

# INDUSTRIAL THERMOCOUPLE ELEMENTS

This Section Contains

**Base Metal Thermocouple Elements** ☐



**Ceramic Insulators** ☐



**Thermocouple Reference Data** ☐



**Accuracy of IPS Thermocouple Wire** ☐



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*If you can't find what you need*

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**From Illinois 618-465-7623**

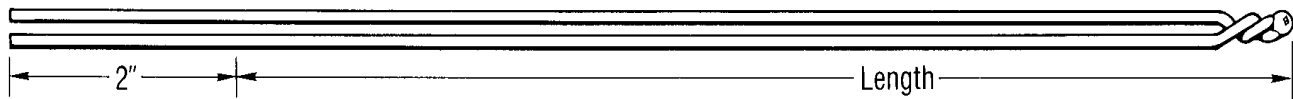
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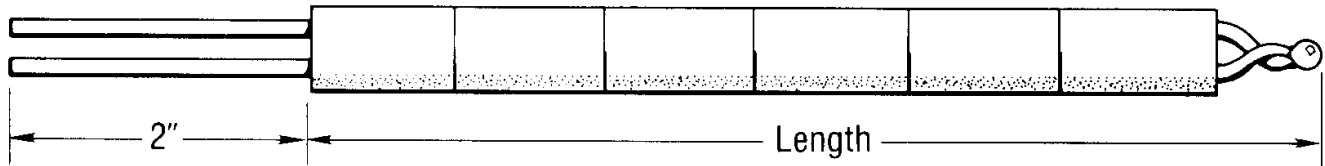
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# BASE METAL THERMOCOUPLE ELEMENTS

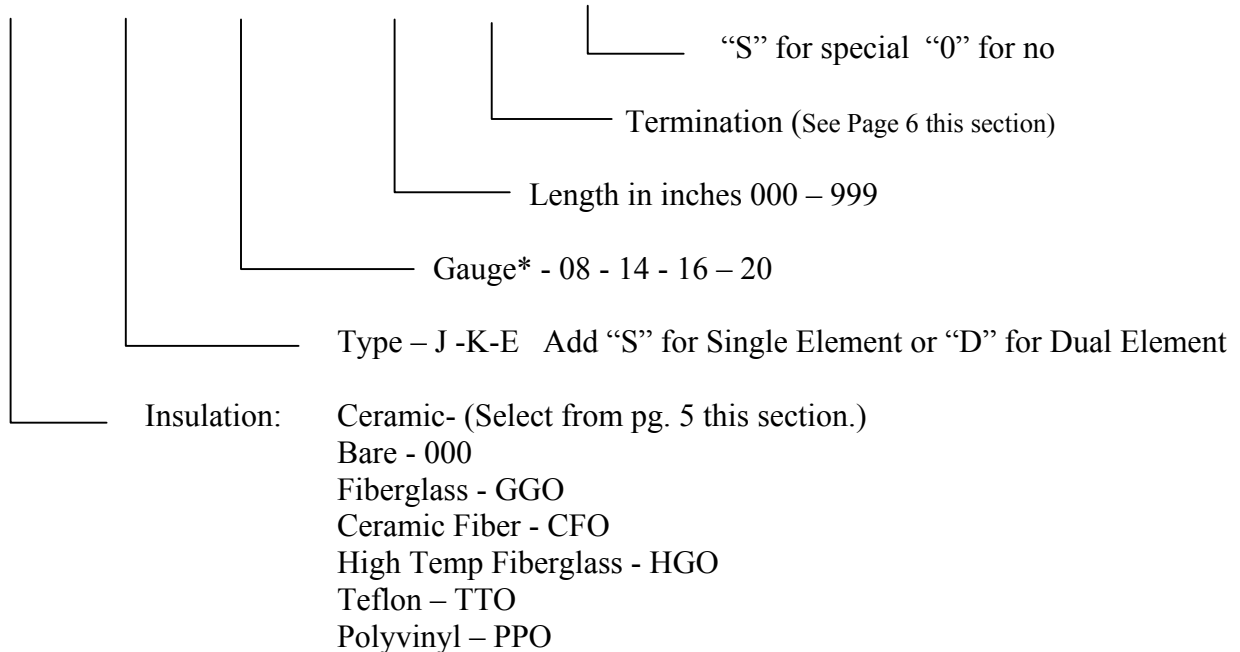
## Bare Thermocouple



## Insulated Thermocouple



TE - □□□ - □□ - □□ - □□□ - □□ - □



\* Please consult Technical specifications on Page 7 of this section for proper gauge of the thermocouple wire.

IPS thermocouples are precisely manufactured according to industry standards. IPS uses only the highest grade material available, to assure that our thermocouples precisely fall within the accepted performance curves of the ANSI Standard accuracy limits.

