG	④ Conductor Type/ Tolerance	⑤	⑥	⑦
			3	0	4

①	ASTM E 230 Calibration
E =	Type E
J =	Type J
K =	Type K
S =	Type S
T =	Type T

② ③	AWG
24 =	24 gauge solid or 24 gauge stranded (7/32)
20 =	20 gauge solid or 20 gauge stranded (7/28)

④	Conductor Type/Tolerance
1 =	Thermocouple grade, solid wire, standard tolerance
2 =	Thermocouple grade, solid wire, special tolerance
3 =	Thermocouple grade, stranded wire, standard tolerance
4 =	Thermocouple grade, stranded wire, special tolerance
5 =	Extension grade, solid wire, standard tolerance
6 =	Extension grade, solid wire, special tolerance
7 =	Extension grade, stranded wire, standard tolerance
8 =	Extension grade, stranded wire, special tolerance

Note: Minimum order sizes apply for non-stock constructions.

Thermocouple and Extension Wire

Fiberglass Wrapped Thermocouple and Extension Wire SERIES 305

SERIES 305 is specifically constructed for light duty applications where size is a critical factor. Single conductors are insulated using a specialized yarn wrapped around the conductors in layers. Yarn is then impregnated to add abrasion resistance and enhance electrical properties. The insulated single conductors are then laid parallel and covered with a layer of braided glass. A final impregnation is applied to the braid.

For higher temperature applications, use SERIES 321.

Performance Capabilities

- Continuous temperature rating: 900°F (482°C)
- Fiberglass braided yarn insulation
- Yarn wrapped conductors for superior coverage on small gauge wires
- Available with an optional metallic overbraid for additional abrasion resistance

Applications

- Heat treating
- Oven
- General use

Specifications

Continuous use temperature
- 900°F (482°C)

Single use temperature
- 1000°F (540°C)

Resin retained to 400°F (204°C)

Resistance properties
- Moisture: Good
- Chemical: Good
- Abrasion: Fair

Popular Constructions

Grade	AWG	Wire Type	Limits of Error	Type K	Type J
Thermocouple	24	Solid	Standard	K24-1-305	J24-1-305
		Solid	Special	K24-2-305	J24-2-305
	28	Solid	Standard	K28-1-305	J28-1-305
		Solid	Special	**K28-2-305**	**J28-2-305**
	30	Solid	Standard	**K30-1-305**	**J30-1-305**
		Solid	Special	**K30-2-305**	**J30-2-305**

Note: Bolded products are stocked.

Wire Specifications

AWG	Nominal Conductor Size		Nominal Insulation Thickness				Nominal Overall Size		Approximate Shipping Weight	
			Conductor		Overall					
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	lbs/1000 ft	(kg/km)
30	0.010	(0.254)	0.005	(0.127)	0.008	(0.203)	0.036 x 0.056	(0.914 x 1.42)	3	(4.5)
28	0.013	(0.320)	0.005	(0.127)	0.008	(0.203)	0.040 x 0.062	(1.02 x 1.57)	3	(4.5)
24	0.020	(0.508)	0.005	(0.127)	0.006	(0.152)	0.042 x 0.072	(1.07 x 1.83)	7	(10.4)
24 S* (7/32)	0.024	(0.610)	0.005	(0.127)	0.006	(0.152)	0.048 x 0.080	(1.22 x 2.03)	8	(11.9)
20	0.032	(0.813)	0.005	(0.127)	0.006	(0.152)	0.054 x 0.096	(1.37 x 2.44)	9	(13.4)
20 S* (7/28)	0.038	(0.965)	0.005	(0.127)	0.006	(0.152)	0.060 x 0.108	(1.52 x 2.74)	10	(14.9)

* “S” denotes stranded wire: e.g., “24 S (7/32)” is seven strands of 32 gauge wire to make a 24 gauge stranded conductor.

Thermocouple and Extension Wire

Fiberglass Wrapped Thermocouple and Extension Wire SERIES 305 (Continued)

Ordering Information

Part Number

① ASTM E 230 Calibration	②③ AWG	④ Conductor Type/ Tolerance	⑤	⑥	⑦
			3	0	5

①	ASTM E 230 Calibration
E =	Type E
J =	Type J
K =	Type K
S =	Type S
T =	Type T

②③	AWG
30 =	30 gauge solid
28 =	28 gauge solid
24 =	24 gauge solid or 24 gauge stranded (7/32)
20 =	20 gauge solid or 20 gauge stranded (7/28)

④	Conductor Type/Tolerance
1 =	Thermocouple grade, solid wire, standard tolerance
2 =	Thermocouple grade, solid wire, special tolerance
3 =	Thermocouple grade, stranded wire, standard tolerance
4 =	Thermocouple grade, stranded wire, special tolerance
5 =	Extension grade, solid wire, standard tolerance
6 =	Extension grade, solid wire, special tolerance
7 =	Extension grade, stranded wire, standard tolerance
8 =	Extension grade, stranded wire, special tolerance

Note: Minimum order sizes apply for non-stock constructions.

Thermocouple and Extension Wire

High-Temperature Fiberglass Twisted Thermocouple Wire SERIES 314

The SERIES 314 is an economical construction for general, high temperature applications. The braided high temperature yarn is applied in a unique manner that allows SERIES 314 to be competitively priced with other fiberglass constructions. It produces a finished wire that performs at temperatures to 1600°F (870°C).

The conductors are insulated with braided, high strength fiberglass and impregnated to improve abrasion resistance. The impregnation is tinted to impart color coding to primary insulations. The insulated single conductors are then twisted together to yield a construction flexible enough for almost any application.

Performance Capabilities

- Continuous temperature rating: 1300°F (705°C)
- Fiberglass braided yarn insulation
- Twisted design has no jacket
- Available with an optional metallic overbraid for additional abrasion resistance

Applications

- Heat treating
- Aluminum stress relieving
- Steel annealing

Specifications

Continuous use temperature
- 1300°F (705°C)

Single use temperature
- 1600°F (870°C)

Resin retained to 400°F (204°C)

Resistance properties
- Moisture: Good
- Chemical: Good
- Abrasion: Good

Popular Constructions

Grade	AWG	Wire Type	Limits of Error	Type K	Type J
Thermocouple	20	Solid	Standard	K20-1-314	J20-1-314
		Solid	Special	**K20-2-314**	**J20-2-314**
	24	Solid	Standard	K24-1-314	J24-1-314
		Solid	Special	K24-2-314	J24-2-314

Note: Bolded products are stocked.

Wire Specifications

AWG	Nominal Conductor Size		Nominal Conductor Insulation Thickness		Nominal Overall Size		Approximate Shipping Weight	
	in.	(mm)	in.	(mm)	in.	(mm)	lbs/1000 ft	(kg/km)
24	0.020	(0.508)	0.015	(0.381)	0.100	(2.54)	6	(8.9)
20	0.032	(0.965)	0.015	(0.381)	0.124	(3.15)	10	(14.9)
18	0.040	(1.02)	0.018	(0.457)	0.152	(3.56)	16	(23.8)
16	0.051	(1.29)	0.018	(0.457)	0.174	(4.42)	21	(31.3)

Ordering Information

Part Number

① ASTM E 230 Calibration	②③ AWG	④ Conductor Type/ Tolerance	⑤	⑥	⑦
			3	1	4

①	ASTM E 230 Calibration
J =	Type J
K =	Type K

②③	AWG
24 =	24 gauge solid
20 =	20 gauge solid
16 =	16 gauge solid

④	Conductor Type/Tolerance
1 =	Thermocouple grade, solid wire, standard tolerance
2 =	Thermocouple grade, solid wire, special tolerance

Note: Minimum order sizes apply for non-stock constructions.

Thermocouple and Extension Wire

High-Temperature Braided Fiberglass Thermocouple Wire SERIES 321

The addition of color coding and impregnation to the high temperature fiberglass make this wire the next logical step for systems which exceed temperature capabilities of the standard glass insulated series.

Each conductor is covered with a color coded, high temperature fiberglass braid. This braid is then impregnated to enhance abrasion resistance and reduce fraying. The insulated conductors are laid parallel and covered with another braid of high temperature fiberglass and impregnation.

