TEW&C TE Wire & Cable

Product Catalog E-Book

Metallurgy

Aerospace Composites

Industrial

MARMON

Marmon Engineered Wire & Cable LLC

A Berkshire Hathaway Company

The most trusted name
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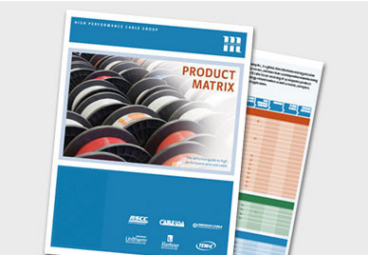
Quality Products, Innovative Solutions, Superior Service and Unmatched Experience

High-Performance Wire and Cable Design Solutions



What do the industrial, commercial and RF communication, aerospace and defense markets all have in common? Customers in these markets all require wire design solutions that fit their exact technical standards, from thermocouple and high-temperature wire to custom MIL spec cables. The seven companies that make up the Marmon High Performance Cable Group each provide highly engineered cables to meet the exacting standards these markets require. Read More.

Collaboration Leads to Innovation in Wire and Cable Design

In the wire and cable industry, customers have plenty of legacy products to choose from, so there isn't much opportunity for innovative product development. To meet our customers' needs in the most efficient way possible, we may try to reinvent/enhance older products or find applications that could lead to new wire and cable design products. Here are two skills that help manufacturers identify the best products and applications for their customers... Read More.

Applying 6S Continuous Improvement to Shipping

Have you ever been completing a task, deep in concentration, and suddenly you're interrupted – a coworker with a question, you ran out of staples, you lost your pen – and now you've lost that concentration? It takes you extra time to get your train of thought back, and you're more likely to make costly errors. Something so simple as a misplaced tool can distract anyone, whether in the office or on the shop floor, from the task at hand... Read More.

Synergy Brochure

Questions? Contact Us

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Technical Resources

The ABC's of thermocouple wire calibration types: What do they mean?

When it comes to thermocouple wire, there's a veritable alphabet of calibration types available: K type thermocouple, J type thermocouple, T type and so on. We're frequently asked: What do these designations mean and which type is right for a specific application? First, you have to understand what is meant by the phrase 'calibration type'. This refers to the designation name (or type) that defines the unique chemical composition of the dissimilar metals of the positive and negative thermo element bare conductors used in the thermocouple wire. Read More.

What do the thermocouple wire color codes mean?

Most countries developed their own thermocouple wire color codes years ago. Today, there are two governing bodies that are globally recognized for setting the accepted color codes standards: ASTM International (formerly known as American Society for Testing and Materials or ASTM) and International Electrotechnical Commission (IEC). ASTM E230-03 is the standard adopted by the United States. The standard recognized in Europe is IEC 584-3. Read More.

Wire Color Codes

Thermocouple Extension Type		ANSI	BS	DIN	NFC	JIS	IEC
JX	Iron +						
	Constantan® -						
KX	Chromel® +						
	Alumel® -						
TX	Copper +						
	Constantan® -						
EX	Chromel® +						
	Constantan® -						
NX	Nicrosil® +						
	Nisil® -						
SX	Copper +						
	Alloy II -						

3 Basic Steps to Selecting the Right Thermocouple Wire for Your Application

It is important that the entire circuit must be the same calibration type. Even if you're using calibrated wire that has been tested in a calibration laboratory, they cannot and should not be substituted one for another. The Electro Motive Force (EMF) output of each thermocouple type is different and unique from all other types. You want to be sure that you've selected the right calibrated wire for the temperature range of your application. Read More.

Quick Reference Guide

Subscribe to Blog

Technical Resources

Top 3 Considerations when Selecting Type K Thermocouple Wire

The TC wire market is not as big as copper or electrical wire, but it's exciting to see how this proven technology is still being implemented into next generation equipment. TC wire can be found in a diversity of applications – from scientific research in cryogenic temperatures to industrial applications in metallurgy – that require a high temperature tolerance. TC wires are generally very accurate and have a wide range of operating temperatures. Type K is the high temperature thermocouple of choice among many customers throughout the world. Here are the top three selection factors to keep in mind when making your selection. Read More.

How to Control Noise in Instrumentation Circuits (Part 1)

4 Common Sources of Noise that Affect Instrumentation Circuits – It can be a real challenge to select the right thermocouple wire. You not only have to determine the type of thermocouple elements to use, but also the temperature range, calibration accuracy and insulation type for your application. With thousands of different configurations, it's still far less complicated than thermocouple and instrumentation cable circuits. Regardless, it is important to know how to control noise in instrumentation circuits. Read More.

How to Control "Noise" in Instrumentation Circuits (Part 2)

Understanding Noise Levels and Installation Considerations – In part one, we discussed the four types of noise frequently found in instrumentation circuits (i.e., Common Mode, Cross Talk, Static and Magnetic) as well as the methods used to correct the problems they cause. Next, we discuss the types of noise levels found in various environments and some installation considerations that will help you mitigate or completely eliminate the noise problems. Read More.

Learn More:

- The ABC's of thermocouple wire calibration types: What do they mean?
- What do the thermocouple wire color codes mean?
- Top 3 Considerations when Selecting Type K Thermocouple Wire
- How to Control Noise in Instrumentation Circuits (Part 1)
- Can different thermocouple wire calibration types be used in the same circuit?
- 3 Basic Steps to Selecting the Right Thermocouple Wire for Your Application
- Everything You Wanted to Know About Thermocouple Theory and Chemistry (but Were Afraid to Ask)
- Thermocouple Wire Recycling Part I: Going Green Protects Planet, Saves Greenbacks
- 5 Reasons to use Gas-Block Cables in Power Generation Applications
- Does Your Thermocouple Wire Measure Up to Global Standards for Aluminum Heat Treat?
- Need help finding the right thermocouple solution for your application?

PVC Insulated 221°F (105°C)

QuickQuote

Applications

- Temperature Sensors
- Testing
- Laboratories
- Heating and Air Conditioning
- General Industry

Available Options

- Continuous use up to 221F (105C)
- Flame Retardant
- Good Moisture, Chemical and Solvent Resistance
- Excellent Dielectric Strength
- Economical Construction

Product Features

- Metal Overbraids
- Galvanized Half-Oval Armor
- Nylon Jackets
- Twisted/Shielded Pair
- Multi-Pair Cables
- Cotton Overbraid
- TPE Insulation and Jacket Rated to 250F (125C)
- Special Color Codes

Product Specifications

Conductors:	Solid or stranded thermocouple wire per ASTM E230 & ANSI MC96.1
Insulation:	Flame retardant PVC
Construction:	Parallel conductors
Jacket:	Flame retardant PVC
Operating Temperature:	-15F (-26C) to +221F (+105C) continuous
Limits of Error:	Conforms to ASTM E230, IEC 584 and ANSI MC 96.1
Color Code:	Conforms to ASTM E230 and ANSI MC 96.1 (International Color Codes Available)

Ordering Code

P / P [ ] - [ ] [ ] - [ ]

Optional Metal Coverings
- S = Stainless Steel Braid
- CU = Tinned Copper Braid
- I = Inconel Braid
- X = Half-Oval Galvanized Steel

Wire Size AWG or Metric

Add (F) for Stranded Wire

Calibration Grade Designation Per Table 1

PVC Insulated 221°F (105°C)

QuickQuote

Conductor Size		Insulation Thickness		Jacket Thickness		Outer Diameter		Net Weight	
AWG	(MM)	inches	(MM)	inches	(MM)	inches	(MM)	LB/MF	(KG/KM)
12	(2.05)	.020	(.51)	.020	(.51)	.161 x .282	(4.1 x 7.2)	57	(85)
14	(1.63)	.015	(.38)	.015	(.38)	.124 x .218	(3.1 x 5.5)	34	(51)
14F*	(1.80)	.015	(.38)	.015	(.38)	.132 x .234	(3.4 x 5.9)	38	(57)
16	(1.29)	.015	(.38)	.015	(.38)	.111 x .192	(2.8 x 4.9)	24	(36)
16F*	(1.47)	.015	(.38)	.015	(.38)	.118 x .206	(3.0 x 5.2)	26	(39)
18	(1.02)	.015	(.38)	.015	(.38)	.100 x .170	(2.5 x 4.3)	17	(25)
18F*	(1.22)	.015	(.38)	.015	(.38)	.108 x .186	(2.7 x 4.7)	18	(27)
20	(0.81)	.015	(.38)	.015	(.38)	.092 x .154	(2.3 x 3.9)	14	(21)
20F*	(0.97)	.015	(.38)	.015	(.38)	.096 x .162	(2.4 x 4.1)	15	(22)
22	(0.64)	.015	(.38)	.015	(.38)	.085 x .140	(2.2 x 3.6)	8.1	(13)
24	(0.51)	.015	(.38)	.015	(.38)	.080 x .130	(2.0 x 3.3)	7.1	(11)
24F*	(0.61)	.015	(.38)	.015	(.38)	.084 x .138	(2.1 x 3.5)	7.6	(12)

MANY ITEMS AVAILABLE FROM STOCK WITHIN 24 HOURS

The products referenced above represent the most popular constructions. Other constructions can be manufactured to meet individual specification and application requirements. Contact factory for additional information.

Table 1

Initial Calibration Tolerances Per ASTM E230 and ANSI MC96.1

			Tolerance-Reference Junction 32F (0C)		
Thermocouple Type	Temperature Range F (C)	Grade Designation	Standard Grade Limits F (C) whichever is greater	Grade Designation	Special Grade Limits F (C) whichever is greater
Thermocouple Wire					
T	32 (0) to 700 (370)	T	±1.8 (1) or ±0.75%	TT	±0.9 (0.5) or 0.4%
J	32 (0) to 1400 (760)	J	±4 (2.2) or ±0.75%	JJ	±2 (1.1) or 0.4%
E	32 (0) to 1600 (870)	E	±3.1 (1.7) or ±0.50%	EE	±1.8 (1) or 0.4%
K or N	32 (0) to 2300 (1260)	K or N	±4 (2.2) or ±0.75%	KK or NN	±2 (1.1) or 0.4%
T*	-328 (-200) to 32 (0)	T	±1.8 (1) or ±1.5%	TT	±0.9 (0.5) or 0.8%**
E*	-328 (-200) to 32 (0)	E	±3.1 (1.7) or ±1%	EE	±1.8 (1) or 0.5%**
K*	-328 (-200) to 32 (0)	K	±4 (2.2) or ±2%	KK	**
Extension Wire					
TX	32 (0) to 212 (100)	TX	±1.8 (1)	TTX	±0.9 (0.5)
JX	32 (0) to 400 (200)	JX	±4 (2.2)	JJX	±2 (1.1)
EX	32 (0) to 400 (200)	EX	±3.1 (1.7)	EEX	±1.8 (1)
KX or NX	32 (0) to 400 (200)	KX or NX	±4 (2.2)	KKX or NNX	±2 (1.1)
RX or SX	32 (0) to 400 (200)	RX or SX	±9 (5)		
BX	32 (0) to 212 (100)	BX***	±7.6 (4.2)		
BX	32 (0) to 400 (200)	BX ALLOY***	±6.7 (3.7)		

* Thermocouple material is normally supplied to meet tolerances above 0C (32F). If material is required to meet tolerances below 0C (32F), the purchase order must so state. Special selection of material is required.

** Suggested initial calibration tolerance. Requirements should be discussed between purchaser and supplier.

*** Copper vs. copper can be used as an extension for Type B thermocouples if the transition is below 100C (212F). Above 100C (212F), PCLW30-6 alloy should be used as the positive extension wire.

PVC Insulated Rip Cord 221°F (105°C)

QuickQuote

Applications

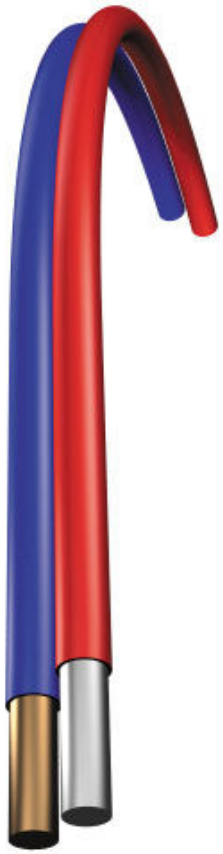
- Temperature Sensors
- Testing
- Laboratories
- Transportation
- Heating and ...Air Conditioning
- Appliances
- Validation

Available Options

- Tighter than Special Limit ...Accuracy Tolerances
- Special Color Codes
- Calibration Test Reports

Product Features

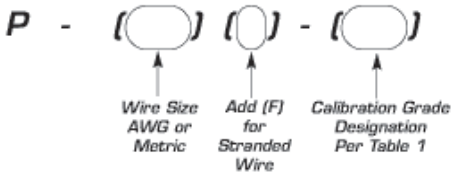
- Continuous use up ...to 221F (105C)
- Flame Retardant
- Small Compact Size
- Individual Insulation ...Color Coded
- Economical Construction
- Flexible
- Rip Design for Easy ...Conductor Seperation



Product Specifications

Conductors:	Solid or stranded thermocouple wire per ASTM E230 & ANSI MC96.1
Insulation:	Flame retardant PVC
Construction:	Parallel conductors bonded together
Operating Temperature:	-15F (-26C) to +221F (+105C) continuous
Limits of Error:	Conforms to ASTM E230, IEC 584 and ANSI MC 96.1
Color Code:	Conforms to ASTM E230 and ANSI MC 96.1 (International Color Codes Available)

Ordering Code



PVC Insulated Rip Cord 221°F (105°C)

QuickQuote

Conductor Size		Insulation Thickness		Outer Diameter		Net Weight	
AWG	(MM)	inches	(MM)	inches	(MM)	LB/MF	(KG/KM)
14	(1.63)	.012	(.30)	.088 x .176	(2.2 x 4.5)	29	(43)
14F*	(1.80)	.012	(.30)	.100 x .200	(2.5 x 5.1)	32	(48)
16	(1.29)	.012	(.30)	.075 x .150	(1.9 x 3.8)	19	(28)
16F*	(1.47)	.012	(.30)	.084 x .168	(2.1 x 4.2)	22	(33)
18	(1.02)	.012	(.30)	.064 x .128	(1.6 x 3.3)	12	(18)
18F*	(1.22)	.012	(.30)	.072 x .144	(1.8 x 3.7)	14	(21)
20	(0.81)	.010	(.25)	.052 x .104	(1.3 x 2.6)	7.8	(12)
20F*	(0.97)	.010	(.25)	.058 x .116	(1.5 x 2.9)	8.4	(13)
22	(0.64)	.010	(.25)	.045 x .090	(1.1 x 2.3)	5.3	(7.9)
24	(0.51)	.010	(.25)	.040 x .080	(1.0 x 2.0)	3.5	(5.2)
24F*	(0.61)	.010	(.25)	.044 x .088	(1.1 x 2.2)	3.8	(5.7)
26	(0.41)	.010	(.25)	.036 x .072	(.91 x 1.8)	2.5	(3.7)

MANY ITEMS AVAILABLE FROM STOCK WITHIN 24 HOURS

The products referenced above represent the most popular constructions. Other constructions can be manufactured to meet individual specification and application requirements. Contact factory for additional information.

Table 1

Initial Calibration Tolerances Per ASTM E230 and ANSI MC96.1

			Tolerance-Reference Junction 32F (0C)		
Thermocouple Type	Temperature Range F (C)	Grade Designation	Standard Grade Limits F (C) whichever is greater	Grade Designation	Special Grade Limits F (C) whichever is greater
Thermocouple Wire					
T	32 (0) to 700 (370)	T	±1.8 (1) or ±0.75%	TT	±0.9 (0.5) or 0.4%
J	32 (0) to 1400 (760)	J	±4 (2.2) or ±0.75%	JJ	±2 (1.1) or 0.4%
E	32 (0) to 1600 (870)	E	±3.1 (1.7) or ±0.50%	EE	±1.8 (1) or 0.4%
K or N	32 (0) to 2300 (1260)	K or N	±4 (2.2) or ±0.75%	KK or NN	±2 (1.1) or 0.4%
T*	-328 (-200) to 32 (0)	T	±1.8 (1) or ±1.5%	TT	±0.9 (0.5) or 0.8%**
E*	-328 (-200) to 32 (0)	E	±3.1 (1.7) or ±1%	EE	±1.8 (1) or 0.5%**
K*	-328 (-200) to 32 (0)	K	±4 (2.2) or ±2%	KK	**
Extension Wire					
TX	32 (0) to 212 (100)	TX	±1.8 (1)	TTX	±0.9 (0.5)
JX	32 (0) to 400 (200)	JX	±4 (2.2)	JJX	±2 (1.1)
EX	32 (0) to 400 (200)	EX	±3.1 (1.7)	EEX	±1.8 (1)
KX or NX	32 (0) to 400 (200)	KX or NX	±4 (2.2)	KKX or NNX	±2 (1.1)
RX or SX	32 (0) to 400 (200)	RX or SX	±9 (5)		
BX	32 (0) to 212 (100)	BX***	±7.6 (4.2)		
BX	32 (0) to 400 (200)	BX ALLOY***	±6.7 (3.7)		

* Thermocouple material is normally supplied to meet tolerances above 0C (32F). If material is required to meet tolerances below 0C (32F), the purchase order must so state. Special selection of material is required.

** Suggested initial calibration tolerance. Requirements should be discussed between purchaser and supplier.

*** Copper vs. copper can be used as an extension for Type B thermocouples if the transition is below 100C (212F). Above 100C (212F), PCLW30-6 alloy should be used as the positive extension wire.

Shielded PVC Insulated 221°F (105°C)

QuickQuote

Applications
- Temperature Sensors
- Testing
- Laboratories
- New Plant Construction
- General Industry

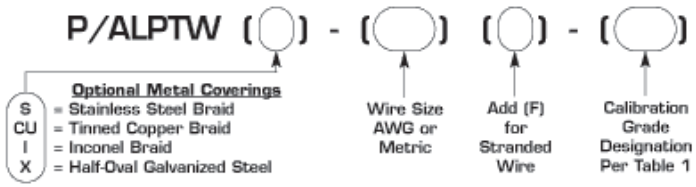
Available Options
- Metal Overbraids
- Multi-Pair Cables
- UL Listed Constructions
- TPE Insulation and Jacket ...Rated to 250F (125C)
- Special Color Codes
- Calibration Test Reports

Product Features
- Continuous use up to ...221F (105C)
- Flame Retardant
- Good Moisture, Chemical ...and Solvent Resistance
- Excellent Dielectric Strength
- 100% Continuous ...Drain/Shield Contact
- Economical Construction

Product Specifications

Conductors:	Solid or stranded thermocouple wire per ASTM E230 & ANSI MC96.1
Insulation:	Flame retardant PVC
Construction:	Single twisted pair
Pair Shield:	.002”(.05MM) aluminum/polyester tape, 25% overlap
Pair Drain Wire:	7-strand tinned copper, 2 AWG sizes smaller than conductor (24 AWG smallest drain)
Jacket:	Flame retardant PVC with ripcord under jacket
Operating Temperature:	-15F (-26C) to +221F (+105C) continuous
Limits of Error:	Conforms to ASTM E230, IEC 584 and ANSI MC 96.1
Color Code:	Conforms to ASTM E230 and ANSI MC 96.1 (International Color Codes Available)

Ordering Code



Shielded PVC Insulated 221°F (105°C)

QuickQuote

Conductor Size		Insulation Thickness		Jacket Thickness		Outer Diameter		Net Weight	
AWG	(MM)	inches	(MM)	inches	(MM)	inches	(MM)	LB/MF	(KG/KM)
12	(2.05)	.020	(.51)	.025	(.64)	.308	(7.8)	77	(115)
14	(1.63)	.020	(.51)	.025	(.64)	.274	(7.0)	54	(80)
14F*	(1.80)	.020	(.51)	.025	(.64)	.290	(7.4)	60	(89)
16	(1.29)	.015	(.38)	.020	(.51)	.218	(5.5)	35	(52)
16F*	(1.47)	.015	(.38)	.020	(.51)	.232	(5.9)	38	(57)
18	(1.02)	.015	(.38)	.020	(.51)	.196	(5.0)	25	(37)
18F*	(1.22)	.015	(.38)	.020	(.51)	.208	(5.3)	27	(40)
20	(0.81)	.015	(.38)	.020	(.51)	.180	(4.6)	18	(27)
20F*	(0.97)	.015	(.38)	.020	(.51)	.188	(4.8)	20	(30)
22	(0.64)	.015	(.38)	.020	(.51)	.166	(4.2)	16	(24)
24	(0.51)	.015	(.38)	.020	(.51)	.156	(4.0)	12	(18)
24F*	(0.61)	.015	(.38)	.020	(.51)	.164	(4.1)	13	(19)

MANY ITEMS AVAILABLE FROM STOCK WITHIN 24 HOURS

The products referenced above represent the most popular constructions. Other constructions can be manufactured to meet individual specification and application requirements. Contact factory for additional information.

Table 1

Initial Calibration Tolerances Per ASTM E230 and ANSI MC96.1

			Tolerance-Reference Junction 32F (0C)		
Thermocouple Type	Temperature Range F (C)	Grade Designation	Standard Grade Limits F (C) whichever is greater	Grade Designation	Special Grade Limits F (C) whichever is greater
Thermocouple Wire					
T	32 (0) to 700 (370)	T	±1.8 (1) or ±0.75%	TT	±0.9 (0.5) or 0.4%
J	32 (0) to 1400 (760)	J	±4 (2.2) or ±0.75%	JJ	±2 (1.1) or 0.4%
E	32 (0) to 1600 (870)	E	±3.1 (1.7) or ±0.50%	EE	±1.8 (1) or 0.4%
K or N	32 (0) to 2300 (1260)	K or N	±4 (2.2) or ±0.75%	KK or NN	±2 (1.1) or 0.4%
T*	-328 (-200) to 32 (0)	T	±1.8 (1) or ±1.5%	TT	±0.9 (0.5) or 0.8%**
E*	-328 (-200) to 32 (0)	E	±3.1 (1.7) or ±1%	EE	±1.8 (1) or 0.5%**
K*	-328 (-200) to 32 (0)	K	±4 (2.2) or ±2%	KK	**
Extension Wire					
TX	32 (0) to 212 (100)	TX	±1.8 (1)	TTX	±0.9 (0.5)
JX	32 (0) to 400 (200)	JX	±4 (2.2)	JJX	±2 (1.1)
EX	32 (0) to 400 (200)	EX	±3.1 (1.7)	EEX	±1.8 (1)
KX or NX	32 (0) to 400 (200)	KX or NX	±4 (2.2)	KKX or NNX	±2 (1.1)
RX or SX	32 (0) to 400 (200)	RX or SX	±9 (5)		
BX	32 (0) to 212 (100)	BX***	±7.6 (4.2)		
BX	32 (0) to 400 (200)	BX ALLOY***	±6.7 (3.7)		

* Thermocouple material is normally supplied to meet tolerances above 0C (32F). If material is required to meet tolerances below 0C (32F), the purchase order must so state. Special selection of material is required.

** Suggested initial calibration tolerance. Requirements should be discussed between purchaser and supplier.

*** Copper vs. copper can be used as an extension for Type B thermocouples if the transition is below 100C (212F). Above 100C (212F), PCLW30-6 alloy should be used as the positive extension wire.

Nylon Insulated 250°F (121°C)

QuickQuote

Applications
- Temperature Sensors
- Testing
- Laboratories
- Heating and Air ...Conditioning
- General Industry

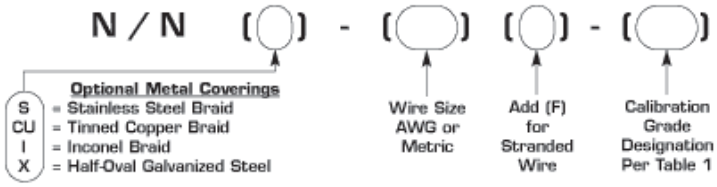
Available Options
- Metal Overbraids
- Galvanized Half-Oval Armor
- Twisted/Shielded Pair
- Multi-Pair Cables
- Special Color Codes
- Calibration Test Reports

Product Features
- Continuous use up to ...250F (121C)
- Excellent Abrasion Resistance
- Good Chemical and Solvent Resistance
- Excellent Dielectric Strength
- Small Compact Size

Product Specifications

Conductors:	Solid or stranded thermocouple wire per ASTM E230 & ANSI MC96.1
Insulation:	Nylon polyamide resin
Construction:	Parallel conductors
Jacket:	Nylon polyamide resin
Operating Temperature:	-85F (-65C) to +250F (+121C) continuous
Limits of Error:	Conforms to ASTM E230, IEC 584 and ANSI MC 96.1
Color Code:	Conforms to ASTM E230 and ANSI MC 96.1 (International Color Codes Available)

Ordering Code



Nylon Insulated 250°F (121°C)

QuickQuote

Conductor Size		Insulation Thickness		Jacket Thickness		Outer Diameter		Net Weight	
AWG	(MM)	inches	(MM)	inches	(MM)	inches	(MM)	LB/MF	(KG/KM)
12	(2.05)	.008	(.20)	.008	(.20)	.113 x .210	(2.9 x 5.3)	43	(64)
14	(1.63)	.006	(.15)	.008	(.20)	.092 x .168	(2.3 x 4.3)	29	(43)
14F*	(1.80)	.006	(.15)	.008	(.20)	.100 x .184	(2.5 x 4.7)	31	(46)
16	(1.29)	.006	(.15)	.008	(.20)	.079 x .142	(2.0 x 3.6)	18	(27)
16F*	(1.47)	.006	(.15)	.008	(.20)	.086 x .156	(2.2 x 4.0)	21	(31)
18	(1.02)	.006	(.15)	.008	(.20)	.068 x .120	(1.7 x 3.0)	12	(18)
18F*	(1.22)	.006	(.15)	.008	(.20)	.074 x .132	(1.9 x 3.4)	13	(19)
20	(0.81)	.005	(.13)	.008	(.20)	.058 x .100	(1.5 x 2.5)	7.8	(12)
20F*	(0.97)	.005	(.13)	.008	(.20)	.062 x .108	(1.6 x 2.7)	8.9	(13)
22	(0.64)	.005	(.13)	.006	(.15)	.048 x .084	(1.2 x 2.1)	5.0	(7.4)
24	(0.51)	.005	(.13)	.006	(.15)	.042 x .072	(1.1 x 1.8)	3.3	(4.9)
24F*	(0.61)	.005	(.13)	.006	(.15)	.046 x .080	(1.2 x 2.0)	3.7	(5.5)

MANY ITEMS AVAILABLE FROM STOCK WITHIN 24 HOURS

The products referenced above represent the most popular constructions. Other constructions can be manufactured to meet individual specification and application requirements. Contact factory for additional information.

Table 1

Initial Calibration Tolerances Per ASTM E230 and ANSI MC96.1

			Tolerance-Reference Junction 32F (0C)		
Thermocouple Type	Temperature Range F (C)	Grade Designation	Standard Grade Limits F (C) whichever is greater	Grade Designation	Special Grade Limits F (C) whichever is greater
Thermocouple Wire					
T	32 (0) to 700 (370)	T	±1.8 (1) or ±0.75%	TT	±0.9 (0.5) or 0.4%
J	32 (0) to 1400 (760)	J	±4 (2.2) or ±0.75%	JJ	±2 (1.1) or 0.4%
E	32 (0) to 1600 (870)	E	±3.1 (1.7) or ±0.50%	EE	±1.8 (1) or 0.4%
K or N	32 (0) to 2300 (1260)	K or N	±4 (2.2) or ±0.75%	KK or NN	±2 (1.1) or 0.4%
T*	-328 (-200) to 32 (0)	T	±1.8 (1) or ±1.5%	TT	±0.9 (0.5) or 0.8%**
E*	-328 (-200) to 32 (0)	E	±3.1 (1.7) or ±1%	EE	±1.8 (1) or 0.5%**
K*	-328 (-200) to 32 (0)	K	±4 (2.2) or ±2%	KK	**
Extension Wire					
TX	32 (0) to 212 (100)	TX	±1.8 (1)	TTX	±0.9 (0.5)
JX	32 (0) to 400 (200)	JX	±4 (2.2)	JJX	±2 (1.1)
EX	32 (0) to 400 (200)	EX	±3.1 (1.7)	EEX	±1.8 (1)
KX or NX	32 (0) to 400 (200)	KX or NX	±4 (2.2)	KKX or NNX	±2 (1.1)
RX or SX	32 (0) to 400 (200)	RX or SX	±9 (5)		
BX	32 (0) to 212 (100)	BX***	±7.6 (4.2)		
BX	32 (0) to 400 (200)	BX ALLOY***	±6.7 (3.7)		

* Thermocouple material is normally supplied to meet tolerances above 0C (32F). If material is required to meet tolerances below 0C (32F), the purchase order must so state. Special selection of material is required.

** Suggested initial calibration tolerance. Requirements should be discussed between purchaser and supplier.

*** Copper vs. copper can be used as an extension for Type B thermocouples if the transition is below 100C (212F). Above 100C (212F), PCLW30-6 alloy should be used as the positive extension wire.

