

SERV-RITE® Wire and Cable

Thermocouple and Thermocouple Extension Wire

Manufactured to Exacting Specifications

Since 1914, SERV-RITE® thermocouple wire and thermocouple extension wire have been known for premium performance and reliability. All stock and custom wire is manufactured in our plant where careful selection of materials, latest type of special machines and quality controls assure superior uniformity.

While this section presents available stock wire products, Watlow Gordon can custom manufacture wire using alloys and insulation types to meet your specific application demands.

All SERV-RITE thermocouple wire and thermocouple extension wire is manufactured under rigid quality controls. Watlow Gordon's wire products are manufactured following ISO 9001 standards. In addition, all EMF vs. temperature calibration procedures follow one or more of the following standards:

- ASTM E 207
- ASTM E 220
- AMS 2750

All testing has NIST (formerly NBS) 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 2350°F (-200 to 1290°C)
- Tolerances from $\pm 0.5^\circ\text{C}$ or $\pm 0.4\%$
- NIST calibration certificates



SERV-RITE Wire and Cable

Features and Benefits

- **Type E, J, K, N and T thermocouple wire** for virtually all applications.
- **Type EX, JX, KX, NX, TX extension wire** to match thermocouple type.
- **Compensating extension wire for Type B, C*, R and S thermocouples** permit fine tuning of temperature measuring circuit.
- **Solid or stranded wire constructions** to meet specific application requirements.
- **Wide selection of insulation types** to meet temperature, chemical, moisture and abrasion resistance objectives.

- **Color coding** available to comply with United States, United Kingdom, German, Japanese and IEC standards.
- **Select metallic overbraids and wraps** to enhance abrasion resistance.
- **UL® listed PLTC wire and cable** for applications requiring agency compliance.
- **Stock RTD lead wire** to meet virtually all industrial RTD applications.

*Not an ASTM E 230 symbol.

UL® is a registered trademark of Underwriter's Laboratories, Inc.

SERV-RITE Wire and Cable

Thermocouple and Thermocouple Extension Wire

Technical Data

The following pages contain SERV-RITE wire technical data. This information covers ASTM E 230 letter designations and tolerances, color coding, stranded and solid constructions, selection considerations, how to read SERV-RITE wire product code numbers, metallic overbraid and wrap options, insulation or "Series," constructions and characteristics.

If you are unable to locate the stock product specifications required by your application, Watlow Gordon can custom manufacture a wire to meet your needs.

Calibration and Certification

SERV-RITE thermocouple wire and elements can be factory calibrated and certified at an extra charge. Each thermocouple, coil, reel or spool of wire is then tagged to show the individual departure from curve. Once calibrated, their exact departure from the standard curve at any specified temperature is known and can be taken into account. Thermocouples and wire samples sent to the factory for calibrating must be at least 36 inches long.

The standard calibrating temperature points range from 32 to 2300°F (0 to 1260°C), depending on calibration, gauge size and insulation. Sub-zero and cryogenic calibration is available at fixed points, such as boiling helium, nitrogen and sublimated carbon dioxide, including temperatures down to -110°F (-80°C).

A certificate of calibration is furnished for all calibrated items. Each item calibrated is also tagged with the results.

Common Certifications for Wire

The following standard certifications are available from Watlow Gordon. Requirements for these certifications must be stated on the order.

Certificate #1 - Certificate of Compliance/Conformity

This certification states that product is being supplied which meets the requirements of the purchase order.

Certificate #2 - Certificate of Compliance to ASTM E 230 Tolerance

This certification states that product is being supplied which meets the requirements of the purchase order, including the correct calibration type and tolerance. This certification is also used when conformance to ASTM E 230 must be documented.

Certificate #3 - Certificate of Conformance to MIL Standard 45662A

This certificate is used to certify that our calibration system is in accordance with MIL-STD 45662A.

Certificate #4 - Certificate of Traceability to NIST

This certification is used to certify that the materials they receive is traceable to NIST via calibration data of the thermoelements used to manufacture the product.

Certificate #6 - Certificate of Calibration at Standard Calibration Points

This is a calibration certification offering the preproduction calibration values of the insulated wire product at the standard calibration check points.

Certificate #7A - Chemical and Physical Analysis of conductors in insulated wire products

This certification offers the nominal chemical composition of the alloy used in the insulated wire products.

Certificate #8 - Certificate of Calibration at Specified Temperatures

This is a calibration certification when post-production calibration data is desired. Calibration is performed in the Watlow calibration laboratory with NIST traceable calibration standards. In addition to the calibration data, the test standard, equipment, NIST traceability, and reference to applicable calibration procedures are stated.

Note: Custom certifications are available upon request.

SERV-RITE Wire Standard Calibration Temperatures

Calibration	Standard Calibration Points °F*
E	300, 500, 1000, 1600
J	200, 500, 1000, 1400
K	300, 500, 1000, 1600, 2000
N	300, 500, 1000, 1600, 2000
T	200, 500
BX	212, 400
CX	200, 300, 400, 500
EX	200, 400
JX	200, 400
KX	200, 300, 400
NX	200, 300, 400
RX	400
SX	400
TX	200, 400

* Calibration not made when temperature exceeds wire insulation rating.

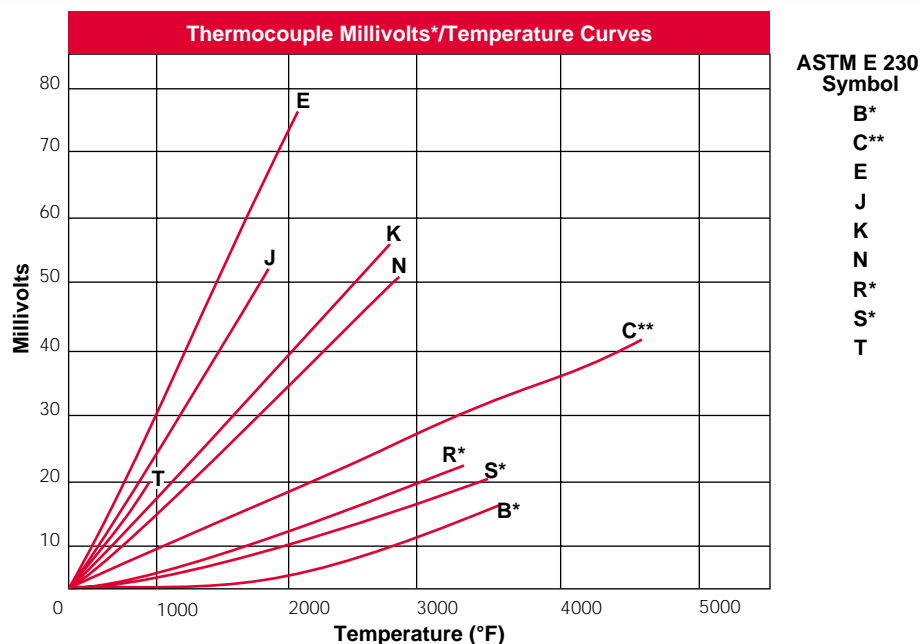
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Calibration and Certification

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*Millivolt values shown for C, R, S and B calibrations pertain to thermocouple calibrations only. RX, SX and BX constructions described in this catalog section are intended for use as **extension wire only** and will not exhibit the millivolt outputs shown.

**Not an ASTM E 230 Symbol—Tungsten 5% Rhenium/Tungsten 26% Rhenium.

ASTM E 230 Letter Designations

Thermocouple and extension wires are generally ordered and specified by ASTM E 230 letter designations for wire type. Positive and negative legs are identified by the appropriate letter suffixes P and N, respectively.

ASTM E 230 Letter	Description	Thermocouple Grade Alloys	Extension or Compensating Grade Alloys
B	BP BN	Platinum 30% Rhodium Platinum 6% Rhodium	BPX-PCLW-30-6 Copper
C*	CP CN	W5Re (Tungsten 5% Rhenium) W26Re (Tungsten 26% Rhenium)	Alloy 405 Alloy 426
E	EP EN	Chromel® Constantan	Chromel® Constantan
J	JP JN	Iron Constantan	Iron Constantan
K	KP KN	Chromel® Alumel®	Chromel® Alumel®
N	NP NN	Nicrosil Nisil	Nicrosil Nisil
R	RP RN	Platinum 13% Rhodium Pure Platinum	Copper #11 Alloy
S	SP SN	Platinum 10% Rhodium Pure Platinum	Copper #11 Alloy
T	TP TN	Copper Constantan	Copper Constantan

*Not an ASTM E 230 symbol.

Note: Watlow Gordon reserves the right to substitute equivalent materials.

Chromel® and Alumel® are registered trademarks of Hoskins Manufacturing Company.

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ASTM E 230 Tolerances

Unless otherwise specified, all SERV-RITE thermocouple wire and extension wire is supplied to meet Standard Tolerances of ASTM E 230. Special Tolerances are also available. The standard and special tolerances for thermocouple and extension wires are given in the accompanying tables. Where tolerances are given in percent, the percentage applies to the temperature being measured.

Initial Calibration Tolerances for SERV-RITE Wire And Cable

Reference Junction 32°F (0°C)

Calibration Type	Temperature Range °F (°C)		Tolerances (whichever is greater)			
			Standard °F (°C)		Special °F (°C)	
Thermocouples ① ③						
B	1600 to 3100	(870 to 1700)	②	(±0.5%)	②	(±0.25%)
E	32 to 1600	(0 to 870)	②	(±1.7 or ±0.5%)	②	(±1.0 or ±0.4%)
J	32 to 1400	(0 to 760)	②	(±2.2 or ±0.75%)	②	(±1.1 or ±0.4%)
K or N	32 to 2300	(0 to 1260)	②	(±2.2 or ±0.75%)	②	(±1.1 or ±0.4%)
R or S	32 to 2700	(0 to 1480)	②	(±1.5 or ±0.25%)	②	(±0.6 or ±0.1%)
T	32 to 700	(0 to 370)	②	(±1.0 or ±0.75%)	②	(±0.5 or ±0.4%)
E ^④	-328 to 32	(-200 to 0)	②	(±1.7 or ±1%)	②	⑤
K ^④	-328 to 32	(-200 to 0)	②	(±2.2 or ±2%)	②	⑤
T ^④	-328 to 32	(-200 to 0)	②	(±1.0 or ±1.5%)	②	⑤
Extension Wires ⑥ ⑦						
EX	32 to 400	(0 to 200)	±3.0	(±1.7)	±1.8	(±1.0)
JX	32 to 400	(0 to 200)	±4.0	(±2.2)	±2.0	(±1.1)
KX or NX	32 to 400	(0 to 200)	±4.0	(±2.2)	±2.0	(±1.1)
TX	32 to 200	(0 to 100)	±1.8	(±1.0)	±0.9	(±0.5)
Compensating Extension Wires ⑧ ⑨						
BX ^⑩	32 to 400	(0 to 200)	±7.6	(±4.2)	*	*
CX	32 to 500	(0 to 260)	±12.2	(±6.8)	*	*
RX, SX	32 to 400	(0 to 200)	±9.0	(±5.0)	*	*

① Tolerances in this table apply to new essentially homogeneous thermocouple wire, normally in the size range 0.25 to 3 mm in diameter (No. 30 to No. 8 AWG) and used at temperatures not exceeding the recommended limits on page 177. If used at higher temperatures these tolerances may not apply.

② At a given temperature that is expressed in °C, the tolerance expressed in °F is 1.8 times larger than the tolerance expressed in °C. Note: Wherever applicable, percentage-based tolerances must be computed from temperatures that are expressed in °C.

③ **Caution:** Users should be aware that certain characteristics of thermocouple materials, including the EMF vs. temperature relationship may change with time in use; consequently, test results and performance obtained at time of manufacture may not necessarily apply throughout an extended period of use. Tolerances given above apply only to new wire as delivered to the user *and do not allow for changes in characteristics with use*. The magnitude of such changes will depend on such factors as wire size, temperature, time of exposure and environment. It should be further noted that due to possible changes in homogeneity, attempting to recalibrate *used* thermocouples is likely to yield irrelevant results, and is not recommended. However, it may be appropriate to compare used thermocouples *in-situ* with new or known good ones to ascertain their suitability for further service under the conditions of the comparison.

④ Thermocouples and thermocouple materials are normally supplied to meet the tolerances specified in the table for temperatures above 0°C. The same materials, however, may not fall within the tolerances given for temperatures below 0°C in the second section of the table. If materials are required to meet the tolerances stated for temperatures below 0°C the purchase order must so state. Selection of materials usually will be required.

⑤ Special tolerances for temperatures below 0°C are difficult to justify due to limited available information. However, the following values for Types E and T thermocouples are suggested as a guide for discussion between purchaser and supplier: *Type E:* -200 to 0°C ±1.0°C or ±0.5% (whichever is greater); *Type T:* -200 to 0°C ±0.5 or ±0.8% (whichever is greater).

Initial values of tolerance for Type J thermocouples at temperatures below 0°C and special tolerances for Type K thermocouples below 0°C are not given due to the characteristics of the materials.

⑥ Tolerances in the table represent the maximum error contribution allowable from new and essentially homogeneous thermocouple extension wire when exposed to the full temperature range given above. Extension grade materials are not intended for use outside the temperature range shown.

⑦ Thermocouple extension wire makes a contribution to the total thermoelectric signal that is dependent upon the temperature difference between the extreme ends of the extension wire length. The actual magnitude of any error introduced into a measuring circuit by homogeneous and correctly connected extension wires is equal to the algebraic difference of the deviations at its two end temperatures, as determined for that extension wire pair.

⑧ Tolerances in the table apply to new and essentially homogeneous thermocouple compensating extension wire when used at temperatures within the range given above.

⑨ Thermocouple compensating extension wire makes a contribution to the total thermoelectric signal that is dependent upon the temperature difference between the extreme ends of the compensating extension wire length.

⑩ Special compensating extension wires are not necessary with Type B over the limited temperature range 32 to 125°F (0 to 50°C), where the use of non-compensated (copper/copper) conductors introduces no significant error. For a somewhat larger temperature gradient of 32 to 210°F (0 to 100°C) across the extension portion of the circuit, the use of non-compensated (copper/copper) extension wires may result in small errors, the magnitude of which will not exceed the tolerance values given in the table above for measurements above 1800°F (1000°C). Proprietary alloy compensating extension wire is available for use over 32 to 400°F (0 to 200°C) temperature range.

* Special tolerance grade compensating extension wires are not available.

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International Standards

SERV-RITE wire and cable complies with international standards and tolerances in both standard and special limits.

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 type of insulation 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 B, R and S the color codes relate to the compensating cable normally used. Additionally, various national and international standard agencies have adopted color codes for the identification of thermocouple wire and products. These generally differ from those used by ASTM E 230.

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
B (overall)	—	Grey	—	Grey	Grey	—
BP	—	+Grey	—	+Red	+Red	—
BN	—	-Red	—	-Grey	-White	—
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	—	—	—	—
NP	+Orange	+Orange	—	—	—	—
NN	-Red	-Red	—	—	—	—
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



See colored version on the inside back cover.

SERV-RITE Wire and Cable

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Technical Data

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Solid and Stranded Conductors

Thermocouple wire and extension wire are usually solid conductors. When greater flexibility is required, either may be ordered in stranded construction.

Stranded wire is specified when flexibility is a major concern. It is manufactured by using several smaller gauge strands grouped together to form the desired gauge size. This is accomplished by twisting the smaller gauge wires together. The twisting also adds to the flexibility of the wire.

The most widely used stranding combination consists of seven small strands. This yields a fairly round construction and allows the use of various connection systems that are designed for round solid wires. SERV-RITE wire's standard items use this seven strand construction.

While most stranded wire is specified for its flexibility, there is another less common reason for its use. When a very specific resistance is required, the stranded conductors allow "fine tuning" the finished conductor's resistance. By replacing fine wires with slightly larger wires, the conductor's resistance can be adjusted to within a few percent of any given target resistance.

When flexibility or resistance are of prime concern, SERV-RITE wire or cable can be designed for your particular application.

Conductor Sizes

Wire Size B & S Gauge	Solid		Stranded			
	Diameter		Diameter		Number of Strands	Strand Gauge
	inch	(mm)	inch	(mm)		
14	0.064	(1.630)	0.076	(1.930)	7	22
16	0.051	(1.290)	0.060	(1.520)	7	24
18	0.040	(1.020)	0.048	(1.220)	7	26
20	0.032	(0.813)	0.038	(0.965)	7	28
22	0.025	(0.635)	0.030	(0.762)	7	30
24	0.020	(0.508)	0.024	(0.610)	7	32
26	0.016	(0.406)				
28	0.013	(0.330)				
30	0.010	(0.254)				
32	0.008	(0.203)				
34	0.006	(0.152)				
36	0.005	(0.127)				

Ohms per Double Feet

The use of analog based instrumentation, make conductor resistance an important consideration in selecting the wire gauge best suited for your

application. The table below lists the nominal ohms per double feet for thermocouple and thermocouple extension wire. Ohms per double feet is the total resistance, in ohms, for both conductors, per foot.

Nominal Resistance for Thermocouple Alloys in Ohms per Double Feet at 20°C

B & S Gauge	Diameter		BX	CX*	E	J	K	N	RX,SX	T
	inch	(mm)								
2	0.258	(6.543)			0.011	0.006	0.009	0.012		
4	0.204	(5.189)			0.017	0.009	0.014	0.019		
6	0.162	(4.115)			0.028	0.014	0.023	0.030		
8	0.129	(3.264)			0.044	0.023	0.036	0.048		
10	0.102	(2.588)			0.070	0.036	0.058	0.077		
12	0.081	(2.053)	0.015	0.058	0.111	0.057	0.092	0.123	0.006	0.048
14	0.064	(1.630)	0.024	0.093	0.177	0.091	0.147	0.195	0.010	0.076
16	0.051	(1.290)	0.039	0.147	0.281	0.145	0.233	0.310	0.016	0.120
18	0.040	(1.020)	0.063	0.238	0.453	0.234	0.376	0.500	0.025	0.194
20	0.032	(0.813)	0.098	0.372	0.709	0.367	0.589	0.783	0.040	0.304
22	0.025	(0.645)	0.156	0.592	1.129	0.584	0.937	1.245	0.063	0.483
24	0.020	(0.508)	0.248	0.941	1.795	0.928	1.490	1.980	0.100	0.768
26	0.016	(0.406)	0.395	1.495	2.853	1.476	2.369	3.148	0.159	1.221
28	0.013	(0.320)	0.628	2.378	4.537	2.347	3.767	5.006	0.253	1.942
30	0.010	(0.254)	0.999	3.781	7.214	3.731	5.990	7.960	0.402	3.088
32	0.008	(0.203)	1.588	6.012	11.470	5.933	9.524	12.656	0.639	4.910
34	0.006	(0.152)	2.525	9.560	18.239	9.434	15.145	20.126	1.016	7.808
36	0.005	(0.127)	4.015	15.200	29.000	15.000	24.080	32.000	1.615	12.415
14 Stranded	0.076	(1.930)	0.022	0.085	0.161	0.083	0.134	0.178	0.009	0.069
16 Stranded	0.060	(1.520)	0.035	0.134	0.256	0.133	0.213	0.283	0.014	0.110
18 Stranded	0.048	(1.220)	0.056	0.214	0.408	0.211	0.338	0.450	0.023	0.174
20 Stranded	0.038	(0.965)	0.090	0.340	0.648	0.335	0.538	0.715	0.036	0.277
22 Stranded	0.030	(0.762)	0.143	0.540	1.031	0.533	0.856	1.137	0.057	0.441
24 Stranded	0.024	(0.610)	0.227	0.859	1.639	0.848	1.361	1.808	0.091	0.701

*Not an ASTM E 230 symbol

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How to Select Wire to Suit Your Requirements

The following information will acquaint you with some of the nomenclature involved with thermocouple wire and thermocouple extension wire. By spending a few minutes reading this information orders can be placed quickly and accurately.

Thermocouple Wire or Thermocouple Extension Wire

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

The most obvious difference is the color-code used to identify the wire itself. In most cases, thermocouple grade wire is identified by its overall brown color. The 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 when there is no overall covering as in SERV-RITE wire Series 505, 511 and 314.

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

This catalog lists certain specific insulations for thermocouple and extension grade wire. However, virtually any of SERV-RITE wire insulation systems can be applied to either thermocouple or extension wire.

The following explains the meanings of the terms used in the tables of this section.

Single Conductor Insulation

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

Duplex Conductor Insulation

This item lists the overall insulation when one is used. Some constructions which have no overall insulation use this area to describe the duplexing method—i.e. twisting, "ripcore", etc.

Temperature Rating

Most constructions are rated for both continuous use and for single reading applications. The continuous use temperature is considered to be the highest temperature at which that particular construction will survive indefinitely. The single reading temperature has been determined by actual tests. Each insulation system will perform differently when exposed to this temperature. Generally, the construction will perform at this temperature and produce an accurate reading. However, after exposure to this temperature, the wire will exhibit less flexibility and/or abrasion resistance. Because of this, it is unlikely that the wire could be removed from the application and then replaced after exposure to the "single reading temperature."

Recommended Upper Temperature Limit for Protected Thermocouple Wire

Thermocouple Type	No. 8 Gauge °F (°C)	No. 14 Gauge °F (°C)	No. 20 Gauge °F (°C)	No. 24 Gauge °F (°C)	No. 28 Gauge °F (°C)
E	1600 (870)	1200 (650)	1005 (540)	805 (430)	805 (430)
J	1400 (760)	1095 (590)	895 (480)	700 (370)	700 (370)
K and N	2300 (1260)	1995 (1090)	1795 (980)	1600 (870)	1600 (870)
T		700 (370)	500 (260)	395 (200)	395 (200)

Table courtesy of ASTM.

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How to Select Wire to Suit Your Requirements

Continued

ASTM E 230 Color Code

Generally, SERV-RITE wire has color codes wherever possible. The exceptions are the high temperature yarn constructions such as the 301 and 350 Series. Color coding of the 511 and 512 Series 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 the wire in the "as received" condition. In the case of fiberglass insulated wire, the moisture resistance is achieved by the use of 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 the fluoroplastics) and the polyimide insulated constructions will maintain their moisture resistance up to their "continuous" temperature rating.

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

UL® Listed PLTC Wire And Cable

Watlow Gordon offers UL® listed SERV-RITE thermocouple and extension wire and cable for PLTC (Power Limited Tray Cable) applications. The following insulation Series have these approvals:

- 502
- 507
- 509
- 510
- 900
- 1000

All these insulation Series have the following physical characteristics:

- UL® listed Type PLTC—300 Volt
- Passes IEEE 383 70,000 BTU/Hr flame test
- Passes VW-1 flame test
- UL® listed under Subject 13
- Non-propagating
- Flame retardant
- UV light resistant

How to Read SERV-RITE Wire Code Numbers

Product code numbers for SERV-RITE wire are made up of three sets of figures separated by slashes. These figures convey the following data:

- The first set consists of a letter and two numerals. The letter is the ASTM E 230 Type designation for wire type. The numerals signify the wire B&S gauge.
- The second set consists of a single number. For thermocouple wire, 1 indicates solid, while 3 indicates stranded. For extension wire, 5 indicates solid, while 7 indicates stranded. The use of ODD numbers also indicates that the wire is manufactured to Standard Tolerances. If Special

Tolerances are desired, this figure MUST be changed to the next higher EVEN digit when ordering.

- The third set consists of three numerals signifying SERV-RITE wire insulation type or "Series."

Example:

1 2 3 4 5 6 7
K 2 0 / 1 / 3 0 4

1. ASTM E 230 Letter Designation (Calibration)

2-3. B & S Gauge

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

5-7. Insulation Type (Series)

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Metallic Overbraids and Wraps

Continued

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. The following are the available overbraids and wraps.

Stainless Steel Wire Braid (S)

This, the most popular of the overbraids, uses 300 series stainless steel and is available on virtually all standard SERV-RITE wire offerings. It is an economical method of extending the life of thermocouple and extension wire. Several of our standard wire items are available from stock with a stainless overbraid. Non-stock items are available on a special order basis.

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's Series 350 the performance of the material is only surpassed by metal-sheathed cables. Consult 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 of our standard products use aluminized tapes as an intrinsic shield. However, when shielding is needed on other constructions, a tinned copper shield can be specified on special order.

Half Oval Galvanized Wrap and Stainless Steel Spiral Wrap (G) or (W)

Certain constructions are available with a spirally applied galvanized or stainless steel wrap. The wrap yields a tough mechanical coating that survives well in most outdoor applications. Consult factory for the availability on specific catalog items. To add a metallic overbraid or wrap, insert the letter designator as follows:

How to Select Wire

Code Number

1. ASTM E 230 Calibration^①

B J S
C* K T
E N

2-3. B & S Gauge

14 to 36

4. Conductor Type/Tolerance^②

- 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 Overbraids (optional)

S = Stainless steel
N = Alloy 600
C = Tinned copper

6-8. Insulation Series

Refer to Insulation chart below.