Performance Capabilities

- Continuous temperature rating: 1300°F (705°C)
- Heavy fiberglass braided yarn insulation
- Twisted design has no jacket
- Available with an optional metallic overbraid for additional abrasion resistance

Applications

- Heat treating
- Aluminum and steel

Specifications

Continuous use temperature
- 1300°F (705°C)

Single use temperature
- 1600°F (870°C)

Resin retained to 400°F (204°C)

Resistance properties
- Moisture: Good
- Chemical: Good
- Abrasion: Good

Popular Constructions

Grade	AWG	Wire Type	Limits of Error	Type K	Type J
Thermocouple	20	Solid	Standard	**K20-1-321**	**J20-1-321**
		Solid	Special	**K20-2-321**	**J20-2-321**
		Solid	Special		**J20-2-321-CAL***
	24	Solid	Standard	K24-1-321	J24-1-321
		Solid	Special	K24-2-321	J24-2-321

* Calibrated from 200 to 2200°F (93 to 1204°C), every 200°F (93°C). Only available in this construction.
Bolded products are stocked.

Wire Specifications

AWG	Nominal Conductor Size		Nominal Insulation Thickness				Nominal Overall Size		Approximate Shipping Weight	
			Conductor		Overall					
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	lbs/1000 ft	(kg/km)
24	0.020	(0.508)	0.015	(0.381)	0.010	(0.254)	0.072 x 0.120	(1.83 x 3.05)	10	(14.9)
20	0.032	(0.965)	0.015	(0.381)	0.010	(0.254)	0.082 x 0.140	(2.08 x 3.56)	13	(19.4)
18	0.040	(1.02)	0.015	(0.381)	0.010	(0.254)	0.090 x 0.156	(2.29 x 3.96)	18	(26.8)

Ordering Information

Part Number

① ASTM E 230 Calibration	②③ AWG	④ Conductor Type/ Tolerance	⑤	⑥	⑦
			3	2	1

①	ASTM E 230 Calibration
J =	Type J
K =	Type K

②③	AWG
24 =	24 gauge solid
20 =	20 gauge solid

④	Conductor Type/Tolerance
1 =	Thermocouple grade, solid wire, standard tolerance
2 =	Thermocouple grade, solid wire, special tolerance

Note: Minimum order sizes apply for non-stock constructions.

Thermocouple and Extension Wire

High-Temperature Ceramic Fiber Thermocouple Wire SERIES 350 and 355

The SERIES 350 uses the ultimate high-temperature flexible insulating system. The ceramic fiber yarn's upper temperature limit often exceeds the melting point of the material it insulates.

When an application requires flexible insulation, while pushing Type K or Type N to extreme limits, ceramic fiber insulation is the only choice.

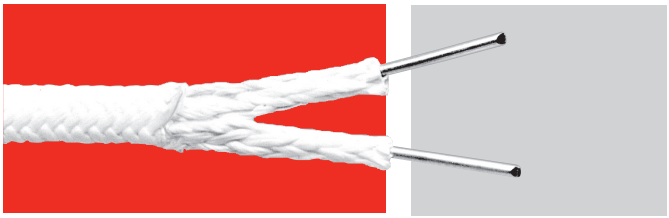
We supplies standard SERIES 350 without color coding or impregnations to minimize contaminating the pure ceramic fiber yarn. Because this insulation has no binders or impregnations, it may "flower" when stripped. Laboratory testing indicates impregnation can decrease the upper use temperature by as much as 1000°F (540°C).

The SERIES 355 construction is a cost-effective, medium insulation build of the popular SERIES 350 heavy-duty construction.

If application temperatures exceed SERIES 350 construction, specify XACTPAK® mineral-insulated, metal-sheathed cable.

Performance Capabilities

- Continuous temperature rating: 1205°C (2200°F)
- Ceramic fiber braided yarn insulation
- Available with an optional metallic overbraid for additional abrasion resistance



Applications

- Heat treating
- Oven and furnace survey
- Load thermocouple

Specifications

Continuous use temperature
- 2200°F (1205°C)

Single use temperature
- 2600°F (1430°C)

Resistance properties
- Moisture: Fair
- Chemical: Good
- Abrasion: Good

Popular Constructions

Grade	AWG	Wire Type	Insulation	Limits of Error	Type K
Thermocouple	20	Solid	Heavy	Standard	**K20-1-350**
		Solid	Heavy	Special	**K20-2-350**
		Solid	Heavy	Standard	**N20-1-350**
		Solid	Heavy	Special	**N20-2-350**
		Solid	Heavy	Special	**K20-2-350-CAL***
		Solid	Medium	Standard	**K20-1-355**
		Solid	Medium	Special	**K20-2-355**
		Solid	Medium	Standard	**N20-1-355**
		Solid	Medium	Special	**N20-2-355**

* Calibrated from 200 to 2200°F (93 to 1204°C), every 200°F (93°C). Only available in this construction.
Bolded products are stocked.

Wire Specifications

AWG	Nominal Conductor Size		Nominal Insulation Thickness				Nominal Overall Size		Approximate Shipping Weight	
			Conductor		Overall					
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	lbs/1000 ft	(kg/km)
24①	0.020	(0.508)	0.016	(0.406)	0.016	(0.406)	0.088 x 0.132	(2.24 x 3.35)	13	(19.4)
20①	0.032	(0.965)	0.016	(0.406)	0.016	(0.406)	0.100 x 0.154	(2.54 x 3.91)	16	(23.8)
16①	0.051	(1.29)	0.016	(0.406)	0.016	(0.406)	0.119 x 0.192	(3.02 x 4.88)	32	(47.7)
14①	0.064	(1.63)	0.016	(0.406)	0.016	(0.406)	0.132 x 0.218	(3.35 x 5.54)	44	(65.6)
24②	0.020	(0.508)	0.012	(0.305)	0.016	(0.406)	0.078 x 0.116	(1.98 x 2.95)	13	(19.4)
20②	0.032	(0.813)	0.012	(0.305)	0.016	(0.406)	0.090 x 0.138	(2.29 x 3.50)	16	(23.8)
16②	0.051	(1.29)	0.012	(0.305)	0.016	(0.406)	0.111 x 0.176	(2.82 x 4.47)	32	(47.7)

①SERIES 350, ②SERIES 355

Thermocouple and Extension Wire

High-Temperature Ceramic Fiber Thermocouple Wire SERIES 350 and 355 (Continued)

Ordering Information

Part Number

① ASTM E 230 Calibration	② ③ AWG	④ Conductor Type/ Tolerance	⑤ ⑥ ⑦ Insulation Type

①	ASTM E 230 Calibration
K =	Type K
N =	Type N

② ③	AWG
24 =	20 gauge solid
20 =	20 gauge solid
16 =	16 gauge solid
14 =	14 gauge solid

④	Conductor/Type Tolerance
1 =	Thermocouple grade, solid wire, standard tolerance
2 =	Thermocouple grade, solid wire, special tolerance

⑤ ⑥ ⑦	Insulation Type
350=	Heavy build
355=	Medium build

Note: Minimum order sizes apply for non-stock constructions.

Thermocouple and Extension Wire

Polyvinyl Chloride (PVC) Insulated Extension Wire SERIES 502

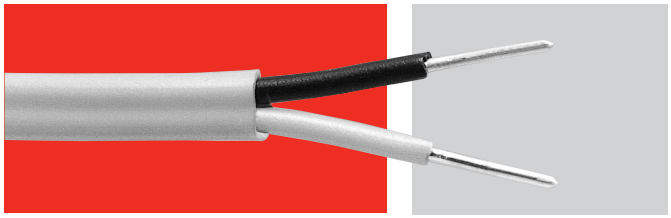
SERIES 502 is an economical wire that has PVC for the primary and duplex insulation.

The primary and duplex insulation is PVC. It yields a construction that is inexpensive and performs continuously at temperatures up to 220°F (105°C).

SERIES 502 is often used in conduit and wiring trays where its flexibility allows for easy installation. It can be easily stripped using hand tools or mechanical methods.

Performance Capabilities

- Continuous temperature rating: 220°F (105°C)
- Flexible PVC plastic insulation
- Available with an optional metallic overbraid for additional abrasion resistance



Applications

- General use extension wire

Specifications

Continuous use temperature
- 220°F (105°C)

Single use temperature
- 220°F (105°C)

Resistance properties
- Moisture: Excellent
- Chemical: Excellent
- Abrasion: Excellent

Popular Constructions

Grade	AWG	Wire Type	Limits of Error	Type K	Type J	Type T	Type E	Type S
Extension	16	Solid	Standard	**K16-5-502**	**J16-5-502**			
		Stranded	Standard	K16-7-502	J16-7-502			
	20	Solid	Standard	**K20-5-502**	**J20-5-502**	**T20-5-502**	**E20-5-502**	**S20-5-502**
		Stranded	Standard	**K20-7-502**	**J20-7-502**	**T20-7-502**		
	24	Solid	Standard	K24-5-502	J24-5-502	T24-5-502		
		Stranded	Standard	K24-7-502	J24-7-502	T24-7-502		

Note: Bolded products are stocked.