FEP Insulated 400°F (200°C)

QuickQuote

Applications

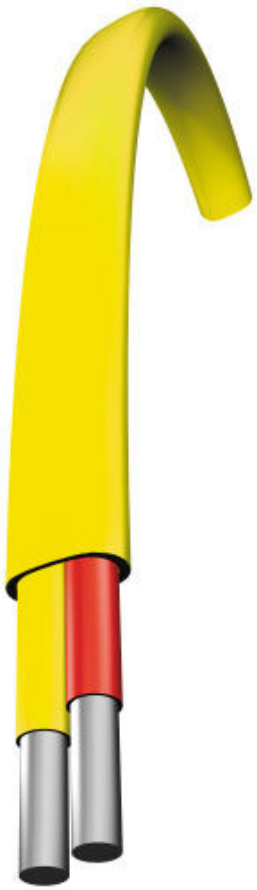
- Temperature Sensors
- Aerospace
- Transportation
- Cryogenics
- Petrochemical Plants
- FDA Approved ...Applications
- Composites

Available Options

- Metal Overbraids
- Galvanized Half-Oval Armor
- Twisted/Shielded Pair
- Multi-Pair Cables
- Fiberglass Overbraid
- UL Listed Constructions
- ETFE Insulation and Jacket ...Rated to 300F (150C)
- Special Color Codes
- Calibration Test Reports

Product Features

- Continuous use up ...to 400F (200C)
- Excellent Chemical Resistance
- Excellent Electrical Properties
- Flame Retardant
- Passes IEEE 383 Flame Test
- Passes VW-1 Flame Test



Product Specifications

Conductors:	Solid or stranded thermocouple wire per ASTM E230 & ANSI MC96.1
Insulation:	Flame retardant extruded fluoropolymer FEP
Construction:	Parallel conductors
Jacket:	Flame retardant extruded fluoropolymer FEP
Operating Temperature:	-328F (-200C) to +400F (+200C) continuous
Limits of Error:	Conforms to ASTM E230, IEC 584 and ANSI MC 96.1
Color Code:	Conforms to ASTM E230 and ANSI MC 96.1 (International Color Codes Available)

Ordering Code

TEX / TEX [ ] - [ ] [ ] - [ ]

Optional Metal Coverings
- S = Stainless Steel Braid
- CU = Tinned Copper Braid
- I = Inconel Braid
- X = Half-Oval Galvanized Steel

Wire Size AWG or Metric

Add (F) for Stranded Wire

Calibration Grade Designation Per Table 1

FEP Insulated 400°F (200°C)

QuickQuote

Conductor Size		Insulation Thickness		Jacket Thickness		Outer Diameter		Net Weight	
AWG	(MM)	inches	(MM)	inches	(MM)	inches	(MM)	LB/MF	(KG/KM)
14	(1.63)	.008	(.20)	.010	(.25)	.104 x .188	(2.6 x 4.8)	34	(51)
16	(1.29)	.008	(.20)	.010	(.25)	.087 x .154	(2.2 x 3.9)	22	(33)
16F*	(1.47)	.008	(.20)	.010	(.25)	.094 x .168	(2.4 x 4.3)	24	(36)
18	(1.02)	.008	(.20)	.010	(.25)	.076 x .132	(1.9 x 3.4)	15	(22)
20	(0.81)	.008	(.20)	.010	(.25)	.068 x .116	(1.7 x 2.9)	11	(16)
20F*	(0.97)	.008	(.20)	.010	(.25)	.072 x .124	(1.8 x 3.1)	12	(18)
22	(0.64)	.008	(.20)	.010	(.25)	.061 x .102	(1.5 x 2.6)	7.6	(11)
24	(0.51)	.008	(.20)	.010	(.25)	.056 x .092	(1.4 x 2.3)	5.7	(8.5)
24F*	(0.61)	.008	(.20)	.010	(.25)	.060 x .100	(1.6 x 2.7)	6.2	(9.2)
26	(0.41)	.008	(.20)	.010	(.25)	.052 x .084	(1.3 x 2.1)	4.4	(6.5)
28	(0.32)	.008	(.20)	.010	(.25)	.049 x .078	(1.2 x 2.0)	3.7	(5.5)
30	(0.25)	.008	(.20)	.010	(.25)	.046 x .072	(1.2 x 1.8)	3.0	(4.5)

MANY ITEMS AVAILABLE FROM STOCK WITHIN 24 HOURS

The products referenced above represent the most popular constructions. Other constructions can be manufactured to meet individual specification and application requirements. Contact factory for additional information.

Table 1

Initial Calibration Tolerances Per ASTM E230 and ANSI MC96.1

			Tolerance-Reference Junction 32F (0C)		
Thermocouple Type	Temperature Range F (C)	Grade Designation	Standard Grade Limits F (C) whichever is greater	Grade Designation	Special Grade Limits F (C) whichever is greater
Thermocouple Wire					
T	32 (0) to 700 (370)	T	±1.8 (1) or ±0.75%	TT	±0.9 (0.5) or 0.4%
J	32 (0) to 1400 (760)	J	±4 (2.2) or ±0.75%	JJ	±2 (1.1) or 0.4%
E	32 (0) to 1600 (870)	E	±3.1 (1.7) or ±0.50%	EE	±1.8 (1) or 0.4%
K or N	32 (0) to 2300 (1260)	K or N	±4 (2.2) or ±0.75%	KK or NN	±2 (1.1) or 0.4%
T*	-328 (-200) to 32 (0)	T	±1.8 (1) or ±1.5%	TT	±0.9 (0.5) or 0.8%**
E*	-328 (-200) to 32 (0)	E	±3.1 (1.7) or ±1%	EE	±1.8 (1) or 0.5%**
K*	-328 (-200) to 32 (0)	K	±4 (2.2) or ±2%	KK	**
Extension Wire					
TX	32 (0) to 212 (100)	TX	±1.8 (1)	TTX	±0.9 (0.5)
JX	32 (0) to 400 (200)	JX	±4 (2.2)	JJX	±2 (1.1)
EX	32 (0) to 400 (200)	EX	±3.1 (1.7)	EEX	±1.8 (1)
KX or NX	32 (0) to 400 (200)	KX or NX	±4 (2.2)	KKX or NNX	±2 (1.1)
RX or SX	32 (0) to 400 (200)	RX or SX	±9 (5)		
BX	32 (0) to 212 (100)	BX***	±7.6 (4.2)		
BX	32 (0) to 400 (200)	BX ALLOY***	±6.7 (3.7)		

* Thermocouple material is normally supplied to meet tolerances above 0C (32F). If material is required to meet tolerances below 0C (32F), the purchase order must so state. Special selection of material is required.

** Suggested initial calibration tolerance. Requirements should be discussed between purchaser and supplier.

*** Copper vs. copper can be used as an extension for Type B thermocouples if the transition is below 100C (212F). Above 100C (212F), PCLW30-6 alloy should be used as the positive extension wire.

Twisted FEP Insulated 400°F (200°C)

QuickQuote

Applications

- Temperature Sensors
- Aerospace
- Transportation
- Cryogenics
- Autoclaves
- FDA Approved ...Applications
- Composites

Available Options

- Metal Overbraids
- Galvanized Half-Oval Armor
- Tight Lay Lengths
- Multi-Pair Cables
- ETFE Insulation ...Rated to 300F (150C)
- Special Color Codes
- Calibration Test Reports

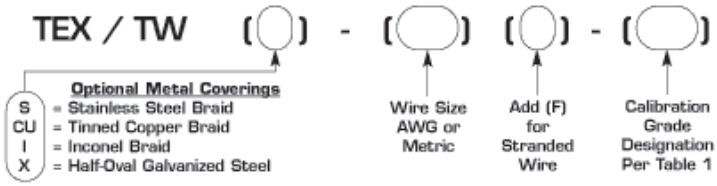
Product Features

- Continuous use up ...to 400F (200C)
- Excellent Chemical Resistance
- Excellent Electrical Properties
- Flame Retardant
- Passes IEEE 383 Flame Test
- Passes VW-1 Flame Test

Product Specifications

Conductors:	Solid or stranded thermocouple wire per ASTM E230 & ANSI MC96.1
Insulation:	Flame retardant extruded fluoropolymer FEP
Construction:	Twisted conductors
Lay Length:	1-1/2” (38MM) to 2-1/2” (64MM)
Operating Temperature:	-328F (-200C) to +400F (+200C) continuous
Limits of Error:	Conforms to ASTM E230, IEC 584 and ANSI MC 96.1
Color Code:	Conforms to ASTM E230 and ANSI MC 96.1 (International Color Codes Available)

Ordering Code



Twisted FEP Insulated 400°F (200°C)

QuickQuote

Conductor Size		Insulation Thickness		Jacket Thickness		Outer Diameter		Net Weight	
AWG	(MM)	inches	(MM)	inches	(MM)	inches	(MM)	LB/MF	(KG/KM)
16	(1.29)	.008	(.20)	2-1/2	(64)	.134	(3.4)	19	(28)
16F*	(1.47)	.008	(.20)	2-1/2	(64)	.148	(3.8)	21	(31)
18	(1.02)	.008	(.20)	2	(51)	.112	(2.8)	12	(18)
20	(0.81)	.008	(.20)	2	(51)	.096	(2.4)	8.3	(12)
20F*	(0.97)	.008	(.20)	2	(51)	.104	(2.6)	9.2	(14)
22	(0.64)	.008	(.20)	2	(51)	.082	(2.1)	5.6	(8.3)
24	(0.51)	.008	(.20)	1-1/2	(38)	.072	(1.8)	4.3	(6.4)
24F*	(0.61)	.008	(.20)	1-1/2	(38)	.080	(2.0)	4.8	(7.1)
26	(0.41)	.008	(.20)	1-1/2	(38)	.064	(1.6)	3.1	(4.6)
28	(0.32)	.008	(.20)	1-1/2	(38)	.058	(1.5)	2.0	(3.0)
30	(0.25)	.008	(.20)	1-1/2	(38)	.052	(1.3)	1.5	(2.2)

MANY ITEMS AVAILABLE FROM STOCK WITHIN 24 HOURS

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Table 1

Initial Calibration Tolerances Per ASTM E230 and ANSI MC96.1

			Tolerance-Reference Junction 32F (0C)		
Thermocouple Type	Temperature Range F (C)	Grade Designation	Standard Grade Limits F (C) whichever is greater	Grade Designation	Special Grade Limits F (C) whichever is greater
Thermocouple Wire					
T	32 (0) to 700 (370)	T	±1.8 (1) or ±0.75%	TT	±0.9 (0.5) or 0.4%
J	32 (0) to 1400 (760)	J	±4 (2.2) or ±0.75%	JJ	±2 (1.1) or 0.4%
E	32 (0) to 1600 (870)	E	±3.1 (1.7) or ±0.50%	EE	±1.8 (1) or 0.4%
K or N	32 (0) to 2300 (1260)	K or N	±4 (2.2) or ±0.75%	KK or NN	±2 (1.1) or 0.4%
T*	-328 (-200) to 32 (0)	T	±1.8 (1) or ±1.5%	TT	±0.9 (0.5) or 0.8%**
E*	-328 (-200) to 32 (0)	E	±3.1 (1.7) or ±1%	EE	±1.8 (1) or 0.5%**
K*	-328 (-200) to 32 (0)	K	±4 (2.2) or ±2%	KK	**
Extension Wire					
TX	32 (0) to 212 (100)	TX	±1.8 (1)	TTX	±0.9 (0.5)
JX	32 (0) to 400 (200)	JX	±4 (2.2)	JJX	±2 (1.1)
EX	32 (0) to 400 (200)	EX	±3.1 (1.7)	EEX	±1.8 (1)
KX or NX	32 (0) to 400 (200)	KX or NX	±4 (2.2)	KKX or NNX	±2 (1.1)
RX or SX	32 (0) to 400 (200)	RX or SX	±9 (5)		
BX	32 (0) to 212 (100)	BX***	±7.6 (4.2)		
BX	32 (0) to 400 (200)	BX ALLOY***	±6.7 (3.7)		

* Thermocouple material is normally supplied to meet tolerances above 0C (32F). If material is required to meet tolerances below 0C (32F), the purchase order must so state. Special selection of material is required.

** Suggested initial calibration tolerance. Requirements should be discussed between purchaser and supplier.

*** Copper vs. copper can be used as an extension for Type B thermocouples if the transition is below 100C (212F). Above 100C (212F), PCLW30-6 alloy should be used as the positive extension wire.

PFA Insulated 500°F (260°C)

QuickQuote

Applications

- Temperature Sensors
- Aerospace
- Transportation
- Cryogenics
- Petrochemical Plants
- FDA Approved ...Applications
- Composites

Available Options

- Metal Overbraids
- Galvanized Half-Oval Armor
- Twisted/Shielded Pair
- Multi-Pair Cables
- Fiberglass Overbraid
- ETFE Insulation and Jacket ...Rated to 300F (150C)
- Special Color Codes
- Calibration Test Reports

Product Features

- Continuous use up to ...500F (260C)
- Excellent Chemical Resistance
- Excellent Electrical Properties
- Flame Retardant
- Passes IEEE 383 Flame Test
- Passes VW-1 Flame Test

Product Specifications

Conductors:	Solid or stranded thermocouple wire per ASTM E230 & ANSI MC96.1
Insulation:	Flame retardant extruded fluoropolymer PFA
Construction:	Parallel conductors
Jacket:	Flame retardant extruded fluoropolymer PFA
Operating Temperature:	-328F (-200C) to +500F (+260C) continuous
Limits of Error:	Conforms to ASTM E230, IEC 584 and ANSI MC 96.1
Color Code:	Conforms to ASTM E230 and ANSI MC 96.1 (International Color Codes Available)

Ordering Code

PFA / PFA [ ] - [ ] [ ] - [ ]

- [ ]: Optional Metal Coverings
  - S = Stainless Steel Braid
  - CU = Tinned Copper Braid
  - I = Inconel Braid
  - X = Half-Oval Galvanized Steel
- [ ]: Wire Size AWG or Metric
- [ ]: Add (F) for Stranded Wire
- [ ]: Calibration Grade Designation Per Table 1

PFA Insulated 500°F (260°C)

QuickQuote

Conductor Size		Insulation Thickness		Jacket Thickness		Outer Diameter		Net Weight	
AWG	(MM)	inches	(MM)	inches	(MM)	inches	(MM)	LB/MF	(KG/KM)
14	(1.63)	.008	(.20)	.010	(.25)	.104 x .188	(2.6 x 4.8)	34	(51)
16	(1.29)	.008	(.20)	.010	(.25)	.087 x .154	(2.2 x 3.9)	22	(33)
16F*	(1.47)	.008	(.20)	.010	(.25)	.094 x .168	(2.4 x 4.3)	24	(36)
18	(1.02)	.008	(.20)	.010	(.25)	.076 x .132	(1.9 x 3.4)	15	(22)
20	(0.81)	.008	(.20)	.010	(.25)	.068 x .116	(1.7 x 2.9)	11	(16)
20F*	(0.97)	.008	(.20)	.010	(.25)	.072 x .124	(1.8 x 3.1)	12	(18)
22	(0.64)	.008	(.20)	.010	(.25)	.061 x .102	(1.5 x 2.6)	7.6	(11)
24	(0.51)	.008	(.20)	.010	(.25)	.056 x .092	(1.4 x 2.3)	5.7	(8.5)
24F*	(0.61)	.008	(.20)	.010	(.25)	.060 x .100	(1.6 x 2.7)	6.2	(9.2)
26	(0.41)	.008	(.20)	.010	(.25)	.052 x .084	(1.3 x 2.1)	4.4	(6.5)
28	(0.32)	.008	(.20)	.010	(.25)	.049 x .078	(1.2 x 2.0)	3.7	(5.5)
30	(0.25)	.008	(.20)	.010	(.25)	.046 x .072	(1.2 x 1.8)	3.0	(4.5)

MANY ITEMS AVAILABLE FROM STOCK WITHIN 24 HOURS

The products referenced above represent the most popular constructions. Other constructions can be manufactured to meet individual specification and application requirements. Contact factory for additional information.

Table 1

Initial Calibration Tolerances Per ASTM E230 and ANSI MC96.1

			Tolerance-Reference Junction 32F (0C)		
Thermocouple Type	Temperature Range F (C)	Grade Designation	Standard Grade Limits F (C) whichever is greater	Grade Designation	Special Grade Limits F (C) whichever is greater
Thermocouple Wire					
T	32 (0) to 700 (370)	T	±1.8 (1) or ±0.75%	TT	±0.9 (0.5) or 0.4%
J	32 (0) to 1400 (760)	J	±4 (2.2) or ±0.75%	JJ	±2 (1.1) or 0.4%
E	32 (0) to 1600 (870)	E	±3.1 (1.7) or ±0.50%	EE	±1.8 (1) or 0.4%
K or N	32 (0) to 2300 (1260)	K or N	±4 (2.2) or ±0.75%	KK or NN	±2 (1.1) or 0.4%
T*	-328 (-200) to 32 (0)	T	±1.8 (1) or ±1.5%	TT	±0.9 (0.5) or 0.8%**
E*	-328 (-200) to 32 (0)	E	±3.1 (1.7) or ±1%	EE	±1.8 (1) or 0.5%**
K*	-328 (-200) to 32 (0)	K	±4 (2.2) or ±2%	KK	**
Extension Wire					
TX	32 (0) to 212 (100)	TX	±1.8 (1)	TTX	±0.9 (0.5)
JX	32 (0) to 400 (200)	JX	±4 (2.2)	JJX	±2 (1.1)
EX	32 (0) to 400 (200)	EX	±3.1 (1.7)	EEX	±1.8 (1)
KX or NX	32 (0) to 400 (200)	KX or NX	±4 (2.2)	KKX or NNX	±2 (1.1)
RX or SX	32 (0) to 400 (200)	RX or SX	±9 (5)		
BX	32 (0) to 212 (100)	BX***	±7.6 (4.2)		
BX	32 (0) to 400 (200)	BX ALLOY***	±6.7 (3.7)		

* Thermocouple material is normally supplied to meet tolerances above 0C (32F). If material is required to meet tolerances below 0C (32F), the purchase order must so state. Special selection of material is required.

** Suggested initial calibration tolerance. Requirements should be discussed between purchaser and supplier.

*** Copper vs. copper can be used as an extension for Type B thermocouples if the transition is below 100C (212F). Above 100C (212F), PCLW30-6 alloy should be used as the positive extension wire.

Pipe Tape Insulated 500°F (260°C)

QuickQuote

Applications

- Aerospace
- Power Generation
- Laboratories
- Petrochemical Plants
- Cryogenic Applications
- FDA Approved ...Applications
- Composites

Available Options

- Metal Overbraids
- Galvanized Half-Oval ...Armor
- Twisted/Shielded Pair
- Special Color Codes
- Calibration Test Reports

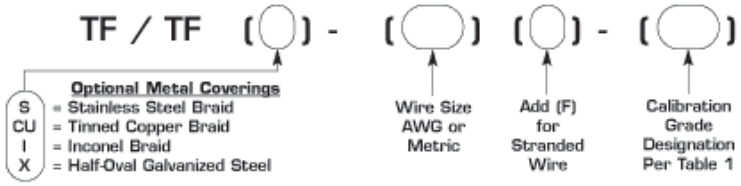
Product Features

- Continuous use up ...to 500F (260C)
- Excellent Solvent Resistance
- Flame Retardant
- Passes IEEE 383 Flame Test
- Passes VW-1 Flame Test
- Will Not Melt
- Abrasion Resistant

Product Specifications

Conductors:	Solid or stranded thermocouple wire per ASTM E230 & ANSI MC96.1
Insulation:	Two layers of fused fluoropolymer PTFE tape
Construction:	Parallel conductors
Jacket:	Two layers of fused fluoropolymer PTFE tape
Operating Temperature:	-328°F (-200°C) to +500F (+260C) continuous
Limits of Error:	Conforms to ASTM E230, IEC 584 and ANSI MC 96.1
Color Code:	Conforms to ASTM E230 and ANSI MC 96.1 (International Color Codes Available)

Ordering Code



Pipe Tape Insulated 500°F (260°C)

QuickQuote

Conductor Size		Insulation Thickness		Jacket Thickness		Outer Diameter		Net Weight	
AWG	(MM)	inches	(MM)	inches	(MM)	inches	(MM)	LB/MF	(KG/KM)
14	(1.63)	.012	(.30)	.012	(.30)	.112 x .200	(2.8 x 5.1)	33	(49)
16	(1.29)	.012	(.30)	.012	(.30)	.099 x .174	(2.5 x 4.4)	23	(34)
16F*	(1.47)	.012	(.30)	.012	(.30)	.106 x .188	(2.7 x 4.8)	25	(37)
18	(1.02)	.012	(.30)	.012	(.30)	.088 x .152	(2.2 x 3.9)	15	(22)
20	(0.81)	.008	(.20)	.012	(.30)	.072 x .120	(1.8 x 3.0)	10	(15)
20F*	(0.97)	.008	(.20)	.012	(.30)	.078 x .132	(2.0 x 3.4)	11	(16)
22	(0.64)	.008	(.20)	.012	(.30)	.065 x .106	(1.7 x 2.7)	7.4	(11)
24	(0.51)	.008	(.20)	.012	(.30)	.060 x .096	(1.5 x 2.4)	5.2	(7.7)
24F*	(0.61)	.008	(.20)	.012	(.30)	.064 x .104	(1.6 x 2.6)	6.0	(8.9)
26	(0.41)	.008	(.20)	.012	(.30)	.056 x .088	(1.4 x 2.2)	4.3	(6.4)
28	(0.32)	.008	(.20)	.012	(.30)	.053 x .082	(1.3 x 2.1)	3.2	(4.8)
30	(0.25)	.008	(.20)	.012	(.30)	.050 x .076	(1.3 x 1.9)	2.8	(4.2)

MANY ITEMS AVAILABLE FROM STOCK WITHIN 24 HOURS

The products referenced above represent the most popular constructions. Other constructions can be manufactured to meet individual specification and application requirements. Contact factory for additional information.

Table 1

Initial Calibration Tolerances Per ASTM E230 and ANSI MC96.1

			Tolerance-Reference Junction 32F (0C)		
Thermocouple Type	Temperature Range F (C)	Grade Designation	Standard Grade Limits F (C) whichever is greater	Grade Designation	Special Grade Limits F (C) whichever is greater
Thermocouple Wire					
T	32 (0) to 700 (370)	T	±1.8 (1) or ±0.75%	TT	±0.9 (0.5) or 0.4%
J	32 (0) to 1400 (760)	J	±4 (2.2) or ±0.75%	JJ	±2 (1.1) or 0.4%
E	32 (0) to 1600 (870)	E	±3.1 (1.7) or ±0.50%	EE	±1.8 (1) or 0.4%
K or N	32 (0) to 2300 (1260)	K or N	±4 (2.2) or ±0.75%	KK or NN	±2 (1.1) or 0.4%
T*	-328 (-200) to 32 (0)	T	±1.8 (1) or ±1.5%	TT	±0.9 (0.5) or 0.8%**
E*	-328 (-200) to 32 (0)	E	±3.1 (1.7) or ±1%	EE	±1.8 (1) or 0.5%**
K*	-328 (-200) to 32 (0)	K	±4 (2.2) or ±2%	KK	**
Extension Wire					
TX	32 (0) to 212 (100)	TX	±1.8 (1)	TTX	±0.9 (0.5)
JX	32 (0) to 400 (200)	JX	±4 (2.2)	JJX	±2 (1.1)
EX	32 (0) to 400 (200)	EX	±3.1 (1.7)	EEX	±1.8 (1)
KX or NX	32 (0) to 400 (200)	KX or NX	±4 (2.2)	KKX or NNX	±2 (1.1)
RX or SX	32 (0) to 400 (200)	RX or SX	±9 (5)		
BX	32 (0) to 212 (100)	BX***	±7.6 (4.2)		
BX	32 (0) to 400 (200)	BX ALLOY***	±6.7 (3.7)		

* Thermocouple material is normally supplied to meet tolerances above 0C (32F). If material is required to meet tolerances below 0C (32F), the purchase order must so state. Special selection of material is required.

** Suggested initial calibration tolerance. Requirements should be discussed between purchaser and supplier.

*** Copper vs. copper can be used as an extension for Type B thermocouples if the transition is below 100C (212F). Above 100C (212F), PCLW30-6 alloy should be used as the positive extension wire.

Polyimide Tape Insulated 500°F (260°C)

QuickQuote

Applications

- Aerospace Industry
- Power Generation
- Laboratories
- Petrochemical Plants
- Cryogenic Applications
- Pharmaceutical
- Autoclaves

Available Options

- Metal Overbraids
- Galvanized Half-Oval Armor
- Twisted/Shielded Pair
- Small Diameter HF/D-Overall
  ...Jacket One Insulated One
  ...Bare Conductor
- Special Color Codes
- Calibration Test Reports

Product Features

- Continuous use up ...to 500F (260C)
- Unaffected by Extreme or ...Rapid Temperature Variations
- Excellent Solvent Resistance
- Flame Retardant
- Resistant to Radiation
- Does Not Burn

Product Specifications

Conductors:	Solid or stranded thermocouple wire per ASTM E230 & ANSI MC96.1
Insulation:	Two layers of fused polyimide tape, color coded with a polyimide coating
Construction:	Parallel conductors
Jacket:	Two layers of fused polyimide tape
Operating Temperature:	-400F (-240C) to +500F (+260C) continuous
Limits of Error:	Conforms to ASTM E230, IEC 584 and ANSI MC 96.1
Color Code:	Conforms to ASTM E230 and ANSI MC 96.1 (International Color Codes Available)

Ordering Code

K / K [ ] - [ ] [ ] - [ ]

Optional Metal Coverings
S = Stainless Steel Braid
CU = Tinned Copper Braid
I = Inconel Braid
X = Half-Oval Galvanized Steel

Wire Size AWG or Metric

Add (F) for Stranded Wire

Calibration Grade Designation Per Table 1

Polyimide Tape Insulated 500°F (260°C)

QuickQuote

Conductor Size		Insulation Thickness		Jacket Thickness		Outer Diameter		Net Weight	
AWG	(MM)	inches	(MM)	inches	(MM)	inches	(MM)	LB/MF	(KG/KM)
14	(1.63)	.005	(.13)	.005	(.13)	.086 x .160	(2.2 x 4.1)	28	(42)
16	(1.29)	.005	(.13)	.005	(.13)	.071 x .132	(1.8 x 3.4)	18	(27)
16F*	(1.47)	.005	(.13)	.005	(.13)	.080 x .150	(2.0 x 3.8)	20	(30)
18	(1.02)	.005	(.13)	.005	(.13)	.060 x .110	(1.5 x 2.8)	11	(16)
20	(0.81)	.005	(.13)	.005	(.13)	.052 x .094	(1.3 x 2.4)	7.9	(11)
20F*	(0.97)	.005	(.13)	.005	(.13)	.058 x .106	(1.5 x 2.7)	8.2	(12)
22	(0.64)	.005	(.13)	.005	(.13)	.045 x .080	(1.1 x 2.0)	5.4	(8.0)
24	(0.51)	.005	(.13)	.005	(.13)	.040 x .070	(1.0 x 1.8)	3.7	(5.5)
24F*	(0.61)	.005	(.13)	.005	(.13)	.044 x .078	(1.1 x 2.0)	4.2	(6.2)
26	(0.41)	.005	(.13)	.005	(.13)	.036 x .062	(.91 x 1.6)	2.7	(4.0)
28	(0.32)	.005	(.13)	.005	(.13)	.033 x .056	(.84 x 1.4)	2.0	(3.0)
30	(0.25)	.005	(.13)	.005	(.13)	.030 x .050	(.76 x 1.3)	1.7	(2.5)

MANY ITEMS AVAILABLE FROM STOCK WITHIN 24 HOURS

The products referenced above represent the most popular constructions. Other constructions can be manufactured to meet individual specification and application requirements. Contact factory for additional information.

Table 1

Initial Calibration Tolerances Per ASTM E230 and ANSI MC96.1

			Tolerance-Reference Junction 32F (0C)		
Thermocouple Type	Temperature Range F (C)	Grade Designation	Standard Grade Limits F (C) whichever is greater	Grade Designation	Special Grade Limits F (C) whichever is greater
Thermocouple Wire					
T	32 (0) to 700 (370)	T	±1.8 (1) or ±0.75%	TT	±0.9 (0.5) or 0.4%
J	32 (0) to 1400 (760)	J	±4 (2.2) or ±0.75%	JJ	±2 (1.1) or 0.4%
E	32 (0) to 1600 (870)	E	±3.1 (1.7) or ±0.50%	EE	±1.8 (1) or 0.4%
K or N	32 (0) to 2300 (1260)	K or N	±4 (2.2) or ±0.75%	KK or NN	±2 (1.1) or 0.4%
T*	-328 (-200) to 32 (0)	T	±1.8 (1) or ±1.5%	TT	±0.9 (0.5) or 0.8%**
E*	-328 (-200) to 32 (0)	E	±3.1 (1.7) or ±1%	EE	±1.8 (1) or 0.5%**
K*	-328 (-200) to 32 (0)	K	±4 (2.2) or ±2%	KK	**
Extension Wire					
TX	32 (0) to 212 (100)	TX	±1.8 (1)	TTX	±0.9 (0.5)
JX	32 (0) to 400 (200)	JX	±4 (2.2)	JJX	±2 (1.1)
EX	32 (0) to 400 (200)	EX	±3.1 (1.7)	EEX	±1.8 (1)
KX or NX	32 (0) to 400 (200)	KX or NX	±4 (2.2)	KKX or NNX	±2 (1.1)
RX or SX	32 (0) to 400 (200)	RX or SX	±9 (5)		
BX	32 (0) to 212 (100)	BX***	±7.6 (4.2)		
BX	32 (0) to 400 (200)	BX ALLOY***	±6.7 (3.7)		

* Thermocouple material is normally supplied to meet tolerances above 0C (32F). If material is required to meet tolerances below 0C (32F), the purchase order must so state. Special selection of material is required.