9-11. Color Code

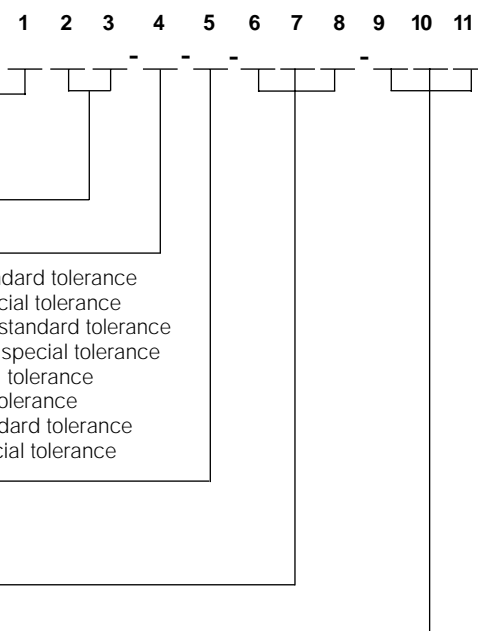
Blank = ASTM E 230 (formerly ANSI MC96.1)
BSC = BS 1843
DIN = DIN 43710
JIS = JIS C 1610-1981
IEC = IEC 584-3

*Not an ASTM E 230 symbol.

① Color coding will be to ASTM E 230 standards, unless specified.

② Stranded conductors will be seven strand constructions. Consult factory for other configurations.

Note: Product normally shipped in 1,000 foot spools. However, random lengths may be shipped, if not specified. Consult factory for special packaging.



Made-to-order

If you are unable to locate the stock SERV-RITE wire product that meets your unique application, Watlow Gordon can manufacture the exact wire product that does. With short lead times, Watlow Gordon can make-to-order any combination of wire type and insulation with metallic

overbraids, wraps or shielding, in designated standards. Simply review "How to Order," at the end of this section, define your requirements and call your Watlow representative to place your order and confirm specifications.

SERV-RITE Wire and Cable

Thermocouple and Thermocouple Extension Wire

Technical Data

Construction and Characteristics

The following table lists the available SERV-RITE wire insulation series for thermocouple and extension wire. Further construction and characteristic explanations are contained in the pages referenced in the extreme right column of this table.

Temperature Rating [®]		Series	Single Conductor		Duplex Conductors		ASTM Color Coded	Physical Properties			Notes	Page No.
Continuous	Single Reading		Insulation	Impregnation	Insulation	Impregnation		Abrasion Resistance	Moisture Resistance	Chemical Resistance		
Thermocouple and Thermocouple Extension Wire Constructions												
190°F (88°C)	190°F (80°C)	308-002	Double Cotton Wrap	—	Twisted, with Double Cotton Braid	Light Lacquer Coating	Yes	Fair	Fair	Poor		NA
220°F (105°C)	220°F (105°C)	502 or 502/UL	PVC	—	PVC	—	Yes	Good	Excellent	Good		195, 210
220°F (105°C)	220°F (105°C)	503	PVC	—	PVC Twisted W/Cotton	—	Yes	Good	Excellent	Good		NA
220°F (105°C)	220°F (105°C)	505	PVC	—	Ripcord	—	Yes	Good	Excellent	Good		197
220°F (105°C)	220°F (105°C)	510 or 510/UL	PVC	—	PVC Twisted	—	Yes	Good	Excellent	Good	Aluminum/ Polyester shield with Drain Wire	202, 212
220°F (105°C)	220°F (105°C)	900 or 900/UL	PVC	—	PVC Twisted/ Cabled	—	Yes	Good	Excellent	Good	Aluminum/ Polyester shield with Drain Wire	208, 213
220°F (105°C)	220°F (105°C)	1000 or 1000/UL	PVC	—	PVC Twisted/ Cabled	—	Yes	Good	Excellent	Good	Aluminum/ Polyester shield with Drain Wire [®]	209, 214
300°F (150°C)	300°F (150°C)	504	Nylon	—	Nylon	—	Yes	Excellent	Fair	Good	Overall Jacket is clear	196
300°F (150°C)	390°F (200°C)	514	Tefzel [®]	—	Tefzel [®]	—	Yes	Excellent	Excellent	Excellent		206
300°F (150°C)	390°F (200°C)	515	Tefzel [®]	—	Tefzel [®] Twisted	—	Yes	Excellent	Excellent	Excellent	Aluminum/ Polyester shield with Drain Wire	NA
400°F (204°C)	500°F (260°C)	506	FEP Extr.	—	FEP Extr.	—	Yes	Excellent	Excellent	Excellent		198
400°F (204°C)	500°F (260°C)	507 or 507/UL	FEP Extr.	—	FEP Extr.	—	Yes	Excellent	Excellent	Excellent		199, NA

CONTINUED

Tefzel[®] is a registered trademark of E.I. du Pont de Nemours & Company.

SERV-RITE Wire and Cable

Thermocouple and Thermocouple Extension Wire

Technical Data

Construction and Characteristics

Continued

Temperature Rating [®]		Series	Single Conductor		Duplex Conductors		ASTM Color Coded	Physical Properties			Notes	Page No.
Continuous	Single Reading		Insulation	Impregnation	Insulation	Impregnation		Abrasion Resistance	Moisture Resistance	Chemical Resistance		
Thermocouple and Thermocouple Extension Wire Constructions Continued												
400°F (204°C)	500°F (260°C)	509 or 509/UL	FEP Extr.	—	FEP Extr. Twisted	—	Yes	Excellent	Excellent	Excellent	Aluminum/ Polyester shield with Drain Wire	201, 211
400°F (204°C)	500°F (260°C)	1900	FEP Extr.	—	FEP Extr. Twisted/ Cabled	—	Yes	Excellent	Excellent	Excellent	Aluminum/ Polyester shield with Drain Wire	NA
400°F (204°C)	500°F (260°C)	2000	FEP Extr.	—	FEP Extr. Twisted/ Cabled	—	Yes	Excellent	Excellent	Excellent	Aluminum/ Polyester shield with Drain Wire [®]	NA
500°F (260°C)	600°F (315°C)	508	TFE Tape Fused	—	TFE Tape Fused	—	Yes	Good	Excellent	Excellent		200
500°F (260°C)	550°F (290°C)	516	PFA	—	PFA	—	Yes	Good	Excellent	Excellent		207
500°F (260°C)	550°F (290°C)	517	PFA	—	PFA Twisted	—	Yes	Good	Excellent	Excellent	Aluminum/ Polyester shield with Drain Wire	NA
550°F (290°C)	650°F (340°C)	155	Glass Braid	Modified Resin	SERVTEX [®] Braid	Modified Resin	Yes	Good	Good	Good	Impregnation retained to 400°F (204°C)	184
550°F (290°C)	650°F (340°C)	157	TFE Tape (not fused) Glass Braid	Modified Resin	SERVTEX Braid	Modified Resin	Yes	Good	Good	Good	Impregnation retained to 400°F (204°C); TFE good to 500°F (260°C)	185
600°F (315°C)	800°F (430°C)	511	Fused Polyimide Tape	—	None Twisted	—	Both legs have tracer	Excellent	Excellent	Excellent	FEP binder melts at approx. 500°F (260°C)	203

CONTINUED

SERV-RITE Wire and Cable

Thermocouple and Thermocouple Extension Wire

Technical Data

Construction and Characteristics

Continued

Temperature Rating [®]		Series	Single Conductor		Duplex Conductors		ASTM Color Coded	Physical Properties			Notes	Page No.
Continuous	Single Reading		Insulation	Impregnation	Insulation	Impregnation		Abrasion Resistance	Moisture Resistance	Chemical Resistance		
Thermocouple and Thermocouple Extension Wire Constructions Continued												
600°F (315°C)	800°F (430°C)	512	Fused Polyimide Tape	—	Fused Polyimide Tape	—	Both legs have tracer	Excellent	Excellent	Excellent	FEP binder melts at approx. 500°F (260°C)	204
600°F (315°C)	800°F (430°C)	513	Fused Polyimide Tape	—	Fused Polyimide Tape	—	Yes	Excellent	Excellent	Excellent	FEP binder melts at approx. 500°F (260°C)	205
900°F (480°C)	1000°F (540°C)	302	Double Glass Braid	Modified Resin	Glass Braid	Modified Resin	Yes	Good	Good	Good	Impregnation retained to 400°F (204°C)	187
900°F (480°C)	1000°F (540°C)	303	Enameled Conductors/ Glass Braid	Modified Resin	Glass Braid	Modified Resin	Yes	Fair	Good	Good	Impregnation retained to 400°F (204°C)	NA
900°F (480°C)	1000°F (540°C)	304	Glass Braid	Modified Resin	Glass Braid	Modified Resin	Yes	Fair	Good	Good	Impregnation retained to 400°F (204°C)	188
900°F (480°C)	1000°F (540°C)	305	Double Glass Wrap	Modified Resin	Glass Braid	Modified Resin	Yes	Fair	Good	Good	Impregnation retained to 400°F (204°C)	189
900°F (480°C)	1000°F (540°C)	306	Glass Braid	—	Glass Braid	—	No	Fair	Fair	Good		NA
900°F (480°C)	1000°F (540°C)	307	TFE Tape (not fused) TFE coated glass	—	TFE Coated Glass Braid	—	Yes	Good	Excellent	Excellent	TFE good to 500°F (260°C)	190
900°F (480°C)	1000°F (540°C)	313	Glass Braid	Modified Resin	Glass Braid	Modified Resin	Yes	Good	Good	Good	Impregnation retained to 400°F (204°C)	191

CONTINUED

SERV-RITE Wire and Cable

Thermocouple and Thermocouple Extension Wire

Technical Data

Construction and Characteristics

Continued

Temperature Rating ^①		Series	Single Conductor		Duplex Conductors		ASTM Color Coded	Physical Properties			Notes	Page No.
Continuous	Single Reading		Insulation	Impregnation	Insulation	Impregnation		Abrasion Resistance	Moisture Resistance	Chemical Resistance		
Thermocouple and Thermocouple Extension Wire Constructions Continued												
900°F (480°C)	1000°F (540°C)	315	Glass Braid	Modified Resin	Twisted	—	Yes	Good	Good	Good	Impregnation retained to 400°F (204°C)	NA
1300°F (705°C)	1600°F (870°C)	309	High Temp. Glass Braid	—	High Temp. Glass Braid	Modified Resin	Both legs have tracer	Good	Fair	Good	Impregnation retained to 400°F (204°C)	NA
1300°F (705°C)	1600°F (870°C)	311	High Temp. Glass Braid	—	High Temp. Glass Braid	Modified Resin	No	Fair	Fair	Good	Coating retained to 300°F (149°C)	NA
1300°F (705°C)	1600°F (870°C)	314	High Temp. Glass Braid	Modified Resin	Twisted	—	Yes	Good	Good	Good	Impregnation retained to 400°F (204°C)	192
1300°F (705°C)	1600°F (870°C)	321	High Temp. Glass Braid	Modified Resin	High Temp. Glass Braid	Modified Resin	Yes	Good	Good	Good	Impregnation retained to 400°F (204°C)	193
1800°F (980°C)	2000°F (1095°C)	301	Vitreous Silica Fiber	—	Vitreous Silica Fiber	—	No	Fair	Fair	Good		186
1800°F (980°C)	2000°F (1095°C)	365	Vitreous Silica Fiber	—	Vitreous Silica Fiber		No	Fair	Fair	Good		NA
2200°F (1205°C)	2600°F (1430°C)	350	Ceramic Fiber	—	Ceramic Fiber	—	No	Good	Fair	Good		194
2200°F (1205°C)	2600°F (1430°C)	355	Ceramic Fiber	—	Ceramic Fiber	—	No	Good	Fair	Good		NA
RTD Leadwire Constructions												
220°F (105°C)	220°F (105°C)	701	PVC	—	PVC	—	Yes**	Good	Excellent	Good	RTD Leadwire	215
400°F (204°C)	500°F (260°C)	704	FEP Extr.	—	FEP Extr. Twisted	—	Yes**	Excellent	Excellent	Excellent	RTD Leadwire	216
900°F (480°C)	1000°F (540°C)	705	Glass Braid	Modified Resin	Glass Braid	Modified Resin	Yes**	Fair	Good	Good	RTD Leadwire	217

^①Thermocouple extension grade wire is only calibrated up to 400°F (204°C).

^②Individual and overall

**Not an ASTM E 230 color code.

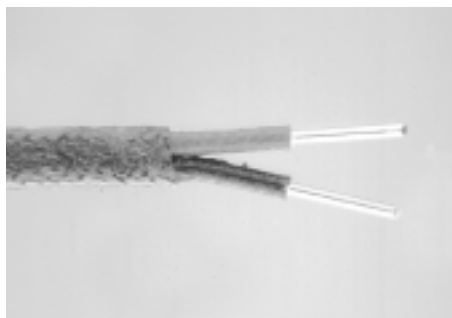


- K16/5/155
- K16/7/155

SERV-RITE Wire and Cable

SERVTEX Insulated Extension Wire

Series 155



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
550°F (290°C)	Good	Good	Good

The Series 155 is a tough wire especially suited to applications involving momentary contact with molten metals.

Conductors are insulated with braided fiberglass and then impregnated with a resin. Insulated conductors are then laid parallel and a SERVTEX braid is woven over them and a final impregnation is applied.

Construction Combinations

1. ASTM E 230 Calibrations

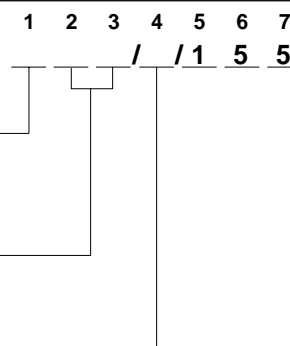
E N
J S
K T

2-3. B & S Gauge

20 16 14
20 stranded (7/28) 16 stranded (7/24) 14 stranded (7/22)

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



Performance Capabilities

- Continuous temperature rating: 550°F (290°C)
- Single reading: 650°F (340°C)

Features and Benefits

- **Braided fiberglass single conductor insulation** impregnated for moisture resistance.
- **SERVTEX braid duplex insulation** for superior abrasion resistance.
- **Impregnation retained to 400°F (204°C).**
- **ASTM E 230 color code** for easy identification.

- **Good abrasion and chemical resistance, good moisture resistance.**
- **Additional abrasion resistance** with optional stainless steel, tinned copper and alloy 600 wire overbraids, or flat stainless steel spiral and half oval galvanized steel spiral wraps.
- **Custom constructions available, consult factory.**

Applications

- Heat treating
- Steel and aluminum plants
- Glass, ceramic and brick manufacturing

Wire Specifications

B & S Gauge	Nominal Conductor Size		Nominal Insulation Thickness		Nominal Overall Size		Approximate Shipping Weight	
			Conductor	Overall				
	inches	(mm)	inches (mm)	inches (mm)	inches	(mm)	lbs/1000 ft	(kg/km)
20	0.032	(0.813)	0.015 (0.381)	0.030 (0.762)	0.136 X 0.178	(3.45 X 4.52)	15	(22.4)
20 S* (7/28)	0.038	(0.965)	0.015 (0.381)	0.030 (0.762)	0.144 X 0.196	(3.66 X 4.98)	16	(23.8)
16	0.051	(1.290)	0.015 (0.381)	0.030 (0.762)	0.158 X 0.226	(4.01 X 5.74)	29	(43.2)
16 S* (7/24)	0.060	(1.524)	0.015 (0.381)	0.030 (0.762)	0.170 X 0.244	(4.32 X 6.20)	31	(46.2)
14	0.064	(1.628)	0.015 (0.381)	0.030 (0.762)	0.180 X 0.252	(4.57 X 6.40)	40	(59.6)
14 S* (7/22)	0.076	(1.930)	0.015 (0.381)	0.030 (0.762)	0.205 X 0.270	(5.21 X 6.86)	46	(68.5)

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

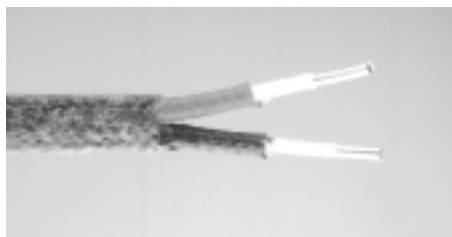


- K16/5/157
- S16/5/157

SERV-RITE Wire and Cable

SERVTEX and TFE Tape Extension Wire

Series 157



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
550°F (290°C)	Good	Good	Good

The Series 157 is an improved version of Series 155. The Series 157 uses tape over the conductors to improve moisture resistance.

The Series 157 conductors are first wrapped with a TFE tape, braided with fiberglass, and then impregnated with a resin. The insulated single conductors are then laid parallel and braided with SERVTEX yarn. The final coat is a resin impregnation.

The excellent abrasion resistance of the Series 157 can be further improved by the addition of metallic braids or wraps.

Construction Combinations

1. ASTM E 230 Calibrations

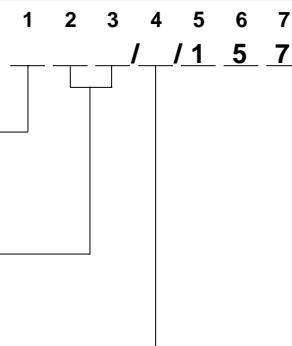
E N
J S
K T

2-3. B & S Gauge

20 16 14
20 stranded (7/28) 16 stranded (7/24) 14 stranded (7/22)

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



Performance Capabilities

- Continuous temperature rating: 550°F (290°C)
- Single reading: 650°F (340°C)

Features and Benefits

- **Non-fused TFE tape and braided fiberglass single conductor insulation** impregnated with modified resin to provide moisture resistance.
- **SERVTEX braid duplex insulation** impregnated for additional moisture resistance.
- **Impregnation retained to 400°F (204°C), TFE good to 500°F (260°C).**
- **ASTM E 230 color code** for easy identification.
- **Good abrasion, moisture and chemical resistance.**

- **Additional abrasion resistance** with optional stainless steel, tinned copper and alloy 600 wire overbraids, or flat stainless steel spiral and half oval galvanized steel spiral wraps.
- **Custom constructions available, consult factory.**

Applications

- Heat treating
- Steel and aluminum plants
- Glass, ceramic and brick manufacturing

Wire Specifications

B & S Gauge	Nominal Conductor Size inches (mm)		Nominal Insulation Thickness		Nominal Overall Size inches (mm)		Approximate Shipping Weight lbs/1000 ft (kg/km)	
			Conductor inches (mm)	Overall inches (mm)				
20	0.032	(0.813)	0.020 (0.508)	0.030 (0.762)	0.146 X 0.192	(3.71 X 4.87)	16	(23.8)
20 S* (7/28)	0.038	(0.965)	0.020 (0.508)	0.030 (0.762)	0.154 X 0.210	(3.91 X 5.33)	17	(25.3)
16	0.051	(1.290)	0.020 (0.508)	0.030 (0.762)	0.168 X 0.240	(4.27 X 6.10)	30	(44.7)
16 S* (7/24)	0.060	(1.524)	0.020 (0.508)	0.030 (0.762)	0.180 X 0.258	(4.57 X 6.55)	32	(47.7)
14	0.064	(1.628)	0.020 (0.508)	0.030 (0.762)	0.019 X 0.266	(4.83 X 6.76)	42	(62.6)
14 S (7/22)	0.076	(1.930)	0.025 (0.508)	0.030 (0.762)	0.225 X 0.302	(5.72 X 7.67)	48	(71.5)

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



- K20/1/301
- K20/2/301

SERV-RITE Wire and Cable

High Temperature Vitreous Silica Braided Thermocouple Wire

Series 301



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
1800°F (980°C)	Fair	Good	Fair

Series 301 uses vitreous silica yarn as the insulation on both the conductors and duplex. This yarn retains its flexibility after exposure to high temperatures.

The vitreous silica yarn's greater purity performs better at high temperatures than other fibrous glass products. Testing has indicated that "contamination" will compromise this material's upper use temperature. For this reason, our standard offering is supplied without color coding or impregnations.

For higher temperatures consider Series 350.

Construction Combinations

1. ASTM E 230 Calibrations

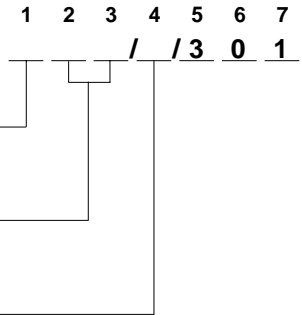
E K
J N

2-3. B & S Gauge

20 16
18

4. Conductor Type/Tolerance

- 1 = Thermocouple grade, solid wire, standard tolerances
2 = Thermocouple grade, solid wire, special tolerances



Performance Capabilities

- Continuous temperature rating: 1800°F (980°C)
- Single reading: 2000°F (1095°C)

Features and Benefits

- **Braided vitreous silica yarn* single conductor and duplex insulation** provides high temperature performance.
- **Good chemical resistance, fair abrasion and moisture resistance.**

- **Additional abrasion resistance** with optional stainless steel and alloy 600 wire overbraids.
- **Custom constructions available, consult factory.**

Applications

- Furnace survey work
- Heat treating load thermocouples

Wire Specifications

B & S Gauge	Nominal Conductor Size inches (mm)	Nominal Insulation Thickness	Nominal Overall Size inches (mm)	Approximate Shipping Weight lbs/1000 ft (kg/km)
		Conductor inches (mm)	Overall inches (mm)	
20	0.032 (0.813)	0.018 (0.457)	0.015 (0.381)	0.098 X 0.154 (2.49 X 3.91)
18	0.040 (1.020)	0.018 (0.457)	0.015 (0.381)	0.110 X 0.180 (2.79 X 4.57)
16	0.051 (1.290)	0.016 (0.406)	0.015 (0.381)	0.118 X 0.198 (3.00 X 5.03)

* Lack of binders or impregnations may cause insulation to "flower" when stripped.

SERV-RITE Wire and Cable

Fiberglass Double Braided Thermocouple and Extension Wire

Series 302



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
900°F (480°C)	Good	Good	Good

Series 302 is a heavy duty version of the popular Series 304. The construction uses a double fibrous glass braid over each single conductor. These double insulated single conductors are then laid parallel and covered with a braided glass. Each braid is impregnated to add abrasion resistance and minimize fraying of the fibrous glass. Due to additional layers of glass, this Series can be expected to survive longer and at higher temperatures than its single braided counterparts. For higher temperature applications consider Series 321.

Construction Combinations

1. ASTM E 230 Calibrations

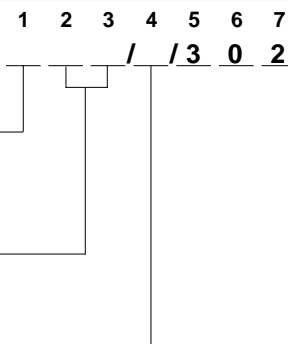
E N
J S
K T

2-3. B & S Gauge

24 20
24 stranded (7/32) 20 stranded (7/28)

4. Conductor Type/Tolerance

- 1 = Thermocouple grade, solid wire, standard tolerances
- 2 = Thermocouple grade, solid wire, special tolerances
- 3 = Thermocouple grade, stranded wire, standard tolerances
- 4 = Thermocouple grade, stranded wire, special tolerances
- 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



Performance Capabilities

- Continuous temperature rating: 900°F (480°C)
- Single reading: 1000°F (540°C)

Features and Benefits

- **Double fiberglass braid single conductor insulation** impregnated with modified resin to provide abrasion resistance.
- **Fiberglass braid duplex insulation** impregnated with modified resin for added abrasion resistance.
- **Impregnation retained to 400°F (204°C).**
- **ASTM E 230 color code** for easy identification.

- **Good abrasion, moisture and chemical resistance.**
- **Additional abrasion resistance** with optional stainless steel, tinned copper and alloy 600 wire overbraids.
- **Custom constructions available, consult factory.**

Applications

- Steel and aluminum plants
- Heat treating
- Foundries
- Glass, ceramic and brick plants
- Plastic processing equipment

Wire Specifications

B & S Gauge	Nominal Conductor Size inches (mm)	Nominal Insulation Thickness		Nominal Overall Size inches (mm)	Approximate Shipping Weight lbs/1000 ft (kg/km)
		Conductor inches (mm)	Overall inches (mm)		
24	0.020 (0.508)	0.008 (0.203)	0.006 (0.152)	0.048 X 0.084 (1.22 X 2.13)	7 (10.4)
24 S* (7/32)	0.024 (0.610)	0.008 (0.203)	0.006 (0.152)	0.054 X 0.094 (1.37 X 2.39)	7 (10.4)
20	0.032 (0.813)	0.008 (0.203)	0.006 (0.152)	0.060 X 0.108 (1.52 X 2.74)	10 (14.9)
20 S* (7/28)	0.038 (0.965)	0.008 (0.203)	0.006 (0.152)	0.068 X 0.122 (1.73 X 3.10)	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.