Wire Specifications

AWG	Nominal Conductor Size		Nominal Insulation Thickness				Nominal Overall Size		Approximate Shipping Weight	
			Conductor		Overall					
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	lbs/1000 ft	(kg/km)
24	0.020	(0.508)	0.015	(0.381)	0.015	(0.381)	0.080 x 0.130	(2.03 x 3.30)	10	(14.9)
24 S* (7/32)	0.024	(0.610)	0.015	(0.381)	0.015	(0.381)	0.084 x 0.138	(2.13 x 3.51)	11	(16.4)
20	0.032	(0.813)	0.015	(0.381)	0.015	(0.381)	0.092 x 0.154	(2.34 x 3.91)	14	(20.9)
20 S* (7/28)	0.038	(0.965)	0.015	(0.381)	0.015	(0.381)	0.098 x 0.166	(2.49 x 4.22)	16	(23.8)
16	0.051	(1.29)	0.020	(0.508)	0.020	(0.508)	0.131 x 0.222	(3.33 x 5.64)	28	(41.7)
16 S* (7/24)	0.060	(1.52)	0.020	(0.508)	0.020	(0.508)	0.140 x 0.240	(3.56 x 6.10)	30	(44.7)

* “S” denotes stranded wire: e.g., “24 S (7/32)” is seven strands of 32 gauge wire to make a 24 gauge stranded conductor.

Thermocouple and Extension Wire

PVC Insulated Extension Wire SERIES 502 (Continued)

Ordering Information

Part Number

① ASTM E 230 Calibration	② ③ AWG	④ Conductor Type/ Tolerance	⑤	⑥	⑦
			5	0	2

①	ASTM E 230 Calibration
E =	Type E
J =	Type J
K =	Type K
S =	Type S
T =	Type T

② ③	AWG
24 =	24 gauge solid or 24 gauge stranded (7/28)
20 =	20 gauge solid or 20 gauge stranded (7/28)
16 =	16 gauge solid or 16 gauge stranded (7/24)

④	Conductor Type/Tolerance
5 =	Extension grade, solid wire, standard tolerance
6 =	Extension grade, solid wire, special tolerance
7 =	Extension grade, stranded wire, standard tolerance
8 =	Extension grade, stranded wire, special tolerance

Note: Minimum order sizes apply for non-stock constructions.

Thermocouple and Extension Wire

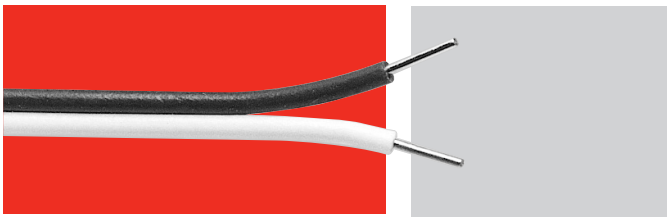
PVC Insulated "RIPCORD" SERIES 505

The SERIES 505 is the most economical wire produced. Unlike some competitive "ripcord" type constructions which use only a stripe to establish polarity, SERIES 505 single conductors are fully color coded. The conductors are individually insulated with the proper colored PVC and fused into "ripcord" using a proprietary process.

Insulated conductors can be easily separated by hand once the bond between conductors has been slit. As with other PVC insulated products, SERIES 505 lends itself well to both manual and mechanical stripping methods.

Performance Capabilities

- Continuous temperature rating: 220°F (105°C)
- Flexible PVC plastic insulation
- "Ripcord" peelable construction
- Available with an optional metallic overbraid for additional abrasion resistance



Applications

- Laboratory
- Test stand
- Automotive

Specifications

Continuous use temperature
- 220°F (105°C)

Single use temperature
- 220°F (105°C)

Resistance properties
- Moisture: Excellent
- Chemical: Good
- Abrasion: Good

Popular Constructions

Grade	AWG	Wire Type	Limits of Error	Type K	Type J	Type T
Thermocouple	24	Solid	Standard	**K24-1-505**	**J24-1-505**	**T24-1-505**
		Solid	Special	**K24-2-505**	**J24-2-505**	**T24-2-505**

Note: Bolded products are stocked.

Wire Specifications

AWG	Nominal Conductor Size		Nominal Conductor Insulation Thickness		Nominal Overall Size		Approximate Shipping Weight	
	in.	(mm)	in.	(mm)	in.	(mm)	lbs/1000 ft	(kg/km)
26	0.016	(0.406)	0.015	(0.381)	0.046 x 0.088	(1.17 x 2.24)	4	(6.0)
24	0.020	(0.508)	0.015	(0.381)	0.050 x 0.096	(1.27 x 2.44)	5	(7.5)

Ordering Information

Part Number

① ASTM E 230 Calibration	②③ AWG	④ Conductor Type/ Tolerance	⑤	⑥	⑦
			5	0	5

①	ASTM E 230 Calibration
J =	Type J
K =	Type K
T =	Type T

②③	AWG
26 =	26 gauge solid
24 =	24 gauge solid or 24 gauge stranded (7/32)
20 =	20 gauge solid or 20 gauge stranded (7/28)

④	Conductor Type/Tolerance
1 =	Thermocouple grade, solid wire, standard tolerance
2 =	Thermocouple grade, solid wire, special tolerance
3 =	Thermocouple grade, stranded wire, standard tolerance
4 =	Thermocouple grade, stranded wire, special tolerance

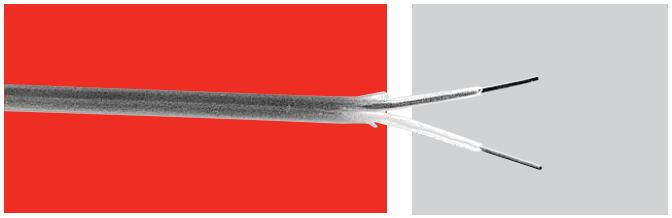
Note: Minimum order sizes apply for non-stock constructions.

Thermocouple and Extension Wire

Small Gauge Fluorinated Ethylene Propylene (FEP) Insulated SERIES 506

The SERIES 506 is the smallest standard insulated wire construction. The thin FEP wall on both primary and duplex insulation yields a construction that can operate safely at temperatures far beyond common PVC and nylon insulations.

The SERIES 506 is fully color coded for easy installation. Its small size allows use in high density circuits. Response time is minimized by small diameter conductors. For larger diameter gauge sizes than #28, specify SERIES 507.



Performance Capabilities

- Continuous temperature rating: 400°F (204°C)
- Flexible FEP plastic insulation
- Thin insulation wall for a compact construction
- Available with an optional metallic overbraid for additional abrasion resistance

Applications

- Laboratory
- Test stand
- Industrial equipment testing

Specifications

Continuous use temperature
- 400°F (204°C)

Single use temperature
- 500°F (260°C)

Resistance properties
- Moisture: Excellent
- Chemical: Excellent
- Abrasion: Excellent

Popular Constructions

Grade	AWG	Wire Type	Limits of Error	Type K	Type J	Type T
Thermocouple	28	Solid	Special	K28-2-506	J28-2-506	T28-2-506
	30	Solid	Special	**K30-2-506**	**J30-2-506**	**T30-2-506**
	36	Solid	Special	K36-2-506	J36-2-506	T36-2-506

Note: Bolded products are stocked.

Wire Specifications

AWG	Nominal Conductor Size		Nominal Insulation Thickness				Nominal Overall Size		Approximate Shipping Weight	
			Conductor		Overall					
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	lbs/1000 ft	(kg/km)
36	0.005	(0.127)	0.005	(0.127)	0.005	(0.127)	0.025 x 0.040	(0.635 x 1.02)	2	(3.0)
32	0.008	(0.203)	0.005	(0.127)	0.005	(0.127)	0.028 x 0.046	(0.711 x 1.17)	2	(3.0)
30	0.010	(0.254)	0.005	(0.127)	0.005	(0.127)	0.030 x 0.050	(0.762 x 1.27)	3	(4.5)
28	0.013	(0.330)	0.005	(0.127)	0.005	(0.127)	0.033 x 0.056	(0.838 x 1.42)	3	(4.5)

Ordering Information

Part Number

① ASTM E 230 Calibration	②③ AWG	④ Conductor Type/ Tolerance	⑤	⑥	⑦
			5	0	6

①	ASTM E 230 Calibration
E =	Type E
J =	Type J
K =	Type K
S =	Type S
T =	Type T

②③	AWG
36 =	36 gauge solid
30 =	30 gauge solid
28 =	28 gauge solid

④	Conductor Type/Tolerance
1 =	Thermocouple grade, solid wire, standard tolerance
2 =	Thermocouple grade, solid wire, special tolerance

Note: Minimum order sizes apply for non-stock constructions.