** Suggested initial calibration tolerance. Requirements should be discussed between purchaser and supplier.

*** Copper vs. copper can be used as an extension for Type B thermocouples if the transition is below 100C (212F). Above 100C (212F), PCLW30-6 alloy should be used as the positive extension wire.

B-Fiber Insulated 500°F (260°C)

QuickQuote

Applications

- Heat Treatment
- Brick and Ceramic ...Manufacturing
- Steel and Aluminum ...Industry
- Metals Production
- Glass Industry

Available Options

- Fiberglass Jacket
- Stabilized Type K & ...Type E Conductors
- Fused PTFE Tape ...Moisture Barrier
- Twisted/Shielded Pair
- Metal Coverings
- Tighter Than Special ...Limit Accuracy Tolerances
- Special Color Codes
- Calibration Test Reports

Product Features

- Continuous use up ...to 500F (260C)
- Single exposure up ...to 650F (343C)
- Superior Abrasion ...Resistance
- High Temperature Stability

Product Specifications

Conductors:	Solid or stranded thermocouple wire per ASTM E230 & ANSI MC96.1
Insulation:	Felted synthetic polyamide fiber blend with high temperature impregnation*
Construction:	Parallel conductors
Jacket:	Braided synthetic polyamide fiber blend with high temperature impregnation*
Operating Temperature:	+500F (+260C) continuous +650F (+343C) single exposure
Limits of Error:	Conforms to ASTM E230, IEC 584 and ANSI MC 96.1
Color Code:	Conforms to ASTM E230 and ANSI MC 96.1 (International Color Codes Available)

*Impregnation maintained to +400F (+200C)

Ordering Code

B-Fiber Insulated 500°F (260°C)

QuickQuote

Conductor Size		Insulation Thickness		Jacket Thickness		Outer Diameter		Net Weight	
AWG	(MM)	inches	(MM)	inches	(MM)	inches	(MM)	LB/MF	(KG/KM)
12	(2.06)	.015	(.38)	.035	(.89)	.181 x .292	(4.6 x 7.4)	46	(68)
14	(1.63)	.015	(.38)	.035	(.89)	.164 x .258	(4.2 x 6.6)	33	(49)
16	(1.29)	.015	(.38)	.035	(.89)	.151 x .232	(3.8 x 5.9)	23	(34)
16F*	(1.47)	.015	(.38)	.035	(.89)	.160 x .250	(4.1 x 6.4)	25	(37)
18	(1.02)	.015	(.38)	.035	(.89)	.140 x .210	(3.6 x 5.3)	16	(24)
18F*	(1.22)	.015	(.38)	.035	(.89)	.148 x .226	(3.8 x 5.7)	17	(25)
20	(0.81)	.015	(.38)	.035	(.89)	.132 x .194	(3.4 x 4.9)	12	(18)
20F*	(0.97)	.015	(.38)	.035	(.89)	.138 x .206	(3.5 x 5.2)	13	(19)
22	(0.64)	.010	(.25)	.035	(.89)	.115 x .160	(2.9 x 4.1)	8.4	(12)
22F*	(0.76)	.010	(.25)	.035	(.89)	.120 x .170	(3.0 x 4.3)	8.9	(13)
24	(0.51)	.010	(.25)	.035	(.89)	.110 x .150	(2.8 x 3.8)	6.0	(8.9)
24F*	(0.61)	.010	(.25)	.035	(.89)	.114 x .158	(2.9 x 4.0)	6.3	(9.4)

MANY ITEMS AVAILABLE FROM STOCK WITHIN 24 HOURS

The products referenced above represent the most popular constructions. Other constructions can be manufactured to meet individual specification and application requirements. Contact factory for additional information.

Table 1

Initial Calibration Tolerances Per ASTM E230 and ANSI MC96.1

			Tolerance-Reference Junction 32F (0C)		
Thermocouple Type	Temperature Range F (C)	Grade Designation	Standard Grade Limits F (C) whichever is greater	Grade Designation	Special Grade Limits F (C) whichever is greater
Thermocouple Wire					
T	32 (0) to 700 (370)	T	±1.8 (1) or ±0.75%	TT	±0.9 (0.5) or 0.4%
J	32 (0) to 1400 (760)	J	±4 (2.2) or ±0.75%	JJ	±2 (1.1) or 0.4%
E	32 (0) to 1600 (870)	E	±3.1 (1.7) or ±0.50%	EE	±1.8 (1) or 0.4%
K or N	32 (0) to 2300 (1260)	K or N	±4 (2.2) or ±0.75%	KK or NN	±2 (1.1) or 0.4%
T*	-328 (-200) to 32 (0)	T	±1.8 (1) or ±1.5%	TT	±0.9 (0.5) or 0.8%**
E*	-328 (-200) to 32 (0)	E	±3.1 (1.7) or ±1%	EE	±1.8 (1) or 0.5%**
K*	-328 (-200) to 32 (0)	K	±4 (2.2) or ±2%	KK	**
Extension Wire					
TX	32 (0) to 212 (100)	TX	±1.8 (1)	TTX	±0.9 (0.5)
JX	32 (0) to 400 (200)	JX	±4 (2.2)	JJX	±2 (1.1)
EX	32 (0) to 400 (200)	EX	±3.1 (1.7)	EEX	±1.8 (1)
KX or NX	32 (0) to 400 (200)	KX or NX	±4 (2.2)	KKX or NNX	±2 (1.1)
RX or SX	32 (0) to 400 (200)	RX or SX	±9 (5)		
BX	32 (0) to 212 (100)	BX***	±7.6 (4.2)		
BX	32 (0) to 400 (200)	BX ALLOY***	±6.7 (3.7)		

* Thermocouple material is normally supplied to meet tolerances above 0C (32F). If material is required to meet tolerances below 0C (32F), the purchase order must so state. Special selection of material is required.

** Suggested initial calibration tolerance. Requirements should be discussed between purchaser and supplier.

*** Copper vs. copper can be used as an extension for Type B thermocouples if the transition is below 100C (212F). Above 100C (212F), PCLW30-6 alloy should be used as the positive extension wire.

Fiberglass Insulated 950°F (510°C)

QuickQuote

Applications

- Heat Treatment
- Temperature Sensors
- Steel and Aluminum ...Industry
- Plastic Processing ...Equipment
- Furnace Surveys
- Testing

Available Options

- Reduced Itch TuffbondTM ...Impregnation on Singles
- Stabilized Type K & ...Type E Conductors
- Fused PTFE Tape Moisture ...Barrier
- Double Glass Braid Insulation
- Twisted/Shielded Pair
- Metal Coverings
- Tighter Than Special Limit ...Accuracy Tolerances
- Special Color Codes
- Calibration Test Reports

Product Features

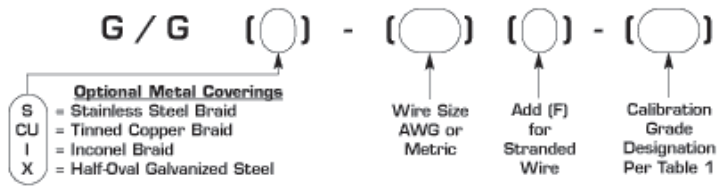
- Continuous use up to ...950F (510C)
- Single Exposure up to ...1200F (650C)
- Good Moisture, Chemical ...and Abrasion Resistance
- High Temperature Stability

Product Specifications

Conductors:	Solid or stranded thermocouple wire per ASTM E230 & ANSI MC96.1
Insulation:	Braided fiberglass with high temperature impregnation* (24 to 30 AWG Served Glass)
Construction:	Parallel conductors
Jacket:	Braided fiberglass with high temperature impregnation*
Operating Temperature:	+950F (+510C) continuous +1200F (+650C) single exposure
Limits of Error:	Conforms to ASTM E230, IEC 584 and ANSI MC 96.1
Color Code:	Conforms to ASTM E230 and ANSI MC 96.1 (International Color Codes Available)

*Impregnation maintained to +400F (+200C)

Ordering Code



Fiberglass Insulated 950°F (510°C)

QuickQuote

Conductor Size		Insulation Thickness		Jacket Thickness		Outer Diameter		Net Weight	
AWG	(MM)	inches	(MM)	inches	(MM)	inches	(MM)	LB/MF	(KG/KM)
14	(1.63)	.007	(.18)	.010	(.25)	.100 x .180	(2.5 x 4.6)	29	(43)
16	(1.29)	.007	(.18)	.010	(.25)	.085 x .150	(2.2 x 3.8)	20	(30)
16F*	(1.47)	.007	(.18)	.010	(.25)	.094 x .168	(2.4 x 4.3)	22	(33)
18	(1.02)	.007	(.18)	.010	(.25)	.070 x .124	(1.8 x 3.2)	13	(19)
20	(0.81)	.006	(.15)	.006	(.15)	.056 x .100	(1.4 x 2.5)	7.7	(11)
20F*	(0.97)	.006	(.15)	.006	(.15)	.060 x .108	(1.5 x 2.7)	8.3	(12)
22	(0.64)	.006	(.15)	.006	(.15)	.049 x .086	(1.2 x 2.2)	5.4	(8.0)
24	(0.51)	.006	(.15)	.006	(.15)	.040 x .068	(1.0 x 1.7)	3.2	(4.8)
24F*	(0.61)	.006	(.15)	.006	(.15)	.048 x .084	(1.2 x 2.1)	3.4	(5.1)
26	(0.41)	.004	(.11)	.006	(.15)	.036 x .060	(0.9 x 1.5)	2.2	(3.3)
28	(0.32)	.004	(.11)	.006	(.15)	.033 x .054	(0.8 x 1.4)	1.7	(2.5)
30	(0.25)	.004	(.11)	.006	(.15)	.030 x .048	(0.8 x 1.2)	1.3	(1.9)

MANY ITEMS AVAILABLE FROM STOCK WITHIN 24 HOURS

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Table 1

Initial Calibration Tolerances Per ASTM E230 and ANSI MC96.1

			Tolerance-Reference Junction 32F (0C)		
Thermocouple Type	Temperature Range F (C)	Grade Designation	Standard Grade Limits F (C) whichever is greater	Grade Designation	Special Grade Limits F (C) whichever is greater
Thermocouple Wire					
T	32 (0) to 700 (370)	T	±1.8 (1) or ±0.75%	TT	±0.9 (0.5) or 0.4%
J	32 (0) to 1400 (760)	J	±4 (2.2) or ±0.75%	JJ	±2 (1.1) or 0.4%
E	32 (0) to 1600 (870)	E	±3.1 (1.7) or ±0.50%	EE	±1.8 (1) or 0.4%
K or N	32 (0) to 2300 (1260)	K or N	±4 (2.2) or ±0.75%	KK or NN	±2 (1.1) or 0.4%
T*	-328 (-200) to 32 (0)	T	±1.8 (1) or ±1.5%	TT	±0.9 (0.5) or 0.8%**
E*	-328 (-200) to 32 (0)	E	±3.1 (1.7) or ±1%	EE	±1.8 (1) or 0.5%**
K*	-328 (-200) to 32 (0)	K	±4 (2.2) or ±2%	KK	**
Extension Wire					
TX	32 (0) to 212 (100)	TX	±1.8 (1)	TTX	±0.9 (0.5)
JX	32 (0) to 400 (200)	JX	±4 (2.2)	JJX	±2 (1.1)
EX	32 (0) to 400 (200)	EX	±3.1 (1.7)	EEX	±1.8 (1)
KX or NX	32 (0) to 400 (200)	KX or NX	±4 (2.2)	KKX or NNX	±2 (1.1)
RX or SX	32 (0) to 400 (200)	RX or SX	±9 (5)		
BX	32 (0) to 212 (100)	BX***	±7.6 (4.2)		
BX	32 (0) to 400 (200)	BX ALLOY***	±6.7 (3.7)		

* Thermocouple material is normally supplied to meet tolerances above 0C (32F). If material is required to meet tolerances below 0C (32F), the purchase order must so state. Special selection of material is required.

** Suggested initial calibration tolerance. Requirements should be discussed between purchaser and supplier.

*** Copper vs. copper can be used as an extension for Type B thermocouples if the transition is below 100C (212F). Above 100C (212F), PCLW30-6 alloy should be used as the positive extension wire.

High Temperature Fiberglass Insulated 1300°F (704°C)

QuickQuote

Applications

- Heat Treatment
- Component Testing
- Steel and Aluminum ...Industry
- Metals Production
- Furnace Surveys
- Temperature Sensors

Available Options

- Reduced Itch Tuffbond™ ...Impregnation on Singles
- Stabilized Type K & ...Type E Conductors
- Fused PTFE Tape Moisture ...Barrier
- Twisted/Shielded Pair
- Metal Coverings
- Tighter than Special Limit ...Accuracy Tolerances
- Special Color Codes
- Calibration Test Reports

Product Features

- Continuous use up to ...1300F (704C)
- Single Exposure up to ...1600F (871C)
- Good Moisture, Chemical ...and Abrasion Resistance
- High Temperature Stability

Product Specifications

Conductors:	Solid or stranded thermocouple wire per ASTM E230 & ANSI MC96.1
Insulation:	Braided fiberglass with high temperature impregnation*
Construction:	Parallel conductors
Jacket:	Braided fiberglass with high temperature impregnation*
Operating Temperature:	+1300F (+704C) continuous +1600F (+871C) single exposure
Limits of Error:	Conforms to ASTM E230, IEC 584 and ANSI MC 96.1
Color Code:	Conforms to ASTM E230 and ANSI MC 96.1 (International Color Codes Available)

*Impregnation maintained to +400F (+200C)

Ordering Code

Q / Q [ ] - [ ] [ ] - [ ]

Optional Metal Coverings
- S = Stainless Steel Braid
- CU = Tinned Copper Braid
- I = Inconel Braid
- X = Half-Oval Galvanized Steel

Wire Size AWG or Metric

Add (F) for Stranded Wire

Calibration Grade Designation Per Table 1

High Temperature Fiberglass Insulated 1300°F (704°C)

QuickQuote

Conductor Size		Insulation Thickness		Jacket Thickness		Outer Diameter		Net Weight	
AWG	(MM)	inches	(MM)	inches	(MM)	inches	(MM)	LB/MF	(KG/KM)
12	(2.06)	.013	(.33)	.013	(.33)	.133 x .240	(3.4 x 6.1)	44	(65)
14	(1.63)	.013	(.33)	.013	(.33)	.116 x .206	(2.9 x 5.2)	31	(46)
16	(1.29)	.013	(.33)	.013	(.33)	.103 x .180	(2.6 x 4.6)	22	(33)
16F*	(1.47)	.013	(.33)	.013	(.33)	.110 x .194	(2.8 x 4.9)	23	(34)
18	(1.02)	.013	(.33)	.013	(.33)	.092 x .158	(2.3 x 4.0)	15	(22)
18F*	(1.22)	.013	(.33)	.013	(.33)	.100 x .174	(2.5 x 4.4)	16	(24)
20	(0.81)	.013	(.33)	.013	(.33)	.084 x .142	(2.1 x 3.6)	11	(16)
20F*	(0.97)	.013	(.33)	.013	(.33)	.088 x .150	(2.2 x 3.8)	12	(18)
22	(0.64)	.009	(.23)	.013	(.33)	.069 x .112	(1.8 x 2.8)	7.2	(11)
22F*	(0.76)	.009	(.23)	.013	(.33)	.074 x .122	(1.9 x 3.1)	7.8	(12)
24	(0.51)	.009	(.23)	.013	(.33)	.064 x .102	(1.6 x 2.6)	5.8	(8.6)
24F*	(0.61)	.009	(.23)	.013	(.33)	.068 x .110	(1.7 x 2.8)	6.2	(9.2)

MANY ITEMS AVAILABLE FROM STOCK WITHIN 24 HOURS

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Table 1

Initial Calibration Tolerances Per ASTM E230 and ANSI MC96.1

			Tolerance-Reference Junction 32F (0C)		
Thermocouple Type	Temperature Range F (C)	Grade Designation	Standard Grade Limits F (C) whichever is greater	Grade Designation	Special Grade Limits F (C) whichever is greater
Thermocouple Wire					
T	32 (0) to 700 (370)	T	±1.8 (1) or ±0.75%	TT	±0.9 (0.5) or 0.4%
J	32 (0) to 1400 (760)	J	±4 (2.2) or ±0.75%	JJ	±2 (1.1) or 0.4%
E	32 (0) to 1600 (870)	E	±3.1 (1.7) or ±0.50%	EE	±1.8 (1) or 0.4%
K or N	32 (0) to 2300 (1260)	K or N	±4 (2.2) or ±0.75%	KK or NN	±2 (1.1) or 0.4%
T*	-328 (-200) to 32 (0)	T	±1.8 (1) or ±1.5%	TT	±0.9 (0.5) or 0.8%**
E*	-328 (-200) to 32 (0)	E	±3.1 (1.7) or ±1%	EE	±1.8 (1) or 0.5%**
K*	-328 (-200) to 32 (0)	K	±4 (2.2) or ±2%	KK	**
Extension Wire					
TX	32 (0) to 212 (100)	TX	±1.8 (1)	TTX	±0.9 (0.5)
JX	32 (0) to 400 (200)	JX	±4 (2.2)	JJX	±2 (1.1)
EX	32 (0) to 400 (200)	EX	±3.1 (1.7)	EEX	±1.8 (1)
KX or NX	32 (0) to 400 (200)	KX or NX	±4 (2.2)	KKX or NNX	±2 (1.1)
RX or SX	32 (0) to 400 (200)	RX or SX	±9 (5)		
BX	32 (0) to 212 (100)	BX***	±7.6 (4.2)		
BX	32 (0) to 400 (200)	BX ALLOY***	±6.7 (3.7)		

* Thermocouple material is normally supplied to meet tolerances above 0C (32F). If material is required to meet tolerances below 0C (32F), the purchase order must so state. Special selection of material is required.

** Suggested initial calibration tolerance. Requirements should be discussed between purchaser and supplier.

*** Copper vs. copper can be used as an extension for Type B thermocouples if the transition is below 100C (212F). Above 100C (212F), PCLW30-6 alloy should be used as the positive extension wire.

High Temperature Fiberglass Twisted 1300°F (704°C)

QuickQuote

Applications

- Heat Treatment
- Component Testing
- Steel and Aluminum ...Industry
- Metals Production
- Furnace Surveys
- Temperature Sensors

Available Options

- Reduced Itch TuffbondTM ...Impregnation on Singles
- Stabilized Type K & ...Type E Conductors
- Fused PTFE Tape Moisture ...Barrier
- Multi-Pair Cables
- Twisted/Shielded Pair
- Metal Coverings
- Tighter Than Special Limit ...Accuracy Tolerances
- Special Color Codes
- Calibration Test Reports

Product Features

- Continuous use up to ...1300F (704C)
- Single exposure up to ...1600F (871C)
- Good Moisture, Chemical ...and Abrasion Resistance
- High Temperature Stability

Product Specifications

Conductors:	Solid or stranded thermocouple wire per ASTM E230 & ANSI MC96.1
Insulation:	Braided fiberglass with high temperature impregnation*
Construction:	Twisted conductors
Lay Length:	1-1/2” (38MM) to 3” (76MM)
Operating Temperature:	+1300F (+704C) continuous +1600F (+871C) single exposure
Limits of Error:	Conforms to ASTM E230, IEC 584 and ANSI MC 96.1
Color Code:	Conforms to ASTM E230 and ANSI MC 96.1 (International Color Codes Available)

*Impregnation maintained to +400F +(200C)

Ordering Code

Q / TW [ ] - [ ] [ ] - [ ]

Optional Metal Coverings
- S = Stainless Steel Braid
- CU = Tinned Copper Braid
- I = Inconel Braid
- X = Half-Oval Galvanized Steel

Wire Size AWG or Metric

Add (F) for Stranded Wire

Calibration Grade Designation Per Table 1

High Temperature Fiberglass Twisted 1300°F (704°C)

QuickQuote

Conductor Size		Insulation Thickness		Jacket Thickness		Outer Diameter		Net Weight	
AWG	(MM)	inches	(MM)	inches	(MM)	inches	(MM)	LB/MF	(KG/KM)
12	(2.06)	.013	(.33)	3	(76)	.214	(5.4)	42	(62)
14	(1.63)	.013	(.33)	3	(76)	.180	(4.6)	29	(43)
16	(1.29)	.013	(.33)	2-1/2	(64)	.154	(3.9)	21	(31)
16F*	(1.47)	.013	(.33)	2-1/2	(64)	.168	(4.3)	22	(33)
18	(1.02)	.013	(.33)	2-1/2	(64)	.132	(3.4)	14	(21)
18F*	(1.22)	.013	(.33)	2-1/2	(64)	.148	(3.8)	15	(22)
20	(0.81)	.013	(.33)	2-1/2	(64)	.116	(3.0)	11	(16)
20F*	(0.97)	.013	(.33)	2-1/2	(64)	.124	(3.1)	12	(18)
22	(0.64)	.009	(.23)	1-1/2	(38)	.086	(2.2)	6.8	(10)
22F*	(0.76)	.009	(.23)	1-1/2	(38)	.096	(2.4)	7.4	(11)
24	(0.51)	.009	(.23)	1-1/2	(38)	.076	(1.9)	5.4	(8.0)
24F*	(0.61)	.009	(.23)	1-1/2	(38)	.084	(2.1)	5.8	(8.6)

MANY ITEMS AVAILABLE FROM STOCK WITHIN 24 HOURS

The products referenced above represent the most popular constructions. Other constructions can be manufactured to meet individual specification and application requirements. Contact factory for additional information.

Table 1

Initial Calibration Tolerances Per ASTM E230 and ANSI MC96.1

			Tolerance-Reference Junction 32F (0C)		
Thermocouple Type	Temperature Range F (C)	Grade Designation	Standard Grade Limits F (C) whichever is greater	Grade Designation	Special Grade Limits F (C) whichever is greater
Thermocouple Wire					
T	32 (0) to 700 (370)	T	±1.8 (1) or ±0.75%	TT	±0.9 (0.5) or 0.4%
J	32 (0) to 1400 (760)	J	±4 (2.2) or ±0.75%	JJ	±2 (1.1) or 0.4%
E	32 (0) to 1600 (870)	E	±3.1 (1.7) or ±0.50%	EE	±1.8 (1) or 0.4%
K or N	32 (0) to 2300 (1260)	K or N	±4 (2.2) or ±0.75%	KK or NN	±2 (1.1) or 0.4%
T*	-328 (-200) to 32 (0)	T	±1.8 (1) or ±1.5%	TT	±0.9 (0.5) or 0.8%**
E*	-328 (-200) to 32 (0)	E	±3.1 (1.7) or ±1%	EE	±1.8 (1) or 0.5%**
K*	-328 (-200) to 32 (0)	K	±4 (2.2) or ±2%	KK	**
Extension Wire					
TX	32 (0) to 212 (100)	TX	±1.8 (1)	TTX	±0.9 (0.5)
JX	32 (0) to 400 (200)	JX	±4 (2.2)	JJX	±2 (1.1)
EX	32 (0) to 400 (200)	EX	±3.1 (1.7)	EEX	±1.8 (1)
KX or NX	32 (0) to 400 (200)	KX or NX	±4 (2.2)	KKX or NNX	±2 (1.1)
RX or SX	32 (0) to 400 (200)	RX or SX	±9 (5)		
BX	32 (0) to 212 (100)	BX***	±7.6 (4.2)		
BX	32 (0) to 400 (200)	BX ALLOY***	±6.7 (3.7)		

* Thermocouple material is normally supplied to meet tolerances above 0C (32F). If material is required to meet tolerances below 0C (32F), the purchase order must so state. Special selection of material is required.

** Suggested initial calibration tolerance. Requirements should be discussed between purchaser and supplier.

*** Copper vs. copper can be used as an extension for Type B thermocouples if the transition is below 100C (212F). Above 100C (212F), PCLW30-6 alloy should be used as the positive extension wire.

Vitreous Silica Insulated 1800°F (982°C)

QuickQuote

Applications

- Heat Treatment
- Component Testing
- Steel and Aluminum Industry
- Metals Production
- Furnace Surveys

Available Options

- No tracers
- Impregnated Jacket
- Stabilized Type K & Type E Conductors
- Metal Coverings
- Tighter Than Special Limit Accuracy Tolerances
- Calibration Test Reports

Product Features

- Continuous use up to 1800F (982C)
- Single exposure up to 2000F (1093C)
- **Heavy Build** Version of HG/HG
- Not Recommended for Abrasive Applications at High Temperatures

Product Specifications

Conductors:	Solid or stranded thermocouple wire per ASTM E230 & ANSI MC96.1
Insulation:	Braided vitreous silica
Construction:	Parallel conductors
Jacket:	Braided vitreous silica
Operating Temperature:	+1800F (+982C) continuous +2000F (+1093C) single exposure
Limits of Error:	Conforms to ASTM E230, IEC 584 and ANSI MC 96.1
Color Code:	Supplied white without saturants red tracer in negative leg

Ordering Code

HG / HG [ ] - [ ] [ ] - [ ]

Optional Metal Coverings
S = Stainless Steel Braid
CU = Tinned Copper Braid
I = Inconel Braid
X = Half-Oval Galvanized Steel

Wire Size AWG or Metric

Add (F) for Stranded Wire

Calibration Grade Designation Per Table 1

Vitreous Silica Insulated 1800°F (982°C)

QuickQuote

Conductor Size AWG	(MM)	Insulation Thickness inches	(MM)	Jacket Thickness inches	(MM)	Outer Diameter inches	(MM)	Net Weight LB/MF	(KG/KM)
12	(2.05)	.020	(.51)	.020	(.51)	.161 x .282	(4.1 x 7.2)	57	(85)
14	(1.63)	.015	(.38)	.015	(.38)	.124 x .218	(3.1 x 5.5)	34	(51)
14F*	(1.80)	.015	(.38)	.015	(.38)	.132 x .234	(3.4 x 5.9)	38	(57)
16	(1.29)	.015	(.38)	.015	(.38)	.111 x .192	(2.8 x 4.9)	24	(36)
16F*	(1.47)	.015	(.38)	.015	(.38)	.118 x .206	(3.0 x 5.2)	26	(39)
18	(1.02)	.015	(.38)	.015	(.38)	.100 x .170	(2.5 x 4.3)	17	(25)
18F*	(1.22)	.015	(.38)	.015	(.38)	.108 x .186	(2.7 x 4.7)	18	(27)
20	(0.81)	.015	(.38)	.015	(.38)	.092 x .154	(2.3 x 3.9)	14	(21)
20F*	(0.97)	.015	(.38)	.015	(.38)	.096 x .162	(2.4 x 4.1)	15	(22)
22	(0.64)	.015	(.38)	.015	(.38)	.085 x .140	(2.2 x 3.6)	8.1	(13)
24	(0.51)	.015	(.38)	.015	(.38)	.080 x .130	(2.0 x 3.3)	7.1	(11)
24F*	(0.61)	.015	(.38)	.015	(.38)	.084 x .138	(2.1 x 3.5)	7.6	(12)

MANY ITEMS AVAILABLE FROM STOCK WITHIN 24 HOURS

The products referenced above represent the most popular constructions. Other constructions can be manufactured to meet individual specification and application requirements. Contact factory for additional information.

Table 1

Initial Calibration Tolerances Per ASTM E230 and ANSI MC96.1

Thermocouple Type	Temperature Range F (C)	Grade Designation	Tolerance-Reference Junction 32F (0C) Standard Grade Limits F (C) whichever is greater	Grade Designation	Special Grade Limits F (C) whichever is greater
Thermocouple Wire					
T	32 (0) to 700 (370)	T	±1.8 (1) or ±0.75%	TT	±0.9 (0.5) or 0.4%
J	32 (0) to 1400 (760)	J	±4 (2.2) or ±0.75%	JJ	±2 (1.1) or 0.4%
E	32 (0) to 1600 (870)	E	±3.1 (1.7) or ±0.50%	EE	±1.8 (1) or 0.4%
K or N	32 (0) to 2300 (1260)	K or N	±4 (2.2) or ±0.75%	KK or NN	±2 (1.1) or 0.4%
T*	-328 (-200) to 32 (0)	T	±1.8 (1) or ±1.5%	TT	±0.9 (0.5) or 0.8%**
E*	-328 (-200) to 32 (0)	E	±3.1 (1.7) or ±1%	EE	±1.8 (1) or 0.5%**
K*	-328 (-200) to 32 (0)	K	±4 (2.2) or ±2%	KK	**
Extension Wire					
TX	32 (0) to 212 (100)	TX	±1.8 (1)	TTX	±0.9 (0.5)
JX	32 (0) to 400 (200)	JX	±4 (2.2)	JJX	±2 (1.1)
EX	32 (0) to 400 (200)	EX	±3.1 (1.7)	EEX	±1.8 (1)
KX or NX	32 (0) to 400 (200)	KX or NX	±4 (2.2)	KKX or NNX	±2 (1.1)
RX or SX	32 (0) to 400 (200)	RX or SX	±9 (5)		
BX	32 (0) to 212 (100)	BX***	±7.6 (4.2)		
BX	32 (0) to 400 (200)	BX ALLOY***	±6.7 (3.7)		

* Thermocouple material is normally supplied to meet tolerances above 0C (32F). If material is required to meet tolerances below 0C (32F), the purchase order must so state. Special selection of material is required.