SERV-RITE Wire and Cable



- B20/5/304
- C24/5/304
- E20/1/304
- J20/1/304
- J20/2/304
- J20/3/304
- J20/1/S/304
- J20/3/S/304
- J24/1/304
- J24/2/304
- J24/3/304
- K20/1/304
- K20/2/304
- K20/3/304
- K20/1/S/304
- K20/3/S/304
- K24/1/304
- K24/2/304
- K24/3/304
- S24/5/304
- T20/1/304
- T24/1/304

Fiberglass Braided Thermocouple and Extension Wire

Series 304



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
900°F (480°C)	Good	Good	Fair

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 better moisture resistance, consider Series 307. For higher temperatures, consider Series 321. For better abrasion resistance, use Series 302 or choose an item with a stainless steel overbraid.

Construction Combinations

1. ASTM E 230 Calibrations

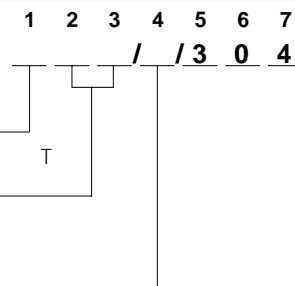
B C E J K N S T

2-3. B & S Gauge

30 24 20
28 24 stranded (7/32) 20 stranded (7/28)

4. Conductor Type/Tolerance

- 1 = Thermocouple grade, solid wire, standard tolerances
- 2 = Thermocouple grade, solid wire, special tolerances
- 3 = Thermocouple grade, stranded wire, standard tolerances
- 4 = Thermocouple grade, stranded wire, special tolerances
- 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



Performance Capabilities

- Continuous temperature rating: 900°F (480°C)
- Single reading: 1000°F (540°C)

Features and Benefits

- **Fiberglass braided single conductor and duplex insulation** impregnated with modified resin to enhance abrasion resistance.
- **Impregnation retained to 400°F (204°C).**
- **ASTM E 230 color code** for easy identification.
- **Good moisture and chemical resistance, fair abrasion resistance.**

- **Additional abrasion resistance** with optional stainless steel, tinned copper and alloy 600 wire overbraids, or flat stainless steel spiral wrap.
- **Custom constructions available, consult factory.**

Applications

- Steel and aluminum plants
- Heat treating
- Foundries
- Glass, ceramic and brick plants

Wire Specifications

B & S Gauge	Nominal Conductor Size inches (mm)	Nominal Insulation Thickness		Nominal Overall Size inches (mm)	Approximate Shipping Weight lbs/1000 ft (kg/km)
		Conductor inches (mm)	Overall inches (mm)		
30	0.010 (0.254)	0.007 (0.178)	0.008 (0.203)	0.043 X 0.064 (1.09 X 1.63)	3 (4.5)
28	0.013 (0.320)	0.007 (0.178)	0.008 (0.203)	0.043 X 0.070 (1.09 X 1.78)	3 (4.5)
24	0.020 (0.508)	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 (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)	0.056 X 0.096 (1.42 X 2.44)	9 (13.4)
20 S* (7/28)	0.038 (0.965)	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., "24 S (7/32)" is seven strands of 32 gauge wire to make a 24 gauge stranded conductor.



- J28/1/305
- J28/2/305
- J30/1/305
- J30/2/305
- K28/2/305
- K30/1/305
- K30/2/305

SERV-RITE Wire and Cable

Fiberglass Wrapped Thermocouple and Extension Wire

Series 305



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
900°F (480°C)	Good	Good	Fair

Series 305 is specifically constructed for light duty applications where size is a critical factor. The single conductors are insulated using a specialized yarn wrapped on the conductors in layers. This 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.

For applications where resistance to abrasion is important, consider Series 302 or choose an item with a stainless steel overbraid.

Construction Combinations

1. ASTM E 230 Calibrations

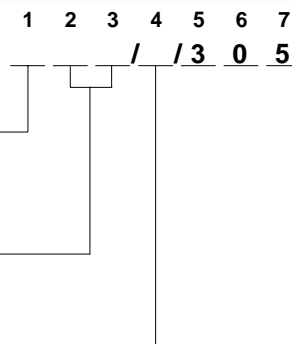
B	J	S
C	K	T
E	N	

2-3. B & S Gauge

30	24	20
28	24 stranded (7/32)	20 stranded (7/28)

4. Conductor Type/Tolerance

- 1 = Thermocouple grade, solid wire, standard tolerances
- 2 = Thermocouple grade, solid wire, special tolerances
- 3 = Thermocouple grade, stranded wire, standard tolerances
- 4 = Thermocouple grade, stranded wire, special tolerances
- 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



Performance Capabilities

- Continuous temperature rating: 900°F (480°C)
- Single reading: 1000°F (540°C)

Features and Benefits

- **Double fiberglass wrap single conductor insulation**, impregnated with modified resin to add abrasion resistance and enhance electrical properties.
- **Fiberglass braided duplex insulation** impregnated with modified resin to enhance abrasion resistance.
- **Impregnation retained to 400°F (204°C).**
- **ASTM E 230 color code** for easy identification.

- **Good chemical and moisture resistance, fair abrasion resistance.**

- **Additional abrasion resistance** with optional stainless steel, tinned copper and alloy 600 wire overbraids, or flat stainless steel spiral wrap.

- **Custom constructions available, consult factory.**

Applications

- Steel and aluminum plants
- Heat treating
- Foundries
- Glass, ceramic and brick plants

Wire Specifications

B & S Gauge	Nominal Conductor Size inches (mm)	Nominal Insulation Thickness		Nominal Overall Size inches (mm)	Approximate Shipping Weight lbs/1000 ft (kg/km)
		Conductor inches (mm)	Overall inches (mm)		
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.

SERV-RITE Wire and Cable

TFE Fiberglass with TFE Tape Thermocouple and Extension Wire Series 307



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
900°F (480°C)	Excellent	Excellent	Good

Series 307 is designed for applications where a possibility of moisture along the unheated portion exists. While fiberglass has little moisture resistance, the use of TFE tape on the conductors provides moisture protection—even after short term exposure to temperatures of 600°F (315°C).

The Series 307 is constructed by first wrapping each conductor with TFE tape. Each taped conductor is then braided with TFE impregnated fiberglass. The two insulated conductors are then laid parallel and braided again with TFE impregnated fiberglass. The final operation involves heating the entire construction to fuse the insulations.

When your application involves higher temperatures, specify Series 314 or 321.

Construction Combinations

1. ASTM E 230 Calibrations

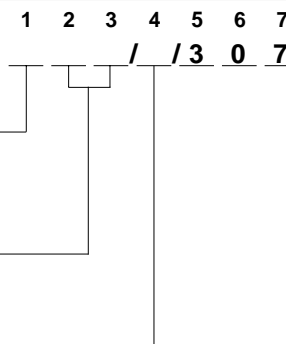
E N
J S
K T

2-3. B & S Gauge

24 16
20

4. Conductor Type/Tolerance

- 1 = Thermocouple grade, solid wire, standard tolerances
2 = Thermocouple grade, solid wire, special tolerances
3 = Thermocouple grade, stranded wire, standard tolerances
4 = Thermocouple grade, stranded wire, special tolerances
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



Performance Capabilities

- Continuous fiberglass temperature rating: 900°F (480°C)
- Continuous TFE temperature rating: 500°F (260°C)
- Single reading: 1000°F (540°C)

Features and Benefits

- **Non-fused TFE tape and TFE coated fiberglass single conductor insulation** provides excellent moisture and chemical resistance.
- **TFE coated fiberglass braid duplex insulation** adds to moisture and chemical resistance.
- **TFE retained to 600°F (315°C).**
- **ASTM E 230 color code** for easy identification.

- **Excellent moisture and chemical resistance, good abrasion resistance.**
- **Additional abrasion resistance with optional stainless steel,** tinned copper and alloy 600 wire overbraids, or flat stainless steel wrap.
- **Custom constructions available, consult factory.**

Applications

- Steel and aluminum plants
- Heat treating
- Foundries
- Glass, ceramic and brick plants

Wire Specifications

B & S Gauge	Nominal Conductor Size inches (mm)		Nominal Insulation Thickness		Nominal Overall Size inches (mm)	Approximate Shipping Weight lbs/1000 ft (kg/km)				
			Conductor inches (mm)	Overall inches (mm)						
24	0.020	(0.508)	0.012	(0.305)	0.006	(0.152)	0.060 X 0.096	(1.52 X 2.44)	9	(13.4)
20	0.032	(0.813)	0.012	(0.305)	0.006	(0.152)	0.072 X 0.118	(1.83 X 3.00)	12	(17.9)
16	0.051	(1.290)	0.012	(0.305)	0.006	(0.152)	0.085 X 0.158	(2.16 X 4.01)	24	(35.8)

SERV-RITE Wire and Cable



- J16/5/313
- K16/5/313

Heavy Duty Fiberglass Braided Thermocouple and Extension Wire

Series 313



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
900°F (480°C)	Good	Good	Good

Series 313 is designed to replace the popular Series 304 in applications requiring a tougher construction. The Series 313 uses a heavier duty fiberglass yarn than the Series 304. The additional yarn enhances abrasion resistance and cut-through resistance.

Each thermoelement is insulated with braided fiberglass and impregnated to improve abrasion resistance. The insulated single conductors are laid parallel and again braided with fiberglass. Finally, another layer of abrasion resistant impregnation is applied to the construction.

For higher temperatures, consider Series 314 or 321.

For better abrasion resistance, specify Series 302 or consider a metallic overbraid.

Construction Combinations

1. ASTM E 230 Calibrations

E N
J S
K T

2-3. B & S Gauge

20 18 16
20 stranded (7/28) 18 stranded (7/26) 16 stranded (7/24)

4. Conductor Type/Tolerance

- 1 = Thermocouple grade, solid wire, standard tolerances
- 2 = Thermocouple grade, solid wire, special tolerances
- 3 = Thermocouple grade, stranded wire, standard tolerances
- 4 = Thermocouple grade, stranded wire, special tolerances
- 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

1 2 3 4 5 6 7
/ / 3 1 3

Performance Capabilities

- Continuous temperature rating: 900°F (480°C)
- Single reading: 1000°F (540°C)

Features and Benefits

- **Thick fiberglass braid single conductor and duplex insulation** impregnated with modified resin for added abrasion resistance.
- **Impregnation retained to 400°F (204°C).**
- **ASTM E 230 color code** for easy identification.
- **Good abrasion, moisture and chemical resistance.**

Additional abrasion resistance

with optional stainless steel, tinned copper and alloy 600 wire overbraids, or flat stainless steel spiral wrap.

Custom constructions available, consult factory.

Applications

- Steel and aluminum plants
- Heat treating
- Foundries
- Glass, ceramic and brick plants

Wire Specifications

B & S Gauge	Nominal Conductor Size inches (mm)	Nominal Insulation Thickness		Nominal Overall Size inches (mm)	Approximate Shipping Weight lbs/1000 ft (kg/km)
		Conductor inches (mm)	Overall inches (mm)		
20	0.032 (0.813)	0.010 (0.254)	0.010 (0.254)	0.074 X 0.124 (1.88 X 3.15)	12 (17.9)
20 S* (7/28)	0.038 (0.965)	0.010 (0.254)	0.010 (0.254)	0.080 X 0.136 (2.03 X 3.45)	13 (19.4)
18	0.040 (1.02)	0.010 (0.254)	0.010 (0.254)	0.082 X 0.140 (2.08 X 3.56)	16 (23.8)
18 S* (7/26)	0.048 (1.22)	0.010 (0.254)	0.010 (0.254)	0.090 X 0.156 (2.29 X 3.96)	17 (25.3)
16	0.051 (1.29)	0.010 (0.254)	0.010 (0.254)	0.093 X 0.162 (2.36 X 4.11)	22 (32.8)
16 S* (7/24)	0.060 (1.52)	0.010 (0.254)	0.010 (0.254)	0.102 X 0.180 (2.59 X 4.57)	24 (35.8)

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



- J20/2/314
- K20/2/314

SERV-RITE Wire and Cable

High Temperature Fiberglass Twisted Thermocouple and Extension Wire

Series 314



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
1300°F (705°C)	Good	Good	Good

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 most any application.

Construction Combinations

1. ASTM E 230 Calibrations

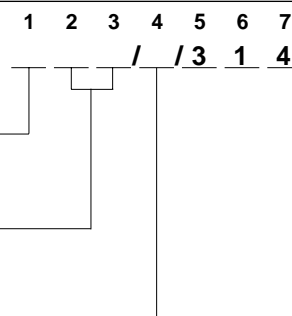
E K T
J N

2-3. B & S Gauge

24 18 14
20 16

4. Conductor Type/Tolerance

- 1 = Thermocouple grade, solid wire, standard tolerances
- 2 = Thermocouple grade, solid wire, special tolerances
- 3 = Thermocouple grade, stranded wire, standard tolerances
- 4 = Thermocouple grade, stranded wire, special tolerances
- 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



For better abrasion resistance, consider Series 321 or a metallic overbraid.

Consider Series 301 or 350 for higher temperatures.

Performance Capabilities

- Continuous temperature rating: 1300°F (705°C)
- Single reading: 1600°F (870°C)

Features and Benefits

- **High temperature fiberglass braid single conductor insulation** impregnated with modified resin for added abrasion resistance.
- **Impregnation retained to 400°F (204°C).**

- **Duplex construction via twisting single conductors.**
- **ASTM E 230 color code** for easy identification.
- **Good abrasion, moisture and chemical resistance.**
- **Additional abrasion resistance** with optional stainless steel, tinned copper and alloy 600 wire overbraids.
- **Custom constructions available, consult factory.**

Applications

- Heat treating load thermocouples
- Aluminum stress relieving
- Steel annealing

Wire Specifications

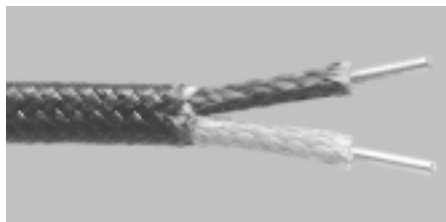
B & S Gauge	Nominal Conductor Size		Nominal Conductor Insulation Thickness		Nominal Overall Size		Approximate Shipping Weight	
	inches	(mm)	inches	(mm)	inches	(mm)	lbs/1000 ft	(kg/km)
24	0.020	(0.508)	0.015	(0.381)	0.100	(2.54)	6	(8.9)
20	0.032	(0.965)	0.015	(0.381)	0.124	(3.15)	10	(14.9)
18	0.040	(1.02)	0.018	(0.457)	0.152	(3.86)	16	(23.8)
16	0.051	(1.29)	0.018	(0.457)	0.174	(4.42)	21	(31.3)
14	0.064	(1.63)	0.018	(0.457)	0.200	(5.08)	32	(47.7)

SERV-RITE Wire and Cable



- J20/1/321
- J20/2/321
- K20/1/321
- K20/2/321

High Temperature Braided Fiberglass Thermocouple Wire Series 321



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
1300°F (705°C)	Good	Good	Good

The addition of color coding and impregnation to the high temperature fiberglass make this the logical next step for systems which have exceeded the temperature capabilities of 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.

The Series 321 is available with a full range of metallic coverings for improved abrasion resistance.

When the temperature of the application exceeds the rating of the Series 321, specify Series 301.

Construction Combinations

1. ASTM E 230 Calibrations

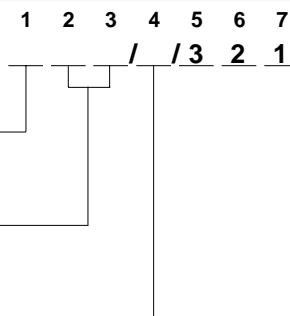
E K T
J N

2-3. B & S Gauge

24 18 14
20 16

4. Conductor Type/Tolerance

- 1 = Thermocouple grade, solid wire, standard tolerances
- 2 = Thermocouple grade, solid wire, special tolerances
- 3 = Thermocouple grade, stranded wire, standard tolerances
- 4 = Thermocouple grade, stranded wire, special tolerances
- 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



Performance Capabilities

- Continuous temperature rating: 1300°F (705°C)
- Single reading: 1600°F (870°C)

Features and Benefits

- **High temperature fiberglass braid single conductor and duplex insulation** impregnated with modified resin for added abrasion resistance.
- **Impregnation retained to 400°F (204°C).**
- **ASTM E 230 color code** for easy identification.
- **Good abrasion, moisture and chemical resistance.**

- **Additional abrasion resistance** with optional stainless steel, tinned copper and alloy 600 wire overbraids, or flat stainless steel spiral and half oval galvanized steel spiral wraps.

- **Custom constructions available, consult factory.**

Applications

- Steel and aluminum plants
- Heat treating

Wire Specifications

B & S Gauge	Nominal Conductor Size inches (mm)	Nominal Insulation Thickness		Nominal Overall Size inches (mm)	Approximate Shipping Weight lbs/1000 ft (kg/km)
		Conductor inches (mm)	Overall inches (mm)		
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)
16	0.051 (1.29)	0.015 (0.381)	0.010 (0.254)	0.100 X 0.174 (2.54 X 4.42)	25 (37.3)
14	0.064 (1.63)	0.015 (0.381)	0.010 (0.254)	0.114 X 0.200 (2.90 X 5.08)	34 (50.7)



- K20/1/350
- K20/2/350

SERV-RITE Wire and Cable

High Temperature Ceramic Fiber Thermocouple Wire Series 350



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
2200°F (1205°C)	Fair	Good	Good

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

While Series 350 can be manufactured to your specification, Watlow Gordon supplies standard Series 350 without color coding or impregnations.* This minimizes contaminating the pure ceramic fiber yarn. Laboratory testing indicates the

Construction Combinations

1. ASTM E 230 Calibrations

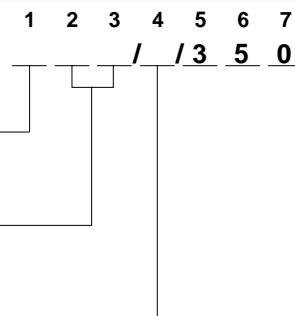
E K
J N

2-3. B & S Gauge

24 18 14
20 16

4. Conductor Type/Tolerance

- 1 = Thermocouple grade, solid wire, standard tolerances
2 = Thermocouple grade, solid wire, special tolerances
3 = Thermocouple grade, stranded wire, standard tolerances
4 = Thermocouple grade, stranded wire, special tolerances



introduction of even small amounts of impregnation can decrease the upper use temperature by as much as 1000°F (540°C). Watlow Gordon's processing assures the ceramic fiber yarn has the longest life and maximum operating temperature.

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

Performance Capabilities

- Continuous temperature rating: 2200°F (1205°C)
- Single reading: 2600°F (1430°C)

Features and Benefits

- **Ceramic fiber braid single conductor and duplex insulation;** no impregnation for contamination-free operation.
- **Good abrasion and chemical resistance, fair moisture resistance.**
- **Additional abrasion resistance** with optional stainless steel and alloy 600 wire overbraids.
- **Custom constructions available, consult factory.**

Applications

- Steel and aluminum plants
- Heat treating

Wire Specifications

B & S Gauge	Nominal Conductor Size inches (mm)	Nominal Insulation Thickness	Nominal Overall Size inches (mm)	Approximate Shipping Weight lbs/1000 ft (kg/km)
		Conductor inches (mm)	Overall inches (mm)	
24	0.020 (0.508)	0.016 (0.406)	0.016 (0.406)	0.088 X 0.132 (2.24 X 3.35)
20	0.032 (0.965)	0.016 (0.406)	0.016 (0.406)	0.100 X 0.154 (2.54 X 3.91)
18	0.040 (1.02)	0.016 (0.406)	0.016 (0.406)	0.108 X 0.170 (2.74 X 4.32)
16	0.051 (1.29)	0.016 (0.406)	0.016 (0.406)	0.119 X 0.192 (3.02 X 4.88)
14	0.064 (1.63)	0.016 (0.406)	0.016 (0.406)	0.132 X 0.218 (3.35 X 5.54)

*Because this insulation has no binders or impregnations, it may "flower" when stripped.

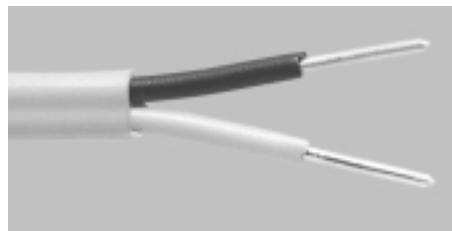
SERV-RITE Wire and Cable



- E20/5/502
- J16/5/502
- J20/5/502
- J20/7/502
- K16/5/502
- K20/5/502
- K20/7/502
- S20/5/502
- T20/5/502
- T20/7/502

PVC Insulated Thermocouple and Extension Wire

Series 502



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
220°F (105°C)	Excellent	Excellent	Excellent

Series 502 is an economical wire that's also available in UL® listings for PLTC (Power Limited Tray Cable) applications.

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

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

Performance Capabilities

- Continuous temperature rating: 220°F (105°C)

Construction Combinations

1. ASTM E 230 Calibrations

B	J	S
C	K	T
E	N	

2-3. B & S Gauge

24	18	14
24 stranded (7/32)	18 stranded (7/26)	14 stranded (7/22)
20	16	
20 stranded (7/28)	16 stranded (7/24)	

4. Conductor Type/Tolerance

- 1 = Thermocouple grade, solid wire, standard tolerances
- 2 = Thermocouple grade, solid wire, special tolerances
- 3 = Thermocouple grade, stranded wire, standard tolerances
- 4 = Thermocouple grade, stranded wire, special tolerances
- 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

1 2 3 4 5 6 7
/ / 5 0 2

Features and Benefits

- **Extruded PVC single conductor and duplex insulation** for excellent moisture resistance.
- **Available as UL® Listed PLTC Wire and Cable.**
- **ASTM E 230 color code** for easy identification.
- **Excellent moisture resistance, good abrasion and chemical resistance.**
- **Additional abrasion resistance** with optional stainless steel and tinned copper wire overbraids.

- **Custom constructions available, consult factory.**

Applications

- Laboratories
- Industrial equipment testing
- Automotive

Wire Specifications

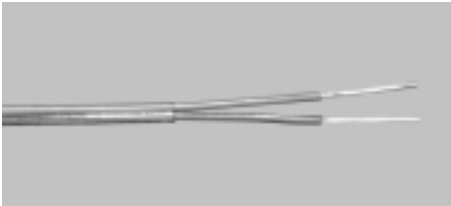
B & S Gauge	Nominal Conductor Size inches (mm)	Nominal Insulation Thickness		Nominal Overall Size inches (mm)		Approximate Shipping Weight lbs/1000 ft (kg/km)	
24	0.020	(0.508)	0.015 (0.381)	0.015 (0.381)	0.080 X 0.130 (2.03 X 3.30)	10	(14.9)
24 S* (7/32)	0.024	(0.610)	0.015 (0.381)	0.015 (0.381)	0.084 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)
18	0.040	(1.02)	0.020 (0.508)	0.020 (0.508)	0.120 X 0.200 (3.05 X 5.08)	21	(31.3)
18 S* (7/26)	0.048	(1.22)	0.020 (0.508)	0.020 (0.508)	0.128 X 0.216 (3.25 X 5.49)	23	(34.3)
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)
14	0.064	(1.628)	0.020 (0.508)	0.025 (0.635)	0.144 X 0.248 (3.66 X 6.30)	44	(65.6)
14 S* (7/22)	0.076	(1.930)	0.020 (0.508)	0.025 (0.635)	0.166 X 0.282 (4.22 X 7.16)	48	(71.5)

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

SERV-RITE Wire and Cable

Nylon Insulated Thermocouple Wire

Series 504



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
300°F (150°C)	Fair	Good	Excellent

The Series 504 is a construction that permits reduced amounts of insulation material to produce a rugged, compact wire.

Primary and duplex insulation is extruded nylon that performs continuously at 300°F (150°C). Single conductors are color coded for easy installation.

Series 504 can be easily stripped using hand tools or mechanical methods.

Construction Combinations



Performance Capabilities

- Continuous temperature rating: 300°F (150°C)

Features and Benefits

- **Extruded nylon single conductor and duplex insulation** for exceptional protection.
- **Resistant to chemicals and hydrocarbons**
- **Overall insulation jacket is clear** to ease identification.
- **ASTM E 230 color code** for easy identification.