Thermocouple and Extension Wire

FEP Insulated Thermocouple and Extension Wire SERIES 507

The SERIES 507 is the most economical fluoroplastic insulated wire. Individual conductors are coated with a layer of color coded FEP. The insulated conductors are then parallel duplexed with an additional layer of color coded FEP. The finished construction has a continuous temperature rating of 400°F (204°C). Abrasion, moisture and chemical resistance exceed most other insulations.

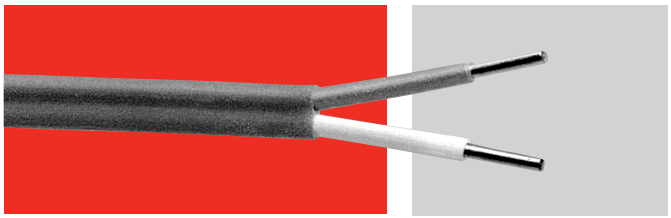
This construction is widely used when pulling long lengths of wire through conduit. FEP's low friction coefficient and abrasion resistance are suited for these applications.

For higher abrasion resistance consider SERIES 514 Tefzel® insulated constructions.

For higher temperatures specify SERIES 508.

Performance Capabilities

- Continuous temperature rating: 400°F (204°C)
- Flexible FEP plastic insulation
- Available with an optional metallic overbraid for additional abrasion resistance



Applications

- General use extension wire

Specifications

Continuous use temperature
- 400°F (204°C)

Single use temperature
- 500°F (260°C)

Resistance properties
- Moisture: Excellent
- Chemical: Excellent
- Abrasion: Excellent

Popular Constructions

Grade	AWG	Wire Type	Limits of Error	Type K	Type J	Type T	Type E	Type S
Extension	20	Solid	Standard	**K20-5-507**	**J20-5-507**	T20-5-507	E20-5-507	**S20-5-507**
	24	Solid	Standard					S24-5-507
Thermocouple	20	Solid	Standard	**K20-1-507**	**J20-1-507**	**T20-1-507**	**E20-1-507**	
		Stranded	Standard	**K20-3-507**	**J20-3-507**	**T20-3-507**	E20-3-507	
		Solid	Special	**K20-2-507**	**J20-2-507**	**T20-2-507**	E20-2-507	
	24	Solid	Standard	**K24-1-507**	**J24-1-507**	T24-1-507	E24-1-507	
		Stranded	Standard	**K24-3-507**	**J24-3-507**	T24-3-507	E24-3-507	
		Solid	Special	**K24-2-507**	**J24-2-507**	**T24-2-507**	E24-2-507	

Note: Bolded products are stocked.

Wire Specifications

AWG	Nominal Conductor Size		Nominal Insulation Thickness				Nominal Overall Size		Approximate Shipping Weight	
			Conductor		Overall					
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	lbs/1000 ft	(kg/km)
24	0.020	(0.508)	0.008	(0.203)	0.010	(0.254)	0.056 x 0.096	(1.42 x 2.44)	8	(11.9)
24 S* (7/32)	0.024	(0.610)	0.008	(0.203)	0.010	(0.254)	0.060 x 0.104	(1.52 x 2.64)	9	(13.4)
22	0.025	(0.635)	0.008	(0.203)	0.010	(0.254)	0.061 x 0.106	(1.55 x 2.69)	10	(14.9)
22 S* (7/30)	0.030	(0.762)	0.008	(0.203)	0.010	(0.254)	0.066 x 0.116	(1.68 x 2.95)	11	(16.4)
20	0.032	(0.813)	0.008	(0.203)	0.010	(0.254)	0.068 x 0.120	(1.73 x 3.05)	12	(17.9)
20 S* (7/28)	0.038	(0.965)	0.008	(0.203)	0.010	(0.254)	0.074 x 0.132	(1.88 x 3.35)	14	(20.9)
18	0.040	(1.02)	0.008	(0.203)	0.010	(0.254)	0.076 x 0.136	(1.93 x 3.45)	18	(26.8)
18 S* (7/26)	0.048	(1.22)	0.008	(0.203)	0.010	(0.254)	0.084 x 0.152	(2.13 x 3.86)	20	(29.8)

* "S" denotes stranded wire: e.g., "24 S (7/32)" is seven strands of 32 gauge wire to make a 24 gauge stranded conductor.

Thermocouple and Extension Wire

FEP Insulated Thermocouple and Extension Wire SERIES 507 (Continued)

Ordering Information

Part Number

① ASTM E 230 Calibration	② ③ AWG	④ Conductor Type/ Tolerance	⑤	⑥	⑦
			5	0	7

①	ASTM E 230 Calibration
E =	Type E
J =	Type J
K =	Type K
S =	Type S
T =	Type T

② ③	AWG
24 =	24 gauge solid or 24 gauge stranded (7/32)
22 =	22 gauge solid or 22 gauge stranded (7/30)
20 =	20 gauge solid or 20 gauge stranded (7/28)

④	Conductor Type/Tolerance
1 =	Thermocouple grade, solid wire, standard tolerance
2 =	Thermocouple grade, solid wire, special tolerance
3 =	Thermocouple grade, stranded wire, standard tolerance
4 =	Thermocouple grade, stranded wire, special tolerance
5 =	Extension grade, solid wire, standard tolerance
6 =	Extension grade, solid wire, special tolerance
7 =	Extension grade, stranded wire, standard tolerance
8 =	Extension grade, stranded wire, special tolerance

Note: Minimum order sizes apply for non-stock constructions.

Thermocouple and Extension Wire

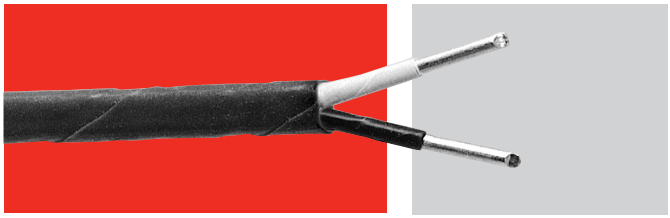
TFE Insulated SERIES 508

The primary and duplex insulation of SERIES 508 is fused TFE tape which is spirally applied to the conductor and heated. This process, called sintering, forms the tape into a homogeneous layer. When sintered, the tape exhibits all of the advantages of extruded TFE insulation, while eliminating the concentricity problems associated with TFE extrusions.

The SERIES 508 is fully color coded and capable of continuous operation in excess of 500°F (260°C). Because the fusing process causes the duplex tape to fuse with the primary insulation, SERIES 508 is not recommended for applications where it is necessary to remove the outer tape while leaving the primary insulation intact.

Performance Capabilities

- Continuous temperature rating: 500°F (260°C)
- Fused TFE tape insulation
- Available with an optional metallic overbraid for additional abrasion resistance



Applications

- Aircraft
- Petroleum processing

Specifications

Continuous use temperature

- 500°F (260°C)

Single use temperature

- 600°F (315°C)

Resistance properties

- Moisture: Excellent
- Chemical: Excellent
- Abrasion: Good

Popular Constructions

Grade	AWG	Wire Type	Limits of Error	Type K	Type J	Type T	Type E
Thermocouple	20	Solid	Standard	**K20-1-508**	**J20-1-508**	T20-1-508	E20-1-508
		Stranded	Standard	K20-3-508	20-3-508	T20-3-508	E20-3-508
		Solid	Special	**K20-2-508**	**J20-2-508**	**T20-2-508**	E20-2-508
	24	Solid	Standard	**K24-1-508**	**J24-1-508**	**T24-1-508**	E24-1-508
		Stranded	Standard	K24-3-508	J24-3-508	T24-3-508	E24-3-508
		Solid	Special	**K24-2-508**	**J24-2-508**	**T24-2-508**	E24-2-508

Note: Bolded products are stocked.