** Suggested initial calibration tolerance. Requirements should be discussed between purchaser and supplier.

*** Copper vs. copper can be used as an extension for Type B thermocouples if the transition is below 100C (212F). Above 100C (212F), PCLW30-6 alloy should be used as the positive extension wire.

Standard Vitreous Silica Insulated 1800°F (982°C)

QuickQuote

Applications

- Heat Treatment
- Component Testing
- Steel and Aluminum ...Industry
- Metals Production
- Furnace Surveys

Available Options

- No tracers
- Impregnated Jacket
- Stabilized Type K & ...Type E Conductors
- Metal Coverings
- Tighter Than Special Limit ...Accuracy Tolerances
- Calibration Test Reports

Product Features

- Continuous use up to ...1800F (982C)
- Single exposure up to ...2000F (1093C)
- **Light Build** Version ...of HG/HG
- Not Recommended ...for Abrasive Applications ...at High Temperatures

Product Specifications

Conductors:	Solid or stranded thermocouple wire per ASTM E230 & ANSI MC96.1
Insulation:	Braided vitreous silica
Construction:	Parallel conductors
Jacket:	Braided vitreous silica
Operating Temperature:	+1800F (+982C) continuous +2000F (+1093C) single exposure
Limits of Error:	Conforms to ASTM E230, IEC 584 and ANSI MC 96.1
Color Code:	Supplied white without saturants red tracer in negative leg

Ordering Code

HG / HG90 [ ] - [ ] [ ] - [ ]

- [ ]: Optional Metal Coverings
  - S = Stainless Steel Braid
  - CU = Tinned Copper Braid
  - I = Inconel Braid
  - X = Half-Oval Galvanized Steel
- [ ]: Wire Size AWG or Metric
- [ ]: Add (F) for Stranded Wire
- [ ]: Calibration Grade Designation Per Table 1

Standard Vitreous Silica Insulated 1800°F (982°C)

QuickQuote

Conductor Size		Insulation Thickness		Jacket Thickness		Outer Diameter		Net Weight	
AWG	(MM)	inches	(MM)	inches	(MM)	inches	(MM)	LB/MF	(KG/KM)
14	(1.63)	.016	(.41)	.017	(.43)	.130 x .226	(3.3 x 5.7)	33	(49)
16	(1.29)	.016	(.41)	.017	(.43)	.117 x .200	(3.0 x 5.1)	24	(36)
16F*	(1.47)	.016	(.41)	.017	(.43)	.124 x .214	(3.1 x 5.4)	26	(39)
18	(1.02)	.016	(.41)	.017	(.43)	.106 x .178	(2.7 x 4.5)	18	(27)
18F*	(1.22)	.016	(.41)	.017	(.43)	.114 x .194	(2.9 x 4.9)	19	(28)
20	(0.81)	.016	(.41)	.017	(.43)	.098 x .162	(2.5 x 4.1)	14	(21)
20F*	(0.97)	.016	(.41)	.017	(.43)	.102 x .170	(2.6 x 4.3)	15	(22)
22	(0.64)	.016	(.41)	.017	(.43)	.091 x .148	(2.3 x 3.8)	12	(18)
22F*	(0.76)	.016	(.41)	.017	(.43)	.096 x .158	(2.4 x 4.0)	13	(19)
24	(0.51)	.016	(.41)	.017	(.43)	.086 x .138	(2.2 x 3.5)	9.3	(14)
24F*	(0.61)	.016	(.41)	.017	(.43)	.090 x .146	(2.3 x 3.7)	9.7	(15)

MANY ITEMS AVAILABLE FROM STOCK WITHIN 24 HOURS

The products referenced above represent the most popular constructions. Other constructions can be manufactured to meet individual specification and application requirements. Contact factory for additional information.

Table 1

Initial Calibration Tolerances Per ASTM E230 and ANSI MC96.1

			Tolerance-Reference Junction 32F (0C)		
Thermocouple Type	Temperature Range F (C)	Grade Designation	Standard Grade Limits F (C) whichever is greater	Grade Designation	Special Grade Limits F (C) whichever is greater
Thermocouple Wire					
T	32 (0) to 700 (370)	T	±1.8 (1) or ±0.75%	TT	±0.9 (0.5) or 0.4%
J	32 (0) to 1400 (760)	J	±4 (2.2) or ±0.75%	JJ	±2 (1.1) or 0.4%
E	32 (0) to 1600 (870)	E	±3.1 (1.7) or ±0.50%	EE	±1.8 (1) or 0.4%
K or N	32 (0) to 2300 (1260)	K or N	±4 (2.2) or ±0.75%	KK or NN	±2 (1.1) or 0.4%
T*	-328 (-200) to 32 (0)	T	±1.8 (1) or ±1.5%	TT	±0.9 (0.5) or 0.8%**
E*	-328 (-200) to 32 (0)	E	±3.1 (1.7) or ±1%	EE	±1.8 (1) or 0.5%**
K*	-328 (-200) to 32 (0)	K	±4 (2.2) or ±2%	KK	**
Extension Wire					
TX	32 (0) to 212 (100)	TX	±1.8 (1)	TTX	±0.9 (0.5)
JX	32 (0) to 400 (200)	JX	±4 (2.2)	JJX	±2 (1.1)
EX	32 (0) to 400 (200)	EX	±3.1 (1.7)	EEX	±1.8 (1)
KX or NX	32 (0) to 400 (200)	KX or NX	±4 (2.2)	KKX or NNX	±2 (1.1)
RX or SX	32 (0) to 400 (200)	RX or SX	±9 (5)		
BX	32 (0) to 212 (100)	BX***	±7.6 (4.2)		
BX	32 (0) to 400 (200)	BX ALLOY***	±6.7 (3.7)		

* Thermocouple material is normally supplied to meet tolerances above 0C (32F). If material is required to meet tolerances below 0C (32F), the purchase order must so state. Special selection of material is required.

** Suggested initial calibration tolerance. Requirements should be discussed between purchaser and supplier.

*** Copper vs. copper can be used as an extension for Type B thermocouples if the transition is below 100C (212F). Above 100C (212F), PCLW30-6 alloy should be used as the positive extension wire.

Heavy Ceramic Fiber Insulated 2200°F (1204°C)

QuickQuote

Applications

- Heat Treatment
- Component Testing
- Steel and Aluminum ...Industry
- Metals Production
- Furnace Surveys
- Beaded Thermocouple ...Replacement

Available Options

- Colored Tracers for Polarity ...Identification
- Impregnated Insulation and ...Jackets
- MICA/Glass Barrier Tape
- Stabilized Type K & ...Type E Conductors
- Twisted Pair
- Metal Coverings
- Tighter Than Special Limit ...Accuracy Tolerances
- Calibration Test Reports

Product Features

- Continuous use up to ...2200F (1204C)
- Single exposure up to ...2400F (1316C)
- **Heavy Build** Version ...of CEFIRSF™
- Good Abrasion Resistance

Product Specifications

Conductors:	Solid or stranded thermocouple wire per ASTM E230 & ANSI MC96.1
Insulation:	Braided ceramic fiber
Construction:	Parallel conductors
Jacket:	Braided ceramic fiber
Operating Temperature:	+2200F (+1204C) continuous +2400F (+1316C) single exposure
Limits of Error:	Conforms to ASTM E230, IEC 584 and ANSI MC 96.1
Color Code:	Supplied white without saturants or colored tracers

Ordering Code

CEFIRSF [ ] - [ ] [ ] - [ ]

Optional Metal Coverings
S = Stainless Steel Braid
CU = Tinned Copper Braid
I = Inconel Braid
X = Half-Oval Galvanized Steel

Wire Size AWG or Metric

Add (F) for Stranded Wire

Calibration Grade Designation Per Table 1

Heavy Ceramic Fiber Insulated 2200°F (1204°C)

QuickQuote

Conductor Size		Insulation Thickness		Jacket Thickness		Outer Diameter		Net Weight	
AWG	(MM)	inches	(MM)	inches	(MM)	inches	(MM)	LB/MF	(KG/KM)
12	(2.06)	.018	(.46)	.018	(.46)	.153 x .270	(3.9 x 6.9)	50	(74)
14	(1.63)	.018	(.46)	.018	(.46)	.136 x .236	(3.5 x 6.0)	33	(49)
16	(1.29)	.018	(.46)	.018	(.46)	.123 x .210	(3.1 x 5.3)	24	(36)
16F*	(1.47)	.018	(.46)	.018	(.46)	.130 x .224	(3.3 x 5.7)	26	(39)
18	(1.02)	.018	(.46)	.018	(.46)	.112 x .188	(2.8 x 4.8)	18	(27)
18F*	(1.22)	.018	(.46)	.018	(.46)	.120 x .204	(3.0 x 5.2)	19	(28)
20	(0.81)	.018	(.46)	.018	(.46)	.104 x .172	(2.6 x 4.4)	14	(21)
20F*	(0.97)	.018	(.46)	.018	(.46)	.108 x .180	(2.7 x 4.6)	15	(22)
22	(0.64)	.018	(.46)	.018	(.46)	.097 x .158	(2.5 x 4.0)	12	(18)
22F*	(0.76)	.018	(.46)	.018	(.46)	.102 x .168	(2.6 x 4.3)	13	(19)
24	(0.51)	.018	(.46)	.018	(.46)	.092 x .148	(2.3 x 3.8)	9.5	(14)
24F*	(0.61)	.018	(.46)	.018	(.46)	.096 x .156	(2.4 x 4.0)	9.9	(15)

MANY ITEMS AVAILABLE FROM STOCK WITHIN 24 HOURS

The products referenced above represent the most popular constructions. Other constructions can be manufactured to meet individual specification and application requirements. Contact factory for additional information.

Table 1

Initial Calibration Tolerances Per ASTM E230 and ANSI MC96.1

			Tolerance-Reference Junction 32F (0C)		
Thermocouple Type	Temperature Range F (C)	Grade Designation	Standard Grade Limits F (C) whichever is greater	Grade Designation	Special Grade Limits F (C) whichever is greater
Thermocouple Wire					
T	32 (0) to 700 (370)	T	±1.8 (1) or ±0.75%	TT	±0.9 (0.5) or 0.4%
J	32 (0) to 1400 (760)	J	±4 (2.2) or ±0.75%	JJ	±2 (1.1) or 0.4%
E	32 (0) to 1600 (870)	E	±3.1 (1.7) or ±0.50%	EE	±1.8 (1) or 0.4%
K or N	32 (0) to 2300 (1260)	K or N	±4 (2.2) or ±0.75%	KK or NN	±2 (1.1) or 0.4%
T*	-328 (-200) to 32 (0)	T	±1.8 (1) or ±1.5%	TT	±0.9 (0.5) or 0.8%**
E*	-328 (-200) to 32 (0)	E	±3.1 (1.7) or ±1%	EE	±1.8 (1) or 0.5%**
K*	-328 (-200) to 32 (0)	K	±4 (2.2) or ±2%	KK	**
Extension Wire					
TX	32 (0) to 212 (100)	TX	±1.8 (1)	TTX	±0.9 (0.5)
JX	32 (0) to 400 (200)	JX	±4 (2.2)	JJX	±2 (1.1)
EX	32 (0) to 400 (200)	EX	±3.1 (1.7)	EEX	±1.8 (1)
KX or NX	32 (0) to 400 (200)	KX or NX	±4 (2.2)	KKX or NNX	±2 (1.1)
RX or SX	32 (0) to 400 (200)	RX or SX	±9 (5)		
BX	32 (0) to 212 (100)	BX***	±7.6 (4.2)		
BX	32 (0) to 400 (200)	BX ALLOY***	±6.7 (3.7)		

* Thermocouple material is normally supplied to meet tolerances above 0C (32F). If material is required to meet tolerances below 0C (32F), the purchase order must so state. Special selection of material is required.

** Suggested initial calibration tolerance. Requirements should be discussed between purchaser and supplier.

*** Copper vs. copper can be used as an extension for Type B thermocouples if the transition is below 100C (212F). Above 100C (212F), PCLW30-6 alloy should be used as the positive extension wire.

Standard Ceramic Fiber Insulated 2200°F (1204°C)

QuickQuote

Applications

- Heat Treatment
- Component Testing
- Steel and Aluminum ...Industry
- Metals Production
- Furnace Surveys
- Beaded Thermocouple ...Replacement

Available Options

- Colored Tracers for Polarity ...Identification
- Impregnated Insulation and ...Jackets
- MICA/Glass Barrier Tape
- Stabilized Type K & ...Type E Conductors
- Twisted Pair
- Metal Coverings
- Tighter Than Special Limit ...Accuracy Tolerances
- Calibration Test Reports

Product Features

- Continuous use up to ...2200F (1204C)
- Single exposure up to ...2400F (1316C)
- **Light Build** Version ...of CEFIRSF™
- Good Abrasion Resistance

Product Specifications

Conductors:	Solid or stranded thermocouple wire per ASTM E230 & ANSI MC96.1
Insulation:	Braided ceramic fiber
Construction:	Parallel conductors
Jacket:	Braided ceramic fiber
Operating Temperature:	+2200F (+1204C) continuous +2400F (+1316C) single exposure
Limits of Error:	Conforms to ASTM E230, IEC 584 and ANSI MC 96.1
Color Code:	Supplied white without saturants or colored tracers

Ordering Code

Standard Ceramic Fiber Insulated 2200°F (1204°C)

QuickQuote

Conductor Size		Insulation Thickness		Jacket Thickness		Outer Diameter		Net Weight	
AWG	(MM)	inches	(MM)	inches	(MM)	inches	(MM)	LB/MF	(KG/KM)
14	(1.63)	.014	(.36)	.018	(.46)	.128 x .220	(3.3 x 5.6)	33	(49)
16	(1.29)	.014	(.36)	.018	(.46)	.115 x .194	(2.9 x 4.9)	24	(36)
16F*	(1.47)	.014	(.36)	.018	(.46)	.122 x .208	(3.1 x 5.3)	26	(39)
18	(1.02)	.014	(.36)	.018	(.46)	.104 x .172	(2.6 x 4.4)	18	(27)
18F*	(1.22)	.014	(.36)	.018	(.46)	.112 x .188	(2.8 x 4.8)	19	(28)
20	(0.81)	.014	(.36)	.018	(.46)	.096 x .156	(2.4 x 4.0)	14	(21)
20F*	(0.97)	.014	(.36)	.018	(.46)	.100 x .164	(2.5 x 4.2)	15	(22)
22	(0.64)	.014	(.36)	.018	(.46)	.089 x .142	(2.3 x 3.6)	12	(18)
22F*	(0.76)	.014	(.36)	.018	(.46)	.094 x .152	(2.4 x 3.9)	13	(19)
24	(0.51)	.014	(.36)	.018	(.46)	.084 x .132	(2.1 x 3.4)	9.3	(14)
24F*	(0.61)	.014	(.36)	.018	(.46)	.088 x .140	(2.2 x 3.6)	9.7	(15)

MANY ITEMS AVAILABLE FROM STOCK WITHIN 24 HOURS

The products referenced above represent the most popular constructions. Other constructions can be manufactured to meet individual specification and application requirements. Contact factory for additional information.

Table 1

Initial Calibration Tolerances Per ASTM E230 and ANSI MC96.1

			Tolerance-Reference Junction 32F (0C)		
Thermocouple Type	Temperature Range F (C)	Grade Designation	Standard Grade Limits F (C) whichever is greater	Grade Designation	Special Grade Limits F (C) whichever is greater
Thermocouple Wire					
T	32 (0) to 700 (370)	T	±1.8 (1) or ±0.75%	TT	±0.9 (0.5) or 0.4%
J	32 (0) to 1400 (760)	J	±4 (2.2) or ±0.75%	JJ	±2 (1.1) or 0.4%
E	32 (0) to 1600 (870)	E	±3.1 (1.7) or ±0.50%	EE	±1.8 (1) or 0.4%
K or N	32 (0) to 2300 (1260)	K or N	±4 (2.2) or ±0.75%	KK or NN	±2 (1.1) or 0.4%
T*	-328 (-200) to 32 (0)	T	±1.8 (1) or ±1.5%	TT	±0.9 (0.5) or 0.8%**
E*	-328 (-200) to 32 (0)	E	±3.1 (1.7) or ±1%	EE	±1.8 (1) or 0.5%**
K*	-328 (-200) to 32 (0)	K	±4 (2.2) or ±2%	KK	**
Extension Wire					
TX	32 (0) to 212 (100)	TX	±1.8 (1)	TTX	±0.9 (0.5)
JX	32 (0) to 400 (200)	JX	±4 (2.2)	JJX	±2 (1.1)
EX	32 (0) to 400 (200)	EX	±3.1 (1.7)	EEX	±1.8 (1)
KX or NX	32 (0) to 400 (200)	KX or NX	±4 (2.2)	KKX or NNX	±2 (1.1)
RX or SX	32 (0) to 400 (200)	RX or SX	±9 (5)		
BX	32 (0) to 212 (100)	BX***	±7.6 (4.2)		
BX	32 (0) to 400 (200)	BX ALLOY***	±6.7 (3.7)		

* Thermocouple material is normally supplied to meet tolerances above 0C (32F). If material is required to meet tolerances below 0C (32F), the purchase order must so state. Special selection of material is required.

** Suggested initial calibration tolerance. Requirements should be discussed between purchaser and supplier.

*** Copper vs. copper can be used as an extension for Type B thermocouples if the transition is below 100C (212F). Above 100C (212F), PCLW30-6 alloy should be used as the positive extension wire.

Thermocouple Extension Cable

Overall Shield, UL Listed 300 Volt PVC Insulated 221°F (105°C)

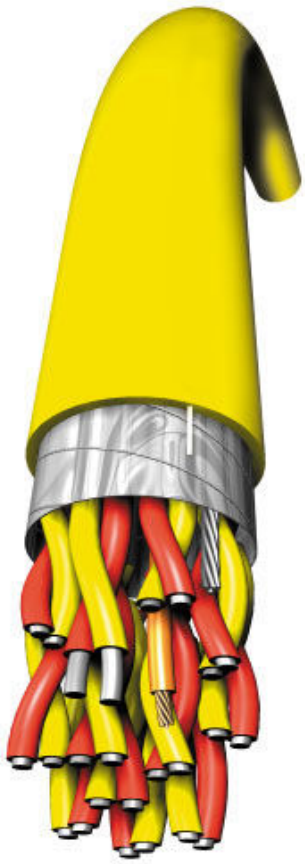
QuickQuote

Applications

- Petrochemical Plants
- Utilities and Industrial Plants
- Thermocouple Circuits
- For use in NEC Article 725
  ...Class 1 Division 2 Hazardous
  ...Locations
- Complies with NEC 725 for
  ...use in Class 2 and Class 3
  ...Circuits

Product Features

- UL Listed Subject 13 PLTC
- Rated 105C 300 Volt
- Flame Retardant
- Passes IEEE 383 Flame Test
- Passes VW-1 Flame Test
- Sunlight Resistant
- Available as Type ITC
- CPE and TPE Constructions
  ...Are Also Available



Product Specifications

Conductors:	Solid or stranded thermocouple extension wire per ASTM E230 & ANSI MC96.1 12 to 22 AWG (2.44 to .63MM)
Insulation:	Nominal .016" (.40MM) flame retardant PVC
Color Code:	Per ASTM E230 & ANSI MC96.1, numbered on positive conductor (other colors available)
Construction:	Twisted pairs
Communication Wire:	22 AWG (.61MM) 7-strand copper insulated with nominal .015" (.38MM) orange PVC (4 pair and larger)
Cable Shield:	.002" (.05MM) aluminum/polyester tape, 25% overlap
Cable Drain Wire:	20 AWG (.91MM) 7-strand tinned copper
Outer Jacket:	Flame retardant PVC with ripcord under jacket

Ordering Code

UP/ALPTWK - [ ] - [ ] [ ] - [ ]

- [ ] # of Pairs
- [ ] Wire Size AWG or Metric
- [ ] Add (F) for Stranded Wire
- [ ] Calibration Grade Designation Per Table 1

Overall Shield, UL Listed 300 Volt PVC Insulated 221°F (105°C)

QuickQuote

(Call for CSA Data)

Wire Size	Numbers of Pairs	Outer Jacket Thickness inches	(MM)	Outer Diameter inches	(MM)	Bend Radius inches	(MM)	Pull Tension LB	KG	Net Weight LB/MF	KG/KM
16 AWG	1	.037	(0.94)	.256	(6.5)	1.5	(39)	54	(25)	43	(64)
(1.29MM)	4	.053	(1.35)	.471	(12.0)	2.8	(72)	172	(78)	135	(201)
Solid	8	.053	(1.35)	.587	(14.9)	3.5	(89)	336	(153)	232	(345)
	12	.064	(1.63)	.708	(18.0)	4.2	(108)	500	(227)	340	(506)
	16	.064	(1.63)	.791	(20.1)	4.7	(121)	664	(302)	431	(642)
	20	.064	(1.63)	.825	(21.0)	5.0	(126)	828	(376)	520	(773)
	24	.074	(1.88)	.953	(24.2)	5.7	(145)	992	(451)	635	(946)
	36	.074	(1.88)	1.077	(27.4)	6.5	(164)	1484	(675)	901	(1341)
18 AWG	1	.037	(0.94)	.234	(5.9)	1.4	(36)	34	(15)	34	(51)
(1.02MM)	4	.053	(1.35)	.424	(10.8)	2.5	(65)	112	(51)	105	(156)
Solid	8	.053	(1.35)	.525	(13.3)	3.2	(80)	216	(98)	174	(259)
	12	.064	(1.63)	.634	(16.1)	3.8	(97)	320	(145)	255	(379)
	16	.064	(1.63)	.706	(17.9)	4.2	(108)	424	(193)	321	(478)
	20	.064	(1.63)	.734	(18.6)	4.4	(112)	528	(240)	383	(569)
	24	.064	(1.63)	.828	(21.0)	5.0	(126)	632	(287)	453	(674)
	36	.074	(1.88)	.956	(24.3)	5.7	(146)	944	(429)	656	(976)
20 AWG	1	.037	(0.94)	.218	(5.5)	1.3	(33)	21	(10)	28	(42)
(0.81MM)	4	.042	(1.07)	.369	(9.4)	2.2	(56)	72	(33)	77	(115)
Solid	8	.053	(1.35)	.480	(12.2)	2.9	(73)	136	(62)	136	(202)
	12	.053	(1.35)	.557	(14.1)	3.3	(85)	200	(91)	188	(280)
	16	.064	(1.63)	.643	(16.3)	3.9	(98)	264	(120)	242	(360)
	20	.064	(1.63)	.669	(17.0)	4.0	(102)	328	(149)	292	(434)
	24	.064	(1.63)	.752	(19.1)	4.5	(115)	392	(178)	343	(510)
	36	.064	(1.63)	.848	(21.5)	5.1	(129)	584	(265)	479	(713)

The products referenced above represent the most popular constructions. Other constructions can be manufactured to meet individual specification and application requirements. Contact factory for additional information.

Table 1

Initial Calibration Tolerances Per ASTM E230 and ANSI MC96.1

Thermocouple Type	Temperature Range F(C)	Grade Designation	Tolerance-Reference Junction 32F (0C) Standard Grade Limits F(C)	Grade Designation	Special Grade Limits F(C)
Extension Wire					
TX	32 (0) to 212 (100)	TX	±1.8 (1)	TTX	±0.9 (0.5)
JX	32 (0) to 400 (200)	JX	±4 (2.2)	JJX	±2 (1.1)
EX	32 (0) to 400 (200)	EX	±3.1 (1.7)	EEX	±1.8 (1)
KX or NX	32 (0) to 400 (200)	KX or NX	±4 (2.2)	KKX or NNX	±2 (1.1)
Compensating Extension Wire					
RX or SX	32 (0) to 400 (200)	RX or SX	±9 (5)		

Electrical Characteristics

Insulation passes 3000 V ac spark test per UL Subject 13.
Completed cable passes a dielectric test of 2500 V dc for
10 seconds, conductor to conductor and conductor to shield, per UL Subject 13.

Individual/Overall Shield, UL Listed 300 Volt PVC Insulated 221°F (105°C)

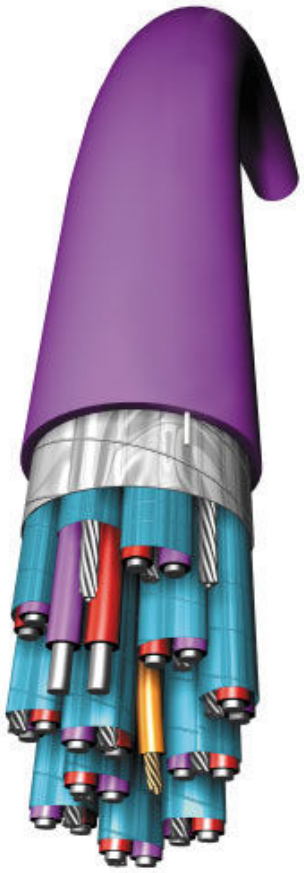
QuickQuote

Applications

- Petrochemical Plants
- Utilities and Industrial Plants
- Thermocouple Circuits
- For use in NEC Article 725
  ...Class 1 Division 2 Hazardous
  ...Locations
- Complies with NEC 725 for
  ...use in Class 2 and Class 3
  ...Circuits

Product Features

- UL Listed Subject 13 PLTC
- Rated 105C 300 Volt
- Flame Retardant
- Passes IEEE 383 Flame Test
- Passes VW-1 Flame Test
- Sunlight Resistant
- Available as Type ITC
- CPE and TPE Constructions
  ...Are Also Available



Product Specifications

Conductors:	Solid or stranded thermocouple extension wire per ASTM E230 & ANSI MC96.1 12 to 22 AWG (2.44 to .63MM)
Insulation:	Nominal .016" (.40MM) flame retardant PVC
Color Code:	Per ASTM E230 & ANSI MC96.1, numbered on positive conductor (other colors available)
Construction:	Twisted pairs
Individual Shield:	.00135" (.03MM) aluminum/polyester tape, 25% overlap
Individual Drain Wire:	22 AWG (.61MM) 7-strand tinned copper
Communication Wire:	22 AWG (.61MM) 7-strand copper insulated with nominal .015" (.38MM) orange PVC (4 pair and larger)
Cable Shield:	.002" (.05MM) aluminum/polyester tape, 25% overlap
Cable Drain Wire:	20 AWG (.91MM) 7-strand tinned copper
Outer Jacket:	Flame retardant PVC with ripcord under jacket

Ordering Code

UP/ALM/ALPTWK - [ ] - [ ] [ ] - [ ]

- [ ] # of Pairs
- [ ] Wire Size AWG or Metric
- [ ] Add (F) for Stranded Wire
- [ ] Calibration Grade Designation Per Table 1

Individual/Overall Shield, UL Listed 300 Volt
PVC Insulated 221°F (105°C)

QuickQuote

(Call for CSA Data)

Wire Size	Numbers of Pairs	Outer Jacket Thickness inches	(MM)	Outer Diameter inches	(MM)	Bend Radius inches	(MM)	Pull Tension LB	KG	Net Weight LB/MF	KG/KM
16 AWG (1.29MM) Solid	2	.053	(1.35)	.464	(11.8)	3.7	(94)	100	(45)	109	(163)
	4	.053	(1.35)	.536	(13.6)	4.3	(109)	192	(87)	165	(246)
	8	.064	(1.63)	.710	(18.0)	5.7	(144)	376	(171)	299	(445)
	12	.064	(1.63)	.835	(21.2)	6.7	(170)	560	(255)	402	(598)
	16	.074	(1.88)	.947	(24.1)	7.6	(193)	744	(338)	530	(789)
	20	.074	(1.88)	1.024	(26.0)	8.2	(208)	928	(422)	640	(952)
	24	.074	(1.88)	1.136	(28.9)	9.1	(231)	1112	(505)	756	(1125)
	36	.085	(2.16)	1.289	(32.7)	10.3	(262)	1664	(756)	1094	(1664)
18 AWG (1.02MM) Solid	2	.053	(1.35)	.422	(10.7)	3.4	(86)	70	(32)	86	(128)
	4	.053	(1.35)	.485	(12.3)	3.9	(99)	132	(60)	126	(187)
	8	.064	(1.63)	.641	(16.3)	5.1	(130)	256	(116)	226	(336)
	12	.064	(1.63)	.751	(19.1)	6.0	(153)	380	(173)	311	(463)
	16	.064	(1.63)	.831	(21.1)	6.6	(169)	504	(229)	392	(583)
	20	.074	(1.88)	.919	(23.3)	7.4	(187)	628	(285)	491	(731)
	24	.074	(1.88)	1.017	(25.8)	8.1	(207)	752	(342)	578	(860)
	36	.074	(1.88)	1.132	(28.8)	9.1	(231)	1124	(511)	810	(1205)
20 AWG (0.81MM) Solid	2	.042	(1.07)	.370	(9.4)	3.0	(75)	50	(23)	60	(89)
	4	.053	(1.35)	.448	(11.4)	3.6	(91)	92	(42)	103	(153)
	8	.053	(1.35)	.569	(14.5)	4.6	(116)	176	(80)	169	(251)
	12	.064	(1.63)	.689	(17.5)	5.5	(140)	260	(118)	248	(369)
	16	.064	(1.63)	.761	(19.3)	6.1	(155)	344	(156)	310	(461)
	20	.064	(1.63)	.823	(20.9)	6.6	(169)	428	(195)	371	(552)
	24	.074	(1.88)	.931	(23.6)	7.4	(187)	512	(233)	449	(668)
	36	.074	(1.88)	1.034	(26.3)	8.3	(210)	764	(347)	629	(936)

The products referenced above represent the most popular constructions. Other constructions can be manufactured to meet individual specification and application requirements. Contact factory for additional information.