- **Excellent abrasion resistance, good chemical resistance and fair moisture resistance.**
- **Additional abrasion resistance** with optional stainless steel and tinned copper wire overbraids.
- **Custom constructions available, consult factory.**

Applications

- Laboratories
- Test stands
- Food processing

Wire Specifications

B & S Gauge	Nominal Conductor Size inches (mm)	Nominal Insulation Thickness		Nominal Overall Size inches (mm)		Approximate Shipping Weight lbs/1000 ft (kg/km)	
24	0.020	(0.508)	0.008 (0.203)	0.004 (0.102)	0.044 X 0.080 (1.12 X 2.03)	6	(8.9)
20	0.032	(0.813)	0.008 (0.203)	0.008 (0.203)	0.064 X 0.112 (1.63 X 2.84)	11	(16.4)



- J24/1/505
- J24/2/505
- K24/1/505
- K24/2/505
- T24/1/505
- T24/2/505

SERV-RITE Wire and Cable

PVC Insulated "RIPCORDER" Thermocouple and Extension Wire

Series 505



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
220°F (105°C)	Excellent	Good	Good

The Series 505 is the most economical wire produced. Unlike some competitive "ripcored" 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 "ripcored" using a proprietary process.

The 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.

Construction Combinations

1. ASTM E 230 Calibrations

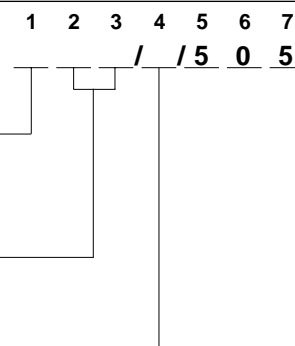
B	J	S
C	K	T
E	N	

2-3. B & S Gauge

26	24	20
	24 stranded (7/32)	20 stranded (7/28)

4. Conductor Type/Tolerance

- 1 = Thermocouple grade, solid wire, standard tolerances
- 2 = Thermocouple grade, solid wire, special tolerances
- 3 = Thermocouple grade, stranded wire, standard tolerances
- 4 = Thermocouple grade, stranded wire, special tolerances
- 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



For higher temperature applications or enhanced abrasion resistance, consider a fluoroplastic insulated construction such as the Series 507 or 508.

Performance Capabilities

- Continuous temperature rating: 220°F (105°C)

Features and Benefits

- **Extruded PVC single conductor insulation** with fused (ripcored) duplex construction for easy separation and stripping.
- **ASTM E 230 color code** for easy identification.

- **Excellent moisture resistance, good abrasion and chemical resistance.**
- **Additional abrasion resistance** with optional stainless steel and tinned copper wire overbraids.
- **Custom constructions available, consult factory.**

Applications

- Laboratories
- Test stands
- Automotive

Wire Specifications

B & S Gauge	Nominal Conductor Size		Nominal Conductor Insulation Thickness		Nominal Overall Size		Approximate Shipping Weight	
	inches	(mm)	inches	(mm)	inches	(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)
24 S* (7/32)	0.024	(0.610)	0.015	(0.381)	0.054 X 0.104	(1.37 X 2.64)	6	(8.9)
20	0.032	(0.813)	0.015	(0.381)	0.062 X 0.120	(1.57 X 3.05)	10	(14.9)
20 S* (7/28)	0.038	(0.965)	0.015	(0.381)	0.068 X 0.132	(1.73 X 3.35)	11	(16.4)

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



- J30/2/506
- K30/2/506
- T30/2/506

SERV-RITE Wire and Cable

Small Gauge FEP Insulated Thermocouple and Extension Wire

Series 506



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
400°F (204°C)	Excellent	Excellent	Excellent

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 ease of installation. Its small size allows use in high density circuits. Response time is minimized by small diameter conductors. Series 506 is available only in gauge sizes of #26 and smaller. For gauge sizes larger than #26 specify Series 507.

Construction Combinations

1. ASTM E 230 Calibrations

E	N
J	S
K	T

2-3. B & S Gauge

36	30
32	28

4. Conductor Type/Tolerance

- 1 = Thermocouple grade, solid wire, standard tolerances
- 2 = Thermocouple grade, solid wire, special tolerances
- 3 = Thermocouple grade, stranded wire, standard tolerances
- 4 = Thermocouple grade, stranded wire, special tolerances
- 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

1 2 3 4 5 6 7
/ / 5 0 6

Performance Capabilities

- Continuous temperature rating: 400°F (204°C)
- Single reading: 500°F (260°C)

Features and Benefits

- **Extruded FEP single conductor and duplex insulation** for excellent protection.
- **ASTM E 230 color code** for easy identification.
- **Excellent abrasion, moisture and chemical resistance.**

- **Additional abrasion resistance** with optional stainless steel and tinned copper wire overbraids.
- **Custom constructions available, consult factory.**

Applications

- Industrial equipment testing

Wire Specifications

B & S Gauge	Nominal Conductor Size inches (mm)	Nominal Insulation Thickness		Nominal Overall Size inches (mm)		Approximate Shipping Weight lbs/1000 ft (kg/km)	
36	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)	0.028 X 0.046 (0.711 X 1.17)	2	(3.0)
30	0.010	(0.254)	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)	0.033 X 0.056 (0.838 X 1.42)	3	(4.5)

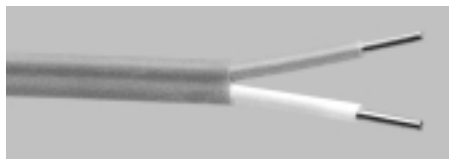
SERV-RITE Wire and Cable



- C24/5/507
- E20/1/507
- J20/1/507
- J20/2/507
- J20/3/507
- J20/5/507
- J24/1/507
- J24/2/507
- J24/3/507
- K20/1/507
- K20/2/507
- K20/3/507
- K20/5/507
- K24/1/507
- K24/2/507
- K24/3/507
- S20/5/507
- T20/1/507
- T20/2/507
- T20/3/507
- T24/2/507

FEP Insulated Thermocouple and Extension Wire

Series 507



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
400°F (204°C)	Excellent	Excellent	Excellent

The Series 507 is the most economical fluoroplastic insulated wire. Series 507 is also available as UL® listed PLTC. 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 temperature rating of 500°F (260°C). Abrasion, moisture and chemical resistance are far in excess of most other insulations.

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

Construction Combinations

1. ASTM E 230 Calibrations

B C E J K N S T

2-3. B & S Gauge

24	20	16
24 stranded (7/32)	20 stranded (7/28)	16 stranded (7/24)
22	18	
22 stranded (7/30)	18 stranded (7/26)	

4. Conductor Type/Tolerance

- 1 = Thermocouple grade, solid wire, standard tolerances
- 2 = Thermocouple grade, solid wire, special tolerances
- 3 = Thermocouple grade, stranded wire, standard tolerances
- 4 = Thermocouple grade, stranded wire, special tolerances
- 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

For higher abrasion resistance consider Tefzel® insulated constructions, the Series 514.

For higher temperatures specify Series 508 or 516.

Performance Capabilities

- Continuous temperature rating: 400°F (204°C)
- Single reading: 500°F (260°C)

Features and Benefits

- **Extruded FEP single conductor and duplex insulation** for excellent protection.

- **Available as UL® listed PLTC wire and cable.**
- **ASTM E 230 color code** for easy identification.
- **Excellent abrasion, moisture and chemical resistance.**
- **Additional abrasion resistance** with optional stainless steel and tinned copper wire overbraids.
- **Custom constructions available, consult factory.**

Applications

- Aerospace
- Industrial equipment testing

Wire Specifications

B & S Gauge	Nominal Conductor Size inches (mm)	Nominal Insulation Thickness		Nominal Overall Size inches (mm)	Approximate Shipping Weight lbs/1000 ft (kg/km)
		Conductor inches (mm)	Overall inches (mm)		
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)
16	0.051 (1.29)	0.008 (0.203)	0.012 (0.305)	0.091 X 0.162 (2.31 X 4.11)	28 (41.7)
16 S* (7/24)	0.060 (1.52)	0.008 (0.203)	0.012 (0.305)	0.100 X 0.186 (2.54 X 4.72)	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.

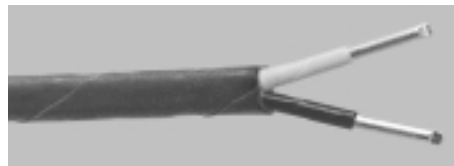
SERV-RITE Wire and Cable



- J20/1/508
- J20/2/508
- J24/1/508
- J24/2/508
- K20/1/508
- K20/2/508
- K24/1/508
- K24/2/508
- T20/2/508
- T24/1/508
- T24/2/508

TFE Tape Insulated Thermocouple and Extension Wire

Series 508



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
500°F (260°C)	Excellent	Excellent	Good

The primary and duplex insulation of Series 508 is fused TFE tape. The tape 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's necessary to remove the outer tape while leaving the primary insulation intact.

Construction Combinations

1. ASTM E 230 Calibrations

B	C	E	J	K	N	S	T
26		20		16			
		20 stranded (7/28)		16 stranded (7/24)			
24		18					
24 stranded (7/32)		18 stranded (7/26)					

4. Conductor Type/Tolerance

- 1 = Thermocouple grade, solid wire, standard tolerances
- 2 = Thermocouple grade, solid wire, special tolerances
- 3 = Thermocouple grade, stranded wire, standard tolerances
- 4 = Thermocouple grade, stranded wire, special tolerances
- 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

When higher temperature capabilities are required, specify polyimide insulated constructions: Series 511, 512 or 513.

For improved abrasion resistance, consider Series 514 or a stainless steel overbraid.

Performance Capabilities

- Continuous temperature rating: 500°F (260°C)
- Single reading: 600°F (315°C)

Features and Benefits

- **Fused TFE tape single conductor and duplex insulation** to eliminate concentricity problems.

- **ASTM E 230 color code** for easy identification.
- **Excellent moisture and chemical resistance, good abrasion resistance.**
- **Additional abrasion resistance** with optional stainless steel and tinned copper wire overbraids.
- **Custom constructions available, consult factory.**

Applications

- Aircraft composite bonding
- Petroleum plants

Wire Specifications

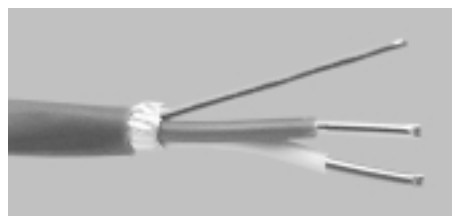
B & S Gauge	Nominal Conductor Size inches (mm)	Nominal Insulation Thickness		Nominal Overall Size inches (mm)	Approximate Shipping Weight lbs/1000 ft (kg/km)
		Conductor inches (mm)	Overall inches (mm)		
26	0.016 (0.406)	0.006 (0.152)	0.008 (0.203)	0.044 X 0.072 (1.12 X 1.83)	4 (6.0)
24	0.020 (0.508)	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)
16	0.051 (1.29)	0.010 (0.254)	0.008 (0.203)	0.087 X 0.158 (2.21 X 4.01)	25 (37.3)
16 S* (7/24)	0.060 (1.52)	0.010 (0.254)	0.008 (0.203)	0.096 X 0.176 (2.44 X 4.47)	27 (40.2)

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

SERV-RITE Wire and Cable

FEP Insulated and Shielded Thermocouple and Extension Wire

Series 509



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
400°F (204°C)	Excellent	Excellent	Excellent

The Series 509 was developed especially for use with microprocessor based systems. Series 509 is also available as UL® listed PLTC.

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

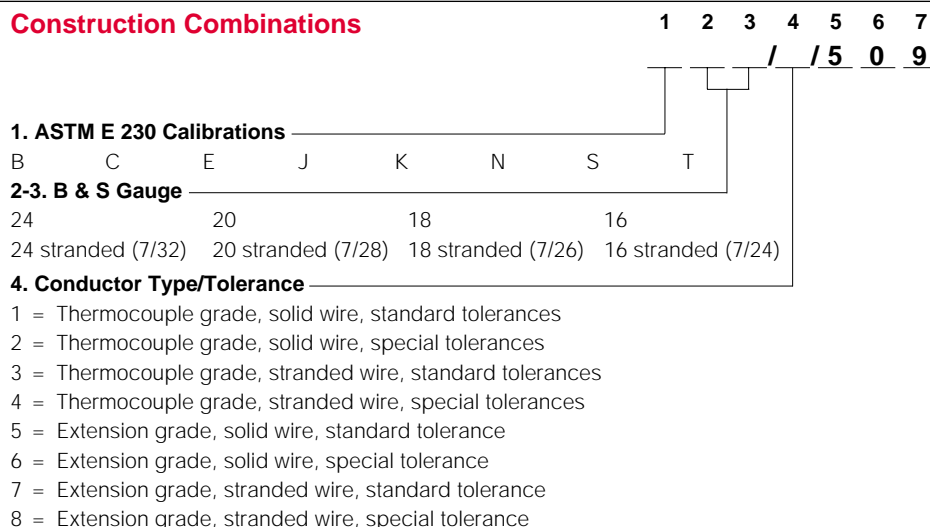
The finished construction can withstand temperatures in excess of 400°F (204°C). Twisted conductors minimize EMI and the taped shield eliminates most problems associated with AC "noise."

When better abrasion resistance is required, specify an overall metallic braid.



- J16/5/509
- J20/1/509
- J20/5/509
- K16/5/509
- K20/1/509
- K20/2/509
- K20/5/509
- T20/1/509

Construction Combinations



Performance Capabilities

- Continuous temperature rating: 400°F (204°C)
- Single reading: 500°F (260°C)

Features and Benefits

- **Extruded FEP single conductor insulation** for excellent protection.
- **Twisted; extruded FEP overall duplex insulation** to minimize electrical interference.
- **Available as UL® listed PLTC wire and cable.**
- **Aluminum/polyester shield with drain wire** reduces electrical noise.
- **ASTM E 230 color code** for easy identification.

- **Excellent abrasion, moisture and chemical resistance.**
- **Additional abrasion resistance** with optional stainless steel and tinned copper wire overbraids.
- **Custom constructions available, consult factory.**

Applications

- Aerospace
- Industrial equipment testing
- Glass manufacture

Wire Specifications

B & S Gauge	Nominal Conductor Size inches (mm)	Nominal Insulation Thickness		Nominal Overall Size inches (mm)		Approximate Shipping Weight lbs/1000 ft (kg/km)	
		Conductor inches (mm)	Overall inches (mm)				
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)		

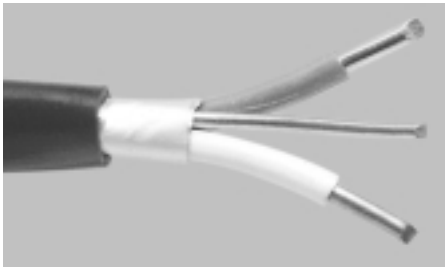
* "S" denotes stranded wire: e.g., "24 S (7/32)" is seven strands of 32 gauge wire to make a 24 gauge stranded conductor.

SERV-RITE Wire and Cable



- E20/5/510
- J16/5/510
- J20/5/510
- J20/7/510
- K16/5/510
- K20/5/510
- K20/7/510
- S20/5/510
- T16/5/510
- T20/5/510

PVC Insulated and Shielded Thermocouple and Extension Wire Series 510



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
220°F (105°C)	Excellent	Good	Good

The Series 510 is a PVC insulated, twisted and shielded construction for systems sensitive to induced voltages and "noise." Series 510 is also available as UL® listed PLTC.

The conductors are insulated with color coded PVC. The next operation twists the two insulated conductors with a copper drain wire. An aluminum polyester tape is wrapped around the wires to impart 100 per cent shielding. Lastly, another layer of PVC is applied.

Construction Combinations

1. ASTM E 230 Calibrations

B	E	K	S
C	J	N	T

2-3. B & S Gauge

24	20	18
24 stranded (7/32)	20 stranded (7/28)	18 stranded (7/26)
16	14	
16 stranded (7/24)	14 stranded (7/22)	

4. Conductor Type/Tolerance

- 1 = Thermocouple grade, solid wire, standard tolerances
- 2 = Thermocouple grade, solid wire, special tolerances
- 3 = Thermocouple grade, stranded wire, standard tolerances
- 4 = Thermocouple grade, stranded wire, special tolerances
- 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

The twisting eliminates most EMI while the shield tape minimizes AC "noise."

For higher temperatures specify Series 509. For improved abrasion resistance consider a metallic overbraid.

Performance Capabilities

- Continuous temperature rating: 220°F (105°C)

Features and Benefits

- **Extruded PVC single conductor insulation** for excellent protection.

- **Twisted; extruded PVC overall duplex insulation.**
- **Available in UL® PLTC.**
- **Aluminum/polyester shield with drain wire.**
- **ASTM E 230 color code.**
- **Excellent moisture resistance, good abrasion and chemical resistance.**
- **Additional abrasion resistance** with optional stainless steel and tinned copper wire overbraids.
- **Custom constructions available, consult factory.**

Wire Specifications

B & S Gauge	Nominal Conductor Size inches (mm)		Nominal Insulation Thickness		Nominal Overall Size inches (mm)		Approximate Shipping Weight lbs/1000 ft (kg/km)			
			Conductor inches (mm)	Overall inches (mm)						
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)
14	0.064	(1.63)	0.020	(0.508)	0.025	(0.635)	0.258	(6.55)	55	(82.0)
14 S* (7/22)	0.076	(1.93)	0.020	(0.508)	0.025	(0.635)	0.282	(7.16)	58	(86.4)

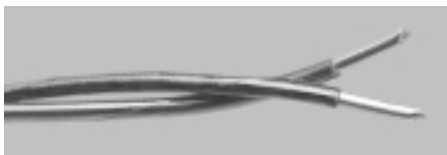
* "S" denotes stranded wire: e.g., "24 S (7/32)" is seven strands of 32 gauge wire to make a 24 gauge stranded conductor.



SERV-RITE Wire and Cable

Polyimide Insulated and Twisted Thermocouple and Extension Wire

Series 511



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
600°F (315°C)	Excellent	Excellent	Excellent

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

The 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 final operation is twisting the insulated conductors into a duplex construction, thereby eliminating the overall duplex insulation and minimizing cost.

Construction Combinations

1. ASTM E 230 Calibrations

E K T
J N

2-3. B & S Gauge

30 24 20 16
24 stranded (7/32) 20 stranded (7/28)

4. Conductor Type/Tolerance

- 1 = Thermocouple grade, solid wire, standard tolerances
- 2 = Thermocouple grade, solid wire, special tolerances
- 3 = Thermocouple grade, stranded wire, standard tolerances
- 4 = Thermocouple grade, stranded wire, special tolerances
- 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

The Series 512 and 513 use additional polyimide insulation and should be specified when better abrasion resistance is required.

For higher temperatures, consider our fiberglass insulated constructions.

If heavier insulation is needed, refer to Series 512.

Performance Capabilities

- Continuous temperature rating: 600°F (315°C)
- Single reading: 800°F (430°C)

Features and Benefits

- **Fused polyimide tape*** single conductor insulation for excellent protection.
- **Duplex construction via twisted single conductors.**

- **Both legs have ASTM E 230 color coded tracers** for easy identification.
- **Excellent abrasion, moisture and chemical resistance.**
- **Additional abrasion resistance** with optional stainless steel and tinned copper wire overbraids.
- **Custom constructions available, consult factory.**

Applications

- Petrochemical plants
- Glass, ceramic and brick manufacturing
- Electric power plants
- Cryogenic applications
- Aerospace industry

Wire Specifications

B & S Gauge	Nominal Conductor Size		Nominal Insulation Thickness		Nominal Overall Size		Approximate Shipping Weight	
			Conductor					
	inches	(mm)	inches	(mm)	inches	(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)
16	0.051	(1.29)	0.005	(0.127)	0.122	(3.10)	19	(28.3)

* FEP laminate melts at approximately 500°F (260°C). Polyimide tape film may be either Kapton® from E.I. du Pont de Nemours & Company, or Apical® from Allied.

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



- J20/1/512
- J20/3/512
- K20/3/512

SERV-RITE Wire and Cable

Polyimide Insulated Thermocouple and Extension Wire

Series 512



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
600°F (315°C)	Excellent	Excellent	Excellent

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". However, 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.

Construction Combinations

	1	2	3	4	5	6	7
				/	/	5	1 2
1. ASTM E 230 Calibrations							
E							
K							
T							
J							
N							
2-3. B & S Gauge							
30	24		20		16		
	24 stranded (7/32)		20 stranded (7/28)		16 stranded (7/24)		
4. Conductor Type/Tolerance							
1 = Thermocouple grade, solid wire, standard tolerances							
2 = Thermocouple grade, solid wire, special tolerances							
3 = Thermocouple grade, stranded wire, standard tolerances							
4 = Thermocouple grade, stranded wire, special tolerances							
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							

Performance Capabilities

- Continuous temperature rating: 600°F (315°C)
- Single reading: 800°F (430°C)

Features and Benefits

- **Fused polyimide tape* single conductor and duplex insulation** for excellent protection.
- **Both legs have ASTM E 230 color coded tracers** for easy identification.
- **Excellent abrasion, moisture and chemical resistance.**
- **Additional abrasion resistance** with optional stainless steel and tinned copper wire overbraids.

- **Custom constructions available, consult factory.**

Applications

- Petrochemical plants
- Glass, ceramic and brick manufacturing
- Electric power plants
- Cryogenic applications
- Aerospace industry

Wire Specifications

B & S Gauge	Nominal Conductor Size inches (mm)	Nominal Insulation Thickness		Nominal Overall Size inches (mm)	Approximate Shipping Weight 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)
16	0.051 (1.29)	0.005 (0.127)	0.005 (0.127)	0.071 X 0.132 (1.80 X 3.35)	19 (28.3)
16 S** (7/24)	0.060 (1.52)	0.005 (0.127)	0.005 (0.127)	0.084 X 0.148 (2.134 X 3.760)	21 (31.3)

* FEP laminate melts at approximately 500°F (260°C). Polyimide tape film may be either Kapton® from E.I. du Pont de Nemours & Company, or Apical® from Allied.

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

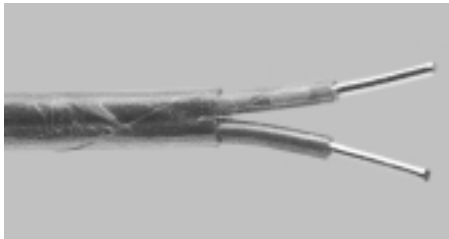


- J20/2/513
- J24/2/513
- K20/2/513
- K24/2/513
- K30/2/513

SERV-RITE Wire and Cable

Double Polyimide Insulated Thermocouple and Extension Wire

Series 513



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
600°F (315°C)	Excellent	Excellent	Excellent

The Series 513 is the ultimate polyimide insulated wire. The toughness of multiple polyimide tape layers along with fully color coded conductors make this insulation system the choice for high reliability circuits. Abrasion, moisture and chemical resistance are all enhanced by additional layers of tape and application of polyimide varnish.

The actual construction consists of a double polyimide tape layer applied to each conductor. The tape is fused by heating. Each insulated single conductor is then coated to impart the proper color code. Finally, the insulated conductors are laid parallel and covered by a double, heat fused layer of polyimide tape.

Construction Combinations

1. ASTM E 230 Calibrations

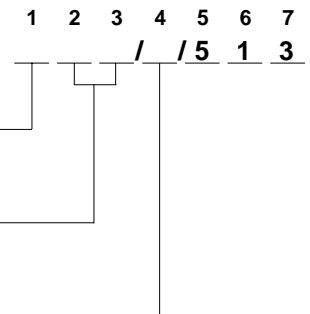
E K T
J N

2-3. B & S Gauge

30 24 20
 24 stranded (7/32) 20 stranded (7/28)

4. Conductor Type/Tolerance

- 1 = Thermocouple grade, solid wire, standard tolerances
- 2 = Thermocouple grade, solid wire, special tolerances
- 3 = Thermocouple grade, stranded wire, standard tolerances
- 4 = Thermocouple grade, stranded wire, special tolerances
- 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



When applications require higher heat resistance, it is necessary to specify fiberglass insulation.

For applications requiring better abrasion resistance, specify a metallic overbraid.

Performance Capabilities

- Continuous temperature rating: 600°F (315°C)
- Single reading: 800°F (430°C)

Features and Benefits

- **Fused polyimide tape* single conductor insulation** color coded with polyimide enamel for excellent protection.
- **Fused polyimide tape* duplex insulation** for additional protection.