Wire Specifications

AWG	Nominal Conductor Size		Nominal Insulation Thickness				Nominal Overall Size		Approximate Shipping Weight	
			Conductor		Overall					
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	lbs/1000 ft	(kg/km)
26	0.016	(0.406)	0.006	(0.152)	0.008	(0.203)	0.044 x 0.072	(1.12 x 1.83)	4	(6.0)
24	0.020	(0.508)	0.006	(0.152)	0.008	(0.203)	0.047 x 0.077	(1.19 x 1.95)	5	(7.5)
24 S* (7/32)	0.024	(0.610)	0.006	(0.152)	0.008	(0.203)	0.049 x 0.084	(1.24 x 2.13)	6	(8.9)
20	0.032	(0.813)	0.006	(0.152)	0.008	(0.203)	0.061 x 0.106	(1.55 x 2.69)	11	(16.4)
20 S* (7/28)	0.038	(0.965)	0.006	(0.152)	0.008	(0.203)	0.064 x 0.112	(1.63 x 2.84)	12	(17.9)
18	0.040	(1.02)	0.006	(0.152)	0.008	(0.203)	0.068 x 0.120	(1.73 x 3.05)	16	(23.8)
18 S* (7/26)	0.048	(1.22)	0.006	(0.152)	0.008	(0.203)	0.076 x 0.136	(1.93 x 3.45)	18	(26.8)

* “S” denotes stranded wire: e.g., “24 S (7/32)” is seven strands of 32 gauge wire to make a 24 gauge stranded conductor.

Thermocouple and Extension Wire

TFE Insulated SERIES 508 (Continued)

Ordering Information

Part Number

① ASTM E 230 Calibration	② ③ AWG	④ Conductor Type/ Tolerance	⑤	⑥	⑦
			5	0	8

①	ASTM E 230 Calibration
E =	Type E
J =	Type J
K =	Type K
S =	Type S
T =	Type T

② ③	AWG
26 =	26 gauge solid
24 =	24 gauge solid or 24 gauge stranded (7/32)
20 =	20 gauge solid or 20 gauge stranded (7/28)

④	Conductor Type/Tolerance
1 =	Thermocouple grade, solid wire, standard tolerance
2 =	Thermocouple grade, solid wire, special tolerance
3 =	Thermocouple grade, stranded wire, standard tolerance
4 =	Thermocouple grade, stranded wire, special tolerance

Note: Minimum order sizes apply for non-stock constructions.

Thermocouple and Extension Wire

FEP Insulated and Shielded Thermocouple and Extension Wire SERIES 509

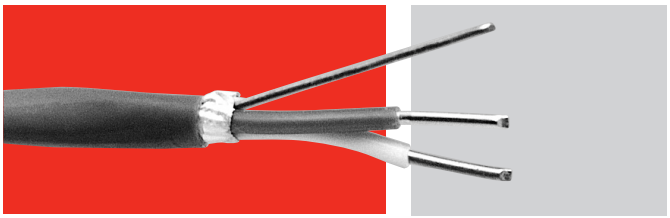
The SERIES 509 was developed specially for use with microprocessor-based systems.

The conductors are insulated with color coded FEP. They are then twisted with a copper drain wire. An aluminized polyester tape is wrapped around the conductors and drain wire and then FEP is applied.

The finished construction can withstand temperatures in excess of 400°F (204°C). Twisted conductors minimize electromagnetic interference (EMI) and the shield tape eliminates most problems associated with AC "noise" in the sensing circuit.

Performance Capabilities

- Continuous temperature rating: 400°F (204°C)
- Flexible FEP plastic insulation
- Twisted and shielded construction to reduce electrical noise interference
- Available with an optional metallic overbraid for additional abrasion resistance



Applications

- General use extension wire

Specifications

Continuous use temperature
- 400°F (204°C)

Single use temperature
- 500°F (260°C)

Resistance properties
- Moisture: Excellent
- Chemical: Excellent
- Abrasion: Excellent

Popular Constructions

Grade	AWG	Wire Type	Limits of Error	Type K	Type J	Type T	Type E	Type S
Extension	16	Solid	Standard	**K16-5-509**	**J16-5-509**			
		Stranded	Standard	K16-7-509	J16-7-509			
	20	Solid	Standard	**K20-5-509**	**J20-5-509**	T20-5-509	E20-5-509	S20-5-509
		Stranded	Standard	K20-7-509	J20-7-509	T20-7-509		
Thermocouple	20	Solid	Standard	**K20-1-509**	**J20-1-509**	**T20-1-509**		
		Solid	Special	**K20-2-509**	J20-2-509	T20-2-509		
	24	Solid	Standard	K24-1-509	J24-1-509	T24-1-509		
		Stranded	Standard	K24-3-509	J24-3-509	T24-3-509		

Note: Bolded products are stocked.

Wire Specifications

AWG	Nominal Conductor Size		Nominal Insulation Thickness				Nominal Overall Size		Approximate Shipping Weight	
			Conductor		Overall					
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	lbs/1000 ft	(kg/km)
24	0.020	(0.508)	0.008	(0.203)	0.012	(0.305)	0.104	(2.64)	12	(17.9)
24 S* (7/32)	0.024	(0.610)	0.008	(0.203)	0.012	(0.305)	0.112	(2.84)	13	(19.4)
20	0.032	(0.813)	0.008	(0.203)	0.012	(0.305)	0.128	(3.25)	18	(26.8)
20 S* (7/28)	0.038	(0.965)	0.008	(0.203)	0.012	(0.305)	0.140	(3.56)	20	(29.8)
18	0.040	(1.02)	0.008	(0.203)	0.015	(0.381)	0.152	(3.86)	25	(37.3)
18 S* (7/26)	0.048	(1.22)	0.008	(0.203)	0.015	(0.381)	0.168	(4.27)	27	(40.2)
16	0.051	(1.29)	0.008	(0.203)	0.015	(0.381)	0.174	(4.42)	33	(49.2)
16 S* (7/24)	0.060	(1.52)	0.008	(0.203)	0.015	(0.381)	0.192	(4.88)	35	(52.2)

* "S" denotes stranded wire: e.g., "24 S (7/32)" is seven strands of 32 gauge wire to make a 24 gauge stranded conductor.

Thermocouple and Extension Wire

FEP Insulated and Shielded Thermocouple and Extension Wire SERIES 509 (Continued)

Ordering Information

Part Number

① ASTM E 230 Calibration	②③ AWG	④ Conductor Type/ Tolerance	⑤	⑥	⑦
			5	0	9

①	ASTM E 230 Calibration
E =	Type E
J =	Type J
K =	Type K
S =	Type S
T =	Type T

②③	AWG
24 =	24 gauge solid or 24 gauge stranded (7/32)
20 =	20 gauge solid or 20 gauge stranded (7/28)
16 =	16 gauge solid or 16 gauge stranded (7/24)

④	Conductor Type/Tolerance
1 =	Thermocouple grade, solid wire, standard tolerance
2 =	Thermocouple grade, solid wire, special tolerance
3 =	Thermocouple grade, stranded wire, standard tolerance
4 =	Thermocouple grade, stranded wire, special tolerance
5 =	Extension grade, solid wire, standard tolerance
6 =	Extension grade, solid wire, special tolerance
7 =	Extension grade, stranded wire, standard tolerance
8 =	Extension grade, stranded wire, special tolerance

Note: Minimum order sizes apply for non-stock constructions.

Thermocouple and Extension Wire

PVC Insulated and Shielded Thermocouple and Extension Wire SERIES 510

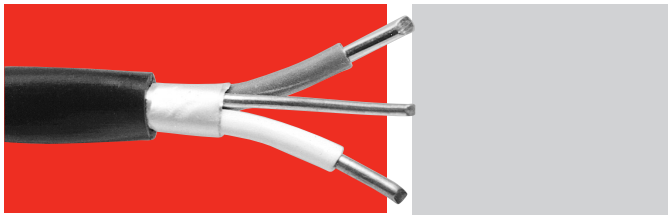
The SERIES 510 is a PVC insulated, twisted and shielded construction for systems sensitive to induced voltages and “noise.”

The conductors are insulated with color coded PVC and then twisted with a copper drain wire. An aluminized polyester tape is wrapped around the two conductors and drain wires to impart 100 percent shielding. Then, another layer of PVC is applied.

The twisting eliminates most EMI while the shield tape minimizes AC “noise” in the sensing circuit.