Table 1

Initial Calibration Tolerances Per ASTM E230 and ANSI MC96.1

Thermocouple Type	Temperature Range F(C)	Grade Designation	Tolerance-Reference Junction 32F (0C) Standard Grade Limits F(C)	Grade Designation	Special Grade Limits F(C)
Extension Wire					
TX	32 (0) to 212 (100)	TX	±1.8 (1)	TTX	±0.9 (0.5)
JX	32 (0) to 400 (200)	JX	±4 (2.2)	JJX	±2 (1.1)
EX	32 (0) to 400 (200)	EX	±3.1 (1.7)	EEX	±1.8 (1)
KX or NX	32 (0) to 400 (200)	KX or NX	±4 (2.2)	KKX or NNX	±2 (1.1)
Compensating Extension Wire					
RX or SX	32 (0) to 400 (200)	RX or SX	±9 (5)		

Electrical Characteristics
Insulation passes 3000 V ac spark test per UL Subject 13.
Completed cable passes a dielectric test of 2500 V dc for
10 seconds, conductor to conductor and conductor to shield, per UL Subject 13.

Overall Shield, FEP Insulated 400°F (200°C)

QuickQuote

Applications

- Petrochemical Plants
- Utilities and Industrial Plants
- Pharmaceutical Industry
- Thermocouple Circuits
- Food Processing Plants
- Agricultural Industry
- FDA Approved Applications
- Suitable for 300 Volt Applications

Product Features

- Continuous Use -328F (-200C) ...to +400F (+200C)
- Excellent Chemical Resistance
- Excellent Electrical Properties
- Passes IEEE 383 Flame Test
- Passes VW-1 Flame Test
- Sunlight Resistant
- UL Listed CL2, CL3, PLTC or ITC ...Constructions are Also Available

Product Specifications

Conductors:	Solid or stranded thermocouple extension wire per ASTM E230 & ANSI MC96.1 10 to 30 AWG (2.6 to .25MM)
Insulation:	Nominal .010" (.25MM) flame retardant extruded fluoropolymer FEP
Color Code:	Per ASTM E230 & ANSI MC96.1
Construction:	Twisted pairs
Pair Identification:	Numbered polyester tapes
Communication Wire:	22 AWG (.61MM) 7-strand copper insulated with nominal .010" (.25MM) orange FEP (4 pair and larger)
Cable Shield:	.002" (.05MM) aluminum/polyester tape, 25% overlap
Cable Drain Wire:	20 AWG (.91MM) 7-strand tinned copper
Outer Jacket:	Flame retardant extruded fluoropolymer FEP (ETFE +300F (+150C) and PFA +500F (+260C) are also available)

Ordering Code

TEX/ALTEXTWK - [ ] - [ ] [ ] - [ ]

- [ ] # of Pairs
- [ ] Wire Size AWG or Metric
- [ ] Add (F) for Stranded Wire
- [ ] Calibration Grade Designation Per Table 1

Overall Shield, FEP Insulated 400°F (200°C)

QuickQuote

Wire Size	Numbers of Pairs	Outer Jacket Thickness inches	(MM)	Outer Diameter inches	(MM)	Bend Radius inches	(MM)	Pull Tension LB	KG	Net Weight LB/MF	KG/KM
16 AWG	1	.015	(0.38)	.188	(4.8)	1.1	(29)	54	(25)	34	(51)
(1.29MM)	2	.020	(0.51)	.337	(8.6)	2.0	(51)	90	(41)	68	(101)
Solid	4	.020	(0.51)	.396	(10.1)	2.4	(60)	172	(78)	118	(176)
	8	.025	(0.64)	.531	(13.5)	3.2	(81)	336	(153)	218	(324)
	12	.025	(0.64)	.634	(16.1)	3.8	(97)	500	(227)	315	(469)
	16	.030	(0.76)	.719	(18.3)	4.3	(110)	664	(302)	485	(722)
	24	.030	(0.76)	.875	(22.2)	5.3	(133)	992	(451)	595	(885)
	36	.030	(0.76)	.983	(25.0)	5.9	(150)	1484	(675)	860	(1280)
18 AWG	1	.015	(0.38)	.166	(4.2)	1.0	(25)	34	(15)	25	(37)
(1.02MM)	2	.020	(0.51)	.295	(7.5)	1.8	(45)	60	(28)	50	(74)
Solid	4	.020	(0.51)	.346	(8.8)	2.1	(53)	112	(51)	83	(124)
	8	.020	(0.51)	.452	(11.5)	2.7	(69)	216	(98)	143	(213)
	12	.025	(0.64)	.550	(14.0)	3.3	(84)	424	(193)	211	(314)
	16	.025	(0.64)	.614	(15.6)	3.7	(94)	528	(240)	272	(405)
	24	.030	(0.76)	.756	(19.2)	4.5	(115)	632	(287)	400	(595)
	36	.030	(0.76)	.848	(21.5)	5.1	(129)	944	(429)	572	(851)
20 AWG	1	.015	(0.38)	.150	(3.8)	0.9	(23)	21	(10)	17	(25)
(0.81MM)	2	.020	(0.51)	.265	(6.7)	1.7	(40)	40	(18)	35	(52)
Solid	4	.020	(0.51)	.319	(8.1)	1.9	(49)	72	(33)	63	(94)
	8	.020	(0.51)	.412	(10.5)	2.5	(63)	136	(62)	102	(152)
	12	.020	(0.51)	.488	(12.4)	2.9	(74)	200	(91)	155	(231)
	16	.025	(0.64)	.544	(13.8)	3.3	(83)	264	(120)	195	(290)
	24	.030	(0.76)	.670	(17.0)	4.0	(102)	392	(178)	275	(409)
	36	.030	(0.76)	.750	(19.1)	4.5	(114)	584	(265)	405	(603)

The products referenced above represent the most popular constructions. Other constructions can be manufactured to meet individual specification and application requirements. Contact factory for additional information.

Table 1

Initial Calibration Tolerances Per ASTM E230 and ANSI MC96.1

Thermocouple Type	Temperature Range F(C)	Grade Designation	Tolerance-Reference Junction 32F (0C) Standard Grade Limits F(C)	Grade Designation	Special Grade Limits F(C)
Extension Wire					
TX	32 (0) to 212 (100)	TX	±1.8 (1)	TTX	±0.9 (0.5)
JX	32 (0) to 400 (200)	JX	±4 (2.2)	JJX	±2 (1.1)
EX	32 (0) to 400 (200)	EX	±3.1 (1.7)	EEX	±1.8 (1)
KX or NX	32 (0) to 400 (200)	KX or NX	±4 (2.2)	KKX or NNX	±2 (1.1)
Compensating Extension Wire					
RX or SX	32 (0) to 400 (200)	RX or SX	±9 (5)		

Electrical Characteristics

Insulation passes 3000 V ac spark test.
Completed cable passes a dielectric test of 1300 V dc for 60 seconds, conductor to conductor and conductor to shield.

Individual/Overall Shield, FEP Insulated 400°F (200°C)

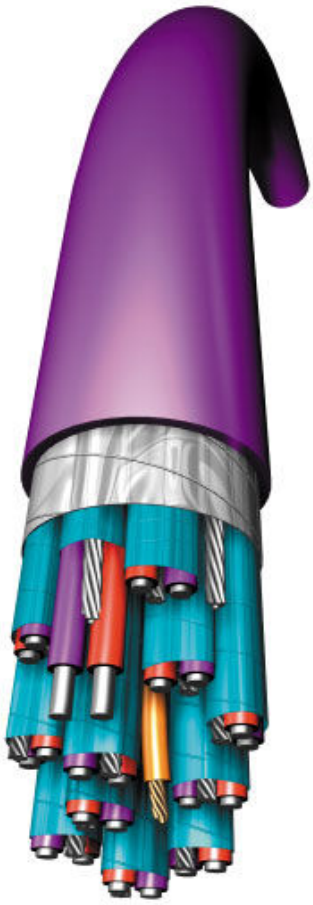
QuickQuote

Applications

- Petrochemical Plants
- Utilities and Industrial Plants
- Pharmaceutical Industry
- Thermocouple Circuits
- Food Processing Plants
- Agricultural Industry
- FDA Approved Applications
- Suitable for 300 Volt Applications

Product Features

- Continuous Use -328F ...(-200C) to +400F (+200C)
- Excellent Chemical Resistance
- Excellent Electrical Properties
- Passes IEEE 383 Flame Test
- Passes VW-1 Flame Test
- Sunlight Resistant
- UL Listed CL2, CL3, PLTC or ITC ...Constructions are Also Available



Product Specifications

Conductors:	Solid or stranded thermocouple extension wire per ASTM E230 & ANSI MC96.1 10 to 30 AWG (2.6 to .25MM)
Insulation:	Nominal .010" (.25MM) flame retardant extruded fluoropolymer FEP
Color Code:	Per ASTM E230 & ANSI MC96.1
Construction:	Twisted pairs
Pair Identification:	Numbered polyester tapes
Individual Shield:	.00135" (.03MM) aluminum/polyester tape, 25% overlap
Individual Drain Wire:	22 AWG (.61MM) 7-strand tinned copper
Communication Wire:	22 AWG (.61MM) 7-strand copper insulated with nominal .010" (.25MM) orange FEP (4 pair and larger)
Cable Shield:	.002" (.05MM) aluminum/polyester tape, 25% overlap
Cable Drain Wire:	20 AWG (.91MM) 7-strand tinned copper
Outer Jacket:	Flame retardant extruded fluoropolymer FEP (ETFE +300F (+150C) and PFA +500F (+260C) are also available)

Ordering Code

TEX/ALM/ALTEXTWK - [ ] - [ ] [ ] - [ ]

- [ ] # of Pairs
- [ ] Wire Size AWG or Metric
- [ ] Add (F) for Stranded Wire
- [ ] Calibration Grade Designation Per Table 1

Individual/Overall Shield, FEP Insulated 400°F (200°C)

QuickQuote

Wire Size	Numbers of Pairs	Outer Jacket Thickness inches	(MM)	Outer Diameter inches	(MM)	Bend Radius inches	(MM)	Pull Tension LB	KG	Net Weight LB/MF	KG/KM
16 AWG	2	.020	(0.51)	.345	(8.8)	2.8	(70)	100	(45)	73	(109)
(1.29MM)	4	.020	(0.51)	.405	(10.3)	3.2	(82)	192	(87)	128	(190)
Solid	8	.025	(0.64)	.544	(13.8)	4.4	(111)	376	(171)	238	(354)
	12	.025	(0.64)	.649	(16.5)	5.2	(132)	560	(255)	345	(513)
	16	.030	(0.76)	.737	(18.7)	5.9	(150)	744	(338)	451	(671)
	20	.030	(0.76)	.802	(20.4)	6.4	(163)	928	(422)	551	(820)
	24	.030	(0.76)	.897	(22.8)	7.2	(182)	1112	(505)	655	(975)
	36	.030	(0.76)	1.007	(25.6)	8.1	(205)	1664	(756)	950	(1414)
18 AWG	2	.020	(0.51)	.303	(7.7)	2.4	(62)	70	(32)	56	(83)
(1.02MM)	4	.020	(0.51)	.355	(9.0)	2.8	(72)	132	(60)	95	(141)
Solid	8	.020	(0.51)	.465	(11.8)	3.7	(94)	256	(116)	167	(248)
	12	.025	(0.64)	.565	(14.4)	4.5	(115)	380	(173)	247	(367)
	16	.025	(0.64)	.631	(16.0)	5.0	(128)	504	(229)	320	(476)
	20	.025	(0.64)	.687	(17.4)	5.5	(140)	628	(285)	389	(579)
	24	.030	(0.76)	.778	(19.7)	6.2	(158)	752	(342)	472	(702)
	36	.030	(0.76)	.872	(22.1)	7.0	(177)	1124	(511)	680	(1012)
20 AWG	2	.015	(0.38)	.263	(6.7)	2.1	(53)	50	(23)	41	(61)
(0.81MM)	4	.020	(0.51)	.318	(8.1)	2.5	(65)	92	(42)	75	(112)
Solid	8	.020	(0.51)	.414	(10.5)	3.3	(84)	176	(80)	126	(187)
	12	.025	(0.64)	.505	(12.8)	4.0	(103)	260	(118)	191	(284)
	16	.025	(0.64)	.548	(13.9)	4.4	(111)	344	(156)	243	(362)
	20	.025	(0.64)	.611	(15.5)	4.9	(124)	428	(195)	297	(442)
	24	.025	(0.64)	.682	(17.3)	5.5	(139)	512	(233)	347	(516)
	36	.030	(0.76)	.774	(19.7)	6.2	(157)	764	(347)	513	(763)

The products referenced above represent the most popular constructions. Other constructions can be manufactured to meet individual specification and application requirements. Contact factory for additional information.

Table 1

Initial Calibration Tolerances Per ASTM E230 and ANSI MC96.1

Thermocouple Type	Temperature Range F(C)	Grade Designation	Tolerance-Reference Junction 32F (0C) Standard Grade Limits F(C)	Grade Designation	Special Grade Limits F(C)
Extension Wire					
TX	32 (0) to 212 (100)	TX	±1.8 (1)	TTX	±0.9 (0.5)
JX	32 (0) to 400 (200)	JX	±4 (2.2)	JJX	±2 (1.1)
EX	32 (0) to 400 (200)	EX	±3.1 (1.7)	EEX	±1.8 (1)
KX or NX	32 (0) to 400 (200)	KX or NX	±4 (2.2)	KKX or NNX	±2 (1.1)
Compensating Extension Wire					
RX or SX	32 (0) to 400 (200)	RX or SX	±9 (5)		

Electrical Characteristics

Insulation passes 3000 V ac spark test.
Completed cable passes a dielectric test of 1300 V dc for 60 seconds, conductor to conductor and conductor to shield.

Overall Shield, UL Listed 300 Volt PVC Insulated 221°F (105°C)

QuickQuote

Applications

- Petrochemical Plants
- Utilities and Industrial Plants
- Instrumentation Circuits
- For use in NEC Article 725
  ...Class 1 Division 2 Hazardous
  ...Locations
- Complies with NEC 725 for use in
  ...Class 2 and Class 3 Circuits

Product Features

- UL Listed Subject 13 PLTC
- Rated 105C 300 Volt
- Flame Retardant
- Passes IEEE 383 Flame Test
- Passes VW-1 Flame Test
- Sunlight Resistant
- Available as Type ITC
- CPE and TPE Constructions
  ...Are Also Available

Product Specifications

Conductors: Solid or stranded, bare or tinned copper 12 to 22 AWG (2.44 to .63MM)

Insulation: Nominal .016" (.40MM) flame retardant PVC

Color Code: Pairs-black & white, numbered. Triads-black, white & red, numbered (other colors available)

Construction: Twisted pairs or triads

Communication Wire: 22 AWG (.61MM) 7-strand copper insulated with nominal .015" (.38MM) orange PVC (4 pair/triad and larger)

Cable Shield: .002" (.05MM) aluminum/polyester tape, 25% overlap

Cable Drain Wire: 20 AWG (.91MM) 7-strand tinned copper

Outer Jacket: Flame retardant PVC with ripcord under jacket

Ordering Code

UP/ALPTWK - [ ] - [ ] [ ] - [ ]

- # of Pairs or Triads
- Wire Size AWG or Metric
- Add (F) for Stranded Wire
- (TRIAD) or (BX) for Pairs
- Add (TIN) for Tinned Copper

Overall Shield, UL Listed 300 Volt PVC Insulated 221°F (105°C)

QuickQuote

(Call for CSA Data)

Wire Size	Numbers of Pairs/Triads	Outer Jacket Thickness inches	(MM)	Outer Diameter inches	(MM)	Bend Radius inches	(MM)	Pull Tension LB	KG	Net Weight LB/MF	KG/KM
16 AWG	1...	.037	(0.94)	.270	(6.9)	1.7	(41)	54	(25)	47	(70)
(1.47MM)	2...	.053	(1.35)	.437	(11.1)	2.6	(67)	90	(41)	100	(149)
7-Strand	4...	.053	(1.35)	.500	(12.7)	3.0	(77)	172	(78)	148	(220)
	8...	.064	(1.63)	.648	(16.5)	3.9	(99)	336	(153)	268	(399)
	12...	.064	(1.63)	.756	(19.2)	4.5	(115)	500	(227)	372	(554)
	16...	.064	(1.63)	.846	(21.5)	5.1	(129)	664	(302)	473	(704)
	24...	.074	(1.88)	1.019	(25.9)	6.1	(156)	992	(451)	695	(1034)
	36...	.074	(1.88)	1.154	(29.3)	6.9	(176)	1484	(675)	1539	(2290)
	...1	.042	(1.07)	.294	(7.5)	1.8	(45)	75	(34)	62	(93)
	...4	.053	(1.35)	.591	(15.0)	3.5	(90)	254	(115)	206	(307)
	...8	.064	(1.63)	.786	(20.0)	4.7	(120)	500	(227)	385	(573)
	...12	.074	(1.88)	.969	(24.6)	5.8	(148)	746	(339)	556	(827)
	...24	.074	(1.88)	1.328	(33.7)	8.0	(202)	1484	(675)	1022	(1521)
18 AWG	1...	.037	(0.94)	.246	(6.2)	1.5	(37)	34	(15)	36	(54)
(1.2MM)	2...	.042	(1.07)	.373	(9.5)	2.3	(57)	60	(27)	71	(106)
7-Strand	4...	.053	(1.35)	.450	(11.4)	2.7	(69)	112	(51)	112	(167)
	8...	.053	(1.35)	.559	(14.2)	3.4	(85)	216	(98)	184	(274)
	12...	.064	(1.63)	.675	(17.1)	4.1	(103)	320	(145)	268	(399)
	16...	.064	(1.63)	.752	(19.1)	4.5	(115)	424	(193)	337	(501)
	24...	.074	(1.88)	.905	(23.0)	5.5	(138)	632	(287)	490	(729)
	36...	.074	(1.88)	1.022	(26.0)	6.1	(156)	944	(429)	688	(1024)
	...1	.037	(0.94)	.258	(6.5)	1.6	(39)	47	(21)	44	(65)
	...4	.053	(1.35)	.529	(13.4)	3.2	(81)	164	(76)	149	(222)
	...8	.064	(1.63)	.700	(17.8)	4.2	(107)	320	(145)	271	(403)
	...12	.064	(1.63)	.841	(21.4)	5.0	(128)	476	(217)	377	(561)
	...24	.074	(1.88)	1.172	(29.8)	7.0	(177)	944	(429)	710	(1056)
20 AWG	1...	.037	(0.94)	.226	(5.7)	1.3	(34)	21	(10)	28	(42)
(0.91MM)	2...	.042	(1.07)	.338	(8.6)	2.0	(52)	40	(18)	55	(82)
7-Strand	4...	.053	(1.35)	.408	(10.4)	2.4	(62)	72	(33)	88	(131)
	8...	.053	(1.35)	.503	(12.8)	3.0	(77)	136	(62)	145	(216)
	12...	.053	(1.35)	.584	(14.8)	3.5	(89)	200	(91)	191	(284)
	16...	.064	(1.63)	.674	(17.1)	4.0	(103)	264	(120)	262	(390)
	24...	.064	(1.63)	.790	(20.1)	4.7	(120)	392	(178)	348	(518)
	36...	.074	(1.88)	.912	(23.2)	5.5	(139)	584	(265)	508	(756)
	...1	.037	(0.94)	.236	(6.0)	1.4	(36)	29	(13)	35	(51)
	...4	.053	(1.35)	.476	(12.1)	2.9	(73)	104	(47)	118	(176)
	...8	.064	(1.63)	.627	(15.9)	3.8	(96)	200	(91)	206	(307)
	...12	.064	(1.63)	.750	(19.1)	4.5	(114)	296	(135)	285	(242)
	...24	.074	(1.88)	1.040	(26.4))	6.2	(158)	584	(265)	528	(786)

The products referenced above represent the most popular constructions. Other constructions can be manufactured to meet individual specification and application requirements. Contact factory for additional information.

Electrical Characteristics

Insulation passes 3000 V ac spark test per UL Subject 13.
Completed cable passes a dielectric test of 2500 V dc for
10 seconds, conductor to conductor and conductor to shield, per UL Subject 13.

Individual/Overall Shield, UL Listed 300 Volt PVC Insulated 221°F (105°C)

QuickQuote

Applications

- Petrochemical Plants
- Utilities and Industrial Plants
- Instrumentation Circuits
- For use in NEC Article 725
  ...Class 1 Division 2 Hazardous
  ...Locations
- Complies with NEC 725 for
  ...use in Class 2 and Class 3
  Circuits

Product Features

- UL Listed Subject 13 PLTC
- Rated 105C 300 Volt
- Flame Retardant
- Passes IEEE 383 Flame Test
- Passes VW-1 Flame Test
- Sunlight Resistant
- Available as Type ITC
- CPE and TPE Constructions
  ...are also available

Product Specifications

Conductors:	Solid or stranded, bare or tinned copper 12 to 22 AWG (2.44 to .61 MM)
Insulation:	Nominal .016" (.40MM) flame retardant PVC
Color Code:	Pairs-black & white, numbered. Triads-black, white & red, numbered (other colors available)
Construction:	Twisted pairs or triads
Individual Shield:	.00135" (.03MM) aluminum/polyester tape, 25% overlap
Pair Drain Wire:	22 AWG (.61MM) 7-strand tinned copper
Communication Wire:	22 AWG (.61MM) 7-strand copper insulated with nominal .015" (.38MM) orange PVC (4 pair/triad and larger)
Cable Shield:	.002" (.05MM) aluminum/polyester tape, 25% overlap
Cable Drain Wire:	20 AWG (.91MM) 7-strand tinned copper
Outer Jacket:	Flame retardant PVC with ripcord under jacket

Ordering Code

UP/ALM/ALPTWK - [ ] - [ ] [ ] - [ ]

- [ ]: # of Pairs or Triads
- [ ]: Wire Size AWG or Metric
- [ ]: Add (F) for Stranded Wire
- [ ]: (TRIAD) or (BX) for Pairs
- [ ]: Add (TIN) for Tinned Copper

Individual/Overall Shield, UL Listed 300 Volt PVC Insulated
221°F (105°C)

QuickQuote

(Call for CSA Data)

Wire Size	Numbers of Pairs/Triads	Outer Jacket Thickness inches	(MM)	Outer Diameter inches	(MM)	Bend Radius inches	(MM)	Pull Tension LB	KG	Net Weight LB/MF	KG/KM
16 AWG	2...	.053	(1.35)	.483	(12.3)	3.9	(98)	100	(45)	111	(165)
(1.47MM)	4...	.053	(1.35)	.559	(14.2)	4.5	(114)	192	(87)	169	(251)
7-Strand	8...	.064	(1.63)	.741	(18.8)	5.9	(151)	376	(171)	309	(460)
	10...	.064	(1.63)	.866	(22.0)	6.9	(176)	468	(213)	376	(560)
	12...	.064	(1.63)	.873	(22.2)	7.0	(178)	560	(255)	432	(643)
	16...	.074	(1.88)	.990	(25.1)	7.9	(201)	744	(338)	569	(847)
	20...	.074	(1.88)	1.072	(27.2)	8.6	(218)	928	(422)	688	(1023)
	24...	.074	(1.88)	1.190	(30.2)	9.5	(242)	1112	(505)	813	(1210)
	36...	.085	(2.16)	1.350	(34.3)	10.8	(274)	1664	(756)	1181	(1757)
	...4	.064	(1.63)	.638	(16.2)	5.1	(130)	274	(125)	233	(347)
	...8	.064	(1.63)	.809	(20.5)	6.5	(164)	540	(245)	409	(609)
	...12	.074	(1.88)	1.012	(25.7)	8.1	(206)	806	(366)	604	(899)
	...24	.085	(2.16)	1.410	(35.8)	11.3	(287)	1604	(729)	1143	(1700)
18 AWG	2...	.053	(1.35)	.432	(11.0)	3.5	(88)	70	(32)	90	(134)
(1.2MM)	4...	.053	(1.35)	.497	(12.6)	4.0	(101)	132	(60)	128	(191)
7-Strand	8...	.064	(1.63)	.657	(16.7)	5.2	(134)	256	(116)	230	(343)
	10...	.064	(1.63)	.763	(19.4)	6.1	(155)	318	(145)	279	(415)
	12...	.064	(1.63)	.770	(19.6)	6.2	(156)	380	(173)	317	(471)
	16...	.064	(1.63)	.853	(21.7)	6.8	(173)	504	(229)	402	(597)
	20...	.074	(1.88)	.943	(23.9)	7.5	(192)	628	(285)	502	(747)
	24...	.074	(1.88)	1.044	(26.5)	8.4	(212)	752	(342)	590	(877)
	36...	.074	(1.88)	1.162	(29.5)	9.3	(236)	1124	(511)	822	(1223)
	...4	.053	(1.35)	.546	(13.9)	4.4	(111)	184	(84)	162	(241)
	...8	.064	(1.63)	.723	(18.4)	5.8	(147)	360	(164)	284	(423)
	...12	.064	(1.63)	.870	(22.1)	7.0	(177)	536	(244)	402	(598)
	...24	.074	(1.88)	1.214	(30.8)	9.7	(247)	1064	(484)	720	(1071)
20 AWG	2...	.042	(1.07)	.372	(9.4)	3.0	(76)	50	(23)	65	(97)
(0.91MM)	4...	.053	(1.35)	.451	(11.5)	3.6	(92)	92	(42)	105	(156)
7-Strand	8...	.053	(1.35)	.572	(14.5)	4.6	(116)	176	(80)	173	(257)
	10...	.064	(1.63)	.687	(17.4)	5.5	(140)	218	(99)	220	(327)
	12...	.064	(1.63)	.693	(17.6)	5.6	(141)	260	(118)	251	(373)
	16...	.064	(1.63)	.766	(19.5)	6.1	(156)	344	(156)	313	(466)
	20...	.064	(1.63)	.827	(21.0)	6.6	(168)	428	(195)	375	(558)
	24...	.074	(1.88)	.936	(23.8)	7.5	(191)	512	(233)	453	(674)
	36...	.074	(1.88)	1.040	(26.4)	8.3	(211)	764	(347)	635	(945)
	...4	.053	(1.35)	.493	(12.5)	3.9	(100)	124	(56)	128	(191)
	...8	.064	(1.63)	.650	(16.5)	5.2	(132)	240	(109)	234	(348)
	...12	.064	(1.63)	.779	(19.8)	6.2	(158)	356	(162)	326	(485)
	...24	.074	(1.88)	1.082	(27.5)	8.6	(220)	704	(320))	610	(908)

The products referenced above represent the most popular constructions. Other constructions can be manufactured to meet individual specification and application requirements. Contact factory for additional information.

Electrical Characteristics
Insulation passes 3000 V ac spark test per UL Subject 13.
Completed cable passes a dielectric test of 2500 V dc for
10 seconds, conductor to conductor to shield, per UL Subject 13.