- **Both conductors have ASTM E 230 color code** for easy identification.
- **Excellent abrasion, moisture and chemical resistance.**
- **Additional abrasion resistance** with optional stainless steel and tinned copper wire overbraids.
- **Custom constructions available consult factory.**

Applications

- Petrochemical plants
- Glass, ceramic and brick manufacturing
- Electric power plants
- Cryogenic applications
- Aerospace industry

Wire Specifications

B & S Gauge	Nominal Conductor Size inches (mm)	Nominal Insulation Thickness		Nominal Overall Size inches (mm)	Approximate Shipping Weight lbs/1000 ft (kg/km)
		Conductor inches (mm)	Overall inches (mm)		
30	0.010 (0.254)	0.006 (0.152)	0.006 (0.152)	0.038 X 0.058 (0.97 X 1.47)	3 (4.5)
24	0.020 (0.508)	0.006 (0.152)	0.006 (0.152)	0.054 X 0.076 (1.37 X 1.93)	5 (7.5)
24 S** (7/32)	0.024 (0.610)	0.006 (0.152)	0.006 (0.152)	0.056 X 0.084 (1.42 X 2.13)	6 (8.9)
20	0.032 (0.813)	0.006 (0.152)	0.006 (0.152)	0.065 X 0.100 (1.65 X 2.54)	10 (14.9)
20S** (7/28)	0.038 (0.965)	0.006 (0.152)	0.006 (0.152)	0.070 X 0.112 (1.78 X 2.84)	11 (16.4)

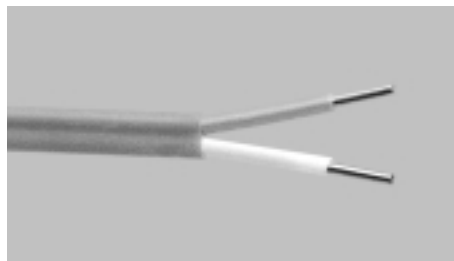
* FEP laminate melts at approximately 500°F (260°C). Polyimide tape film may be either Kapton® from E.I. du Pont de Nemours & Company, or Apical® from Allied.

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

SERV-RITE Wire and Cable

Tefzel® Insulated Thermocouple and Extension Wire

Series 514



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
300°F (150°C)	Excellent	Excellent	Excellent

The Series 514 for applications requiring a higher cut-through resistance than is typically available with the other fluoroplastics. The Tefzel® insulation retains the chemical resistance associated with fluoroplastics but has enhanced physical properties. Its temperature rating, while not as high as the other fluoroplastics, is far higher than nylon or PVC.

The construction consists of bare conductors insulated with a color coded layer of extruded Tefzel®. The insulated conductors are then laid parallel and covered with another layer of Tefzel®.

Construction Combinations

1. ASTM E 230 Calibrations

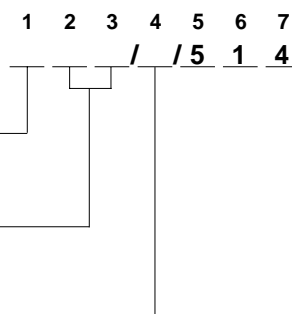
B	E	K	S
C	J	N	T

2-3. B & S Gauge

24	20	16
24 stranded (7/32)	20 stranded (7/28)	16 stranded (7/24)

4. Conductor Type/Tolerance

- 1 = Thermocouple grade, solid wire, standard tolerances
- 2 = Thermocouple grade, solid wire, special tolerances
- 3 = Thermocouple grade, stranded wire, standard tolerances
- 4 = Thermocouple grade, stranded wire, special tolerances
- 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



Performance Capabilities

- Continuous temperature rating: 300°F (150°C)
- Single reading: 390°F (200°C)

Features and Benefits

- **Extruded Tefzel® (ETFE) single conductor and duplex insulation** for excellent protection.
- **ASTM E 230 color code** for easy identification.
- **Excellent abrasion, moisture and chemical resistance.**

- **Additional abrasion resistance** with optional stainless steel and tinned copper wire overbraids.
- **Custom constructions available, consult factory.**

Applications

- Petrochemical plants
- Power generating plants

Wire Specifications

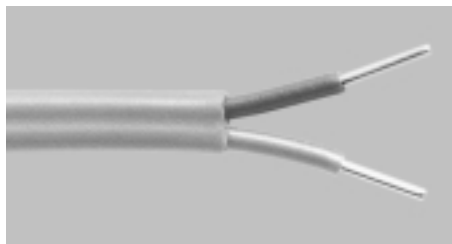
B & S Gauge	Nominal Conductor Size		Nominal Insulation Thickness		Nominal Overall Size	Approximate Shipping Weight				
			Conductor	Overall						
	inches	(mm)	inches	(mm)	inches	(mm)	lbs/1000 ft	(kg/km)		
24	0.020	(.0508)	0.010	(.0254)	0.010	(.0254)	0.060 X 0.100	(1.52 X 2.54)	9	(13.4)
24 S* (7/32)	0.024	(.0610)	0.010	(.0254)	0.010	(.0254)	0.064 X 0.108	(1.63 X 2.74)	10	(14.9)
20	0.032	(.0813)	0.010	(.0254)	0.012	(.0305)	0.076 X 0.128	(1.93 X 3.25)	12	(17.9)
20 S* (7/28)	0.038	(.0965)	0.010	(.0254)	0.012	(.0305)	0.082 X 0.140	(2.08 X 3.56)	13	(19.4)
16	0.051	(1.29)	0.010	(.0254)	0.012	(.0305)	0.095 X 0.166	(2.41 X 4.22)	26	(38.7)
16 S* (7/24)	0.060	(1.52)	0.010	(.0254)	0.012	(.0305)	0.104 X 0.184	(2.64 X 4.67)	28	(41.7)

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

SERV-RITE Wire and Cable

PFA Insulated Thermocouple and Extension Wire

Series 516



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
500°F (260°C)	Excellent	Excellent	Good

A relatively new fluoroplastic, PFA, is the insulation on 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 food 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 again coated with PFA.

Construction Combinations

1. ASTM E 230 Calibrations

B	E	K	S
C	J	N	T

2-3. B & S Gauge

36	30	24	20	16
		24 stranded (7/32)	20 stranded (7/28)	16 stranded (7/24)

4. Conductor Type/Tolerance

- 1 = Thermocouple grade, solid wire, standard tolerances
- 2 = Thermocouple grade, solid wire, special tolerances
- 3 = Thermocouple grade, stranded wire, standard tolerances
- 4 = Thermocouple grade, stranded wire, special tolerances
- 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

For improved abrasion resistance, the Series 516 can be supplied with a metallic braid or wrap.

For higher temperature applications, specify polyimide insulated wire constructions, Series 511, 512, or 513.

Performance Capabilities

- Continuous temperature rating: 500°F (260°C)
- Single reading: 550°F (290°C)

Features and Benefits

- **Extruded PFA single conductor and duplex insulation** for added protection.
- **ASTM E 230 color code** for easy identification.

- **Excellent, moisture and chemical resistance, good abrasion resistance.**
- **Additional abrasion resistance** with optional stainless steel and tinned copper wire overbraids.
- **Custom constructions available, consult factory.**

Applications

- Food processing facilities
- Petrochemical plants

Wire Specifications

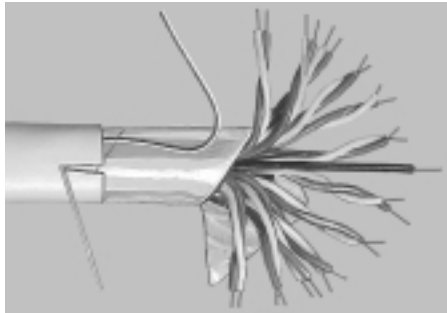
B & S Gauge	Nominal Conductor Size inches (mm)	Nominal Insulation Thickness		Nominal Overall Size inches (mm)	Approximate Shipping Weight lbs/1000 ft (kg/km)
		Conductor inches (mm)	Overall inches (mm)		
36	0.005 (0.127)	0.003 (0.076)	0.003 (0.076)	0.017 X 0.028 (0.432 X 0.711)	2 (3.0)
30	0.010 (0.254)	0.003 (0.076)	0.003 (0.076)	0.022 X 0.038 (0.559 X 0.965)	3 (4.5)
24	0.020 (0.508)	0.008 (0.203)	0.010 (0.254)	0.056 X 0.092 (1.42 X 2.34)	8 (11.9)
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)	9 (13.4)
20	0.032 (0.813)	0.008 (0.203)	0.010 (0.254)	0.068 X 0.116 (1.73 X 2.95)	12 (17.9)
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)	14 (20.9)
16	0.051 (1.29)	0.010 (0.254)	0.012 (0.305)	0.095 X 0.166 (2.41 X 4.22)	27 (40.2)
16 S* (7/24)	0.060 (1.52)	0.010 (0.254)	0.012 (0.305)	0.104 X 0.184 (2.64 X 4.67)	29 (43.2)

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

SERV-RITE Wire and Cable

PVC Insulated Multi-Pair Extension Wire with Overall Shield

Series 900



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
220°F (105°C)	Excellent	Good	Good

Series 900 is the classification for our family of overall shielded multipair cables. Series 900 is also available in UL® listings for PLTC (Power Limited Tray Cable) applications.

Series 900 cable starts by insulating conductors with 220°F (105°C) PVC. For identification, one conductor of each pair is numbered and twisted with its counterpart. These "twisted pairs" are cabled with an additional insulated copper wire for communication use. The entire cable is wrapped with clear polyester tape to

Construction Combinations

1. ASTM E 230 Calibrations

E K T
J S

2-3. B & S Gauge

24 20 18 16

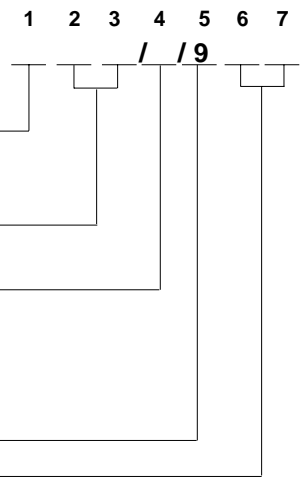
4. Conductor Type/Tolerance

- 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

5. Series 900

6-7. Pair Counts

02 04 06 08 10 12 16 20 24



minimize the chance of short circuits to the cable's shield. An aluminized polyester tape shield is then spirally applied. A copper drain wire and heavy ripcord are longitudinally applied under the final jacket of color coded PVC.

For higher temperatures, contact our factory. Multipair constructions, using FEP, Tefzel®, polyimide and fiberglass can be made to meet specific requirements in quantities of not less than 1000 feet (305 m). Specifications should accompany any request for quotation.

Performance Capabilities

- Continuous temperature rating: 220°F (105°C)

Features and Benefits

- **Extruded PVC single conductor and overall insulation.**
- **Available in UL® PLTC.**
- **Aluminum/polyester shield with drain wire** provides "noise" protection.
- **ASTM E 230 color code.**
- **Excellent moisture resistance, good abrasion and chemical resistance.**

Wire Specifications

No. of Pairs	B & S Gauge	Nominal Conductor Size		Nominal Insulation Thickness		Nominal Overall Size		Approximate Shipping Weight	
				Conductor	Overall				
		inches	(mm)	inches (mm)	inches (mm)	inches	(mm)	lbs/1000 ft	(kg/km)
2	20	0.032	(0.813)	0.015 (0.381)	0.050 (1.27)	0.290	(7.37)	72	(107.3)
4	20	0.032	(0.813)	0.015 (0.381)	0.050 (1.27)	0.350	(8.89)	94	(140.1)
6	20	0.032	(0.813)	0.015 (0.381)	0.050 (1.27)	0.405	(10.29)	116	(172.8)
8	20	0.032	(0.813)	0.015 (0.381)	0.050 (1.27)	0.440	(11.18)	140	(208.6)
10	20	0.032	(0.813)	0.015 (0.381)	0.050 (1.27)	0.490	(12.45)	164	(244.4)
12	20	0.032	(0.813)	0.015 (0.381)	0.060 (1.52)	0.535	(13.59)	188	(280.1)
16	20	0.032	(0.813)	0.015 (0.381)	0.060 (1.52)	0.610	(15.49)	240	(357.6)
20	20	0.032	(0.813)	0.015 (0.381)	0.060 (1.52)	0.650	(16.51)	292	(435.1)
24	20	0.032	(0.813)	0.015 (0.381)	0.060 (1.52)	0.710	(18.03)	344	(512.6)

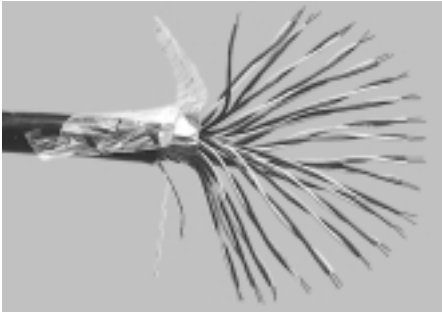


- J20/5/1004
- K20/5/1004
- T20/5/1004
- J20/5/1008
- K20/5/1008
- T20/5/1008

SERV-RITE Wire and Cable

PVC Insulated Multi-Pair Extension Wire with Individual and Overall Shield

Series 1000



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
220°F (105°C)	Excellent	Good	Good

Series 1000 is the classification for our extensive family of individually shielded and isolated multipair cables. Series 1000 is also available in UL® listings for PLTC (Power Limited Tray Cable) applications. Series 1000 cables are manufactured the same as Series 900 cables except each pair is spirally wrapped with an aluminized polyester tape and a drain wire. This isolates each pair of conductors in the cable. This eliminates both internal and external "noise" that can exist in a circuit.

Construction Combinations

1. ASTM E 230 Calibrations

E J K S T

2-3. B & S Gauge

24 20 18 16

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

5-6. Series 1000

7-8. Pair Counts

02 04 06 08 10 12 16 20 24

These individual pairs are then cabled together and finished the same way as the Series 900 cables. These cables are ideal for computerized data communications.

For higher temperature versions of Series 1000, please contact our factory. Special multipair constructions, using FEP, Tefzel®, polyimide and fiberglass can be manufactured to meet specific requirements or specifications in quantities of not less than 1000 feet (305 m). Specifications should accompany any request for quotation.

Performance Capabilities

- Continuous temperature rating: 220°F (105°C)

Features and Benefits

- **Extruded PVC single conductor and overall insulation** for excellent protection.
- **Available as UL® listed PLTC wire and cable.**
- **Aluminum/polyester shield with drain wire** provides "noise" protection.
- **ASTM E 230 color code** for easy identification.
- **Excellent moisture resistance, good abrasion and chemical resistance.**

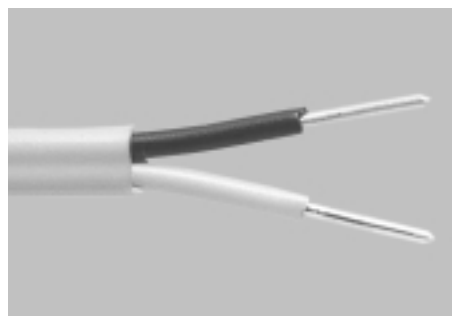
Wire Specifications

No. of Pairs	B & S Gauge	Nominal Conductor Size		Nominal Insulation Thickness		Nominal Overall Size		Approximate Shipping Weight	
				Conductor	Overall				
		inches	(mm)	inches (mm)	inches (mm)	inches	(mm)	lbs/1000 ft	(kg/km)
2	20	0.032	(0.813)	0.015 (0.381)	0.050 (1.27)	0.305	(7.75)	77	(114.7)
4	20	0.032	(0.813)	0.015 (0.381)	0.050 (1.27)	0.385	(9.78)	104	(155.0)
6	20	0.032	(0.813)	0.015 (0.381)	0.050 (1.27)	0.445	(11.30)	131	(195.2)
8	20	0.032	(0.813)	0.015 (0.381)	0.050 (1.27)	0.490	(12.45)	160	(238.4)
10	20	0.032	(0.813)	0.015 (0.381)	0.050 (1.52)	0.560	(14.22)	189	(281.6)
12	20	0.032	(0.813)	0.015 (0.381)	0.050 (1.52)	0.610	(15.49)	218	(324.8)
16	20	0.032	(0.813)	0.015 (0.381)	0.050 (1.52)	0.640	(16.26)	280	(417.2)
20	20	0.032	(0.813)	0.015 (0.381)	0.050 (1.52)	0.710	(18.03)	342	(509.6)
24	20	0.032	(0.813)	0.015 (0.381)	0.050 (1.52)	0.805	(20.45)	404	(602.0)

SERV-RITE Wire and Cable

PVC Insulated 300V UL® Listed PLTC Extension Wire

UL® Series 502



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
220°F (105°C)	Excellent	Good	Good

UL® Series 502 is an economical wire available in UL® listings for PLTC (Power Limited Tray Cable) applications.

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

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

Construction Combinations

Construction Combinations				1	2	3	4	5	6	7	8	9
							/	/5	0	2/U	L	
1. ASTM E 230 Calibrations												
E	N											
J	S											
K	T											
2-3. B & S Gauge												
20	18			16								
20 stranded (7/28)	18 stranded (7/28)			16 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											

Performance Capabilities

- Continuous temperature rating: 220°F (105°C)

Features and Benefits

- **UL® listed Type PLTC—300 volt.**
- **Listed under UL® Subject 13, File Number E116321.**
- **Extruded PVC single conductor and duplex insulation** for excellent moisture resistance.
- **Passes IEEE 383 70,000 BTU/hour flame test.**
- **Passes VW-1 flame test.**
- **Non-propagating.**

- **UV light resistant.**

- **ASTM E 230 color code** for easy identification.
- **Excellent moisture resistance, good abrasion and chemical resistance.**
- **Additional abrasion resistance** with optional stainless steel and tinned copper wire overbraids.
- **Custom constructions available, consult factory.**

Applications

- Laboratories
- Industrial equipment
- Hydrocarbon processing plants
- Automotive

Wire Specifications

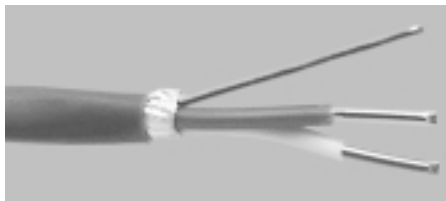
B & S Gauge	Nominal Conductor Size inches (mm)	Nominal Insulation Thickness		Nominal Overall Size inches (mm)	Approximate Shipping Weight lbs/1000 ft (kg/km)
		Conductor inches (mm)	Overall inches (mm)		
20	0.032 (0.813)	0.015 (0.381)	0.035 (0.889)	0.132 X 0.194 (3.35 X 4.93)	23 (34.3)
20 S* (7/28)	0.038 (0.965)	0.015 (0.381)	0.035 (0.889)	0.138 X 0.206 (3.50 X 5.23)	25 (37.3)
18	0.040 (1.02)	0.020 (0.508)	0.035 (0.889)	0.158 X 0.230 (3.81 X 5.48)	31 (46.2)
18 S* (7/26)	0.048 (1.22)	0.020 (0.508)	0.035 (0.889)	0.158 X 0.246 (4.01 X 6.25)	32 (47.7)
16	0.051 (1.29)	0.020 (0.508)	0.035 (0.889)	0.161 X 0.252 (4.09 X 6.40)	38 (56.6)
16 S* (7/24)	0.060 (1.52)	0.020 (0.508)	0.035 (0.889)	0.170 X 0.270 (4.32 X 6.86)	40 (59.6)

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

SERV-RITE Wire and Cable

FEP Insulated with Shield and Drain 300V UL® Listed PLTC Extension Cable

UL® Series 509



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
400°F (204°C)	Excellent	Excellent	Excellent

The Series 509 UL® is one of a family of constructions developed especially for use with microprocessor based systems. Series 509 UL® has UL® listings for PLTC (Power Limited Tray Cable) applications.

The conductors are first insulated with color coded FEP. The conductors are then twisted with a copper drain wire. An aluminized polyester tape is wrapped around the two conductors and drain wire. Finally, an FEP layer is applied over the taped conductors.

The finished construction can withstand temperatures in excess of 400°F (204°C). The twisted conductors minimizes electromagnetic interference and the taped shield

Construction Combinations

	1	2	3	4	5	6	7	8	9
				/	/5	0	9	/U	L
1. ASTM E 230 Calibrations									
E	N								
J	S								
K	T								
2-3. B & S Gauge									
20	16								
20 stranded (7/28)	16 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								

eliminates most problems associated with AC "noise" in the sensing circuit.

When better abrasion resistance is required, specify an overall metallic braid.

Performance Capabilities

- Continuous temperature rating: 400°F (204°C)
- Single reading: 500°F (260°C)

Features and Benefits

- **Extruded FEP single conductor insulation** for excellent protection.
- **Twisted; extruded FEP overall duplex insulation** to minimize electrical interference.
- **UL® listed Type PLTC—300 volt.**
- **Listed under UL® Subject 13, File Number E116321.**
- **Passes IEEE 383 70,000 BTU/hour flame test.**

- **Passes VW-1 flame test.**
- **Non-propagating.**
- **UV light resistant.**
- **Aluminum/polyester shield with drain wire** reduces electrical noise.
- **ASTM E 230 color code** for easy identification.
- **Excellent abrasion, moisture and chemical resistance.**
- **Additional abrasion resistance** with optional stainless steel and tinned copper wire overbraids.
- **Custom constructions available, consult factory.**

Applications

- Aerospace
- Industrial equipment
- Glass manufacture
- Chemical plants

Wire Specifications

B & S Gauge	Nominal Conductor Size inches (mm)	Nominal Insulation Thickness		Nominal Overall Size inches (mm)		Approximate Shipping Weight lbs/1000 ft (kg/km)	
		Conductor inches (mm)	Overall inches (mm)				
20	0.032 (0.813)	0.008 (0.203)	0.018 (0.457)	0.142 (3.61)		22 (32.8)	
20 S* (7/28)	0.038 (0.965)	0.008 (0.203)	0.018 (0.457)	0.158 (3.91)		24 (35.8)	
16	0.051 (1.29)	0.008 (0.203)	0.018 (0.457)	0.180 (4.57)		38 (56.6)	
16 S* (7/24)	0.060 (1.52)	0.008 (0.203)	0.018 (0.457)	0.198 (5.03)		41 (61.1)	

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

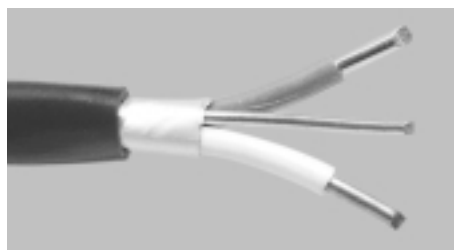
SERV-RITE Wire and Cable



- J16/5/510/UL®
- J20/5/510/UL®
- K16/5/510/UL®
- K20/5/510/UL®

PVC Insulated and Shielded 300V UL® Listed PLTC Extension Cable

UL® Series 510



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
220°F (105°C)	Excellent	Good	Good

The UL® Series 510 is UL® listed for PLTC (Power Limited Tray Cable) applications. It's an economical PVC insulated, twisted and shielded construction for microprocessor based systems and others that are sensitive to induced voltages and "noise."

The conductors are first insulated with color coded PVC. The next operation consists of twisting the two insulated conductors with a copper drain wire. An aluminized polyester tape is then wrapped around the wires to impart 100 percent shielding. Lastly, another layer of PVC is applied.

The twisting eliminates most electro-magnetic interference while the shield tape minimizes AC "noise" interference.

Construction Combinations

Construction Combinations			1	2	3	4	5	6	7	8	9
						/	/ 5	1	0 / U	L	
1. ASTM E 230 Calibrations											
E	N										
J	S										
K	T										
2-3. B & S Gauge											
20	18	16									
20 stranded (7/28)	18 stranded (7/28)	16 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											

For improved abrasion resistance consider a metallic overbraid.

Performance Capabilities

- Continuous temperature rating: 220°F (105°C)

Features and Benefits

- UL® listed Type PLTC—300 volt.
- Listed under UL® Subject 13, File Number E116321.
- Extruded PVC single conductor insulation for excellent protection.
- Twisted; extruded PVC overall duplex insulation to minimize electrical interference.
- Passes IEEE 383 70,000 BTU/hour flame test.
- Passes VW-1 flame test.
- Non-propagating.
- UV light resistant.

- Aluminum/polyester shield with drain wire reduces electrical noise.
- ASTM E 230 color code for easy identification.
- Excellent moisture resistance, good abrasion and chemical resistance.
- Additional abrasion resistance with optional stainless steel and tinned copper wire overbraids.
- Custom constructions available, consult factory.