Performance Capabilities

- Continuous temperature rating: 220°F (105°C)
- Flexible PVC plastic insulation
- Twisted and shielded construction to reduce electrical noise interference
- Available with an optional metallic overbraid for additional abrasion resistance



Applications

- General use extension wire

Specifications

Continuous use temperature
- 220°F (105°C)

Single use temperature
- 220°F (105°C)

Resistance properties
- Moisture: Excellent
- Chemical: Good
- Abrasion: Good

Popular Constructions

Grade	AWG	Wire Type	Limits of Error	Type K	Type J	Type T	Type E	Type S
Extension	16	Solid	Standard	**K16-5-510**	**J16-5-510**	**T16-5-510**		
		Stranded	Standard	K16-7-510	J16-7-510	T16-7-510		
	20	Solid	Standard	**K20-5-510**	**J20-5-510**	**T20-5-510**	**E20-5-510**	**S20-5-510**
		Stranded	Standard	**K20-7-510**	**J20-7-510**	T20-7-510		
	24	Solid	Standard	K24-5-510	J24-5-510	T24-5-510		
		Stranded	Standard	K24-7-510	J24-7-510	T24-7-510		

Note: Bolded products are stocked.

Wire Specifications

AWG	Nominal Conductor Size		Nominal Insulation Thickness				Nominal Overall Size		Approximate Shipping Weight	
			Conductor		Overall					
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	lbs/1000 ft	(kg/km)
24	0.020	(0.508)	0.015	(0.381)	0.020	(0.508)	0.140	(3.56)	13	(19.4)
24 S* (7/32)	0.024	(0.610)	0.015	(0.381)	0.020	(0.508)	0.148	(3.76)	14	(20.9)
20	0.032	(0.813)	0.015	(0.381)	0.020	(0.508)	0.164	(4.17)	22	(32.8)
20 S* (7/28)	0.038	(0.965)	0.015	(0.381)	0.020	(0.508)	0.176	(4.47)	24	(35.8)
18	0.040	(1.02)	0.020	(0.508)	0.020	(0.508)	0.200	(5.08)	30	(44.7)
18 S* (7/26)	0.048	(1.22)	0.020	(0.508)	0.020	(0.508)	0.216	(5.49)	32	(47.7)
16	0.051	(1.29)	0.020	(0.508)	0.020	(0.508)	0.222	(5.64)	39	(58.1)
16 S* (7/24)	0.060	(1.52)	0.020	(0.508)	0.020	(0.508)	0.240	(6.10)	41	(61.1)

* “S” denotes stranded wire: e.g., “24 S (7/32)” is seven strands of 32 gauge wire to make a 24 gauge stranded conductor.

Thermocouple and Extension Wire

PVC Insulated and Shielded Thermocouple and Extension Wire SERIES 510 (Continued)

Ordering Information

Part Number

① ASTM E 230 Calibration	② ③ AWG	④ Conductor Type/ Tolerance	⑤	⑥	⑦
			5	1	0

①	ASTM E 230 Calibration
E =	Type E
J =	Type J
K =	Type K
S =	Type S
T =	Type T

② ③	AWG
24 =	24 gauge solid or 24 gauge stranded (7/32)
20 =	20 gauge solid or 20 gauge stranded (7/28)
16 =	16 gauge solid or 16 gauge stranded (7/24)

④	Conductor Type/Tolerance
1 =	Thermocouple grade, solid wire, standard tolerance
2 =	Thermocouple grade, solid wire, special tolerance
3 =	Thermocouple grade, stranded wire, standard tolerance
4 =	Thermocouple grade, stranded wire, special tolerance
5 =	Extension grade, solid wire, standard tolerance
6 =	Extension grade, solid wire, special tolerance
7 =	Extension grade, stranded wire, standard tolerance
8 =	Extension grade, stranded wire, special tolerance

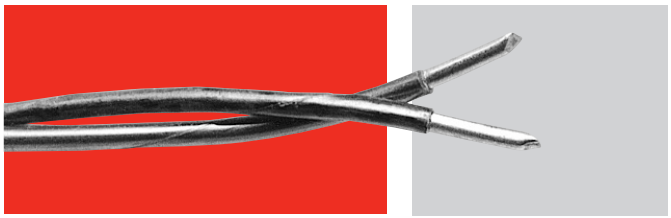
Note: Minimum order sizes apply for non-stock constructions.

Thermocouple and Extension Wire

Polyimide Insulated and Twisted SERIES 511

SERIES 511 is the most economical polyimide taped construction. Polyimide film applied to the conductors is considered to be the ultimate “soft” insulation. The tape maintains its strength at temperatures up to 600°F (315°C). The FEP laminate serves as a moisture barrier and allows the tape to fuse with itself. The finished construction will not unravel when cut.

SERIES 511 conductors are wrapped with the polyimide tape which is fused to itself. Each conductor is color coded with a colored thread under the tape. The insulated conductors are twisted into a duplex construction to eliminate the overall duplex insulation and minimize cost.



Performance Capabilities

- Continuous temperature rating: 600°F (315°C)
- Polyimide fused tape insulation
- Twisted design has no outer jacket
- Colored tracer used to indicate calibration type
- Available with an optional metallic overbraid for additional abrasion resistance

Applications

- Aerospace
- Petrochemical
- Plastics

Specifications

Continuous use temperature
- 600°F (315°C)

Single use temperature
- 800°F (430°C)

Resistance properties
- Moisture: Excellent
- Chemical: Excellent
- Abrasion: Excellent

Popular Constructions

Grade	AWG	Wire Type	Limits of Error	Type K	Type J
Thermocouple	20	Solid	Standard	K20-1-511	J20-1-511
		Solid	Special	K20-2-511	J20-2-511
	24	Solid	Standard	K24-1-511	J24-1-511
		Solid	Special	K24-2-511	**J24-2-511**

Note: **Bolded** products are stocked.

Wire Specifications

AWG	Nominal Conductor Size		Nominal Conductor Insulation Thickness		Nominal Overall Size		Approximate Shipping Weight	
	in.	(mm)	in.	(mm)	in	(mm)	lbs/1000 ft	(kg/km)
30	0.010	(0.254)	0.004	(0.102)	0.040	(1.02)	3	(4.5)
24	0.020	(0.508)	0.005	(0.127)	0.060	(1.52)	4	(6.0)
24 S* (7/32)	0.024	(0.610)	0.005	(0.127)	0.068	(1.73)	5	(7.5)
20	0.032	(0.813)	0.005	(0.127)	0.084	(2.13)	8	(11.9)
20 S* (7/28)	0.038	(0.965)	0.005	(0.127)	0.094	(2.39)	9	(13.4)

Note: FEP laminate melts at approximately 260°C (500°F).

* “S” denotes stranded wire: e.g., “24 S (7/32)” is seven strands of 32 gauge wire to make a 24 gauge stranded conductor.

Thermocouple and Extension Wire

Polyimide Insulated and Twisted SERIES 511

(Continued)

Ordering Information

Part Number

① ASTM E 230 Calibration	② ③ AWG	④ Conductor Type/ Tolerance	⑤	⑥	⑦
			5	1	1

①	ASTM E 230 Calibration
J =	Type J
K =	Type K
T =	Type T

② ③	AWG
30 =	30 gauge solid
24 =	24 gauge solid or 24 gauge stranded (7/32)
20 =	20 gauge solid or 20 gauge stranded (7/28)
16 =	16 gauge solid

④	Conductor Type/Tolerance
1 =	Thermocouple grade, solid wire, standard tolerance
2 =	Thermocouple grade, solid wire, special tolerance
3 =	Thermocouple grade, stranded wire, standard tolerance
4 =	Thermocouple grade, stranded wire, special tolerance

Note: Minimum order sizes apply for non-stock constructions.

Thermocouple and Extension Wire

Polyimide Insulated SERIES 512

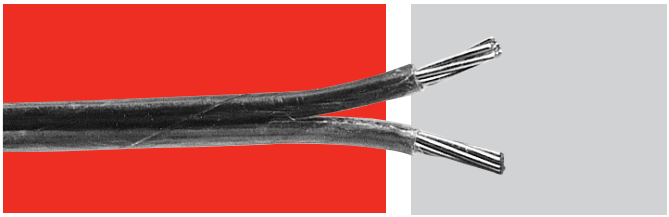
The SERIES 512 is a heavier duty version of SERIES 511 construction, using the same polyimide insulation. Color coding is accomplished using the same colored thread "tracers." The SERIES 512 has a duplex insulation of polyimide tape. The extra wall of tape yields a construction with increased abrasion resistance.

For higher temperature requirements, choose one of our fiberglass insulated wires.

For improved abrasion resistance, and easier color identification of conductors, specify SERIES 513 when contacting the factory.