FEP Insulated 400°F (200°C)

QuickQuote

Applications

- Petrochemical Plants
- Utilities and Industrial Plants
- Pharmaceutical Industry
- Instrumentation Circuits
- Food Processing Plants
- Agricultural Industry
- FDA Approved Applications
- Suitable for 300 Volt Applications

Product Features

- Continuous Use -328F (-200C) ...to +400F (+200C)
- Excellent Chemical Resistance
- Excellent Electrical Properties
- Passes IEEE 383 Flame Test
- Passes VW-1 Flame Test
- Sunlight Resistant
- UL Listed CL2, CL3, PLTC ...or ITC Constructions are Also Available

Product Specifications

Conductors:	Solid or stranded, bare or tinned copper 10 to 30 AWG (2.6 to .25MM)
Insulation:	Nominal .010" (.25MM) flame retardant extruded fluoropolymer FEP
Color Code:	Black & white (other colors available)
Construction:	Twisted pairs
Pair Identification:	Numbered polyester tapes
Communication Wire:	22 AWG (.61MM) 7-strand copper insulated with nominal .010" (.25MM) orange FEP (4 pair and larger)
Cable Shield:	.002" (.05MM) aluminum/polyester tape, 25% overlap
Cable Drain Wire:	20 AWG (.91MM) 7-strand tinned copper
Outer Jacket:	Flame retardant extruded fluoropolymer FEP (ETFE +300F (+150C) and PFA +500F (+260C) are also available)

Ordering Code

TEX/ALTEXTWK - [ ] - [ ] [ ] - [ ]

- [ ]: # of Pairs
- [ ]: Wire Size AWG or Metric
- [ ]: Add (F) for Stranded Wire
- [ ]: (BX) for Pairs
- [ ]: Add (TIN) for Tinned Copper

FEP Insulated 400°F (200°C)

QuickQuote

Wire Size	Numbers of Pairs	Outer Jacket Thickness inches	(MM)	Outer Diameter inches	(MM)	Bend Radius inches	(MM)	Pull Tension LB	KG	Net Weight LB/MF	KG/KM
16 AWG	1	.015	(0.38)	.202	(5.1)	1.2	(32)	54	(25)	37	(55)
(1.47MM)	2	.020	(0.51)	.364	(9.2)	2.2	(55)	90	(41)	77	(115)
7-Strand	4	.020	(0.51)	.428	(10.9)	2.6	(65)	172	(78)	133	(198)
	6	.025	(0.64)	.528	(13.4)	3.2	(80)	254	(115)	195	(290)
	8	.025	(0.64)	.575	(14.6)	3.5	(88)	336	(153)	250	(372)
	10	.025	(0.64)	.682	(17.3)	4.1	(104)	418	(190)	307	(457)
	12	.025	(0.64)	.688	(17.5)	4.2	(105)	500	(227)	367	(546)
	16	.025	(0.64)	.780	(19.8)	4.7	(119)	664	(302)	473	(704)
	20	.030	(0.76)	.850	(21.6)	5.1	(130)	828	(376)	579	(862)
	24	.030	(0.76)	.951	(24.2)	5.1	(145)	992	(451)	690	(1027)
	36	.030	(0.76)	1.068	(27.1)	6.4	(162)	1484	(675)	999	(1487)
18 AWG	1	.015	(0.38)	.178	(4.5)	1.1	(27)	34	(15)	29	(43)
(1.2MM)	2	.020	(0.51)	.326	(8.3)	2.0	(50)	60	(27)	55	(82)
7-Strand	4	.020	(0.51)	.382	(9.7)	2.3	(58)	112	(51)	92	(137)
	6	.025	(0.64)	.471	(12.0)	2.8	(72)	164	(75)	129	(192)
	8	.025	(0.64)	.513	(13.0)	3.1	(78)	216	(98)	169	(251)
	10	.025	(0.64)	.606	(15.4)	3.6	(92)	268	(121)	201	(299)
	12	.025	(0.64)	.611	(15.5)	3.7	(93)	320	(145)	239	(356)
	16	.025	(0.64)	.683	(17.4)	4.1	(104)	424	(193)	314	(467)
	20	.030	(0.76)	.755	(19.2)	4.5	(115)	528	(240)	381	(567)
	24	.030	(0.76)	.843	(21.4)	5.1	(128)	632	(287)	451	(671)
	36	.030	(0.76)	.946	(24.0)	5.7	(144)	944	(429)	642	(955)
	50	.030	(0.76)	1.121	(28.5)	6.7	(171)	1308	(595)	872	(1298)
20 AWG	1	.015	(0.38)	.158	(3.8)	1.0	(25)	21	(10)	20	(30)
(0.91MM)	2	.015	(0.38)	.270	(6.9)	1.6	(41)	40	(18)	40	(60)
7-Strand	4	.020	(0.51)	.328	(8.3)	2.0	(50)	72	(33)	70	(104)
	6	.020	(0.51)	.392	(10.0)	2.4	(60)	104	(47)	96	(143)
	8	.020	(0.51)	.428	(10.9)	2.6	(65)	136	(62)	119	(177)
	10	.025	(0.64)	.514	(13.1)	3.0	(76)	168	(76)	153	(228)
	12	.025	(0.64)	.519	(13.2)	3.1	(77)	200	(91)	175	(260)
	16	.025	(0.64)	.579	(14.7)	3.5	(88)	264	(120)	222	(330)
	20	.025	(0.64)	.630	(16.0)	3.8	(93)	328	(149)	269	(400)
	24	.030	(0.76)	.713	(18.1)	4.3	(109)	392	(178)	327	(487)
	36	.030	(0.76)	.799	(20.3)	4.8	(122)	584	(265)	462	(687)
	50	.030	(0.76)	.944	(24.0)	5.7	(144)	808	(367)	623	(927)

The products referenced above represent the most popular constructions. Other constructions can be manufactured to meet individual specification and application requirements. Contact factory for additional information.

Electrical Characteristics

Insulation passes 3000 V ac spark test.
Completed cable passes a dielectric test of 1300 V dc for 60 seconds, conductor to conductor and conductor to shield.

Individual/Overall Shield, FEP Insulated 400°F (200°C)

QuickQuote

Applications

- Petrochemical Plants
- Utilities and Industrial Plants
- Pharmaceutical Industry
- Instrumentation Circuits
- Food Processing Plants
- Agricultural Industry
- FDA Approved Applications
- Suitable for 300 Volt Applications

Product Features

- Continuous Use -328F (-200C) ...to +400F (+200C)
- Excellent Chemical Resistance
- Excellent Electrical Properties
- Passes IEEE 383 Flame Test
- Passes VW-1 Flame Test
- Sunlight Resistant
- UL Listed CL2, CL3, PLTC or ITC ...Constructions Are Also Available

Product Specifications

Conductors:	Solid or stranded, bare or tinned copper 10 to 30 AWG (2.6 to .25MM)
Insulation:	Nominal .010" (.25MM) flame retardant extruded fluoropolymer FEP
Color Code:	Black & white (other colors available)
Construction:	Twisted pairs
Pair Identification:	Numbered polyester tapes
Individual Shield:	.00135" (.03MM) aluminum/polyester tape, 25% overlap
Individual Drain Wire:	22 AWG (.61MM) 7-strand tinned copper
Communication Wire:	22 AWG (.61MM) 7-strand copper insulated with nominal .010" (.25MM) orange FEP(4 pair and larger)
Cable Shield:	.002" (.05MM) aluminum/polyester tape, 25% overlap
Cable Drain Wire:	20 AWG (.91MM) 7-strand tinned copper
Outer Jacket:	Flame retardant extruded fluoropolymer FEP
	(ETFE +300F (+150C) and PFA +500F (+260C) are also available)

Ordering Code

TEX/ALM/ALTEXTWK - [ ] - [ ] [ ] - [ ]

- # of Pairs
- Wire Size AWG or Metric
- Add (F) for Stranded Wire
- (BX) for Pairs
- Add (TIN) for Tinned Copper

Individual/Overall Shield, FEP Insulated 400°F (200°C)

QuickQuote

Wire Size	Numbers of Pairs	Outer Jacket Thickness inches	(MM)	Outer Diameter inches	(MM)	Bend Radius inches	(MM)	Pull Tension LB	KG	Net Weight LB/MF	KG/KM
16 AWG	2	.020	(0.51)	.371	(9.4)	3.0	(75)	100	(45)	84	(125)
(1.47MM)	4	.020	(0.51)	.438	(11.2)	3.5	(89)	192	(87)	147	(219)
7-Strand	6	.025	(0.64)	.539	(13.7)	4.3	(110)	284	(129)	216	(321)
	8	.025	(0.64)	.588	(14.9)	4.7	(119)	376	(171)	278	(414)
	10	.025	(0.64)	.697	(17.7)	5.6	(142)	468	(213)	342	(509
	12	.030	(0.76)	.713	(18.1)	5.7	(145)	560	(255)	409	(609)
	16	.030	(0.76)	.798	(20.3)	6.4	(162)	744	(338)	529	(787)
	20	.030	(0.76)	.869	(22.1)	7.0	(177)	928	(422)	649	(966)
	24	.030	(0.76)	.972	(24.7)	7.8	(198)	1112	(505)	774	(1152)
	36	.030	(0.76)	1.093	(27.8)	8.7	(222)	1664	(756)	1125	(1674)
18 AWG	2	.020	(0.51)	.333	(8.5)	2.7	(68)	70	(32)	61	(91)
(1.2MM)	4	.020	(0.51)	.392	(10.1)	3.1	(80)	132	(60)	104	(155)
7-Strand	6	.020	(0.51)	.472	(12.0)	3.8	(96)	194	(88)	147	(219)
	8	.025	(0.64)	.525	(13.3)	4.2	(107)	256	(116)	193	(287)
	10	.025	(0.64)	.621	(15.8)	4.9	(126)	318	(145)	231	(344)
	12	.025	(0.64)	.626	(15.9)	5.0	(127)	380	(173)	275	(409)
	16	.030	(0.76)	.711	(18.1)	5.7	(144)	504	(229)	362	(539)
	20	.030	(0.76)	.774	(19.7)	6.2	(157)	628	(285)	441	(656)
	24	.030	(0.76)	.864	(21.9)	6.9	(176)	752	(342)	523	(778)
	36	.030	(0.76)	.970	(24.6)	7.8	(197)	1124	(511)	750	(1116)
	50	.030	(0.76)	1.150	(29.2)	9.2	(234)	1558	(708)	1022	(1521)
20 AWG	2	.015	(0.38)	.278	(7.1)	2.2	(56)	50	(23)	46	(68)
(0.91MM)	4	.020	(0.51)	.337	(8.6)	2.7	(68)	92	(42)	82	(122)
7-Strand	6	.020	(0.51)	.404	(10.3)	3.2	(82)	134	(61)	114	(170)
	8	.020	(0.51)	.440	(11.2)	3.5	(89)	176	(80)	143	(213)
	10	.025	(0.64)	.530	(13.5)	4.2	(108)	218	(99)	183	(272)
	12	.025	(0.64)	.534	(13.6)	4.3	(109)	260	(118)	211	(314)
	16	.025	(0.64)	.596	(15.1)	4.8	(121)	344	(156)	270	(402)
	20	.025	(0.64)	.649	(16.5)	5.2	(132)	428	(195)	329	(490)
	24	.030	(0.76)	.735	(18.4)	5.9	(149)	512	(233)	399	(594)
	36	.030	(0.76)	.823	(20.9)	6.6	(167)	764	(347)	570	(848)
	50	.030	(0.76)	.974	(24.7)	7.8	(199)	1058	(481)	773	(1150)

The products referenced above represent the most popular constructions. Other constructions can be manufactured to meet individual specification and application requirements. Contact factory for additional information.

Electrical Characteristics

Insulation passes 3000 V ac spark test.
Completed cable passes a dielectric test of 1300 V dc for 60 seconds, conductor to conductor and conductor to shield.

Overall Shield, UL Listed 600 Volt PVC/Nylon Insulated 194°F (90°C)

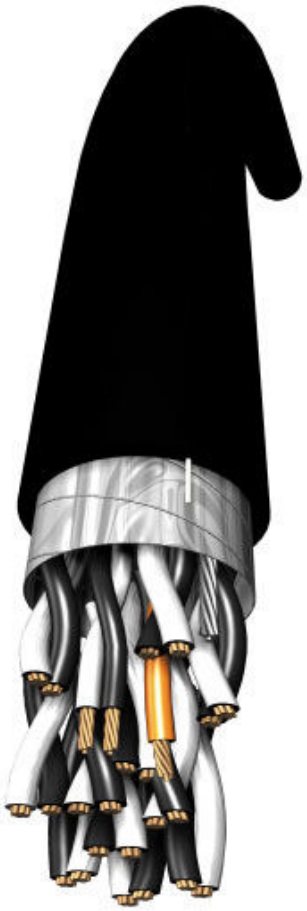
QuickQuote

Applications

- Petrochemical Plants
- Utilities and Industrial Plants
- Power and Control Circuits
- For use in NEC Article 501
  ...Class 1 Division 2 Hazardous
  ...Locations
- Complies with NEC 725 for
  ...use in Class 1 Control Circuits
- For use in Accordance with
  ...NEC 340

Product Features

- UL Listed Subject 1277 TC
- Rated 90C 600 Volt
- Flame Retardant
- Primaries Type TFN and THHN
- Passes IEEE 383 Flame Test
- Sunlight Resistant
- Direct Burial
- CPE and TPE Constructions
  ...Are Also Available



Product Specifications

Conductors:	Solid or stranded, bare or tinned copper 12 to 18 AWG (2.44 to 1.2MM) (Thermocouple conductors are also available)
Insulation:	Nominal .016" (.40MM) flame retardant PVC
Insulation Jacket:	Nominal .0045" (.11MM) clear nylon
Color Code:	Per customer request, pairs or triads numbered
Construction:	Twisted pairs or triads
Communication Wire:	18 AWG (1.2MM) 7-strand copper insulated with nominal .016" (.40MM) orange PVC/.0045" (.11MM) clear nylon
Cable Shield:	(4 pair/triad and larger) .002" (.05MM) aluminum/polyester tape, 25% overlap
Cable Drain Wire:	20 AWG (.91MM) 7-strand tinned copper
Outer Jacket:	Flame retardant PVC with ripcord under jacket

Ordering Code

UPN/ALPTWK - [ ] - [ ] [ ] - [ ]

- # of Pairs or Triads
- Wire Size AWG or Metric
- Add (F) for Stranded Wire
- (TRIAD) or (BX) for Pairs
- Add (TIN) for Tinned Copper

Overall Shield, UL Listed 600 Volt PVC/Nylon Insulated
194°F (90°C)

QuickQuote

(Call for CSA Data)

Wire Size	Numbers of Pairs/Triads	Outer Jacket Thickness inches	(MM)	Outer Diameter inches	(MM)	Bend Radius inches	(MM)	Pull. Tension LB	KG	Net Weight LB/MF	KG/KM
14 AWG	1....	.047	(1.19)	.336	(8.5)	2.0	(51)	86	(39)	69	(103)
(1.80MM)	2....	.047	(1.19)	.506	(12.9)	3.0	(77)	139	(63)	117	(174)
7-Strand	4....	.064	(1.63)	.619	(15.7)	3.7	(94)	270	(123)	212	(315)
	8....	.064	(1.63)	.777	(19.7)	4.7	(118)	532	(242)	369	(549)
	12....	.085	(2.15)	.954	(24.2)	5.7	(145)	794	(361)	560	(833)
	16....	.085	(2.15)	1.067	(27.1)	6.4	(163)	1056	(480)	715	(1064)
	24....	.085	(2.15)	1.259	(32.0)	7.6	(192)	1418	(645)	1018	(1515)
	36....	.085	(2.15)	1.429	(36.3)	8.6	(218)	1580	(718)	1453	(2162)
	1	.047	(1.19)	.353	(2.1)	2.1	(54)	118	(54)	89	(132)
	4	.064	(1.63)	.730	(18.6)	4.4	(111)	400	(182)	284	(423)
	8	.085	(2.15)	.990	(25.1)	5.9	(151)	794	(361)	545	(811)
	12	.085	(2.15)	1.194	(30.3)	7.2	(182)	1184	(538)	772	(1149)
	24	.085	(2.15)	1.644	(41.8)	9.9	(251)	2360	(1073)	1427	(2123)
16 AWG	1....	.047	(1.19)	.308	(7.8)	1.8	(47)	54	(25)	54	(80)
(1.47MM)	2....	.047	(1.19)	.457	(11.6)	2.7	(70)	90	(41)	90	(134)
7-Strand	4....	.064	(1.63)	.560	(14.2)	3.4	(85)	172	(78)	160	(238)
	8....	.064	(1.63)	.698	(17.7)	4.2	(106)	336	(153)	269	(400)
	12....	.064	(1.63)	.817	(20.8)	4.9	(125)	500	(227)	376	(559)
	16....	.085	(2.15)	.958	(24.3)	5.7	(146)	664	(302)	518	(771)
	24....	.085	(2.15)	1.127	(28.6)	6.8	(172)	992	(451)	729	(1085)
	36....	.085	(2.15)	1.275	(32.4)	7.7	(194)	1484	(675)	1027	(1528)
	1	.047	(1.19)	.323	(8.2)	1.9	(49)	75	(34)	67	(100)
	4	.064	(1.63)	.657	(16.7)	3.9	(100)	254	(115)	209	(311)
	8	.085	(2.15)	.891	(22.6)	5.3	(136)	500	(227)	397	(591)
	12	.085	(2.15)	1.069	(27.2)	6.4	(163)	746	(339)	556	(827)
	24	.085	(2.15)	1.644	(41.8)	8.8	(223)	1484	(675)	1006	(1497)
18 AWG	1....	.047	(1.19)	.284	(7.2)	1.7	(43)	34	(15)	43	(64)
(1.2MM)	2....	.047	(1.19)	.415	(10.5)	2.5	(63)	60	(27)	71	(106)
7-Strand	4....	.047	(1.19)	.475	(12.1)	2.9	(72)	112	(51)	109	(162)
	8....	.064	(1.63)	.631	(16.0)	3.8	(96)	216	(98)	204	(304)
	12....	.064	(1.63)	.736	(18.7)	4.4	(112)	320	(145)	280	(417)
	16....	.064	(1.63)	.823	(20.9)	4.9	(125)	424	(193)	354	(527)
	24....	.085	(2.15)	1.013	(25.7)	6.1	(154)	632	(287)	539	(802)
	36....	.085	(2.15)	1.143	(29.0)	6.9	(174)	944	(429)	748	(1113)
	1	.047	(1.19)	.297	(7.5)	1.8	(45)	47	(21)	52	(77)
	4	.064	(1.63)	.595	(15.1)	3.6	(91)	164	(76)	160	(238)
	8	.064	(1.63)	.763	(19.4)	4.6	(116)	320	(145)	268	(400)
	12	.085	(2.15)	.962	(24.4)	5.8	(147)	476	(217)	414	(616)
	24	.085	(2.15)	1.308	(33.2)	7.8	(199)	944	(429)	732	(1089)

The products referenced above represent the most popular constructions. Other constructions can be manufactured to meet individual specification and application requirements. Contact factory for additional information.

Electrical Characteristics
Insulation passes 6000 V ac spark test per UL Subject 1277.
Completed cable passes a dielectric test of 3000 V dc for
60 seconds, conductor to conductor and conductor to shield, per UL Subject 1277.

Individual/Overall Shield, UL Listed 600 Volt PVC/Nylon Insulated 194°F (90°C)

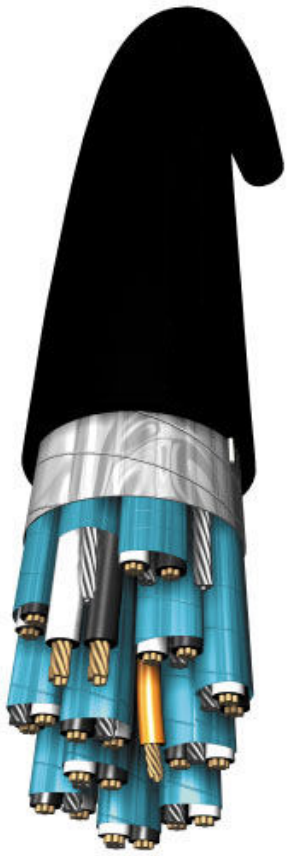
QuickQuote

Applications

- Petrochemical Plants
- Utilities and Industrial Plants
- Power and Control Circuits
- For use in NEC Article 501
  ...Class 1 Division 2 Hazardous
  ...Locations
- Complies with NEC 725 for
  ...use in Class 1 Control Circuits
- For use in Accordance with
  ...NEC 340

Product Features

- UL Listed Subject 1277 TC
- Rated 90C 600 Volt
- Flame Retardant
- Primaries Type TFN and THHN
- Passes IEEE 383 Flame Test
- Sunlight Resistant
- Direct Burial
- CPE and TPE Constructions
  ...Are Also Available



Product Specifications

Conductors:	Solid or stranded, bare or tinned copper 12 to 18 AWG (2.44 to 1.2MM) (Thermocouple conductors are also available)
Insulation:	Nominal .016" (.40MM) flame retardant PVC
Insulation Jacket:	Nominal .0045" (.11MM) clear nylon
Color Code:	Per customer request, pairs or triads numbered
Construction:	Twisted pairs or triads
Individual Shield:	.00135" (.03MM) aluminum/polyester tape, 25% overlap
Individual Drain Wire:	22 AWG (.61MM) 7-strand tinned copper
Communication Wire:	18 AWG (1.2MM) 7-strand copper insulated with nominal .016" (.40MM) orange PVC/.0045" (.11MM) clear nylon
Cable Shield:	(4 pair/triad and larger) .002" (.05MM) aluminum/polyester tape,
Cable Drain Wire:	25% overlap
Outer Jacket:	20 AWG (.91MM) 7-strand tinned copper Flame retardant PVC with ripcord under jacket

Ordering Code

UPN/ALM/ALPTWK - [ ] - [ ] [ ] - [ ] [ ]

- [ ]: # of Pairs or Triads
- [ ]: Wire Size AWG or Metric
- [ ]: Add (F) for Stranded Wire
- [ ]: (TRIAD) or (BX) for Pairs
- [ ]: Add (TIN) for Tinned Copper

Individual/Overall Shield, UL Listed 600 Volt PVC/Nylon Insulated
194°F (90°C)

QuickQuote

(Call for CSA Data)

Wire Size	Numbers of Pairs/Triads	Outer Jacket Thickness inches	(MM)	Outer Diameter inches	(MM)	Bend Radius inches	(MM)	Pull Tension LB	KG	Net Weight LB/MF	KG/KM
14 AWG	2....	.064	(1.63)	.587	(14.9)	4.7	(119)	149	(68)	147	(219)
(1.80MM)	4....	.064	(1.63)	.677	(17.2)	5.4	(138)	290	(131)	234	(348)
7-Strand	6....	.064	(1.63)	.808	(20.5)	6.5	(164)	431	(171)	326	(485)
	8....	.085	(2.15)	.919	(23.3)	7.4	(187)	572	(260)	446	(664)
	12....	.085	(2.15)	1.076	(27.3)	8.6	(219)	854	(388)	622	(926)
	16....	.085	(2.15)	1.199	(30.5)	9.6	(244)	1136	(516)	793	(1180)
	20....	.085	(2.15)	1.330	(33.8)	10.6	(270)	1418	(645)	965	(1436)
	24....	.085	(2.15)	1.444	(36.7)	11.6	(293)	1700	(773)	1134	(1688)
	36....	.085	(2.15)	1.613	(41.0)	12.9	(328)	2546	(1157)	1610	(2396)
	4	.064	(1.63)	.746	(18.9)	6.0	(152)	420	(191)	300	(446)
	8	.085	(2.15)	1.013	(25.7)	8.1	(206)	832	(378)	576	(857)
	12	.085	(2.15)	1.223	(31.1)	9.8	(249)	1244	(565)	819	(1219)
	24	.120	(3.05)	1.756	(44.6)	14.0	(357)	2480	(1127)	1599	(2379)
16 AWG	2....	.047	(1.19)	.500	(12.7)	4.0	(102)	100	(45)	101	(150)
(1.47MM)	4....	.064	(1.63)	.613	(15.6)	4.9	(125)	192	(87)	180	(268)
7-Strand	6....	.064	(1.63)	.728	(18.5)	5.8	(150)	284	(129)	248	(369)
	8....	.064	(1.63)	.789	(20.0)	6.3	(160)	376	(171)	308	(458)
	12....	.085	(2.15)	.969	(24.6)	7.8	(197)	560	(255)	468	(696)
	16....	.085	(2.15)	1.077	(27.4)	8.6	(219)	744	(338)	591	(879)
	20....	.085	(2.15)	1.193	(30.3)	9.5	(242)	928	(422)	715	(1064)
	24....	.085	(2.15)	1.293	(32.8)	10.3	(263)	1112	(505)	837	(1245)
	36....	.085	(2.15)	1.442	(36.6)	11.5	(293)	1664	(756)	1174	(1747)
	4	.064	(1.63)	.674	(17.1)	5.4	(137)	274	(125)	225	(335)
	8	.085	(2.15)	.914	(23.2)	7.3	(186)	540	(245)	428	(637)
	12	.085	(2.15)	1.098	(27.9)	8.8	(223)	806	(366)	600	(893)
	24	.085	(2.15)	1.505	(38.2)	12.0	(306)	1604	(729)	1091	(1623)
18 AWG	2....	.047	(1.19)	.454	(11.5)	3.6	(92)	70	(32)	82	(122)
(1.2MM)	4....	.064	(1.63)	.558	(14.2)	4.5	(113)	132	(60)	144	(214)
7-Strand	6....	.064	(1.63)	.660	(16.7)	5.3	(134)	194	(88)	195	(290)
	8....	.064	(1.63)	.713	(18.1)	5.7	(145)	256	(116)	240	(357)
	12....	.085	(2.15)	.877	(22.3)	7.0	(178)	380	(173)	365	(543)
	16....	.085	(2.15)	.973	(24.7)	7.8	(198)	504	(229)	457	(680)
	20....	.085	(2.15)	1.075	(27.3)	8.6	(218)	628	(285)	550	(818)
	24....	.085	(2.15)	1.163	(29.5)	9.3	(236)	752	(342)	640	(952)
	36....	.085	(2.15)	1.293	(32.8)	10.3	(263)	1124	(511)	887	(1320)
	4	.064	(1.63)	.612	(15.5)	4.9	(124)	184	(84)	175	(260)
	8	.064	(1.63)	.786	(20.0)	6.3	(160)	360	(164)	297	(442)
	12	.085	(2.15)	.991	(25.2)	7.9	(201)	536	(244)	456	(679)
	24	.085	(2.15)	1.350	(34.3)	10.8	(274)	1064	(484)	814	(1211)

The products referenced above represent the most popular constructions. Other constructions can be manufactured to meet individual specification and application requirements. Contact factory for additional information.

Electrical Characteristics
Insulation passes 6000 V ac spark test per UL Subject 1277.
Completed cable passes a dielectric test of 3000 V dc for
60 seconds, conductor to conductor and conductor to shield, per UL Subject 1277.

Copper Control Cable

Overall Shield, UL Listed 600 Volt PVC/Nylon Insulated 194°F (90°C)

QuickQuote

Applications

- Petrochemical Plants
- Utilities and Industrial Plants
- Power and Control Circuits
- For use in NEC Article 501
  ...Class 1 Division 2 Hazardous
  ...Locations
- Complies with NEC 725 for use
  ...in Class 1 Control Circuits
- For use in Accordance with
  ...NEC 340

Product Features

- UL Listed Subject 1277 TC
- Rated 90C 600 Volt
- Flame Retardant
- Primaries Type TFN and THHN
- Passes IEEE 383 Flame Test
- Sunlight Resistant
- Direct Burial
- CPE and TPE Constructions
  ...Are Also Available

Product Specifications

Conductors: Solid or stranded, bare or tinned copper 10 to 18 AWG (2.59 to 1.2MM)

Insulation: Nominal .016" (.40MM) flame retardant PVC (10 AWG .022" (.56MM))

Insulation Jacket: Nominal .0045" (.11MM) clear nylon

Color Code: Per customer request

Construction: Cabled conductors

Cable Shield: .002" (.05MM) aluminum/polyester tape, 25% overlap (Non-shielded constructions are also available)

Cable Drain Wire: 7-strand tinned copper, 2 AWG sizes smaller than conductor

Outer Jacket: Flame retardant PVC with ripcord under jacket

Ordering Code

UPN/ALPK - ( ) ( ) - ( ) CU ( )

- Wire Size AWG or Metric
- Add (F) for Stranded Wire
- Number of Conductors
- Add (TIN) for Tinned Copper

Overall Shield, UL Listed 600 Volt PVC/Nylon Insulated
194°F (90°C)

QuickQuote

(Call for CSA Data)

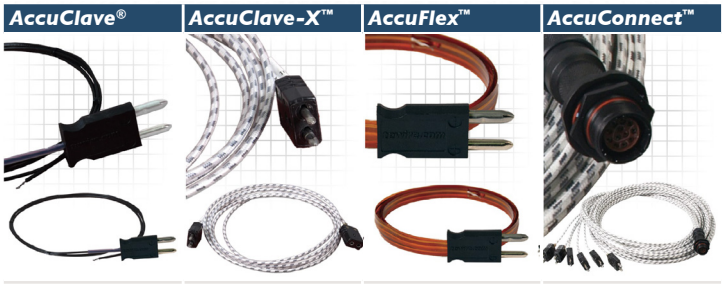
Wire Size	Numbers of Pairs	Outer Jacket Thickness inches	(MM)	Outer Diameter inches	(MM)	Bend Radius inches	(MM)	Pull Tension LB	KG	Net Weight LB/MF	KG/KM
12 AWG	2	.047	(1.19)	.374	(9.5)	2.2	(57)	137	(62)	97	(144)
(2.44MM)	3	.047	(1.19)	.394	(10.0)	2.4	(60)	189	(86)	126	(187)
7-Strand	5	.047	(1.19)	.466	(11.8)	2.8	(71)	293	(133)	184	(274)
	7	.047	(1.19)	.506	(12.9)	3.0	(77)	397	(180)	241	(359)
	9	.064	(1.63)	.622	(15.8)	3.7	(95)	501	(228)	320	(476)
	12	.064	(1.63)	.692	(17.6)	4.2	(105)	657	(299)	409	(609)
	19	.064	(1.63)	.804	(20.4)	4.8	(123)	1031	(464)	607	(903)
	25	.085	(2.15)	.978	(24.8)	5.9	(149)	1333	(606)	819	(1219)
	37	.085	(2.15)	1.110	(28.2)	6.7	(169)	1957	(890)	1155	(1719)
14 AWG	2	.047	(1.19)	.336	(8.5)	2.0	(51)	86	(39)	71	(106)
(1.80MM)	3	.047	(1.19)	.353	(9.0)	2.1	(54)	119	(54)	90	(134)
7-Strand	5	.047	(1.19)	.415	(10.5)	2.5	(63)	185	(84)	130	(193)
	7	.047	(1.19)	.449	(11.4)	2.7	(68)	251	(114)	168	(250)
	9	.064	(1.63)	.553	(14.0)	3.3	(84)	317	(144)	227	(338)
	12	.064	(1.63)	.613	(15.6)	3.7	(93)	416	(189)	285	(424)
	19	.064	(1.63)	.709	(18.0)	4.3	(108)	647	(294)	420	(625)
	25	.064	(1.63)	.822	(20.9)	4.9	(125)	845	(384)	537	(799)
	37	.085	(2.15)	.977	(24.8)	5.9	(149)	1241	(564)	797	(1186)
16 AWG	2	.047	(1.19)	.308	(7.8)	1.8	(47)	54	(25)	54	(80)
(1.47MM)	3	.047	(1.19)	.323	(8.2)	1.9	(49)	74	(34)	68	(101)
7-Strand	5	.047	(1.19)	.377	(9.6)	2.3	(57)	116	(53)	97	(144)
	7	.047	(1.19)	.407	(10.3)	2.4	(62)	157	(71)	124	(185)
	9	.047	(1.19)	.468	(11.9)	2.8	(71)	198	(90)	157	(234)
	12	.064	(1.63)	.555	(14.1)	3.3	(85)	259	(118)	210	(313)
	19	.064	(1.63)	.639	(16.2)	3.8	(97)	403	(183)	310	(461)
	25	.064	(1.63)	.738	(18.7)	4.4	(112)	526	(239)	389	(579)
	37	.085	(2.15)	.879	(22.3)	5.3	(134)	772	(351)	578	(860)
18 AWG	2	.047	(1.19)	.284	(7.2)	1.7	(43)	34	(15)	40	(60)
(1.2MM)	3	.047	(1.19)	.297	(7.5)	1.8	(45)	47	(21)	48	(71)
7-Strand	5	.047	(1.19)	.345	(8.8)	2.1	(53)	73	(33)	72	(107)
	7	.047	(1.19)	.371	(10.3)	2.2	(56)	99	(45)	91	(135)
	9	.047	(1.19)	.425	(10.8)	2.6	(65)	125	(57)	109	(162)
	12	.047	(1.19)	.471	(12.0)	2.8	(71)	164	(75)	138	(208)
	19	.064	(1.63)	.579	(14.7)	3.5	(88)	255	(116)	220	(327)
	25	.064	(1.63)	.666	(16.9)	4.0	(101)	333	(151)	279	(415)
	37	.064	(1.63)	.753	(19.1)	4.5	(115)	489	(222)	382	(568)

The products referenced above represent the most popular constructions. Other constructions can be manufactured to meet individual specification and application requirements. Contact factory for additional information.