Applications

- Industrial equipment
- Automotive
- Laboratories
- Hydrocarbon processing plants

Wire Specifications

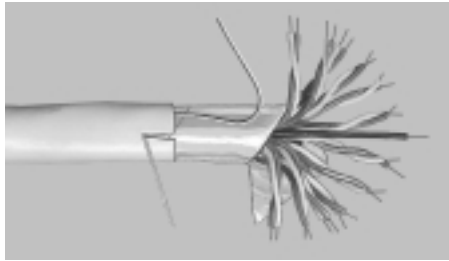
B & S Gauge	Nominal Conductor Size inches (mm)	Nominal Insulation Thickness		Nominal Overall Size inches (mm)		Approximate Shipping Weight lbs/1000 ft (kg/km)	
		Conductor inches (mm)	Overall inches (mm)				
20	0.032 (0.813)	0.015 (0.381)	0.035 (0.889)	0.198 (5.03)		27 (40.2)	
20 S* (7/28)	0.038 (0.965)	0.015 (0.381)	0.035 (0.889)	0.210 (5.33)		29 (43.2)	
18	0.040 (1.02)	0.020 (0.508)	0.035 (0.889)	0.234 (5.94)		35 (52.2)	
18 S* (7/26)	0.048 (1.22)	0.020 (0.508)	0.035 (0.889)	0.250 (6.35)		37 (55.1)	
16	0.051 (1.29)	0.020 (0.508)	0.035 (0.889)	0.256 (6.50)		48 (71.5)	
16 S* (7/24)	0.060 (1.52)	0.020 (0.508)	0.035 (0.889)	0.274 (6.96)		51 (76.0)	

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

SERV-RITE Wire and Cable

PVC Insulated Multi-Pair 300V UL® Listed PLTC Extension Cable

UL® Series 900



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
220°F (105°C)	Excellent	Good	Good

UL® Series 900 is our family of multi-pair cables* for UL® PLTC applications. Standard UL® Series 900 cables of different pair counts in most calibrations can be shipped quickly.

UL® Series 900 cable starts by insulating conductors with 220°F (105°C) PVC. For identification, one conductor of each pair is numbered and twisted with its counterpart. These “twisted pairs” are cabled with an additional insulated copper wire for communication use. The entire cable is wrapped with clear polyester tape to minimize the chance of short circuits to the

Construction Combinations

1. ASTM E 230 Calibrations

E N
J S
K T

2-3. B & S Gauge

24 20 18 16

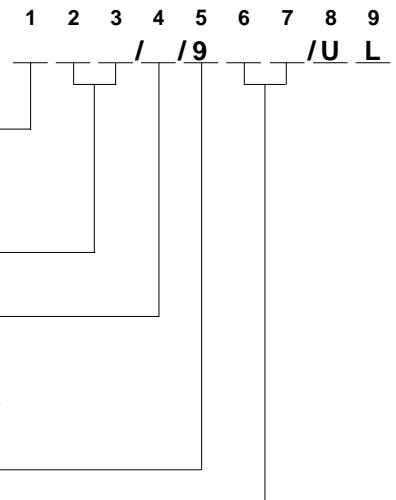
4. Conductor Type/Tolerance

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

5. Series 900

6-7. Pair Counts

02 04 06 08 10 12 16 20 24



cable's shield. An aluminized polyester tape shield is then spirally applied. A copper drain wire and heavy ripcord are longitudinally applied under the final jacket of color coded PVC.

For higher temperatures, UL® Series 900 can be made with FEP insulation. Multipair constructions are also available to meet specific requirements in quantities of not less than 1000 feet (305 m). Specifications should accompany any request for quotation.

Performance Capabilities

- Continuous temperature rating: 220°F (105°C)

Features and Benefits

- **UL® listed Type PLTC—300 volt.**
- **Listed under UL® Subject 13.**
- **Extruded PVC single conductor and overall insulation.**
- **Passes IEEE 383 70,000 BTU/hour flame test.**
- **Passes VW-1 flame test.**
- **Non-propagating.**
- **UV light resistant.**
- **Aluminum/polyester shield with drain wire.**
- **ASTM E 230 color code.**
- **Excellent moisture resistance, good abrasion and chemical resistance.**

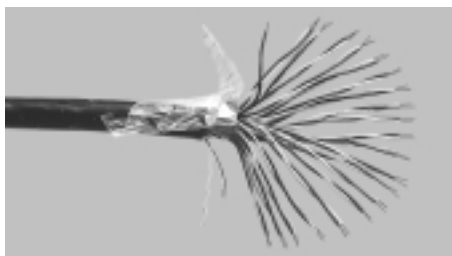
Wire Specifications

No. of Pairs	B & S Gauge	Nominal Conductor Size		Nominal Insulation Thickness		Nominal Overall Size		Approximate Shipping Weight	
				Conductor	Overall				
		inches	(mm)	inches (mm)	inches (mm)	inches	(mm)	lbs/1000 ft	(kg/km)
2	20	0.032	(0.813)	0.015 (0.381)	0.050 (1.27)	0.290	(7.37)	72	(107.3)
4	20	0.032	(0.813)	0.015 (0.381)	0.050 (1.27)	0.350	(8.89)	94	(140.1)
6	20	0.032	(0.813)	0.015 (0.381)	0.050 (1.27)	0.405	(10.29)	116	(172.8)
8	20	0.032	(0.813)	0.015 (0.381)	0.050 (1.27)	0.440	(11.18)	140	(208.6)
10	20	0.032	(0.813)	0.015 (0.381)	0.050 (1.27)	0.490	(12.45)	164	(244.4)
12	20	0.032	(0.813)	0.015 (0.381)	0.060 (1.52)	0.535	(13.59)	188	(280.1)
16	20	0.032	(0.813)	0.015 (0.381)	0.060 (1.52)	0.610	(15.49)	240	(357.6)
20	20	0.032	(0.813)	0.015 (0.381)	0.060 (1.52)	0.650	(16.51)	292	(435.1)
24	20	0.032	(0.813)	0.015 (0.381)	0.060 (1.52)	0.710	(18.03)	344	(512.6)

SERV-RITE Wire and Cable

PVC Insulated Multi-Pair 300V UL® Listed PLTC Extension Cable with Individual and Overall Shield

UL® Series 1000



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
220°F (105°C)	Excellent	Good	Good

UL® Series 1000 is our family of individually shielded and isolated multipair cables* for UL® PLTC applications. UL® Series 1000 cables are made by insulating conductors with 220°F (105°C) PVC. For identification, one conductor of each pair is numbered and twisted with its counterpart. The pairs are then spirally wrapped with an aluminized polyester tape and drain wire to isolate them in the cable. This eliminates "noise" that can exist in a circuit.

Construction Combinations

1. ASTM E 230 Calibrations

E N
J S
K T

2-3. B & S Gauge

24 20 18 16

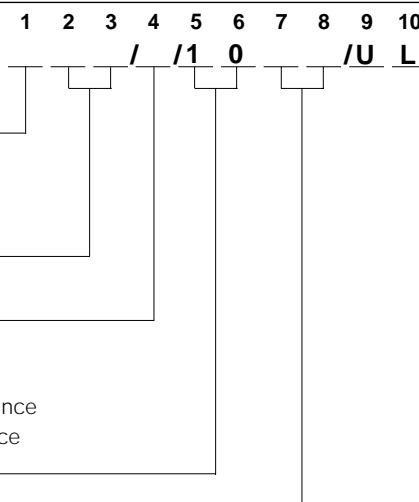
4. Conductor Type/Tolerance

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

5-6. Series 1000

7-8. Pair Counts

02 04 06 08 10 12 16 20 24



Individual pairs are then cabled with an additional insulated copper wire for communication use. These cables are ideal for data signals.

For higher temperature applications, UL® Series 1000 can be made with FEP insulation. Special multipair constructions are also available to meet specific requirements in quantities of not less than 1000 feet (305 m). Specifications should accompany any request for quotation.

Performance Capabilities

- Continuous temperature rating: 220°F (105°C)

Features and Benefits

- UL® listed Type PLTC—300 volt.
- Listed under UL® Subject 13.
- Extruded PVC single conductor and overall insulation.
- Passes IEEE 383 70,000 BTU/hour flame test.
- Passes VW-1 flame test.
- Non-propagating.
- UV light resistant.
- Aluminum/polyester shield with drain wire.
- ASTM E 230 color code.
- Excellent moisture resistance, good abrasion and chemical resistance.

Wire Specifications

No. of Pairs	B & S Gauge	Nominal Conductor Size		Nominal Insulation Thickness		Nominal Overall Size		Approximate Shipping Weight	
				Conductor	Overall				
		inches	(mm)	inches (mm)	inches (mm)	inches	(mm)	lbs/1000 ft	(kg/km)
2	20	0.032	(0.813)	0.015 (0.381)	0.050 (1.27)	0.305	(7.75)	77	(114.7)
4	20	0.032	(0.813)	0.015 (0.381)	0.050 (1.27)	0.385	(9.78)	104	(155.0)
6	20	0.032	(0.813)	0.015 (0.381)	0.050 (1.27)	0.445	(11.30)	131	(195.2)
8	20	0.032	(0.813)	0.015 (0.381)	0.050 (1.27)	0.490	(12.45)	160	(238.4)
10	20	0.032	(0.813)	0.015 (0.381)	0.060 (1.52)	0.560	(14.22)	189	(281.6)
12	20	0.032	(0.813)	0.015 (0.381)	0.060 (1.52)	0.610	(15.49)	218	(324.8)
16	20	0.032	(0.813)	0.015 (0.381)	0.060 (1.52)	0.640	(16.26)	280	(417.2)
20	20	0.032	(0.813)	0.015 (0.381)	0.060 (1.52)	0.710	(18.03)	342	(509.6)
24	20	0.032	(0.813)	0.015 (0.381)	0.060 (1.52)	0.805	(20.45)	404	(602.0)

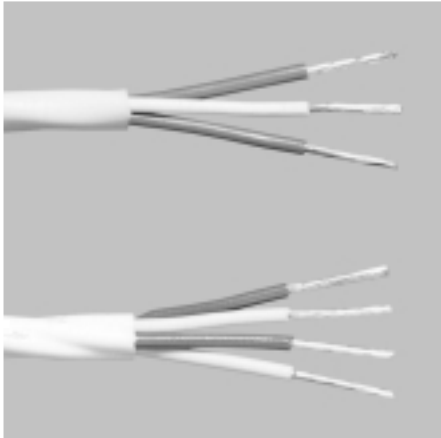


• RT3/22/4/701

SERV-RITE Wire and Cable

PVC Insulated RTD Leadwire

Series 701



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
220°F (105°C)	Excellent	Good	Good

Watlow Gordon's quality, experience and versatility carry over from insulated thermocouple and extension wire to RTD leadwire. Series 701 is offered in three- and four-wire constructions, and available from stock to cover many industrial RTD applications.

Construction Combinations

3. Number of Conductors

2 3 4

4-5. B & S Gauge

24 22 20
18 16

6. Conductor Type/Tolerance

4 = Stranded tinned copper

1 2 3 4 5 6 7 8 9
R T / / / 7 0 1

Each conductor is insulated and color coded with extruded PVC insulation. The conductors are then twisted for added flexibility and covered with an overall PVC insulation.

Performance Capabilities

- Continuous temperature rating: 220°F (105°C)

Features and Benefits

- **Extruded PVC single conductor and overall insulation** for protection.
- **Twisted conductors for reduced electrical interference.**
- **Color coded conductors** for easy installation.

- **Excellent moisture resistance, good abrasion and chemical resistance.**
- **Additional abrasion resistance** with optional stainless steel and tinned copper wire overbraids.
- **Custom constructions available, consult factory.**

SERV-RITE Wire and Cable

Wire Specifications

Number of Conductors	B & S Gauge*	Nominal Conductor Size		Nominal Insulation Thickness		Nominal Overall Size	Approximate Shipping Weight	
				Conductor	Overall			
		inches	(mm)	inches (mm)	inches (mm)	inches (mm)	lbs/1000 ft	(kg/km)
2	22 S** (7/30)	0.030	(0.762)	0.015 (0.381)	0.020 (0.508)	0.160 (4.06)	17	(25.3)
2	20 S** (7/28)	0.038	(0.965)	0.015 (0.381)	0.020 (0.508)	0.176 (4.47)	19	(28.3)
2	18 S** (7/26)	0.048	(1.22)	0.020 (0.508)	0.025 (0.635)	0.226 (5.74)	22	(32.8)
3	22 S** (7/30)	0.030	(0.762)	0.015 (0.381)	0.020 (0.508)	0.172 (4.37)	20	(29.8)
3	20 S** (7/28)	0.038	(0.965)	0.015 (0.381)	0.020 (0.508)	0.190 (4.83)	25	(37.3)
3	18 S** (7/26)	0.048	(1.22)	0.020 (0.508)	0.025 (0.635)	0.244 (6.20)	30	(44.7)
4	22 S** (7/30)	0.030	(0.762)	0.015 (0.381)	0.020 (0.508)	0.184 (4.67)	23	(34.3)
4	20 S** (7/28)	0.038	(0.965)	0.015 (0.381)	0.020 (0.508)	0.204 (5.18)	30	(44.7)
4	18 S** (7/26)	0.048	(1.22)	0.020 (0.508)	0.025 (0.635)	0.262 (6.65)	37	(55.1)

* 24 and 16 gauge constructions also available, consult factory for details.

** "S" denotes stranded wire: e.g., "22 S (7/30)" is seven strands of 30 gauge wire to make a 22 gauge stranded conductor.

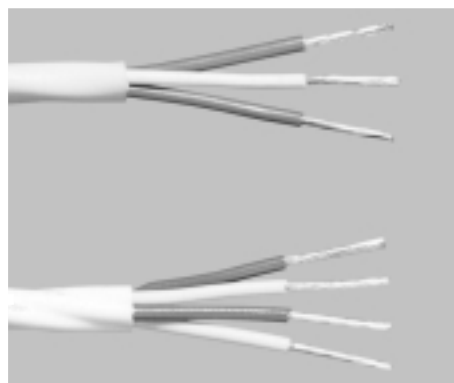


• RT3/22/8/704

SERV-RITE Wire and Cable

FEP Insulated RTD Leadwire

Series 704



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
400°F (204°C)	Excellent	Excellent	Excellent

Watlow Gordon's quality, experience and versatility carry over from insulated thermocouple and extension wire to RTD leadwire. Series 704 is offered in two-, three- and four-wire constructions, and available from stock to cover many industrial RTD applications.

Construction Combinations

	1	2	3	4	5	6	7	8	9
	R	T		/	/	/	7	0	4

3. Number of Conductors _____

2 3 4

4-5. B & S Gauge _____

24 22 20

6. Conductor Type/Tolerance _____

6 = Stranded silver plated copper
8 = Stranded nickel plated copper

Each conductor is insulated and color coded with extruded FEP insulation. The conductors are then twisted for added flexibility and covered with an overall FEP insulation.

Performance Capabilities

- Continuous temperature rating: 400°F (204°C)
- Single reading: 500°F (260°C)

Features and Benefits

- **Extruded FEP single conductor and overall insulation** for protection.

- **Twisted conductors for reduced electrical interference.**
- **Color coded conductors** for easy installation.
- **Excellent moisture, abrasion and chemical resistance.**
- **Additional abrasion resistance** with optional stainless steel and tinned copper wire overbraids.
- **Custom constructions available, consult factory.**

Wire Specifications

Number of Conductors	B & S Gauge	Nominal Conductor Size		Nominal Insulation Thickness		Nominal Overall Size		Approximate Shipping Weight	
				Conductor	Overall				
		inches	(mm)	inches (mm)	inches (mm)	inches (mm)	(mm)	lbs/1000 ft	(kg/km)
2	24 S* (7/32)	0.024	(0.610)	0.008 (0.203)	0.012 (0.305)	0.118	(3.00)	12	(17.9)
2	22 S* (7/30)	0.030	(0.762)	0.008 (0.203)	0.012 (0.305)	0.130	(3.30)	14	(20.9)
2	20 S* (7/28)	0.038	(0.965)	0.008 (0.203)	0.012 (0.305)	0.146	(3.71)	17	(25.3)
3	24 S* (7/32)	0.024	(0.610)	0.008 (0.203)	0.012 (0.305)	0.126	(3.20)	16	(23.8)
3	22 S* (7/30)	0.030	(0.762)	0.008 (0.203)	0.012 (0.305)	0.140	(3.56)	20	(29.8)
3	20 S* (7/28)	0.038	(0.965)	0.008 (0.203)	0.012 (0.305)	0.158	(4.01)	24	(35.8)
4	24 S* (7/32)	0.024	(0.610)	0.008 (0.203)	0.012 (0.305)	0.136	(3.46)	19	(28.3)
4	22 S* (7/30)	0.030	(0.762)	0.008 (0.203)	0.012 (0.305)	0.150	(3.81)	23	(34.3)
4	20 S* (7/28)	0.038	(0.965)	0.008 (0.203)	0.012 (0.305)	0.170	(4.32)	27	(40.2)

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

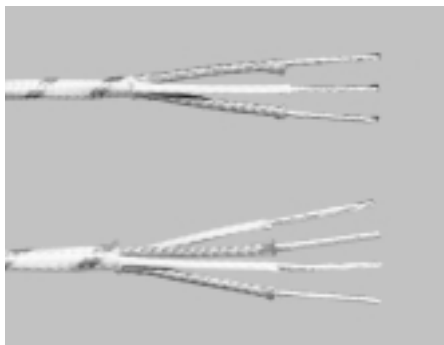


• RT3/24/8/705

SERV-RITE Wire and Cable

Fiberglass Braided RTD Leadwire

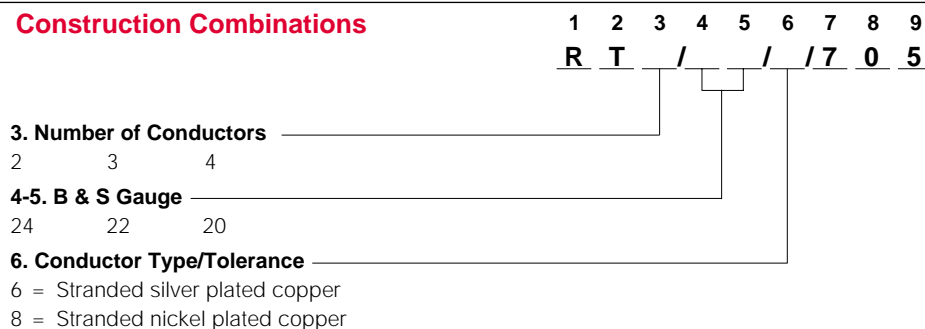
Series 705



Temp.	Resistance Properties		
	Moisture	Chemical	Abrasion
900°F (480°C)	Good	Good	Fair

Watlow Gordon's quality, experience and versatility carry over from insulated thermocouple and extension wire to RTD leadwire. Series 705 is offered in three- and four-wire constructions, and available from stock to cover many industrial RTD applications.

Construction Combinations



Each conductor is covered with a color coded fiberglass braid insulation that's impregnated with a modified resin. The conductors are then twisted for added flexibility and covered with a fiberglass braid impregnated with a modified resin.

Performance Capabilities

- Continuous temperature rating: 900°F (480°C)
- Single reading: 1000°F (540°C)

Features and Benefits

- **Fiberglass braid single conductor and overall insulation** impregnated with modified resin for protection.

- **Twisted conductors** for reduced electrical interference.
- **Color coded conductors** for easy installation.
- **Good moisture and chemical resistance, fair abrasion resistance.**
- **Additional abrasion resistance** with optional stainless steel and tinned copper wire overbraids.

SERV-RITE Wire and Cable

Wire Specifications

Number of Conductors	B & S Gauge	Nominal Conductor Size		Nominal Insulation Thickness		Nominal Overall Size		Approximate Shipping Weight	
				Conductor	Overall				
		inches	(mm)	inches (mm)	inches (mm)	inches (mm)	inches (mm)	lbs/1000 ft	(kg/km)
2	24 S* (7/32)	0.024	(0.610)	0.005 (0.127)	0.006 (0.152)	0.080 (2.03)	6	(8.9)	
2	22 S* (7/30)	0.030	(0.762)	0.005 (0.127)	0.006 (0.152)	0.092 (2.34)	7	(10.4)	
2	20 S* (7/28)	0.038	(0.965)	0.006 (0.152)	0.006 (0.152)	0.112 (2.84)	9	(13.4)	
3	24 S* (7/32)	0.024	(0.610)	0.005 (0.127)	0.006 (0.152)	0.086 (2.18)	8	(11.9)	
3	22 S* (7/30)	0.030	(0.762)	0.005 (0.127)	0.006 (0.152)	0.098 (2.49)	9	(13.4)	
3	20 S* (7/28)	0.038	(0.965)	0.006 (0.152)	0.006 (0.152)	0.120 (3.05)	12	(17.9)	
4	24 S* (7/32)	0.024	(0.610)	0.005 (0.127)	0.006 (0.152)	0.092 (2.34)	10	(14.9)	
4	22 S* (7/30)	0.030	(0.762)	0.005 (0.127)	0.006 (0.152)	0.106 (2.69)	12	(17.9)	
4	20 S* (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.

SERV-RITE Wire and Cable

Bare Thermocouple Alloy

ASTM E 230 Types J, K, T, E and N

Watlow Gordon can provide uninsulated thermocouple alloys for your temperature sensing needs. These are the same quality products used to manufacture our own insulated wire, XACTPAK metal sheathed cable, sensors and specialty components. Many wire products from 2 to 36 AWG may be available for off the shelf shipment in standard or special limits of error.

In addition to the listed products Watlow Gordon can provide other gauge sizes, stranded thermocouple wire, extension grade wire, compensating wire, strip and ribbon items. Consult the factory with your specific requirements for pricing and availability.

Bare Thermocouple Wire—ASTM E 230 Types J and K

B & S Gauge	KP ^① Code No.	Feet per lb	KN ^① Code No.	Feet per lb	JP Code No.	Feet per lb	JN ^② Code No.	Feet per lb
2	1475/2	5	1476/2	5	—	—	—	—
6	1475/6	13	1476/6	13	—	—	—	—
8	1475/8	21	1476/8	21	1565/8	23	1566/8	20
14	1475/14	83	1476/14	83	1565/14	91	1566/14	80
16	1475/16	130	1476/16	130	1565/16	145	1566/16	128
18	1475/18	212	1476/18	212	1565/18	231	1566/18	204
20	1475/20	331	1476/20	331	1565/20	365	1566/20	332
22	1475/22	530	1476/22	530	1565/22	586	1566/22	514
24	1475/24	838	1476/24	838	1565/24	926	1566/24	818
26	1475/26	1340	1476/26	1340	1565/26	1476	1566/26	1300
28	1475/28	2130	1476/28	2130	1565/28	2360	1566/28	2071
30	1475/30	3370	1476/30	3370	1565/30	3740	1566/30	3290
32	1475/32	5260	1476/32	5340	1565/32	5840	1566/32	5185
36	1475/36	13480	1476/36	16480	1565/36	14950	1566/36	13280

① KP and KN 2 ga. to 14 ga. products are oxide finished, all other sizes are bright annealed finish.

② JN must be matched with JP to meet ASTM E 230 Type J calibration. JP and JN must be purchased together as a matched pair only. Order TN (1625) for non-thermocouple applications where constantan alloy is desired.

Bare Thermocouple Wire—ASTM E 230 Types T and E

B & S Gauge	EP Code No.	Feet per lb	TP Code No.	Feet per lb	EN & TN Code No.	Feet per lb
8	1475/8	21	—	—	1625/8	20
14	1475/14	83	1665/14	80	1625/14	80
16	1475/16	130	1665/16	128	1625/16	128
18	1475/18	212	1665/18	204	1625/18	204
20	1475/20	331	1665/20	332	1625/20	332
22	1475/22	530	1665/22	514	1625/22	514
24	1475/24	838	1665/24	818	1625/24	818
26	1475/26	1340	1665/26	1300	1625/26	1300
28	1475/28	2130	1665/28	2071	1625/28	2071
30	1475/30	3370	1665/30	3290	1625/30	3290
32	1475/32	5260	1665/32	5237	1625/32	5155

SERV-RITE Wire and Cable

Bare Thermocouple Alloy ASTM E 230 Types B, R, S and C

ASTM E 230 Type B* (6%/30%)—Standard Grade

Size of Wire		BP Code No.	Inches Per Troy Oz. (Approx.)	BN Code No.	Inches Per Troy Oz. (Approx.)
B & S Gauge	O.D. in				
24	0.0201	2330/24	294	2306/24	343
30	0.0100	2330/30	1373	2306/30	1176

*Type B thermocouples and thermoelements meet ITS-90. BP and BN thermoelements must be ordered as a matched pair.