Performance Capabilities

- Continuous temperature rating: 600°F (315°C)
- Polyimide fused tape insulation
- Colored tracer used to indicate calibration type
- Available with an optional metallic overbraid for additional abrasion resistance



Applications

- Aerospace
- Petrochemical
- Plastics

Specifications

Continuous use temperature
- 600°F (315°C)

Single use temperature
- 800°F (430°C)

Resistance properties
- Moisture: Excellent
- Chemical: Excellent
- Abrasion: Excellent

Popular Constructions

Grade	AWG	Wire Type	Limits of Error	Type K	Type J
Thermocouple	20	Solid	Standard	K20-1-512	**J20-1-512**
		Solid	Special	K20-2-512	J20-2-512
		Stranded	Standard	**K20-3-512**	**J20-3-512**
	24	Solid	Standard	K24-1-512	J24-1-512
		Solid	Special	K24-2-512	J24-2-512

Note: Bolded products are stocked.

Wire Specifications

AWG	Nominal Conductor Size		Nominal Insulation Thickness				Nominal Overall Size		Approximate Shipping Weight	
			Conductor		Overall					
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	lbs/1000 ft	(kg/km)
30	0.010	(0.254)	0.004	(0.102)	0.005	(0.127)	0.026 x 0.044	(0.660 x 1.18)	3	(4.5)
24	0.020	(0.508)	0.005	(0.127)	0.005	(0.127)	0.036 x 0.064	(0.914 x 1.626)	5	(7.5)
24 S* (7/32)	0.024	(0.610)	0.005	(0.127)	0.005	(0.127)	0.043 x 0.066	(1.092 x 1.676)	6	(8.9)
20	0.032	(0.813)	0.005	(0.127)	0.005	(0.127)	0.048 x 0.088	(1.219 x 2.235)	8	(11.9)
20 S* (7/28)	0.038	(0.965)	0.005	(0.127)	0.005	(0.127)	0.056 x 0.098	(1.42 x 2.490)	9	(13.4)

Note: FEP laminate melts at approximately 260°C (500°F).

* "S" denotes stranded wire: e.g., "24 S (7/32)" is seven strands of 32 gauge wire to make a 24 gauge stranded conductor.

Thermocouple and Extension Wire

Polyimide Insulated SERIES 512 (Continued)

Ordering Information

Part Number

① ASTM E 230 Calibration	②③ AWG	④ Conductor Type/ Tolerance	⑤	⑥	⑦
			5	1	2

①	ASTM E 230 Calibration
E =	Type E
J =	Type J
K =	Type K
T =	Type T

②③	AWG
30 =	30 gauge solid
24 =	24 gauge solid or 24 gauge stranded (7/32)
20 =	20 gauge solid or 20 gauge stranded (7/28)

④	Conductor Type/Tolerance
1 =	Thermocouple grade, solid wire, standard tolerance
2 =	Thermocouple grade, solid wire, special tolerance
3 =	Thermocouple grade, stranded wire, standard tolerance
4 =	Thermocouple grade, stranded wire, special tolerance

Note: Minimum order sizes apply for non-stock constructions.

Thermocouple and Extension Wire

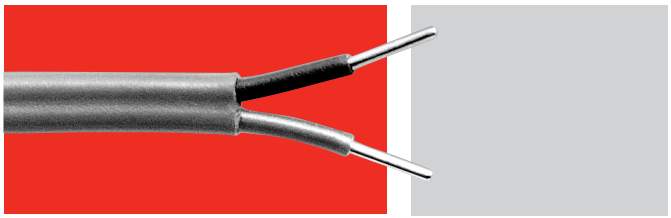
PFA Insulated Thermocouple and Extension Wire SERIES 516

A relatively new fluoroplastic, perfluoralkoxy (PFA), is the insulation used for SERIES 516. PFA's temperature rating is only slightly less than TFE. However, PFA can be applied using conventional extrusion techniques. This produces a smooth finish, as opposed to the spiral usually associated with TFE tape constructions. This is important in the foodservice industry where taped constructions present cleaning problems. The smooth surface also allows this construction to be pulled through conduits and cut-outs more easily.

Once each conductor has been coated with a color coded PFA layer, they are laid parallel and coated again with PFA.

Performance Capabilities

- Continuous temperature rating: 500°F (260°C)
- Flexible TFE plastic insulation
- Available with an optional metallic overbraid for additional abrasion resistance



Applications

- General use extension wire

Specifications

Continuous use temperature
- 500°F (260°C)

Single use temperature
- 550°F (290°C)

Resistance properties
- Moisture: Excellent
- Chemical: Excellent
- Abrasion: Good

Popular Constructions

Grade	AWG	Wire Type	Limits of Error	Type K	Type J	Type T	Type E
Thermocouple	20	Solid	Standard	K20-1-516	J20-1-516	T20-1-516	E20-1-516
		Solid	Special	K20-2-516	J20-2-516	T20-2-516	E20-2-516
		Stranded	Standard	K20-3-516	J20-3-516	T20-3-516	E20-3-516
	24	Solid	Standard	K24-1-516	J24-1-516	T20-1-516	E24-1-516
		Solid	Special	**K24-2-516**	J24-2-516	T20-2-516	E24-2-516
		Stranded	Standard	K24-3-516	**J24-3-516**	T20-3-516	E24-3-516

Note: Bolded products are stocked.

Wire Specifications

AWG	Nominal Conductor Size		Nominal Insulation Thickness				Nominal Overall Size		Approximate Shipping Weight	
			Conductor		Overall					
	in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	lbs/1000 ft	(kg/km)
36	0.005	(0.127)	0.003	(0.076)	0.003	(0.076)	0.017 x 0.028	(0.432 x 0.711)	3.0	(2)
30	0.010	(0.254)	0.003	(0.076)	0.003	(0.076)	0.022 x 0.038	(0.559 x 0.965)	4.5	(3)
24	0.020	(0.508)	0.008	(0.203)	0.010	(0.254)	0.056 x 0.092	(1.42 x 2.34)	11.9	(8)
24 S* (7/32)	0.024	(0.610)	0.008	(0.203)	0.010	(0.254)	0.060 x 0.100	(1.52 x 2.54)	13.4	(9)
20	0.032	(0.813)	0.008	(0.203)	0.010	(0.254)	0.068 x 0.116	(1.73 x 2.95)	17.9	(12)
20 S* (7/28)	0.038	(0.965)	0.008	(0.203)	0.010	(0.254)	0.074 x 0.128	(1.88 x 3.25)	20.9	(14)

* "S" denotes stranded wire: e.g., "24 S (7/32)" is seven strands of 32 gauge wire to make a 24 gauge stranded conductor.

Thermocouple and Extension Wire

PFA Insulated Thermocouple and Extension Wire SERIES 516 (Continued)

Ordering Information

Part Number

① ASTM E 230 Calibration	② ③ AWG	④ Conductor Type/ Tolerance	⑤	⑥	⑦
			5	1	6

①	ASTM E 230 Calibration
E =	Type E
J =	Type J
K =	Type K
S =	Type S
T =	Type T

② ③	AWG
36 =	36 gauge solid
30 =	30 gauge solid
24 =	24 gauge solid or 24 gauge stranded (7/32)
20 =	20 gauge solid or 20 gauge stranded (7/28)

④	Conductor Type/Tolerance
1 =	Thermocouple grade, solid wire, standard tolerance
2 =	Thermocouple grade, solid wire, special tolerance
3 =	Thermocouple grade, stranded wire, standard tolerance
4 =	Thermocouple grade, stranded wire, special tolerance
5 =	Extension grade, solid wire, standard tolerance
6 =	Extension grade, solid wire, special tolerance
7 =	Extension grade, stranded wire, standard tolerance
8 =	Extension grade, stranded wire, special tolerance

Note: Minimum order sizes apply for non-stock constructions.

RTD Lead Wire

SERIES 701, 704, 705 and 707

Watlow's quality, experience and versatility extend from insulated thermocouple and extension wire to resistance temperature detector (RTD) lead wire and fiberglass wire.