Electrical Characteristics
Insulation passes 6000 V ac spark test per UL Subject 1277.
Completed cable passes a dielectric test of 3000 V dc for
60 seconds, conductor to conductor and conductor to shield, per UL Subject 1277.

Composites Curing System Resources

How to Reduce Aerospace Autoclave Applications Setup Time by 90%



ATK Aerospace Structures based in Clearfield, Utah produces carbon fiber/epoxy stringers and frames for an aircraft application that demands high-rate production. Preparing these critical parts for the autoclave had proven to be a major production cycle challenge for them. After the implementation and testing of the AccuConnect autoclave extension cables, the autoclave thermocouple assemblies were tested and proven to reduce production cycle time by 2.5 hours. Read More.

How to Improve Aviation / Aerospace Composite Curing Quality (Video)

Click on the video to learn how our AccuClave system of thermocouple wire and cable products can help aviation and aerospace composites manufacturers improve their autoclave cures. View Video.

Dr TC's Cure for Autoclave Thermocouple Reversed Polarity

It's the ugly stuff bad dreams are made of: You load up your parts in the autoclave or curing oven and then plug the thermocouple wires into the jack panel. Everything looks good and the door closes. Oh no! Not again! As the temperature starts to rise, the software detects a thermocouple anomaly. One TC is not tracking the temperature profile. In fact, the reading becomes significantly 'bad' as the temperature climbs. Read More.

Learn More:

- Dr TC's Cure for Erratic Temperature Reading in Autoclave Composites Manufacturing
- Four Ways to Meet Increased Demands on Aerospace Autoclave Applications
- NADCAP Audit of Composite Autoclave Manufacturing made Easy (Yeah, right!)
- NADCAP Group define AMS2750E Adjunct Spec for Aerospace Composites
- It PAYS to keep TRAC of your aerospace composites thermocouples!
- Autoclave Thermocouples, Airline Safety and Pilot Speeches

FREE AccuClave Line Card

FREE AccuClave White Paper

FREE AccuClave Sample

AccuClave® Series

Autoclave Thermocouple System

QuickQuote

NEW! Easy & convenient online traceability - calibration & manufacturing information

Product Features

Temperatures up to 260°C/500°F

- Save labor and time during autoclave lay-up, and load and unload cycles
- Leakproof **AccuClave® Thermocouple Assemblies** (patent pending) are inexpensive and can be easily replaced after one or more uses
- Rugged **AccuClave®-X Extension Cables** bridge the long runs between thermocouples and instrumentation or jack panels. They remain in place in the autoclave, and can be used time and time again
- Savings on replacing long length thermocouples pays back the cost of the AccuClave®-X Extension Cables in only a few curing cycles
- Ready to use, matched AccuClave® and AccuClave®-X assemblies assure accuracy, performance and reliability for higher autoclave yields
- AccuClave® thermocouple wire is calibrated every 3000 feet (914 meters)
- Every AccuClave® thermocouple can now be conveniently traced to its calibration data and manufacturing information. Simply log on to ***www.tewire.com*** and click TRAC. See complete information on the back of this page.

AccuClave®
Thermocouple Assembly

AccuClave®-X
Extension Cable

Applications

- Autoclaves
- Composites

Available Options

- J or K calibration, Class 1 Special Limits
- Custom constructions available

Product Specifications

AccuClave®

- Standard length 3 feet (0.9 meters)
- Standard construction is flame retardant extruded FEP (+200°C/+400°F continuous). Also available in PFA (+260°C/+500°F continuous)
- Conforms to ASTM E230, IEC 584, ANSI MC96.1 and BAC 5621
- Traceability code (TRAC) permanently laser etched on connector

AccuClave®-X

- Available in standard lengths of 10, 20 & 30 feet (3.0, 6.1 & 9.1 meters)
- Rugged construction of stranded wire (for flexibility), braided fiberglass jacket, and clear fluoropolymer PFA outer jacket
- Available configurations - male to female, male to male, female to female
- Conforms to ASTM E230, IEC 584, ANSI MC 96.1 and BAC 5621
- Traceability code (TRAC) permanently laser etched on connector

Autoclave Thermocouple System

QuickQuote

NEW! Easy & convenient online traceability - calibration and manufacturing information

AccuClave® Series Standard Products

AccuClave® Jacket	Gauge	Calibration	Standard Lengths
FEP (TE/D) *or* PFA (HTE/D)	24 AWG	J & K Class 1/Special limits	0.9 m (3 feet), 4.6 m (15 feet), 9.1 m (30feet)
FEP (TE/D) *or* PFA (HTE/D)	28 AWG	J & K Class 1/Special limits	0.9 m (3 feet), 4.6 m (15 feet), 9.1 m (30feet)

AccuClave®-X Extension Cable products are available in lengths of 10, 20 and 30 feet. Standard products lists are available from TE Wire & Cable, your TE Wire & Cable representative, or check our web site ***www.tewire.com***. Many AccuClave® standard products are available for immediate shipment from stock.

About TE Wire & Cable's AccuClave® and AccuClave®-X System

TE Wire & Cable's AccuClave® Series performance matched thermocouple system is designed to save you time and money, and at the same time provide accuracy, dependability, reliability, compliance and traceability. AccuClave® Series products are used extensively in autoclaves for the aircraft composite industry and in critical applications where all these factors are essential. They are available in J or K Class 1/Special Limits. BAC 5621 compliant.

The AccuClave® Series provides a major advantage when used in autoclaves and other applications where long thermocouple runs and multiple thermocouples are required. The rugged AccuClave®-X Extension Cable spans the wire runs between instrumentation systems and AccuClave® thermocouples. When required the short, inexpensive AccuClave® thermocouple can simply be unplugged and replaced with a new AccuClave® thermocouple - no need to replace the AccuClave®-X Extension Cable. In doing so you spend less time, less in materials, and have less down time.

TE Wire & Cable's calibration laboratory is ISO/IEC 17025:2005 accredited by A2LA.

The AccuClave® thermocouple assembly is patent pending.

Introducing TRAC - Traceable Records of AccuClave Calibration - an exclusive TE Wire & Cable feature

Now all AccuClave® and AccuClave®-X products have a traceability code permanently laser etched on their connectors. To retrieve information regarding a specific product, log on to ***www.tewire.com*** and click on TRAC, located on page headers. Enter the 8-character TRAC code appearing on your connector. Correction factor calibration data will appear for each temperature for which the wire was calibrated. In addition you will be able to determine the part number, product description, calibration date, production date, and the TE Wire & Cable manufacturing work order code.

AccuClave® Technical Information

Initial calibration tolerances per ANSI MC96.1/ASTM E230

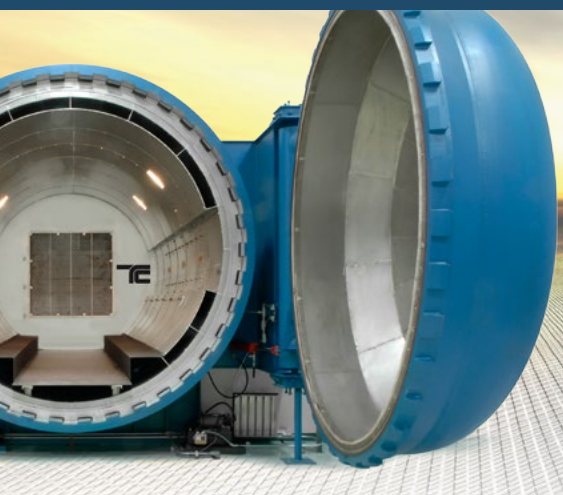
TC Wire	Grade Designation	Grade Limits*
J	JJ (Class 1)	± 1.1°C(2.0°F) or ± 0.4%
K	KK (Class 1)	± 1.1°C(2.0°F) or ± 0.4%

*whichever is greater

Nominal Wire Dimensions

Conductor Size		Insulation		Outer Diameter	
AWG	MM	inches	MM	inches	MM
24	0.51	.010	.25	.040 x .080	1.0 x 2.0
28	0.32	.010	.25	.032 x .066	.81 x 1.7

TE Wire & Cable is an ISO 9001:2008 Certified company. Many TE Wire & Cable products are certified to conform to national and international standards including - ANSI MC96.1; ASTM E230; Boeing BAC5621; GE ST2155; AMS 2750D; NIST; MIL STD 45662A; MIL STD 105, IEC-584 & many others. TE Wire & Cable's calibration laboratory is ISO/IEC 17025:2005 accredited by A2LA. AccuClave® is a registered trade mark of TE Wire & Cable.
Note: Minimum order quantities may apply to custom orders.



AccuConnect™

Multi-circuit extension cable harnesses for Autoclave Thermocouple Systems reduces setup time

AccuConnect™ Assemblies are innovative, multi-circuit thermocouple extension cable harnesses that you use to improve cable connectivity in autoclave applications. AccuConnect can be supplied as 6, 12 or 24 cables terminated with a multi-pin connector on one end with free-floating, independent male or female connections at the opposite end. The AccuConnect design provides assured accuracy and long term use.

Product Benefits

- Ready to use cable harness assemblies reduce setup time / downtime by up to 90%!
- *TRAC* System provides the easiest traceability in the industry! (View demo)
- Available in both type J and type K thermocouple cable assemblies.

Applications

- Thermocouple cable connections can be made on composite parts typically using tool thermocouples or lead/lag thermocouples while they are prepared for the autoclave process. Once the parts are placed into the autoclave, the corresponding AccuConnect cable harness can be quickly connected to its part thermocouple significantly reducing setup time. (Learn more in this case study found in *High-Performance Composites*, March 2012.)

QuickQuote

AccuConnect™

Multi-circuit extension cable harnesses for Autoclave Thermocouple Systems reduces setup time

Specifications

- **Temperature:** Insulation and connectors rated for surveys for up to 200°C.
- **Tolerance:** ±2°F (1.1°C) for up to 200°C (400°F).
- **Available in:** Type: J or type K thermocouple cable assemblies.
- **BAC 5621 compliant** and ease of traceability for NADCAP audits.
- **Jacket:** Extruded FEP, optional PFA.
- **Two ends:** One has 6, 12 or 24 cables terminated with a multi-pin connector; the other free floating cable end has independent male or female plugs.
- **Pins and plugs:** Individually numbered for circuit identification.
- **Cable length:** Specified by customers.

Advantages/Performances

TE Wire and Cable assures the following performance characteristics when AccuConnect assemblies are used following AccuConnect Handling Guidelines.
WE STAND BY OUR PRODUCTS!

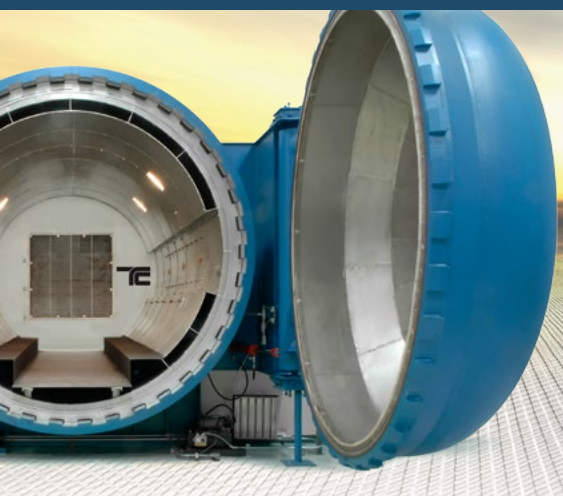
- Survey cycles: 100 cycles (or more) based on proper handling between cycles.
- Calibration: Maintain Type J and K special limit tolerance.
- Mechanical: The cable and connectors maintains adequate mechanical integrity.
- Connector break force: Typical value of 20 lb (9 kg) to pull an individual wire from the connector.

Time/Cost Saving Examples

Case Study: Thermocouple innovation shortens autoclave setup for stringers/frames. ATK Aerospace Structures (Clearfield, Utah) trials a thermocouple system from TE Wire & Cable LLC (Saddle Brook, N.J.) called AccuConnect, which cuts thermocouple setup time from 2.5 hours to 20 minutes.
Learn More.

Whitepaper: How can you save $3,000/month per autoclave?
Download Whitepaper.

QuickQuote



AccuFlex™

Low profile, flat Thermocouple Cable Assemblies help make composite field repairs easy

AccuFlex™ Assemblies are innovative, low-profile, flat thermocouple cable assemblies. As a recent addition to the AccuClave® autoclave pre-assembled thermocouple series, the design was inspired by the need for very small cross-section thermocouple wire required for the field repair of composites, such as repairing damaged aircraft flight surfaces.

Product Benefits

- Low profile makes creating a seal between vacuum bag and instrumentation quick and easy.
- Minimal mark-off – 4× thinner than equivalent 28 gauge round cable.
- Ready to use assemblies save setup time, reduce downtime.
- *TRAC* System provides the easiest traceability in the industry! (View demo)

Applications

- Field repair of damaged composites assemblies (aerospace, aircraft, automotive).
- Autoclave applications requiring a quick and easy seal between vacuum bag and instrumentation.
- Applications where thermocouple measurements require fitting through narrow spaces and openings yet require the low resistance advantage of larger gauge wire.

QuickQuote

AccuFlex™

Low profile, flat Thermocouple Cable Assemblies help make composite field repairs easy

Specifications

- **Temperature:** Up to 500°F (260°C).
- **Available in:** Type J or type K thermocouple cable assemblies.
- **BAC 5621 compliant.**
- **Gauge:** Flat thermocouple wire, equivalent to 28-gauge, laminated between layers of rugged polyimide tape. The thickest point is less than 0.012 inch, which is four times thinner than a 28 gauge round wire thermocouple wire.
- **Grade:** Special limits.
- **Two ends:** One end is terminated with an injection molded ASTM standard pin configuration thermocouple connector; the other end is a welded thermocouple junction.
- **Cable length:** Specified by customers.

Advantages/ Performances

The thermocouple is commonly trimmed with the junction left in place after repair. Traditionally, such repairs used very small diameter wires—as low as 36 gauge—so that the blemish remaining after trimming was minimal and nearly unnoticeable. The small gauge wire is fragile, expensive, difficult to handle and has very high resistance. High resistance has the potential of compromising the accuracy of temperature measurement.

AccuFlex is made with flat wire of a cross-section nearly equivalent to a 28 gauge wire, yet has the same height of a 36 gauge wire (0.005˝) and a resistance 6 times less than 36 gauge standard thermocouple wire. After trimming, the AccuFlex leaves a nearly imperceptible mark-off impression.

QuickQuote

QuickQuote

Tinned Copper Overbraid 400F (200C)
Stainless Steel Overbraid 1400F (760C)

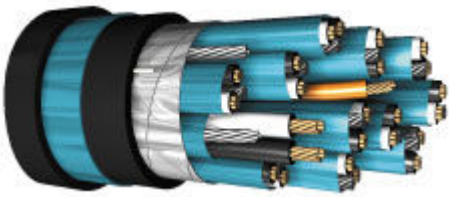
- Round wire braid
- Type 304 stainless steel is standard
- 85% nominal coverage
- Resists abrasion and mechanical damage
- Provides superior tensile strength
- Protects against longitudinal stress in vertical installations
- Color tracer identification available
- Other materials available upon request
- Available on constructions up to 1.000" (25.4MM) diameter

Spiral Armor

- Half-oval galvanized steel
- 90% nominal coverage
- Better resistance to piercing than round wire armor
- Superior crush resistance
- Excellent in applications where wire experiences transverse stress
- Available on constructions up to .300" (7.6MM) diameter

Aluminum Composite Tape Armor

- Nominal .012" (.30MM) continuously bonded aluminum composite tape
- Together with outer jacket, resists acids, alkalis, oil, moisture, weather and mechanical abrasion
- Positive moisture barrier
- Excellent mechanical protection
- Increased chemical and corrosionresistance
- Available on constructions from .200" (5.08MM) to 1.500" (38.1MM) diameter



GAS-BLOCK™
ATEX Cable

QuickQuote

Contact Us

What are Gas-Block™ ATEX cables?

Gas-Block™ cables are designed for use in Industrial OEM application supporting your needs for EU directive 94/9/EC (ATEX 95) (commonly referred to as ATEX "ATmosphères EXplosibles"). Learn more: Five Reasons to Use Gas-Block Cables in Power Generation Applications.

Who is TE Wire & Cable?

For over 70 years, TE Wire & Cable has been providing a wide selection of high quality specialty, industrial thermocouple and instrumentation cable solutions that are designed for critical applications in:

- Power Generation
- Petrochemical Plants
- Oil and Gas
- Industrial Plants

TE Wire & Cable has launched the Gas-Block product line to be the cost effective, time saving cabling solution as a part of a full ATEX system. To date, Gas-Block has been installed in a wide range of ATEX applications and proven in the lab and in field installations.

Is Gas-Block™ ATEX Cable for your application and how does it differ?

To prevent the transfer of hazardous gases or liquids through conductor strands, cable interstices, and associated cable glands, IEC 60079-14 specifies that cables interstitial spaces be filled with non-hygroscopic fillers. TE Wire & Cable has developed a technology and process (patent pending) to build various configurations of cables that meet these stringent requirements for critical ATEX application in oil and gas, power generation and other industrial plant installations. A flexible inert synthetic compound is used to fill the entire cable interstitial spaces.

Independent third party testing has shown full compliance to IEC and UL requirements with cable meeting leak testing per IEC 60079-14 (435 psi test). TE Wire & Cable Gas-Block ATEX Cables built per requirement of IEC 60079-14 shall be tested for oil leakage under a hydraulic pressure of 3000 kPa (435 psi). The cable meets the requirements if no visible oil leakage is detected after 10 seconds of exposure to the hydraulic pressure. The device used to apply hydraulic pressure shall be capable of maintaining the specified pressure during the duration of the test.

QuickQuote

GAS-BLOCK™
ATEX Cable

QuickQuote

Contact Us

One major benefit of Gas-Block technology is the elimination of compound sealed barrier cable glands. Gas-Block cable becomes a single time saving solution when used with flame proof cable gland with an elastomeric sealing ring. We challenge you to try our cable and see how it saves you time during your next installation.

In Accordance with Directive 2006/95/EC – The Low Voltage Directive – all type of cables manufactured with Gas-Block technology by TE Wire & Cable conform to the applicable requirements of the following documents:

Ref No.

- IEC 60079-14 (435 psi test)
- IEC 60332-1
- EN 60204-1 (voltage test)
- IEC 61034
- UL 1277 type TC-ER (exception 6 AWG and 8 AWG)
- EU Directive 2011/65/EC
- REACH

Product Specifications

Conductors:	Solid or stranded, bare or plated copper 6 AWG to 18 AWG (4.11 to 1.2MM)
Insulation and Jacket:	Temperature rating up to 200°C (392°F)
Color Code:	Per customer request (standard color is Black and numbered on singles with Black Jacket)
Construction:	Gas blocking properties as applicable to your operating conditions
Outer Protection Option:	Braided stainless steel

Given the wide range of ATEX demands and environments, every requirement is different. Our team will be happy to evaluate your needs to find a solution. Contact one of our friendly, knowledgeable sales professionals today.

QuickQuote

ACCUTHERM™ High Accuracy Thermocouple Wire

QuickQuote

Business and industry are spending considerable time and money improving the efficiency of their manufacturing processes. Reducing scrap, increasing through-put, and improving product quality are today's benchmarks for success. Temperature is the most frequently measured process variable. To be competitive, industry needs to control and monitor process temperatures
to the highest degree of accuracy. In response to this need, TE Wire & Cable has developed ACCUTHERM™, a super accurate thermocouple wire which surpasses the performance of ASTM/ANSI special limits initial accuracy tolerance.
The accuracy of thermocouple wire is expressed as deviation from the published NIST voltage versus temperature relationship
for each type of wire. This chart shows the accuracy advantage of ACCUTHERM™ thermocouple wire over the initial calibration
tolerances for standard limits and special limits.

Initial Calibration Tolerances per ASTM E230 and ANSI MC96.1

Thermocouple Type	Standard Limits Tolerance*	Special Limits Tolerance*	ACCUTHERM™ Tolerance* **
T	±1.8F (1C) or ±0.75%	±0.9F (0.5C) or ±0.4%	±0.5F (0.3C) or ±0.2%
J	±4F (2.2C) or ±0.75%	±2F (1.1C) or ±0.4%	±1F (0.5C) or ±0.2%
E	±3.1F (1.7C) or ±0.5%	±1.8F (1C) or ±0.4%	±0.9F (0.5C) or ±0.2%
K	±4F (2.2C) or ±0.75%	±2F (1.1C) or ±0.4%	±1F (0.5C) or ±0.2%
N	±4F (2.2C) or ±0.75%	±2F (1.1C) or ±0.4%	±1F (0.5C) or ±0.2%

* whichever is greater
** at customer selected temperature points

The initial calibration tolerance for ACCUTHERM™ is approximately four times that of standard limits thermocouple wire and double that of special limits thermocouple wire. It is available with any of TE Wire & Cable's standard insulations.

Whether your process is Heat Treating or Autoclave Validation; Performance Testing or Research and Development; Aerospace
or Metals, ACCUTHERM™ will give you the temperature accuracy readings you need to remain competitive. When high accuracy temperature measurements are critical to your process, ACCUTHERM™ is the answer.

Stabilized Type K Reduced Drift Thermocouple Wire

QuickQuote

THE PROBLEM
Type K* thermocouples are known to yield accurate temperature measurements in the 1,000F (538C) range for short duration
exposures. However, after extended exposure in the 650F (343C) to 1100F (593C) range, Type K material may exhibit a positive drift in readings of up to 6F (3C) at 1,000F (538C) and as much as 9F (5C) at 2,000F (1093C). This drifting could prove disastrous in applications such as heat treating where temperatures must be increased gradually and sustained in the drifting range for as little as one hour.

The change in thermoelectric properties is generally attributed to "atomic ordering". When the Type K thermocouple is used in the drifting range, some of the atoms of the positive thermoelement rearrange themselves from a random state into an ordered state. This atomic rearrangement changes the EMF output of the conductor. Type K EMF drift causes the temperature
reading to appear higher than it actually is. Any error caused by non-stabilized Type K drift is in addition to the initial calibration tolerance deviation of the Type K material. For example, a heat treat operation running at 2,000F (1093C) using non-stabilized standard limits Type K material could experience an initial tolerance calibration deviation up to 15F (9C) PLUS another 9F (5C) drift error, meaning that the process could actually be running 24F (14C) lower than the thermocouple
EMF output shows. This equates to an error of greater than 1%.

THE SOLUTION
TE Wire & Cable offers STABILIZED Type K wire constructions. STABILIZED Type K was developed by TE Wire & Cable through years of experience, and testing. All STABILIZED Type K constructions are engineered around wire that has been manufactured using proprietary processes which essentially "lock in" the high temperature calibration.
This is a characteristic which is not addressed by non-stabilized Type K thermocouple wire. The proprietary process involves
many procedures and not just a heat treatment of the conductors. Heat treatment alone does not stabilize the wire.

When long term temperature control accuracy is required or if Type K drift is a problem, STABILIZED Type K from TE Wire & Cable is the answer.

* Type E thermocouples are similarly affected. Stabilized E constructions are also available.

QuickQuote

Industry	Products	Industrial Applications
Aerospace and Composites	Autoclave Thermocouples, G, K, PFA, TE/D, TEX, TF	• Control composite temperatures during cure. • Quality verification of autoclave curing temperatures during bonding applications of aircraft components. • Structural parts temperature monitoring during heat treating. • Environmental chamber monitoring. • Engine parts temperature monitoring during heat treating.
Aluminum	CEFIR®, G, HG, Q, Accutherm™	• Thermocouples for homogenizing furnaces to preheat billets. • Coils stress relieving / aging temperature measurement. • Extrusions stress relieving temperature measurement. • Multipoint furnace surveys when temperature certification is needed for quality control. • Temperature measurement when melting or pouring.
Appliance	G, PVC Ripcord	• Control thermocouple • Research and testing of production units
Component Heat Testing	CEFIR®,HG, Q, Accutherm™	• Heat treating various metal parts from 1000°F (593°C) to 2200°F (1204°C)
Field Heat Treating	CEFIR®,G, HG, Q, TEX, Stabilized K, Accutherm™	• Used where parts are to be replaced repaired or modified in the field and require preheating prior to welding and stress relieving after welding. • For recording temperatures to maintain QC records.
Food and Pharmaceutical	K, PFA, TE/D, TEX, TF	• Equipment sterilization and validation • Measure process temperatures
Forgings	Cefir™, G, HG, Q	• Preheating temperature measurement prior to forging. • Stress relieving temperature measurement after forging.
Glass, Ceramics, Clay Tiles, Bricks	B, CEFIR®, G, K, Q, TEX, TF	• Brick and tile curing in long kilns. • Traveling thermocouples to survey kiln temperatures. Glass/fiberglass manufacturing plants High temperature areas. Note: Insulation can be any one or a combination of those listed to meet the individual requirements.
Heat Treating	CEFIR®,, G, HG, Q, Stabilized K, Accutherm™	• Quality control temperature measurements. • Indicate temperatures for – annealing – aging – hardening surfaces of fabricated parts.
Metal Qualification	CEFIR®,, G, HG, Q, Accutherm™	• High temperature creep and rupture testing
New Plant Construction	Cables, KXSubstitute™	• Instrument and control signals. • Process temperature measurements.
OEMs	All Products and special designs	• Measure equipment temperature. • Interconnect sensors and controls.

QuickQuote

Industry	Products	Industrial Applications
Petroleum	K, PFA, PVC, TEX, Cables	• Resistant to most chemicals found in refineries and chemical processing plants where higher than ambient temperatures are encountered due to processing proximity. • Transmission of sensor signals.
Research and Development	Accutherm™	• Use with all available insulations. • Measure temperatures in process pilot plants. • High-tech research.
Sensor Manufacturing	All products	• Lead wire. • Thermocouple junction.
Steel	CEFIR®, G, HG, Q	• Multipoint furnace temperature surveys. • Quality control temperature certification.
Transportation	B, G, K, PVC, TEX, TF	• Testing brakes engines cooling systems etc.. • Interconnection wire on gas turbines. • Production unit testing.
Utilities Power Generation	CEFIR®, HG, K, PFA, Q, TEX, TZ, Cables	• Temperature monitoring in high temperature areas. • Startup performance verification. • Control panel applications (TZ offers good electrical properties • small size and durability). • Transmission of various sensor signals.

QuickQuote

TE Wire & Cable has an extensive inventory of bare thermocouple wire. Conductors are selected and matched to meet customer specific accuracy requirements. Calibration certificates are available.