ASTM E 230 Types R and S—Standard Grade ITS-90**

Size of Wire		RN, SN Code No.	Inches Per Troy Oz. (Approx.)	SP Code No.	Inches Per Troy Oz. (Approx.)	RP Code No.	Inches Per Troy Oz. (Approx.)
B & S Gauge	O.D. in						
23	0.0225	2300/23	222	2310/23	241	2313/23	246
24	0.0201	2300/24	282	2310/24	302	2313/24	308
30	0.0100	2300/30	1127	2310/30	1209	2313/30	1234

ASTM E 230 Types R and S—Reference Grade^①, ITS-90**

Size of Wire		RN, SN Code No.	Inches Per Troy Oz. (Approx.)	SP Code No.	Inches Per Troy Oz. (Approx.)	RP Code No.	Inches Per Troy Oz. (Approx.)
B & S Gauge	O.D. in						
24	0.0201	2300/24/SP	282	2310/24/SP	302	2313/24/SP	308
30	0.0100	2300/30/SP	1127	2310/30/SP	1209	2313/30/SP	1234

^① Accuracy 0.10% from 600 to 1450 °C (1112 to 2642 °F).

** Types R and S thermocouples and thermoelements are provided in accordance with ITS-90.

Type C (Non-ASTM E 230)

Tungsten 5% Rhenium / Tungsten 26% Rhenium. Calibrated accuracy as a matched pair is guaranteed to conform to Part 44 of the 1978 annual book of ASTM standards in the Related Material Section within $\pm 8^{\circ}\text{F}$ ($\pm 4^{\circ}\text{C}$) from room temperature to 800°F (425°C) and $\pm 1\%$ from 800°F to 4200°F (425 to 2315°C).

Size of Wire		Code No. Double Inch
B & S Gauge	O.D. inch	
24	0.0201	2556/24
30	0.0100	2556/30
36	0.0050	2556/36

SERV-RITE Wire and Cable

How to Order

When ordering SERV-RITE thermocouple and extension wire, remember to include the following information:

- **Calibration:** B, C*, E, J, K, N, R, S or T
- **Gauge Size:** B & S gauge
- **Solid or Stranded Conductors:** Stranded conductors will be seven strand constructions. If your requirements need other configurations, please consult the factory.
- **Thermocouple or Extension Grade:** Will this be used for the actual sensor or just to "extend" the signal at lower temperatures.
- **Standard or Special Limits of Error:** This will determine the accuracy of your sensor.
- **Insulation on Singles and Duplex:** These are usually the same material which is chosen for the environment in which the sensor will be used. If special designs are required, consult factory for details.
- **Color Coding:** Unless specified, all color coding will be to ASTM E 230 standards.

- **Spool Lengths:** Spool lengths should be specified as to your requirements. Watlow Gordon tries to maintain a policy of shipping 1,000 foot spools, however, if not specified, random lengths may be shipped. If you have special packaging requirements, please consult factory.
- **Variation in Quantity:** Watlow Gordon follows the industry standard of shipping and invoicing at plus or minus 10 percent of any ordered item. If your requirements dictate anything other than plus or minus ten percent, consult factory as there may be additional charges.
- **Overbraid Options:** If an overbraid is required, the options are presented below.
- **Overbraid Selection Code:**
 - S**—Stainless Steel Wire Braid
 - C**—Tinned Copper Wire Braid
 - W**—Flat Stainless Steel Spiral Wrap
 - G**—Half Oval Galvanized Steel Spiral Wrap
 - N**—Alloy 600 Wire Braid

Each Series page lists these options. Special requirements and testing are available at additional cost. Consult factory for details. These include:

- **Shielding:** Some constructions are available with shielding possibilities.
- **Calibration Tests:** If calibration is required, please specify the temperatures.
- **Certificate of Compliance:** These may be provided to various specifications. When ordering, please provide specification requirements.
- **Special Requirements:** Please consult the factory for any requirements not covered above.

Availability

Stock constructions: Same day shipment on orders received before 11:00 am (CST)

Stock constructions with options: Shipment in five working days or less

Stock constructions requiring calibration or other laboratory services: Shipment in five working days or less

Made-to-order: Two to five weeks, consult factory for details

*Not an ASTM E 230 symbol

Mineral Insulated Metal-Sheathed Cable

XACTPAK® Cable

Watlow helped pioneer XACTPAK® mineral insulated, metal-sheathed cable. The unique properties of XACTPAK make it ideally suited to solve a wide variety of problem applications.

The outer sheath can be made from any malleable metal in a wide range of diameters, containing single or multiple wires. Easily formed or bent, it can accommodate virtually any configuration. The outer sheath protects thermocouple or thermocouple extension wires from oxidation and hostile environments that would quickly destroy unprotected wire.

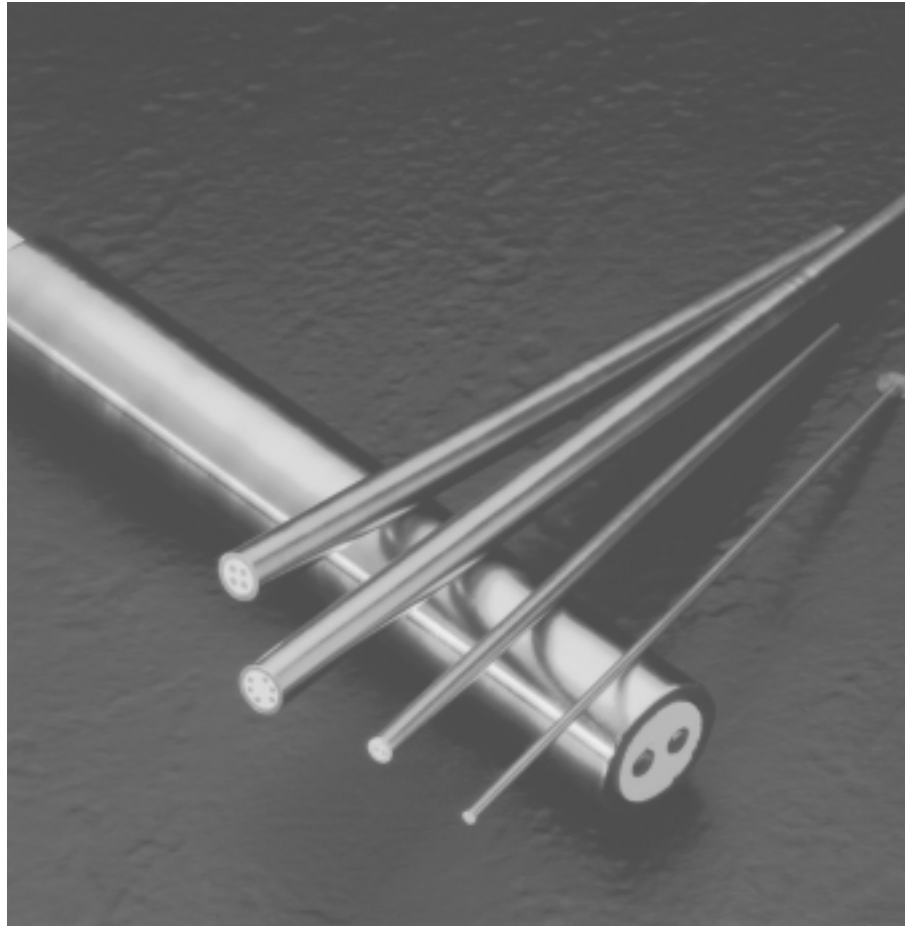
The mineral insulations available provide excellent high temperature dielectric strength to ensure signals are carried faithfully to your instrumentation or controls.

Performance Capabilities

- Available in standard and special calibrations
- Diameters down to 0.010 (0.25 mm)
- Compliance with recognized agency tolerances and specifications
- Sheath materials available to withstand a wide variety of hostile and corrosive environments
- Calibrated for intended temperature range
- Temperature ranges from 32 to 2700°F (0 to 1480°C)
- Cryogenic cable available upon request

Features and Benefits

- **Fireproof** to perform where conventionally insulated wires burn and degrade.
- **Fast, accurate response** for precise temperature measurement.
- **Gas tight and moisture proof** to resist contamination.



- **High pressure rated** for pressure vessel and vacuum applications.
- **Formable and weldable**, adaptable to virtually any application.
- **Cold and thermal shock resistant** to withstand thermal cycling.
- **Corrosion resistant, durable and compact** for long life performance with minimum constraints on applications.
- **High temperature rated** to meet demanding applications.

Applications

- Atomic research
- Bearing temperature
- Blast furnaces
- Catalytic reformers
- Diesel engines

- Food and beverage
- Furnaces
- Glass and ceramic
- Heat treating
- Instrument cabling
- Jet engines and test cells
- Kilns
- Laboratory and research
- Medical
- Nuclear reactors
- Power stations and steam generators
- Refineries and oil processing
- Rocket engines
- Semiconductor processing
- Turbines
- Vacuum furnaces

Mineral Insulated Metal-Sheathed Cable

XACTPAK Cable

Technical Data

XACTPAK Calibration Temperatures

Calibration	Standard Calibration Points (°F)
B	1600, 2000, 2200*, 2700*
E	300, 500, 1000, 1600
J	200, 500, 1000, 1500
K	300, 500, 1000, 1600, 2000*, 2200*
N	300, 500, 1000, 1600, 2000*, 2200*
R	1000, 1500, 2000, 2700*
S	1000, 1500, 2000, 2700*
T	200, 500

*These calibration temperatures are checked if the sheath, sheath diameter and insulation are rated to this temperature.

Quality Control and Testing

To maintain quality and consistency, XACTPAK cable is manufactured under carefully controlled procedures and rigid standards of cleanliness. Quality checks are made at critical points throughout the manufacturing process.

All XACTPAK cable is inspected and tested for sheath condition, insulation density, conductor uniformity, electrical continuity, insulation resistance, calibration conformance and physical dimension. Special testing and certification—including helium leak, homogeneity, metallurgical examination, and dye penetrant, among others—are available on request.

Quality Assurance

Every coil of XACTPAK cable is thoroughly tested for continuity, insulation resistance, physical dimensions and physical appearance.

Each lot, or batch of XACTPAK contains raw materials (sheath, insulation, wires) from one production lot which eliminates the need to calibrate every thermocouple cut from a coil because of poor homogeneity.

Samples from each lot are calibrated in our modern calibration laboratory by highly skilled technicians. Unlike some manufacturers who calibrate at a few low temperature calibration points, Watlow calibrates throughout the range that the cable is designed for.



For a more complete discussion of Watlow's advanced technological capabilities, refer to the laboratory services section, pages 29 to 34.

Care, Handling and Fabrication of XACTPAK Cable

To maximize the performance advantages made possible by XACTPAK cable's overall premium quality, the following instructions covering its storage, handling and further fabrication should be observed:

Storage

To prevent moisture from being absorbed by its hygroscopic mineral insulation, both ends of each length of XACTPAK cable are sealed at the factory. To further guard against moisture penetration, it is advisable to store XACTPAK material in a dry place.

Moisture

If XACTPAK cable is not adequately sealed, its insulation will absorb moisture. This will lower its electrical resistance and may prove to be troublesome in subsequent welding. Minor moisture penetration can be remedied by using a blow torch to heat the sheath. Apply the flame six to seven inches from the open end and slowly work the flame to and over the end. Reseal the end after it has cooled to about 180°F. Deep moisture penetration is unlikely, but should it occur the material may be baked at approximately 250°F for 24 hours to bring up its insulation resistance. If baking does not bring the insulation resistance back to acceptable levels, the material should be discarded.

Mineral Insulated Metal-Sheathed Cable

XACTPAK Cable

Technical Data

Care, Handling and Fabrication of XACTPAK Cable

Continued

Cutting

When pieces are cut off a length of XACTPAK cable the exposed ends should immediately be squared and sealed. Squaring and sealing will guard against possible contamination and remove any loosened insulation or distorted wire caused by cutting. A light pressure sanding with a 180-grit belt is the easiest method for rough squaring of 0.040 inch or larger diameter XACTPAK cable. Using hard pressure against the sanding belt will cause excessive heat build-up which may "smear" the soft metal over the insulation. After sanding, a clean fine toothed file should be used to dress the squared ends. Each exposed end should then be sealed with XACTSEAL to prevent moisture absorption.

Inexperienced personnel may find 0.032 inch or smaller diameter XACTPAK cable difficult to handle and will probably prefer to have all cutting, stripping and fabricating done at our factory.

Insulation Resistance

XACTPAK mineral insulated, metal-sheathed cable should have a minimum room temperature insulation resistance of 100 megohms when tested at 50V $\overline{=}$ (dc) both wires to sheath and wire to wire.

All ceramics used in XACTPAK cable will decrease in resistance as temperature increases.

Shipping and Packaging

XACTPAK cable is stocked in random lengths from 20 feet to the "Maximum Stock Lengths" listed in the tables on the following pages. We reserve the right to supply random lengths of our choice unless specific cut lengths are specified on your order.

On request, XACTPAK cable can be furnished in other coil dimensions or shipped in straight form when necessary. Longer lengths are available on special order.

Stripping

A hand stripping tool will readily remove the sheath from 0.010 through 0.125 inch diameter XACTPAK cable. However, due to the difficulty of working with 0.032 inch or smaller diameter material, it is recommended that small diameter material be ordered factory stripped. Material larger than 0.125 inch diameter can be stripped on a lathe with a suitable tool bit or lathe-mounted stripping tool. It is also possible to strip larger sizes of XACTPAK cable by using a hacksaw to make a ring cut through the sheath at the desired distance from the end. Hammering the severed portion of sheath at several places will break up the insulation allowing the sheath to be slipped off. After stripping, the exposed conductors should be sandblasted or cleaned with emery cloth. The exposed ends should be resealed immediately after completion of the stripping operation.

Forming

Because XACTPAK cable's sheath is dead soft and bright annealed, it can be formed and shaped to most contours without risk of cracking. As a rule of thumb, the sheath can be formed around a mandrel twice the sheath diameter without damage. In other words, 0.125 inch diameter XACTPAK cable can be wound around a 0.250 inch diameter mandrel.

Mineral Insulated Metal-Sheathed Cable

XACTPAK Cable

Technical Data

Care, Handling and Fabrication of XACTPAK Cable

Continued

Welding

Because of the delicate nature of the work and to avoid possible contamination, it is recommended that the fabrication of "hot" or "measuring" junctions be done at our factory.

If they are attempted in the field, a welding rod of the same material as the sheath should be used, and the welding method should be by inert

gas. Flux should not be used as it will contaminate the insulation.

Other weldments, such as to a vessel or pipe, should be made in an inert atmosphere to prevent oxidation of the sheath. When working with XACTPAK cable of 0.040 inch outside diameter or less, extreme caution should be used not to burn through the sheath.

How to Select XACTPAK Cable to Suit Your Requirements

Our mineral insulated metal-sheathed cable section has been designed for ease of use so that the right cable is chosen for each application. The following four items must be considered when selecting XACTPAK mineral insulated metal-sheathed cable:

1. Sheath Material

The sheath serves to isolate and protect the wires and insulation from contamination and mechanical damage. There is no sheath material which is appropriate for all conditions so Watlow offers a wide variety to choose from. Temperature, strength, corrosiveness, service life and cost must be considered when selecting a sheath material.

2. Calibration

Watlow stocks all ASTM recognized thermocouple types along with many that have not been recognized, such

as the full line of tungsten rhenium thermocouples. We also manufacture cable with other wire alloys such as nickel, copper, nickel clad copper, 304 SS, Alloy 600 and virtually any malleable metal.

3. Insulation Material

The insulation separates the conductors from each other and the outer sheath. When selecting insulation, temperature rating, environment and cost must be taken into account.

4. Physical Characteristics

The diameter of the sheath and the wall thickness will directly affect the following:

- Time response
- Service life
- Flexibility
- Pressure rating
- Strength

Mineral Insulated Metal-Sheathed Cable

XACTPAK Cable

Sheath Material

The following information is designed to be used as a guide and may not be correct in every application. If in doubt, consult with your Watlow sales engineer or the factory.

Alloy 600

01—Maximum temperature: 2150°F (1175°C). Most widely used thermocouple sheath material. Good high temperature strength, corrosion resistance, resistance to chloride ion stress corrosion cracking and oxidation resistance to high temperatures. Do not use in sulfur bearing environments. Good in nitriding environments.

304 SS

02—Maximum temperature: 1650°F (900°C). Most widely used low temperature sheath material. Extensively used in food, beverage, chemical and other industries where corrosion resistance is required. Subject to damaging carbide precipitation in 900 to 1600°F (480 to 870°C) range. Lowest cost *corrosion resistant* sheath material available.

310 SS

03—Maximum temperature: 2100°F (1150°C). Mechanical and corrosion resistance, similar to but better than 304 SS. Very good heat resistance. This alloy contains 25% chromium, 20% nickel. Not as ductile as 304 SS.

316 SS

04—Maximum temperature: 1650°F (900°C). Best corrosion resistance of the austenitic stainless steel grades. Widely used in the food and chemical industry. Subject to damaging carbide precipitation in 900 to 1600°F (482 to 870°C) range.

2-3. Sheath Material

4. Calibration

5. Insulation

6-7. Sheath O.D.

8-10. Variation

11-12. Limits of Error

CODE

347 SS

05—Maximum temperature: 1600°F (870°C). Similar to 304 SS except nickel niobium stabilized. This alloy is designed to overcome susceptibility to carbide precipitation in the 900 to 1600°F (480 to 870°C) range. Used in aerospace and chemical applications.

304L

11—Maximum temperature: 1650°F (900°C). Low carbon version of 304 SS (02). Low carbon content allows this material to be welded and heated in the 900 to 1600°F (480 to 870°C) range without damage to corrosion resistance.

Nickel 201

12—Maximum temperature: 2000°F (1095°C). Commercially pure wrought nickel with low carbon. Used in molten salt bath furnaces. Offers good resistance to caustic alkalis and fluorine.

446 SS

13—Maximum temperature: 2100°F (1150°C). Ferritic stainless steel which has good resistance to sulfurous atmospheres at high temperatures. Good corrosion resistance to nitric acid, sulfuric acid and most alkalis. 27 percent chromium content gives this alloy the highest heat resistance of any ferritic stainless steel.

321 SS

16—Maximum temperature: 1600°F (870°C). Similar to 304 SS except titanium stabilized for inter-granular corrosion. This alloy is designed to overcome susceptibility to carbon precipitation in the 900 to 1600°F (480 to 870°C) range. Used in aerospace and chemical applications.

Hastelloy®X

18—Maximum temperature: 2200°F (1205°C). Widely used in aerospace applications. Resistant to oxidizing, reducing and neutral atmospheric conditions. Excellent high temperature strength along with superior oxidation resistance. Resistant to stress corrosion cracking in petrochemical applications.

Inconel® 601

19—Maximum temperature: 2150°F (1175°C) continuous, 2300°F (1260°C) intermittent. Similar to Alloy 600 with the addition of aluminum for outstanding oxidation resistance. Designed for high temperature corrosion resistance. This material is good in carburizing environments, and has good creep rupture strength. *Do not use in vacuum furnaces!* Susceptible to intergranular attack by prolonged heating in 1000 to 1400°F (540 to 760°C) temperature range.

Hastelloy® is a registered trademark of Haynes International.

Inconel® is a registered trademark of the Inco family of companies.

Mineral Insulated Metal-Sheathed Cable

XACTPAK Cable

Sheath Material

Continued

316L

22—Maximum temperature: 1650°F (900°C). Same as 316 SS (04) except low carbon version allows for better welding and fabrication.

Incoloy® 800

23—Maximum temperature: 2000°F (1095°C). Widely used as heater sheath material. Minimal use in thermocouples. Superior to Alloy 600 in sulfur, cyanide salts and fused neutral salts. Susceptible to inter-granular attack in some applications by exposure to the temperature range of 1000 to 1400°F (540 to 760°C).

Inconel® 625

25—Maximum temperature: 1800°F (980°C). Used in many aerospace applications. Excellent high temperature strength. Excellent resistance to pitting and crevice corrosion. Unaffected by radiation embrittlement.

Monel® 400

28—Maximum temperature: 1000°F (540°C) in oxidizing conditions. Nickel-copper alloy with good corrosion resistance. Excellent resistance to sea water, hydrofluoric acid, sulfuric acid, hydrochloric acid and most alkalis.

Alloy 188

30—Maximum temperature 2100°F (1150°C). Cobalt base austenitic alloy. High strength along with oxidation and corrosion resistance to 2100°F (1150°C) make this alloy useful in aerospace, nuclear, chemical and process industries.

2-3. Sheath Material

CODE

4. Calibration

5. Insulation

6-7. Sheath O.D.

8-10. Variation

11-12. Limits of Error

Haynes® Alloy 230

32—Maximum temperature: 2100°F (1150°C). This alloy offers excellent high temperature strength, oxidation resistance and long term thermal stability. Used in aerospace applications, chemical process industries and high temperature industrial heating applications. This alloy is recommended for use in nitriding environments.

Hastelloy® C-276

33—Maximum temperature: 2000°F (1095°C). Widely used in chemical applications. Excellent corrosion resistance, especially in chlorinated environments. Resistant to ferric and cupric chlorides, solvents, chlorine, formic acids, acetic acids, brine, wet chlorine gas and hypochlorite.

Haynes® Alloy 556

34—Maximum temperature: 2000°F (1095°C). This multipurpose alloy offers good resistance to sulfidizing, carburizing and chlorine-bearing environments. Applications include waste incinerators, petroleum processes where sulfur is present, chloride salt baths, exhaust gas thermocouples, recuperator thermocouples and for process thermocouples in molten zinc applications such as galvanizing.

Inconel® Alloy X-750

36—Maximum temperature 1500°F (815°C). Precipitation hardenable alloy similar to Alloy 600. High tensile and creep rupture properties combined with resistance to corrosion and oxidation. Used in aerospace and petrochemical applications.

Haynes® Alloy HR-160

38—Maximum temperature 2150°F (1175°C). Developed to provide superior sulfidation-resistance at high temperatures. This alloy shows good resistance to corrosion in some salt bath applications. Applications include sulfur furnaces, waste incinerators, coke burners, recuperators, cement kilns and high temperature furnaces.

Incoloy® and Monel® are registered trademarks of the Inco family of companies.

Haynes® is a registered trademark of Haynes International.

Mineral Insulated Metal-Sheathed Cable

XACTPAK Cable

Calibration

ASTM Type J

1—Type J's positive leg (JP) is iron. Its negative leg (JN) is approximately 45 percent nickel-55 percent copper. When protected by compacted mineral insulation and outer sheath, Type J is usable from 32 to 1500°F (0 to 815°C). Type J is not susceptible to short range ordering in the 700 to 1000°F (0 to 538°C) temperature range, (+2 to +4°F drift) which occurs with ASTM Type E and K. This low cost, stable thermocouple calibration is primarily used with 96 percent pure MgO insulation and stainless steel sheath.

ASTM Type K

2—Type K's positive leg (KP) is approximately 90 percent nickel-10 percent chromium. Its negative leg (KN) is approximately 95 percent nickel-2 percent aluminum-2 percent manganese-1 percent silicon. When protected by compacted mineral insulation and outer sheath, Type K is usable from -32 to 2300°F (-35 to 1260°C). If the application is between 600 to 1100°F, we recommend Type J or N because of short range ordering that can cause drift of +2 to +4°F in a few hours time. Type K is relatively stable to radiation transmission in nuclear environments. For applications below 32°F, special alloy selections are usually required.

2-3. Sheath Material

4. Calibration

5. Insulation

6-7. Sheath O.D.

8-10. Variation

11-12. Limits of Error

CODE

ASTM Type T

3—Type T's positive leg (TP) is pure copper. Its negative leg (TN) is approximately 45 percent nickel-55 percent copper. When protected by compacted mineral insulation and outer sheath, Type T is usable from 32 to 660°F (0 to 350°C) and very stable in cryogenic and low temperature applications. For applications below 32°F special alloy selections may be required.

ASTM Type E

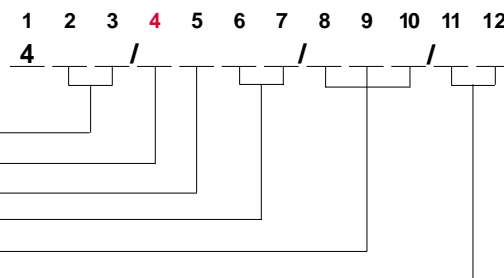
4—Type E's positive leg (EP) is approximately 90 percent nickel-10 percent chromium. Its negative leg (EN) is approximately 45 percent nickel-55 percent copper. When protected by compacted mineral insulation and outer sheath, Type E is usable from 32 to 1650°F (0 to 900°C) and has the highest EMF output per degree of all ASTM types. If the application temperature is between 600 to 1100°F, we recommend Type J or N because of short range ordering which can cause drift of +1 to +3°F in a few hours time. For applications below 32°F, special alloy selections may be required.