Performance Capabilities

- Continuous temperature rating: 220 to 900°F (105 to 480°C) depending upon construction
- Available with an optional metallic overbraid for additional abrasion resistance

Applications

- General use RTD sensor wire

Specifications

PVC

Continuous use temperature
- 220°F (105°C)

Single use temperature
- 220°F (105°C)

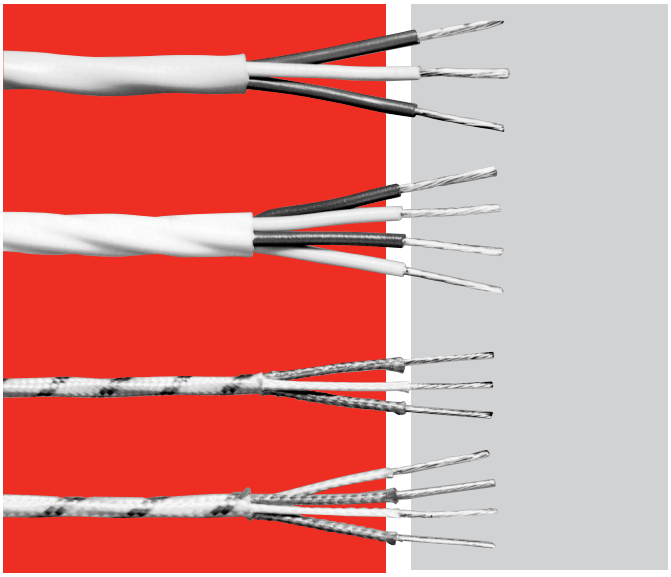
Resistance properties
- Moisture: Excellent
- Chemical: Good
- Abrasion: Good

FEP

Continuous use temperature
- 400°F (204°C)

Single use temperature
- 500°F (260°C)

Resistance properties
- Moisture: Excellent
- Chemical: Excellent
- Abrasion: Excellent



PFA

Continuous use temperature
- 500°F (260°C)

Single use temperature
- 550°F (290°C)

Resistance properties
- Moisture: Excellent
- Chemical: Excellent
- Abrasion: Good

Fiberglass

Continuous use temperature
- 900°F (480°C)

Single use temperature
- 1000°F (540°C)

Resistance properties
- Moisture: Good
- Chemical: Good
- Abrasion: Fair

Popular Constructions

No. of Conductors	AWG	Wire Type*	Insulation Material			
			PVC 220°F (105°C)	FEP 400°F (204°C)	PFA 500°F (260°C)	Fiberglass 900°F (480°C)
2	22	Nickel plated copper	RT2-22-8-701	RT2-22-8-704		RT2-22-8-705
	24	Nickel plated copper	RT2-24-8-701	RT2-24-8-704	RT2-24-8-707	RT2-24-8-705
3	22	Tinned copper	**RT3-22-4-701**			
		Nickel plated copper	RT3-22-8-701	**RT3-22-8-704**		RT3-22-8-705
	24	Nickel plated copper	RT3-24-8-701	RT3-24-8-704	RT3-24-8-707	**RT3-24-8-705**
4	22	Nickel plated copper		RT4-22-8-704		RT4-22-8-705
	24	Nickel plated copper		RT4-24-8-704	RT4-24-8-707	RT4-24-8-705

Note: Bolded products are stocked.

RTD Lead Wire

SERIES 701, 704, 705 and 707 (Continued)

Wire Specifications - SERIES 701 - PVC

No. of Conductors	AWG	Nominal Conductor Size		Nominal Insulation Thickness				Nominal Overall Size		Approximate Shipping Weight	
				Conductor		Overall					
		in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	lbs/1000 ft	(kg/km)
2	22S* (7/30)	0.030	(0.762)	0.015	(0.381)	0.020	(0.508)	0.160	(4.06)	17	(25.3)
	20S* (7/28)	0.038	(0.965)	0.015	(0.381)	0.020	(0.508)	0.176	(4.47)	19	(28.3)
3	22S* (7/30)	0.030	(0.762)	0.015	(0.381)	0.020	(0.508)	0.172	(4.37)	20	(29.8)
	20S* (7/28)	0.038	(0.965)	0.015	(0.381)	0.020	(0.508)	0.190	(4.83)	25	(37.3)
4	22S* (7/30)	0.030	(0.762)	0.015	(0.381)	0.020	(0.508)	0.184	(4.67)	23	(34.3)
	20S* (7/28)	0.038	(0.965)	0.015	(0.381)	0.020	(0.508)	0.204	(5.18)	30	(44.7)

Note: 24 and 16 gauge constructions also available, contact factory for details.

Wire Specifications - SERIES 704 - FEP

No. of Conductors	AWG	Nominal Conductor Size		Nominal Insulation Thickness				Nominal Overall Size		Approximate Shipping Weight	
				Conductor		Overall					
		in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	lbs/1000 ft	(kg/km)
2	24S* (7/32)	0.024	(0.610)	0.008	(0.203)	0.010	(0.254)	0.118	(3.00)	12	(17.9)
	22S* (7/30)	0.030	(0.762)	0.008	(0.203)	0.010	(0.254)	0.130	(3.30)	14	(20.9)
	20S* (7/28)	0.038	(0.965)	0.008	(0.203)	0.010	(0.254)	0.146	(3.71)	17	(25.3)
3	24S* (7/32)	0.024	(0.610)	0.008	(0.203)	0.010	(0.254)	0.126	(3.20)	16	(23.8)
	22S* (7/30)	0.030	(0.762)	0.008	(0.203)	0.010	(0.254)	0.140	(3.56)	20	(29.8)
	20S* (7/28)	0.038	(0.965)	0.008	(0.203)	0.010	(0.254)	0.158	(4.01)	24	(35.8)
4	24S* (7/32)	0.024	(0.610)	0.008	(0.203)	0.010	(0.254)	0.136	(3.46)	19	(28.3)
	22S* (7/30)	0.030	(0.762)	0.008	(0.203)	0.010	(0.254)	0.150	(3.81)	23	(34.3)
	20S* (7/28)	0.038	(0.965)	0.008	(0.203)	0.010	(0.254)	0.170	(4.32)	27	(40.2)

Wire Specifications - SERIES 707 - PFA

No. of Conductors	AWG	Nominal Conductor Size		Nominal Insulation Thickness				Nominal Overall Size		Approximate Shipping Weight	
				Conductor		Overall					
		in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	lbs/1000 ft	(kg/km)
2	24S* (7/32)	0.024	(0.610)	0.008	(0.203)	0.010	(0.254)	0.108	(2.74)	12	(17.9)
3	24S* (7/32)	0.024	(0.610)	0.008	(0.203)	0.010	(0.254)	0.115	(2.91)	16	(23.8)
4	24S* (7/32)	0.024	(0.610)	0.008	(0.203)	0.010	(0.254)	0.126	(3.20)	19	(28.8)

Wire Specifications - SERIES 705 - Fiberglass

No. of Conductors	AWG	Nominal Conductor Size		Nominal Insulation Thickness				Nominal Overall Size		Approximate Shipping Weight	
				Conductor		Overall					
		in.	(mm)	in.	(mm)	in.	(mm)	in.	(mm)	kg/km	(lbs/1000 ft)
2	24S* (7/32)	0.024	(0.610)	0.005	(0.127)	0.006	(0.152)	0.080	(2.03)	6	(8.9)
	22S* (7/30)	0.030	(0.762)	0.005	(0.127)	0.006	(0.152)	0.092	(2.34)	7	(10.4)
	20S* (7/28)	0.038	(0.965)	0.006	(0.152)	0.006	(0.152)	0.112	(2.84)	9	(13.4)
3	24S* (7/32)	0.024	(0.610)	0.005	(0.127)	0.006	(0.152)	0.086	(2.18)	8	(11.9)
	22S* (7/30)	0.030	(0.762)	0.005	(0.127)	0.006	(0.152)	0.098	(2.49)	9	(13.4)
	20S* (7/28)	0.038	(0.965)	0.006	(0.152)	0.006	(0.152)	0.120	(3.05)	12	(17.9)
4	24S* (7/32)	0.024	(0.610)	0.005	(0.127)	0.006	(0.152)	0.092	(2.34)	10	(14.9)
	22S* (7/30)	0.030	(0.762)	0.005	(0.127)	0.006	(0.152)	0.106	(2.69)	12	(17.9)
	20S* (7/28)	0.038	(0.965)	0.006	(0.152)	0.006	(0.152)	0.130	(3.30)	16	(23.8)

* "S" denotes stranded wire: e.g., "24 S (7/32)" is seven strands of 32 gauge wire to make a 24 gauge stranded conductor.

RTD Lead Wire

SERIES 701, 704, 705 and 707 (Continued)

Ordering Information

Part Number

①	②	③	④ ⑤	⑥	⑦ ⑧ ⑨
		Number of Conductors	AWG	Conductor Type/ Tolerance	Insulation Type
R	T				

③	Number of Conductors
2 =	Type 2
3 =	Type 3
4 =	Type 4

④ ⑤	AWG
24 =	24 gauge solid
22 =	22 gauge solid
20 =	20 gauge solid

⑥	Conductor Type/Tolerance
4 =	Stranded tinned copper
8 =	Stranded nickel plated copper

⑦ ⑧ ⑨	Insulation Type
701 =	PVC
704 =	FEP
705 =	Fiberglass
707 =	PFA

Note: Minimum order sizes apply for non-stock constructions.