Bare Thermocouple Wire Feet/Pound

	Diameter	Stranding	Type J		Type K		Type T		Type E		Type N	
AWG	inches	N x OD inches	JP	JN	KP	KN	TP	TN	EP	EN	NP	NN
12	.081	1 x .081	56	51	51	52	50	51	51	51	53	51
	.096	7 x .032	50	45	46	46	45	45	46	45	47	46
14	.064	1 x .064	90	81	82	83	81	81	82	81	84	83
	.076	7 x .0253	80	72	73	74	71	72	73	72	75	73
16	.051	1 x .051	142	128	129	131	127	128	129	128	133	130
	.060	7 x .0201	130	114	116	118	114	114	116	114	118	116
18	.040	1 x .040	231	207	211	213	207	207	211	207	216	211
	.048	7 x .0159	204	182	185	187	181	182	185	182	190	185
	.050	19 x .010	189	170	172	175	169	170	172	170	176	173
20	.032	1 x .032	362	325	329	333	323	325	329	325	337	330
	.038	7 x .0126	330	289	295	301	289	289	295	289	301	295
22	.0253	1 x .0253	593	532	539	546	529	532	539	532	552	541
	.030	7 x .010	513	463	478	485	457	463	478	463	478	463
24	.0201	1 x .0201	926	831	842	853	826	831	842	831	862	845
	.024	7 x .008	800	712	730	741	714	712	730	712	746	730
26	.0159	1 x .0159	1465	1314	1332	1350	1307	1314	1332	1314	1364	1336
28	.0126	1 x .0126	2333	2093	2121	2150	2081	2093	2121	2093	2172	2128
30	.010	1 x .010	3704	3322	3367	3413	3304	3322	3367	3322	3448	3378
32	.008	1 x .008	5787	5191	5261	5333	5162	5191	5261	5191	5388	5279
34	.0063	1 x .0063	9332	8371	8483	8599	8324	8371	8483	8371	8688	8512
36	005	1 x .005	14815	13289	13468	13652	13214	13289	13468	13289	13793	13514

Bare Thermocouple Wire Meters/Kilograms

Area	Diameter	Stranding	Type J		Type K		Type T		Type E		Type N	
MM^2	MM	N x OD MM	JP	JN	KP	KN	TP	TN	EP	EN	NP	NN
4.0	2.26	1 x 2.26	31	28	29	29	28	28	29	28	29	29
	2.55	7 x .850	31	28	28	28	27	28	28	28	29	28
2.5	1.78	1 x 1.78	51	46	46	47	45	46	46	46	47	46
	2.01	7 x .670	49	44	44	45	44	44	44	44	45	45
1.5	1.38	1 x 1.38	85	77	78	79	76	77	78	77	79	78
	1.57	7 x .520	81	73	74	75	73	73	74	73	76	74
1.0	1.13	1 x 1.13	123	110	112	113	110	110	112	110	115	113
	1.30	7 x .430	121	108	110	111	108	108	110	108	113	111
.75	1.00	1 x 1.00	165	147	149	151	146	147	149	147	152	149
	1.11	7 x .370	162	145	147	149	145	145	147	145	151	148
.50	.800	1 x .800	243	218	221	224	217	218	221	218	226	222
	.900	7 x .300	248	223	226	229	221	223	226	223	231	226
.25	.560	1 x .560	514	461	468	474	459	461	468	461	479	469
.10	.360	1 x .360	1270	1139	1154	1170	1133	1139	1154	1139	1182	1158

Bare Wire Metric Conversion Chart

QuickQuote

AWG Size	MM²*	Stranding N x OD inches	(MM)	Diameter inches	(MM)
10	5.3	1 x .102	(2.59)	.102	(2.59)
		7 x .0385	(.978)	.116	(2.95)
	4.0	1 x .089	(2.26)	.089	(2.26)
		7 x .0335	(.850)	.100	(2.55)
12	3.32	1 x .081	(2.05)	.081	(2.05)
		7 x .032	(.813)	.096	(2.44)
	2.5	1 x .070	(1.78)	.070	(1.78)
		7 x .0266	(.670)	.080	(2.01)
14	2.07	1 x .064	(1.63)	.064	(1.63)
		7 x .0253	(.635)	.076	(1.93)
	1.5	1 x .054	(1.38)	.054	(1.38)
		7 x .0206	(.520)	.063	(1.57)
16	1.32	1 x .051	(1.29)	.051	(1.29)
		7 x .0201	(.511)	.060	(1.53)
	1.0	1 x .045	(1.13)	.045	(1.13)
		7 x .0169	(.430)	.051	(1.30)
18	.812	1 x .040	(1.02)	.040	(1.02)
		7 x .0159	(.406)	.048	(1.22)
		19 x .010	(.254)	.050	(1.27)
	.75	1 x .039	(1.00)	.039	(1.00)
		7 x .0146	(.370)	.044	(1.11)
20	.52	1 x .032	(.813)	.032	(.813)
		7 x .0126	(.320)	.038	(.970)
	.50	1 x .0315	(.800)	.0315	(.800)
		7 x .0118	(.300)	.035	(.900)
22	.325	1 x .025	(.635)	.0253	(.635)
		7 x .010	(.254)	.030	(.790)
24	.205	1 x .020	(.511)	.0201	(.511)
		7 x .008	(.203)	.024	(.610)
26	.128	1 x .0159	(.406)	.0159	(.406)
28	.080	1 x .0126	(.320)	.0126	(.320)
30	.051	1 x .010	(.254)	.010	(.254)
32	.032	1 x .008	(.203)	.008	(.203)
34	.020	1 x .0063	(.160)	.0063	(.160)
36	.013	1 x .005	(.127)	.005	(.127)

QuickQuote

TE Wire & Cable offers extensive calibration services to assure that our customers' critical accuracy requirements are met. All calibrations are performed in our in-house laboratory, which is directly traceable to NIST (National Institute for Standards and Technology). All thermocouple wire in carefully calibrated, selected and matched to meet or exceed ASTM and ANSI initial calibration tolerance requirements (see below).

Calibration temperature capabilities are cryogenic –320°F (-196°C) and at any point from a low temperature of -110F (-79C) thru an upper temperature of 2400°F (1316°C). For specific point calibrations, special metal freeze point temperatures can be supplied: water triple point 32.018°F (.01°C), tin 449.47°F (231.93°C), lead 621.43°F (327.46°C), aluminum 1220.58°F (660.32°C), silver 1763.20°F (961.78°C), copper 1984.32°F (1084.62°C). Certified calibration test reports are available showing temperature deviations, correction factors or actual temperature readings.

Calibration reference standards, directly traceable to NIST, include base metal, Type S platinum, Type B platinum, 25 OHM platinum resistance thermometer and freeze point cells.

TE Wire & Cable 's calibration laboratory is ISO 9002 certified, and conforms to the requirements of MIL STD-45662A, ANSI/NCSL Z540, AMS 2750, ASTM E220, ASTM E207, ISO/IEC Guide 25

Products can be supplied to meet ASTM E230, ANSI MC 96.1, BAC 5621, ST 2155 and other customer special accuracy requirements.

In addition to wire,TE Wire & Cable offers calibration of thermocouples, sensors and RTD's.

Table 1

Initial Calibration Tolerances Per ASTM E230 and ANSI MC96.1

	Tolerance-Reference Junction 32F (0C)				
Thermocouple Type	**Temperature Range F (C)**	**Grade Designation**	**Standard Grade Limits F (C) whichever is greater**	**Grade Designation**	**Special Grade Limits F (C) whichever is greater**
Thermocouple Wire					
T	32 (0) to 700 (370)	T	±1.8 (1) or ±0.75%	TT	±0.9 (0.5) or 0.4%
J	32 (0) to 1400 (760)	J	±4 (2.2) or ±0.75%	JJ	±2 (1.1) or 0.4%
E	32 (0) to 1600 (870)	E	±3.1 (1.7) or ±0.50%	EE	±1.8 (1) or 0.4%
K or N	32 (0) to 2300 (1260)	K or N	±4 (2.2) or ±0.75%	KK or NN	±2 (1.1) or 0.4%
T*	-328 (-200) to 32 (0)	T	±1.8 (1) or ±1.5%	TT	±0.9 (0.5) or 0.8%
E*	-328 (-200) to 32 (0)	E	±3.1 (1.7) or ±1%	EE	**
K*	-328 (-200) to 32 (0)	K	±4 (2.2) or ±2%	KK	±1.8 (1) or 0.5%** **
Extension Wire					
TX	32 (0) to 212 (100)	TX	±1.8 (1)	TTX	
JX	32 (0) to 400 (200)	JX	±4 (2.2)	JJX	±0.9 (0.5)
EX	32 (0) to 400 (200)	EX	±3.1 (1.7)	EEX	±2 (1.1)
KX or NX	32 (0) to 400 (200)	KX or NX	±4 (2.2)	KKX or NNX	±1.8 (1) ±2 (1.1)
RX or SX	32 (0) to 400 (200)	RX or SX	±9 (5)		
BX	32 (0) to 212 (100)	BX***	±7.6 (4.2)		
BX	32 (0) to 400 (200)	BX ALLOY***	±6.7 (3.7)		

* Thermocouple material is normally supplied to meet tolerances above 0C (32F). If material is required to meet tolerances below 0C (32F), the purchase order must so state. Special selection of material is required.

** Suggested initial calibration tolerance. Requirements should be discussed between purchaser and supplier.

*** Copper vs. copper can be used as an extension for Type B thermocouples if the transition is below 100C (212F). Above 100C (212F), PCLW30-6 alloy should be used as the positive extension wire.

QuickQuote

TE Wire & Cable supplies products and services to meet a variety of industry and customer specifications. Many are listed below.

Abbreviations

AMS	Aerospace Material Specification
ANSI	American National Standard Institute
ASTM	American Society of Testing and Materials
BAC	Boeing Aircraft Corporation
CSA	Canadian Standards
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronic Engineers
ISO	International Standards Organization
MIL STD	Military Standard
NCSL	National Conference of Standard Laboratories
NEC	National Electrical Code
UL	Underwriters Laboratories

Specifications

AMS 2750	Pyrometry
ANSI MC96.1	Temperature Measurement Thermocouples
ANSI/NCSL Z540-1	Calibration Laboratories and Measuring and Test Equipment General Requirements
ASTM E207	Thermal EMF Test of Single Thermoelement Materials
ASTM E 220	Calibration of Thermocouples by Comparison Techniques
ASTM E 230	Standard Specification and EMF Tables for Standardized Thermocouples
BAC-5621	Temperature Control For Processing Materials
CSA-C22.2 No. 239	Control and Instrumentation Cable
IEC 584	Thermocouples
IEEE 383	Standard Test for Class 1E Cables for Nuclear Generation Stations
IS0 Guide 25	General Requirements for the Competence of Calibration and Testing Laboratories
ISO 9001-2000	ISO 9001-2000 Quality Management
MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-45662A	Calibration System Requirements
NEC Article 340	Power and Control Tray Cable
NEC Article 501	Class 1 Locations
NEC Article 725	Remote-Control, Signaling and Power-Limited Circuits
NEC Article 727	Instrumentation Tray Cable
UL 13	Power-Limited Circuit Cable
UL 62	Flexible Cord and Fixture Wire
UL 83	Thermoplastic-Insulated Wires and Cables
UL 1277	Electrical Power and Control Tray Cables
UL 1581	Reference Standard for Electrical Wires, Cables, and Flexible Cords
UL 2250	Instrumentation Tray Cable

QuickQuote

Control of "Noise" in Instrumentation Circuits

Precaution should be taken during design, engineering and installation to reduce the effects of noise. The type of signal transmitted by the sensor is related to its sensitivity to noise. The lower the voltage level and the higher the impedance of a circuit, the greater the circuits sensitivity to noise of all types. The following discussion describes the major types of "noise" and commonly accepted solutions for each.

Common Mode

A result of different ground potentials at each location in a process plant. Noise created by current flow between grounds. Occurs even with high common mode rejection when shields are improperly grounded. Is particularly critical with thermocouple extension wire circuits.

1. To protect against common mode noise pickup within the wire and cable, a shield circuit should be grounded at the point which the instrument circuit is grounded and isolated from all other grounds; i.e., with a grounded couple, ground the shield on the extension wire at the couple. As the shield circuit is carried back to the control room through a junction box and a multipair cable, connect the pair shield in the cable to the single pair which leads to the couple without grounding the shield in the junction box or connecting it to any other shield (on other pairs). The shield should not be grounded in the control room.

2. Ground all shields. An ungrounded shield will not provide noise protection.

3. Ground a shield at one point only.

Cross Talk

Occurs with ac instrument signals, especially pulse-type signals where more than one circuit is carried in the same cable. It is the tendency for a signal to be coupled from one pair to another within the cable, resulting in noise being superimposed on a circuit. Cross talk noise may be eliminated by the use of cables with individually shielded, isolated pair shields. The pair shield protects against noise picked up from adjacent pairs, as well as reducing noise radiated by the pair it surrounds

Static

Caused by the electric field radiated by a voltage source being coupled capacitively into the instrument circuit. The best way of fighting static noise is to place the circuit inside a total coverage shield which isolates the pair of wires from outside influence. The grounded shield intercepts static interference and carries it off to ground. The shield must be grounded in order to reduce static noise; an ungrounded shield will not reduce noise.

Magnetic

Produced by currents flowing through conductors and pieces of electrical equipment such as motors, generators, etc. As the current flows through equipment, a magnetic field is radiated around the conductor. As this field passes through the space between the conductors in a circuit, a current is set up in the circuit to oppose the magnetic field (transformer action). This current causes a noise to be superimposed on the signal in the instrument circuit. The best way of compensating for this type of noise is to twist the wires in the instrument circuit. Twisting causes the noise to be cancelled in adjacent sections of the wire. This is the least expensive, most effective way of combatting magnetic noise.

Environment vs. Relative Noise Levels

Environment	Relative Noise Level
Wiring located far from power lines, motors; motors less than 5 hp; no induction heating, arcs, control or power relays nearby: tank farms, material storage areas, light process plants, blending operations, fall into this classification.	Low
Instrument wire run near medium sized motors, control relays: the average process plant falls into this classification.	Medium
Electrolytic processes, large motors, generators, transformers, induction heating, relay controls, power lines or control wire nearby: heavy industry, metals, utilities, fall into this classification.	High

QuickQuote

Class of Wire	Single Pair Or Triad	Multipair/Multi Triad Cable
I	Twisted pair or triad, non-shielded	Overall shield, individual pairs or triads twisted but not shielded
II	Twisted pair or triad, shielded	Overall shield, individual pairs or triads twisted but not shielded
III	Twisted pair or triad, shielded	Overall shield, individual pairs or triads twisted and shielded

Process Instrumentation Wire and Cable Selection Guide

Signal Type	Sensor Type	Noise Sensitive To	Noise Environment Level	Wire Class
DC, low level <100 mV	Thermocouples	Static Magnetic Common Mode	Low Medium High	Class III Class III Class III
DC, low level <100 mV	Bridge circuits, thermistors, RTD's, chromatographic ph, magnetic flow meter	Static Magnetic Common Mode	Low Medium High	Class III Class III Class III
DC, medium level 100 mV-5V	Analog computer outputs	Static Magnetic	Low Medium High	Class II Class III Class III
DC high level 75 V	Retransmission potentiometers, annunciators alarms	Static Magnetic	Low Medium High	Class II Class II Class II
AC low level <1OO mV	Bridge circuits, "carrier" transducers	Static Magnetic Common Mode Cross Talk	Low Medium High	Class III Class III Class III
AC medium level 1000 mV-5V	Turbine flow meters, tachometers	Static Magnetic Cross Talk	Low Medium High	Class III Class III Class III
AC high level 75 V	Annunciator pick-up circuits	Static Magnetic Cross Talk	Low Medium High	Class III Class III Class III
Current Systems 1-5 mA 4-20 mA 10-50 mA	Force balance. P/I transducers, differential pressure flow meters	Magnetic	Low Medium High	Class I Class II Class III

QuickQuote

Wire Color Codes

Thermocouple Extension Type			ANSI	BS	DIN	NFC	JIS	IEC
JX	Iron	+						
	Constantan®	-						
KX	Chromel®	+						
	Alumel®	-						
TX	Copper	+						
	Constantan®	-						
EX	Chromel®	+						
	Constantan®	-						
NX	Nicrosil®	+						
	Nisil®	-						
SX	Copper	+						
	Alloy II	-						

QuickQuote

Chemical Composition of Thermoelements in Percent

Element	Positive (+) Conductors					Negative (–) Conductors			
	J	T	K, E	N	RX/SX	J, T, E	K	N	RX/SX
Iron	99+								
Manganese						1	2		2
Silicon				1.5			1.5	4	
Nickel			90	84		44	94	95	3
Copper		100			100	55			95
Chromium			10	14					
Aluminum							2		
Magnesium								.15	
Magnetic	Y	N	N	N	N	N	Y	Y*	N

*Slightly magnetic

Properties of Insulating and Jacketing Materials

QuickQuote

Material Type	Continuous Operating Temperature	Abrasion Resistance	Chemical Resistance	Moisture Resistance	Solvent Resistance	Flame Resistance
PE	176°F (80°C)	Good	Excellent	Excellent	Excellent	Poor
CPE	194°F (90°C)	Very Good	Excellent	Excellent	Excellent	Excellent
PVC	221°F (105°C)	Very Good	Very Good	Good	Fair	Excellent
TPE	257°F (125°C)	Excellent	Poor	Good	Good	Excellent
Nylon	250°F (121°C)	Excellent	Very Good	Fair	Good	Poor
ETFE	300°F (150°C)	Excellent	Excellent	Excellent	Excellent	Excellent
FEP	400°F (200°C)	Excellent	Excellent	Excellent	Excellent	Excellent
TE/D	400°F (200°C)	Excellent	Excellent	Excellent	Excellent	Excellent
PFA	500°F (260°C)	Excellent	Excellent	Excellent	Excellent	Excellent
PTFE	500°F (260°C)	Good	Excellent	Excellent	Excellent	Excellent
Polyimide	500°F (260°C)	Excellent	Excellent	Excellent	Good	Good
B-Fiber*	500°F (260°C)	Good	Good	Fair	Good	Good
G-Glass*	950°F (510°C)	Poor	Good	Good	Excellent	Excellent
Q-Glass*	1300°F (704°C)	Fair	Good	Good	Excellent	Excellent
HG	1800°F (982°C)	Poor	Good	Poor	Excellent	Excellent
CEFIR™	2200°F (1204°C)	Fair	Good	Fair	Excellent	Excellent

***Performance characteristics of fibrous products are improved with impregnation. Impregnation maintained to 400°F (200°C).**

	Designations
PE	Polyethylene
CPE	Chlorinated Polyethylene
PVC	Polyvinyl Chloride
TPE	Thermoplastic Elastomer
Nylon	Polyamide Nylon 6
ETFE	Ethylene-Tetrafluoroethylene
FEP	Fluorinated Ethylene Propylene
TE/D	Fluorinated Ethylene Propylene
PFA	Perflourinated-Tetrafluoroethylene
PFTE	Poly-Tetrafluoroethylene
Polyimide	Polyimide Tape
B-Fiber	Synthetic Polyamide Fibers
G-Glass	Braided or Served Fiberglass Yarn
Q-Glass	Braided Fiberglass Yarn
HG	Braided Vitreous Silica
CEFIR™	Braided Ceramic Fiber

Thermocouple Extension Cable

Overall Shield, FEP Insulated 400°F (200°C)

QuickQuote

Applications

- Petrochemical Plants
- Utilities and Industrial Plants
- Pharmaceutical Industry
- Thermocouple Circuits
- Food Processing Plants
- Agricultural Industry
- FDA Approved Applications
- Suitable for 300 Volt Applications

Product Features

- Continuous Use -328F (-200C) ...to +400F (+200C)
- Excellent Chemical Resistance
- Excellent Electrical Properties
- Passes IEEE 383 Flame Test
- Passes VW-1 Flame Test
- Sunlight Resistant
- UL Listed CL2, CL3, PLTC or ITC ...Constructions are Also Available

Product Specifications

Conductors:	Solid or stranded thermocouple extension wire per ASTM E230 & ANSI MC96.1 10 to 30 AWG (2.6 to .25MM)
Insulation:	Nominal .010" (.25MM) flame retardant extruded fluoropolymer FEP
Color Code:	Per ASTM E230 & ANSI MC96.1
Construction:	Twisted pairs
Pair Identification:	Numbered polyester tapes
Communication Wire:	22 AWG (.61MM) 7-strand copper insulated with nominal .010" (.25MM) orange FEP (4 pair and larger)
Cable Shield:	.002" (.05MM) aluminum/polyester tape, 25% overlap
Cable Drain Wire:	20 AWG (.91MM) 7-strand tinned copper
Outer Jacket:	Flame retardant extruded fluoropolymer FEP (ETFE +300F (+150C) and PFA +500F (+260C) are also available)

Ordering Code

TEX/ALTEXTWK - [ ] - [ ] [ ] - [ ]

- [ ] # of Pairs
- [ ] Wire Size AWG or Metric
- [ ] Add (F) for Stranded Wire
- [ ] Calibration Grade Designation Per Table 1

Overall Shield, UL Listed 300 Volt PVC Insulated 221°F (105°C)

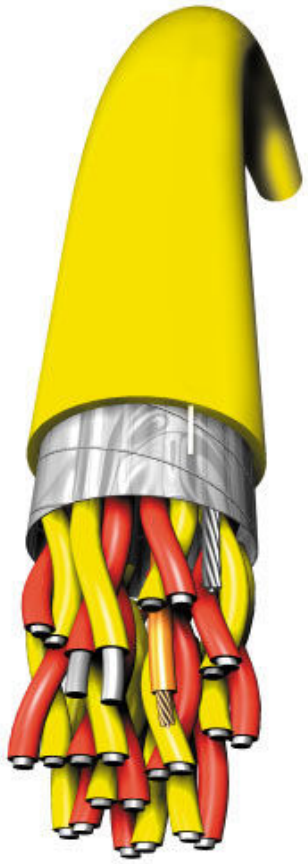
QuickQuote

Applications

- Petrochemical Plants
- Utilities and Industrial Plants
- Thermocouple Circuits
- For use in NEC Article 725 ...Class 1 Division 2 Hazardous ...Locations
- Complies with NEC 725 for ...use in Class 2 and Class 3 ...Circuits

Product Features

- UL Listed Subject 13 PLTC
- Rated 105C 300 Volt
- Flame Retardant
- Passes IEEE 383 Flame Test
- Passes VW-1 Flame Test
- Sunlight Resistant
- Available as Type ITC
- CPE and TPE Constructions ...Are Also Available



Product Specifications

Conductors:	Solid or stranded thermocouple extension wire per ASTM E230 & ANSI MC96.1 12 to 22 AWG (2.44 to .63MM)
Insulation:	Nominal .016" (.40MM) flame retardant PVC
Color Code:	Per ASTM E230 & ANSI MC96.1, numbered on positive conductor (other colors available)
Construction:	Twisted pairs
Communication Wire:	22 AWG (.61MM) 7-strand copper insulated with nominal .015" (.38MM) orange PVC (4 pair and larger)
Cable Shield:	.002" (.05MM) aluminum/polyester tape, 25% overlap
Cable Drain Wire:	20 AWG (.91MM) 7-strand tinned copper
Outer Jacket:	Flame retardant PVC with ripcord under jacket

Ordering Code

UP/ALPTWK - [ ] - [ ] [ ] - [ ]

- [ ] # of Pairs
- [ ] Wire Size AWG or Metric
- [ ] Add (F) for Stranded Wire
- [ ] Calibration Grade Designation Per Table 1

Overall Shield, UL Listed 300 Volt PVC Insulated 221°F (105°C)

QuickQuote

(Call for CSA Data)

Wire Size	Numbers of Pairs	Outer Jacket Thickness inches	(MM)	Outer Diameter inches	(MM)	Bend Radius inches	(MM)	Pull Tension LB	KG	Net Weight LB/MF	KG/KM
16 AWG	1	.037	(0.94)	.256	(6.5)	1.5	(39)	54	(25)	43	(64)
(1.29MM)	4	.053	(1.35)	.471	(12.0)	2.8	(72)	172	(78)	135	(201)
Solid	8	.053	(1.35)	.587	(14.9)	3.5	(89)	336	(153)	232	(345)
	12	.064	(1.63)	.708	(18.0)	4.2	(108)	500	(227)	340	(506)
	16	.064	(1.63)	.791	(20.1)	4.7	(121)	664	(302)	431	(642)
	20	.064	(1.63)	.825	(21.0)	5.0	(126)	828	(376)	520	(773)
	24	.074	(1.88)	.953	(24.2)	5.7	(145)	992	(451)	635	(946)
	36	.074	(1.88)	1.077	(27.4)	6.5	(164)	1484	(675)	901	(1341)
18 AWG	1	.037	(0.94)	.234	(5.9)	1.4	(36)	34	(15)	34	(51)
(1.02MM)	4	.053	(1.35)	.424	(10.8)	2.5	(65)	112	(51)	105	(156)
Solid	8	.053	(1.35)	.525	(13.3)	3.2	(80)	216	(98)	174	(259)
	12	.064	(1.63)	.634	(16.1)	3.8	(97)	320	(145)	255	(379)
	16	.064	(1.63)	.706	(17.9)	4.2	(108)	424	(193)	321	(478)
	20	.064	(1.63)	.734	(18.6)	4.4	(112)	528	(240)	383	(569)
	24	.064	(1.63)	.828	(21.0)	5.0	(126)	632	(287)	453	(674)
	36	.074	(1.88)	.956	(24.3)	5.7	(146)	944	(429)	656	(976)
20 AWG	1	.037	(0.94)	.218	(5.5)	1.3	(33)	21	(10)	28	(42)
(0.81MM)	4	.042	(1.07)	.369	(9.4)	2.2	(56)	72	(33)	77	(115)
Solid	8	.053	(1.35)	.480	(12.2)	2.9	(73)	136	(62)	136	(202)
	12	.053	(1.35)	.557	(14.1)	3.3	(85)	200	(91)	188	(280)
	16	.064	(1.63)	.643	(16.3)	3.9	(98)	264	(120)	242	(360)
	20	.064	(1.63)	.669	(17.0)	4.0	(102)	328	(149)	292	(434)
	24	.064	(1.63)	.752	(19.1)	4.5	(115)	392	(178)	343	(510)
	36	.064	(1.63)	.848	(21.5)	5.1	(129)	584	(265)	479	(713)

The products referenced above represent the most popular constructions. Other constructions can be manufactured to meet individual specification and application requirements. Contact factory for additional information.

Table 1

Initial Calibration Tolerances Per ASTM E230 and ANSI MC96.1

Thermocouple Type	Temperature Range F(C)	Grade Designation	Tolerance-Reference Junction 32F (0C) Standard Grade Limits F(C)	Grade Designation	Special Grade Limits F(C)
Extension Wire					
TX	32 (0) to 212 (100)	TX	±1.8 (1)	TTX	±0.9 (0.5)
JX	32 (0) to 400 (200)	JX	±4 (2.2)	JJX	±2 (1.1)
EX	32 (0) to 400 (200)	EX	±3.1 (1.7)	EEX	±1.8 (1)
KX or NX	32 (0) to 400 (200)	KX or NX	±4 (2.2)	KKX or NNX	±2 (1.1)
Compensating Extension Wire					
RX or SX	32 (0) to 400 (200)	RX or SX	±9 (5)		

Electrical Characteristics

Insulation passes 3000 V ac spark test per UL Subject 13.
Completed cable passes a dielectric test of 2500 V dc for
10 seconds, conductor to conductor and conductor to shield, per UL Subject 13.

Press Release

QuickQuote

TE Wire & Cable Sets a New Standard for Thermocouple Traceability

For years, customers have come to rely on the leak-proof dependability and accuracy of the **AccuClave®** thermocouple product line manufactured by TE Wire & Cable. Gregory Smith, their President, is pleased to announce the next step in innovation. The ***TRAC*** System, an industry first, provides customers with online access to critical thermocouple calibration and manufacturing information for all AccuClave® products.

TRAC is the acronym for Traceable Records of AccuClave® Calibration.

Thermocouple traceability is critical to many industry and customer standards, such as those used in manufacturing of autoclave-cured composite parts for aerospace. Thermocouple correction factors assure customers precise temperature accuracies for their processes. In addition to calibration information, ***TRAC*** also retrieves manufacturing data and part description which is a crucial, key asset for component level life-cycle considerations.

With TRAC, thermocouple traceability has never been easier. Each unit is laser etched with a unique eight character code. To use ***TRAC***, simply go to www.tewire.com, click on the TRAC logo and enter the code.

Without the **AccuClave® *TRAC*** solution, manufactured thermocouples often lose their identity. "We believe that online traceability is unprecedented in the industry," stated Greg. "In addition to exceptional reliability, leak-proof technology and cost savings, ***TRAC*** is one more compelling reason our customers depend on **AccuClave®** products in critical applications."

AccuClave® Thermocouples come in J or K calibrations, and are available in various lengths. Thermocouple wire used in all **AccuClave®** products is calibrated every 3000 feet in conformance to Boeing BAC-5621.

For a limited time TE Wire & Cable is offering to qualified customers a free **AccuClave®** Thermocouple for evaluation and for the opportunity to experience the ***TRAC*** advantage. To receive a free sample and for additional information contact sales@tewire.com, or go to www.tewire.com, or phone 888-4TEWIRE (888-483-9473).

The **AccuClave®** Thermocouple is patent pending. **AccuClave®** is a registered trademark of TE Wire & Cable LLC.

TE Wire & Cable LLC is a Marmon Wire & Cable/Berkshire Hathaway company.