ASTM Type N

8—Type N's positive leg (nicosil) is approximately 14 percent chromium-1.4 percent silicon-84.6 percent nickel. Its negative leg (nihil) is approximately 4.4 percent silicon-95.6 percent nickel. When protected by compacted mineral insulation and outer sheath, it's usable from 32 to 2300°F (0 to 1260°C). Type N overcomes several problems inherent in Type K. Short range ordering, (+2 to +4°F drift), in the 600 to 1100°F (315 to 590°C) range is greatly reduced, and drift rate at high temperatures is considerably less. Type N is also more stable than Type K in nuclear environments.

Miscellaneous

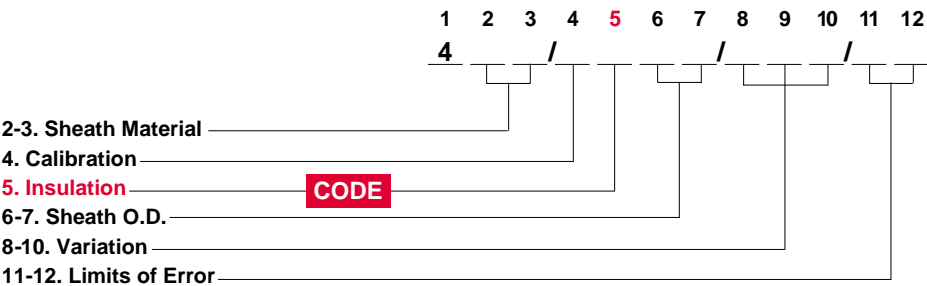
9—Consult factory.



Mineral Insulated Metal-Sheathed Cable

XACTPAK Cable

Insulation



High Purity Magnesium Oxide (MgO) 99.4% Minimum Purity

1—Low impurity levels make this insulation very useful for all thermo-couple calibrations up to 2500°F (1370°C). Above 2500°F we recommend using hafnia oxide insulation because of MgO's low resistivity. This material meets the requirements established in ASTM E-235.

Alumina Oxide (Al₂O₃) 99.6% Minimum Purity

2—Although this material is comparable to MgO in its electrical properties and cost, it does not compact well and tends to "powder out." This undesirable characteristic has made this insulation unpopular in industry so cable with this type of insulation is available only as a "special."

Magnesium Oxide (MgO) 96% Minimum Purity

5—This low cost insulation is similar to high purity MgO (1) except it should be used in applications below 2000°F (1095°C) because of the impurity levels. This insulation *should not* be used with platinum or in nuclear applications.

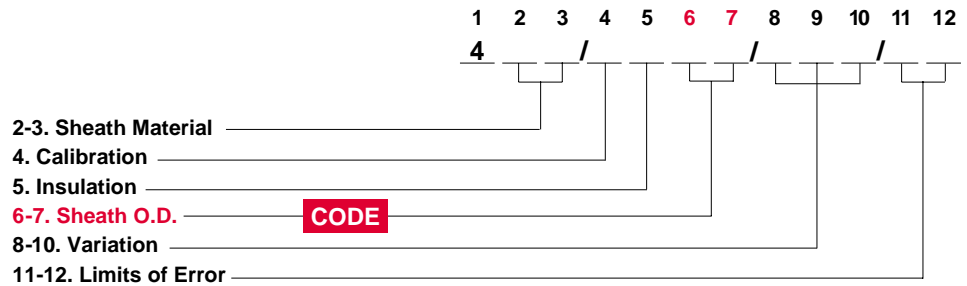
Hafnia Oxide (HfO₂)

7—Hafnia is now being used as a substitute for beryllia oxide because of beryllia's toxicity problem. The temperature limit of hafnia is 4530°F (2500°C) which is higher than BeO.

Mineral Insulated Metal-Sheathed Cable

XACTPAK Cable

Sheath O.D.



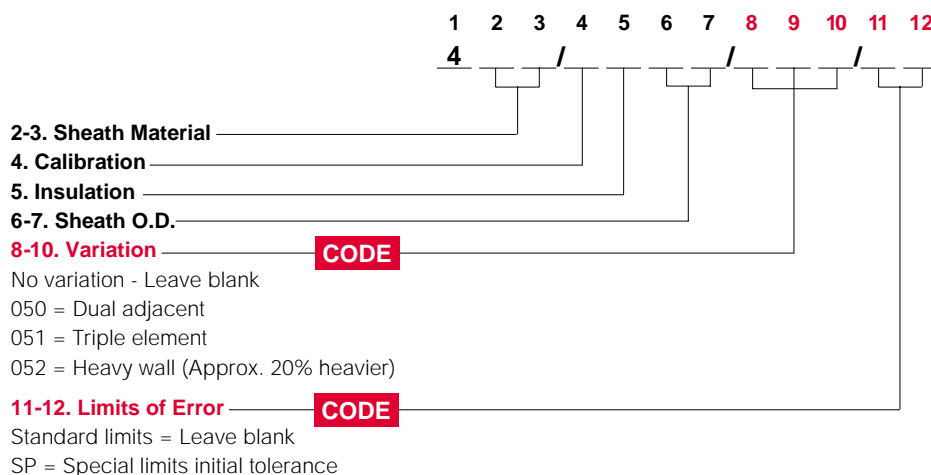
Sheath Diameter		Code No.	Approximate Standard Coil	Weight lbs/100 ft.	Average Response Time* Still Water (seconds)	
					G-JCT	U-JCT
0.020 in	+0.001 -0.0005	01	9 inch	0.08	<0.02	0.03
0.032 in	+0.001 -0.0005	02	9 inch	0.20	0.02	0.07
0.040 in	+0.001 -0.0005	03	9 inch	0.32	0.04	0.13
0.063 in	±0.001	04	24 inch	0.74	0.220	0.4
0.090 in	±0.001	05	24 inch	1.5	0.33	0.68
0.114 in	+0.002 -0.001	06	24 inch	2.45	0.38	0.85
0.125 in	+0.002 -0.001	07	24 inch	3.00	0.50	1.1
0.188 in	+0.002 -0.001	08	24 inch	6.65	1.0	2.3
0.250 in	+0.003 -0.001	11	24 inch	11.65	2.2	4.1
0.313 in	+0.003 -0.001	12	24 inch	19.60	5.0	7.0
0.375 in	+0.003 -0.001	13	straight or 40 inch coils	28.10	8.0	11.0
0.430 in	+0.003 -0.001	14	straight or 40 inch coils	35.0	11.0	15.0
0.500 in	+0.003 -0.001	15	straight or 40 inch coils	47.0	15.0	20.0
0.010 in	+0.001 -0.0005	16	9 inch	0.019	<0.02	<0.02
0.011 in	+0.001 -0.0005	17	9 inch	0.022	<0.02	<0.02
0.0126 in	+0.001 -0.0005	18	9 inch	0.029	<0.02	<0.02
0.025 in	+0.001 -0.0005	19	9 inch	0.13	<0.02	0.05
0.5 mm	±0.02	51	23 cm	0.08	<0.02	0.03
1.0 mm	±0.02	52	23 cm	0.32	0.04	0.13
1.5 mm	±0.02	53	61 cm	0.65	<0.15	0.35
2.0 mm	±0.03	54	61 cm	1.13	0.25	0.55
3.0 mm	±0.03	55	61 cm	2.60	0.40	0.90
4.5 mm	±0.03	56	61 cm	6.0	0.95	2.0
6.0 mm	±0.05	57	61 cm	10.5	2.0	3.5
8.0 mm	±0.05	58	61 cm	19.65	5.0	7.0
9.0 mm	±0.05	59	61 cm	25.0	7.5	10.0

*Note: First order response time 63.2%.

Mineral Insulated Metal-Sheathed Cable

XACTPAK Cable

Variation/Limits of Error



Single Element

(Normally stocked for
off-the-shelf delivery)

Code* No.	Calibration	Sheath Material	Insulation	Nominal B & S Gauge	Nominal Wall Thickness in	Maximum Stock Length ft	Maximum Recommended Operating Temperature °F (°C)
Sheath O.D. 0.020 inches +0.001 -0.0005			Fine diameter, quick time response. Greater availability of calibration types and sheath materials.				
401/2101	K	Alloy 600	99.4% MgO	38	0.003	100	1600 (871)
402/2101	K	304 SS	99.4% MgO	38	0.003	100	1600 (871)
Sheath O.D. 0.032 inches +0.001 -0.0005			Easier to fabricate than 0.020 but faster time response than 0.040.				
401/2102	K	Alloy 600	99.4% MgO	34	0.004	150	1600 (871)
Sheath O.D. 0.040 inches +0.001 -0.0005			Wide range of sheath materials and calibrations. Quick time response.				
401/1103	J	Alloy 600	99.4% MgO	32	0.006	250	1500 (816)
401/2103	K	Alloy 600	99.4% MgO	32	0.006	250	1600 (871)
402/1103	J	304 SS	99.4% MgO	32	0.006	250	1500 (816)
404/2103	K	316 SS	99.4% MgO	32	0.006	250	1600 (871)
Sheath O.D. 0.063 inches ±0.001			One of the more common diameters used. Wide range of calibrations, sheath materials, and accessory hardware available.				
401/2104	K	Alloy 600	99.4% MgO	28	0.009	1000	2000 (1093)
401/2504	K	Alloy 600	96% MgO	28	0.009	1000	2000 (1093)
404/1504	J	316 SS	96% MgO	28	0.009	1000	1500 (816)
404/2504	K	316 SS	96% MgO	28	0.009	1000	1600 (871)
Sheath O.D. 0.090 inches ±0.001			An unusual diameter used by a limited number of customers.				
401/2505	K	Alloy 600	96% MgO	25	0.012	750	2000 (1093)

CONTINUED

*To specify special limits add to code number: /SP

Mineral Insulated Metal-Sheathed Cable

XACTPAK Cable

Single Element

Continued

Code* No.	Calibration	Sheath Material	Insulation	Nominal B & S Gauge	Nominal Wall Thickness in	Maximum Stock Length ft	Maximum Recommended Operating Temperature °F (°C)
Sheath O.D. 0.125 inches +0.002 -0.001			The most popular size we sell. Widest combination of sheath materials and calibrations. Long life yet surprisingly good time response.				
401/2107	K	Alloy 600	99.4% MgO	22	0.017	900	2150 (1177)
401/2507	K	Alloy 600	96% MgO	22	0.017	900	2000 (1093)
401/8107	N	Alloy 600	99.4% MgO	22	0.017	900	2150 (1177)
402/1507	J	304 SS	96% MgO	22	0.017	900	1500 (816)
402/2107	K	304 SS	99.4% MgO	22	0.017	900	1600 (871)
402/2507	K	304 SS	96% MgO	22	0.017	900	1600 (871)
402/3507	T	304 SS	96% MgO	22	0.017	500	662 (350)
403/2507	K	310 SS	96% MgO	22	0.017	900	2000 (1093)
404/2507	K	316 SS	96% MgO	22	0.017	900	1600 (871)
404/3507	T	316 SS	96% MgO	22	0.017	500	662 (350)
404/4507	E	316 SS	96% MgO	22	0.017	900	1600 (871)
418/2107	K	Hastelloy® X	99.4% MgO	22	0.017	125	2200 (1204)
Sheath O.D. 0.188 inches +0.002 -0.001			Heavier duty, longer life than 0.063 or 0.125, but slower time response is the trade-off.				
401/2108	K	Alloy 600	99.4% MgO	19	0.025	350	2150 (1177)
401/2508	K	Alloy 600	96% MgO	19	0.025	350	2000 (1093)
402/1508	J	304 SS	96% MgO	19	0.025	350	1500 (816)
402/2508	K	304 SS	96% MgO	19	0.025	350	1600 (871)
403/2508	K	310 SS	96% MgO	19	0.025	350	2000 (1093)
404/1508	J	316 SS	96% MgO	19	0.025	350	1500 (816)
404/2508	K	316 SS	96% MgO	19	0.025	350	1600 (871)
Sheath O.D. 0.250 inches +0.003 -0.001			Heavy duty industrial grade with wide availability of calibrations and sheaths as well as accessory items.				
401/1511	J	Alloy 600	96% MgO	16	0.033	220	1500 (816)
401/2111	K	Alloy 600	99.4% MgO	16	0.033	220	2150 (1177)
401/2511	K	Alloy 600	96% MgO	16	0.033	220	2000 (1093)
402/1511	J	304 SS	96% MgO	16	0.033	220	1500 (816)
402/2511	K	304 SS	96% MgO	16	0.033	220	1600 (871)
403/2511	K	310 SS	96% MgO	16	0.033	220	2000 (1093)
404/1511	J	316 SS	96% MgO	16	0.033	220	1500 (816)
404/2511	K	316 SS	96% MgO	16	0.033	220	1600 (871)
Sheath O.D. 0.313 inches +0.003 -0.001			Large diameter material for abusive applications where time response is not the primary consideration.				
401/2512	K	Alloy 600	96% MgO	14	0.041	150	2000 (1093)
Sheath O.D. 0.375 inches +0.003 -0.002			Heavy sheath wall and large diameter conductors make this a workhorse, but don't look for fast time response or flexibility.				
401/2513	K	Alloy 600	96% MgO	13	0.052	100	2000 (1093)

*To specify special limits add to code number: /SP

Mineral Insulated Metal-Sheathed Cable

XACTPAK Cable

Double Element— Adjacent Conductors

Code* No.	Calibration	Sheath Material	Insulation	Nominal B & S Gauge	Nominal Wall Thickness in	Maximum Stock Length ft	Maximum Recommended Operating Temperature °F (°C)
Sheath O.D. 0.125 inches +0.002 -0.001			Double the wall thickness of our 0.063 material and considerably larger conductors. Longer life and easier fabrication.				
401/2507/050	K	Alloy 600	96% MgO	24	0.017	900	2000 (1093)
404/1507/050	J	316 SS	96% MgO	24	0.017	900	1500 (816)
Sheath O.D. 0.188 inches +0.002 -0.001			Heavier duty and a wider range of sheath offerings make this a popular size.				
402/1508/050	J	304 SS	96% MgO	21	0.025	350	1500 (816)
Sheath O.D. 0.250 inches +0.003 -0.001			Our best seller in dual element. Heavy duty for long life.				
401/2511/050	K	Alloy 600	96% MgO	18	0.033	220	2000 (1093)
401/4511/050	E	Alloy 600	96% MgO	18	0.033	220	1600 (871)
404/1511/050	J	316 SS	96% MgO	18	0.033	220	1500 (816)

*To specify special limits add to code number: /SP

XACTSEAL

Watlow developed a premium sealant for sealing the exposed ends of XACTPAK sheathed type material against moisture penetration. At room temperature, thin layers of the sealant air-dry in approximately one hour. It may be baked at up to 250°F (120°C) to accelerate drying. The sealant comes ready to use from its

own container; use G.E. #1500 or equivalent should a thinner be needed. XACTSEAL is a temporary sealant. For long term storage we recommend that the ends of the cable be seal welded.

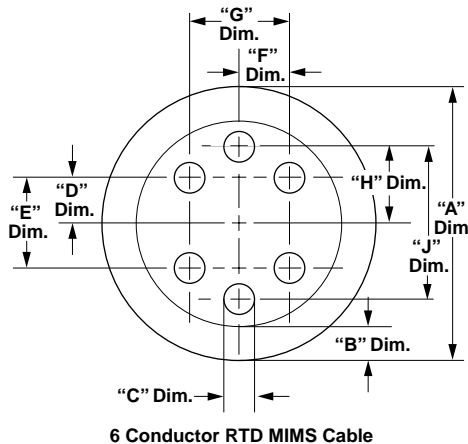
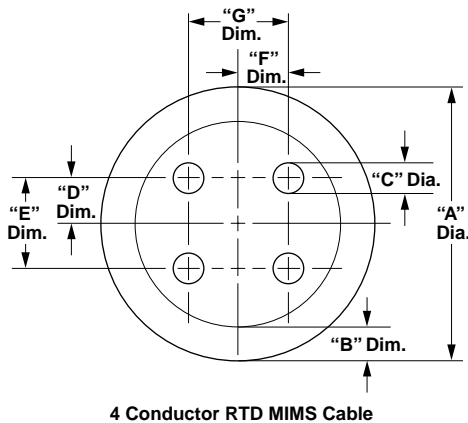
Code No.	Description
8010	4 oz. dispenser can

Mineral Insulated Metal-Sheathed Cable

XACTPAK Cable

Mineral Insulated Metal-Sheathed RTD Cable

This cable is used for making rugged RTD probes. Special spacing allows room for elements to be placed between conductors. Dimensions are shown below.



2-3. Sheath Material

01 = Alloy 600
04 = 316 SS

4. Wire

9 = Nickel 201

5. Wire Insulation

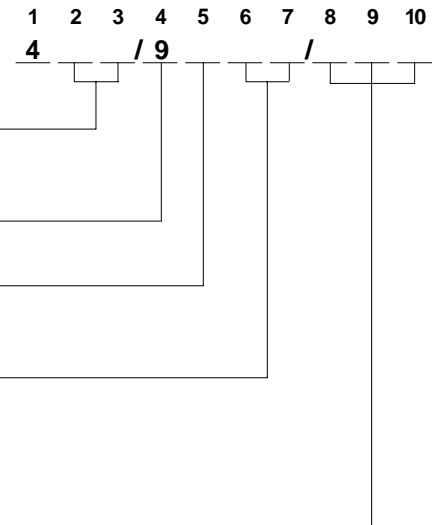
1 = 99.4% MgO
5 = 96% MgO

6-7. Sheath O.D.

07 = 0.125 inch diameter
08 = 0.188 inch diameter
11 = 0.250 inch diameter
12 = 0.313 inch diameter

8-10. Variation

001 = 6-Wire
003 = 4-Wire



A Diameter	B Wall Thickness	C Diameter	Spacing Nominal			
			D Dim.	E Dim.	F Dim.	G Dim.
0.125 +0.002 -0.001	0.015 ± 0.002	0.014 ± 0.002	0.022	0.045	0.025	0.050
0.188 +0.002 -0.001	0.023 ± 0.002	0.020 ± 0.002	0.034	0.068	0.037	0.074
0.250 +0.003 -0.001	0.030 ± 0.005	0.027 ± 0.003	0.045	0.090	0.050	0.100
0.313 +0.003 -0.001	0.038 ± 0.005	0.032 ± 0.003	0.056	0.112	0.062	0.124

A Dim.	B Dim.	C Dim.	D Dim.	E Dim.	F Dim.	G Dim.	H Dim.	J Dim.
0.125 +0.002 -0.001	0.015 ± 0.002	0.014 ± 0.002	0.022	0.045	0.025	0.050	0.034	0.068
0.188 +0.002 -0.001	0.023 ± 0.002	0.020 ± 0.002	0.034	0.068	0.037	0.074	0.052	0.104
0.250 +0.003 -0.001	0.030 ± 0.005	0.027 ± 0.003	0.045	0.090	0.050	0.100	0.068	0.137
0.313 +0.003 -0.001	0.038 ± 0.005	0.032 ± 0.003	0.056	0.112	0.062	0.124	0.085	0.170

Stock

Code Number	Number of Nickel 201 Conductors	Sheath Material	Insulation	Conductor Size	Nominal Wall Thickness	Maximum Stock Length	Maximum Recommended Operating Temperature
401/9108/001	6	Alloy 600	99.4% MgO	0.020 inches	0.023 inches	75 feet	1400°F
401/9108/003	4	Alloy 600	99.4% MgO	0.020 inches	0.023 inches	75 feet	1400°F
404/9108/001	6	316 SS	99.4% MgO	0.020 inches	0.023 inches	75 feet	1000°F
404/9108/003	4	316 SS	99.4% MgO	0.020 inches	0.023 inches	75 feet	1000°F
404/9508/003	4	316 SS	96% MgO	0.020 inches	0.023 inches	75 feet	1000°F
401/9111/001	6	Alloy 600	99.4% MgO	0.027 inches	0.030 inches	45 feet	1400°F
401/9111/003	4	Alloy 600	99.4% MgO	0.027 inches	0.030 inches	45 feet	1400°F
404/9111/001	6	316 SS	99.4% MgO	0.027 inches	0.030 inches	45 feet	1000°F
404/9511/001	6	316 SS	96% MgO	0.027 inches	0.030 inches	45 feet	1000°F
404/9511/003	4	316 SS	96% MgO	0.027 inches	0.030 inches	45 feet	1000°F

Mineral Insulated, Metal-Sheathed Cable

XACTPAK Cable

Made-to-order Mineral-Insulated (MI) Cable

In addition to our full line of metal-sheathed, mineral-insulated thermocouple cable, we will also manufacture metal-sheathed, mineral-insulated signal cable with copper, stainless steel or other conductor materials to meet many specialized requirements. (MI) cable incorporating one or more conductors can be made from a large variety of sheath and insulation materials. Properly selected combinations of materials provide (MI) cable with these outstanding performance features:

- It is totally impervious to moisture.
- It can withstand extremes of temperature and pressure.
- It can endure highly oxidizing or corrosive conditions.
- It adapts well to nuclear applications because of its low neutron capture cross section which is unaffected by radiation heating. (Selected sheaths and calibrations.)
- It can be easily formed to a radius equal to approximately twice its diameter without insulation breakdown. It maintains its shape after forming.

1	2	3	4	5	6	7	8	9	10	11	12
4			/			/		/			
2-3. Sheath Material											
00 = Unused 22 = 316L											
01 = Alloy 600 23 = Incoloy® 800											
02 = 304 SS 25 = Inconel® 625											
03 = 310 SS 28 = Monel®-400											
04 = 316 SS 30 = Alloy 188											
05 = 347 SS 32 = Haynes® Alloy 230											
11 = 304L 33 = Haynes® Alloy C276											
12 = Nickel 201 34 = Haynes® Alloy 556											
13 = 446 SS 36 = Inconel® X-750											
16 = 321 SS 38 = Alloy HR-160											
18 = Hastelloy® X 99 = Miscellaneous											
19 = Inconel® 601											
4. Calibration											
0 = 0-Unused 4 = E											
1 = J 8 = N											
2 = K 9 = Misc.											
3 = T											
5. Insulation											
0 = Unused 7 = Hafnia oxide											
1 = Magnesium oxide 99.4% 8 = Unassigned											
2 = Alumina oxide 99.6% 9 = Miscellaneous											
5 = Magnesium oxide 96%											
6-7. Sheath O.D. [inch (mm)]											
00 = Unassigned 08 = 0.188 16 = 0.010 55 = (3.0 ± 0.03)											
01 = 0.020 09 = Unused 17 = 0.011 56 = (4.5 ± 0.03)											
02 = 0.032 10 = Unused 18 = 0.0126 57 = (6.0 ± 0.05)											
03 = 0.040 11 = 0.250 19 = 0.025 58 = (8.0 ± 0.05)											
04 = 0.063 12 = 0.313 51 = (0.5 ± 0.02) 59 = (9.0 ± 0.05)											
05 = 0.090 13 = 0.375 52 = (1.0 ± 0.02) 99 = Miscellaneous											
06 = 0.114 14 = 0.430 53 = (1.5 ± 0.02)											
07 = 0.125 15 = 0.500 54 = (2.0 ± 0.03)											
8-10. Variation											
Leave blank = No variation Examples											
001 = Dual diagonal 401/2107											
050 = Dual adjacent 401/2107/SP											
051 = Triple element 402/1511/050/SP											
052 = Heavy wall											
(Approximately 20% heavier)											
11-12. Limits of Error											
Standard = Leave blank											
Special limits = SP											

Mineral Insulated, Metal-Sheathed Cable

XACTPAK Cable

Made-to-order Mineral-Insulated (MI) Cable

Continued

Be sure to provide the following information when requesting a quotation for special **made-to-order** (MI) cable:

- **Sheath material**
- **Insulation type**
- **Insulation purity**
- **Calibration**
- **Required conductor size**
- **Wall thickness of the sheath**
- **Minimum acceptable lengths**

Availability

Stock including standard calibration points: Same day shipment on orders received before 11:00 am

Stock requiring special calibration: Shipment in three working days or less

Made-to-order: Two to five weeks, consult factory for details

How to Order

This section presents the information you need to specify and order XACTPAK cable. For unique applications, there's also an example on **made-to-order** cables. Simply follow the code number examples to specify the desired sheath material, calibration, insulation, sheath outside diameter, variation (if required) and the desired limits of error. In addition to specifying your XACTPAK cable, you'll need

to also specify quantity, coil lengths and other special requirements. These include packaging, sealing, certificate of compliance to specification and special testing. As with any Watlow product, our extensive laboratory services are able to handle your most unique requirements. If for any reason you need additional help, please contact your nearest Watlow representative for assistance.

1. Select code number.

See [pages 225-230](#) on how to select your code number, based on your specific requirements.

2. Specify quantity.

3. Specify coil lengths. Random—the factory selects for you (20 foot minimum). Special—specify lengths and tolerance.

4. Specify any other requirement such as:

- Packaging
- Sealing
- Certificate of compliance to specification
- Special testing