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# CERAMIC INSULATORS



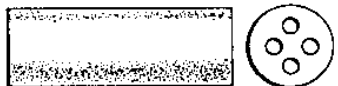
## ROUND ONE HOLE

| WIRE GAUGE | O.D.  | BORE  | LENGTH | PART # |
|------------|-------|-------|--------|--------|
| 8          | .340" | .209" | 1"     | I - 20 |
| 8          | .252" | .156" | 1"     | I - 34 |
| 8          | .375" | .160" | 1"     | I - 35 |
| 8          | .250" | .156" | 3"     | I - 36 |
| 14-16      | .140" | .080" | 1"     | I - 38 |
| 20         | .090" | .038" | 2"     | I - 40 |



## ROUND TWO HOLE

| WIRE GAUGE | O.D.  | BORE  | LENGTH | PART # |
|------------|-------|-------|--------|--------|
| 8          | .468" | .166" | 1"     | I - 18 |
| 8          | .778" | .205" | .5"    | I - 21 |
| 14-16      | .218" | .080" | 3"     | I - 25 |
| 20         | .150" | .039" | 2"     | I - 30 |



## ROUND FOUR HOLE

| WIRE GAUGE | O.D.  | BORE  | LENGTH | PART # |
|------------|-------|-------|--------|--------|
| 14-16      | .315" | .080" | 1"     | I - 42 |



## OVAL TWO HOLE

| WIRE GAUGE | O.D.          | BORE  | LENGTH | PART # |
|------------|---------------|-------|--------|--------|
| 8          | .313" X .575" | .193" | 1"     | I - 10 |
| 8          | .312" X .500" | .185" | 1"     | I - 14 |
| 8          | .284" X .500" | .157" | 3"     | I - 16 |
| 14-16      | .250" X .375" | .090" | 1"     | I - 22 |
| 14-16      | .187" X .312" | .080" | 3"     | I - 24 |
| 20         | .118" X .171" | .042" | 3"     | I - 32 |



## BALL AND SOCKET (FISH SPINE)

| WIRE GAUGE | O.D.  | BORE  | LENGTH | PART # |
|------------|-------|-------|--------|--------|
| 8          | .400" | .156" | .400"  | I - 50 |
| 8          | .260" | .156" | .260"  | I - 52 |
| 10-12      | .330  | .125" | .337"  | I - 51 |
| 14-16      | .170" | .068" | .170"  | I - 56 |
| 20         | .110  | .056" | .110"  | I - 58 |

The upper temperature limit of ceramic insulators is 2475°F. Other variations available upon request. Consult the factory for options.

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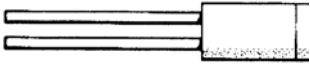
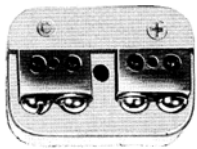
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# TERMINATIONS

| Style | Description                          | Illustration                                                                          |
|-------|--------------------------------------|---------------------------------------------------------------------------------------|
| 00    | Leads bare                           |    |
| 01    | Leads with Fish Spine beads          |    |
| 02    | Leads with Fiberglass sleeves        | Not shown                                                                             |
| 03    | With terminal block                  |    |
| 04    | With spade lugs                      |    |
| 05    | Standard size T/C Plug               |    |
| 06    | Standard size T/C Jack               |   |
| 07    | Standard size T/C Plug and Jack      |   |
| 08    | Miniature T/C Plug                   |  |
| 09    | Miniature T/C Jack                   |  |
| 10    | Miniature T/C Plug and Jack          |  |
| BC    | Butt connectors and Fish Spine Beads |                                                                                       |

Other combinations available, please consult factory.

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# THERMOCOUPLE REFERENCE DATA

| UPPER TEMPERATURE LIMITS FOR THERMOCOUPLES |                        |                    |                    |                    |                    |                   |
|--------------------------------------------|------------------------|--------------------|--------------------|--------------------|--------------------|-------------------|
| THERMOCOUPLE TYPE                          | ANSI<br>TYPE<br>SYMBOL | WIRE GAUGE (AWG)   |                    |                    |                    |                   |
|                                            |                        | 8 ga.              | 14 ga.             | 20 ga.             | 24 ga.             | 30 ga.            |
| Copper – Constantan                        | T                      |                    | 370°C<br>(700°F)   | 260°C<br>(500°F)   | 200°C<br>(400°F)   | 150°C<br>(300°F)  |
| *Iron - Constantan                         | J                      | 760°C<br>(1400°F)  | 600°C<br>(1100°F)  | 500°C<br>(900°F)   | 370°C<br>(700°F)   | 320°C<br>(600°F)  |
| Chromel™ - Constantan                      | E                      | 870°C<br>(1600°F)  | 650°C<br>(1200°F)  | 550°C<br>(1000°F)  | 430°C<br>(800°F)   | 430°C<br>(800°F)  |
| Chromel™ - Alumel™                         | K                      | 1260°C<br>(2300°F) | 1100°C<br>(2000°F) | 1000°C<br>(1800°F) | 870°C<br>(1600°F)  | 760°C<br>(1400°F) |
| Nicrosil - Nisil                           | N                      | 1260°C<br>(2300°F) | 1100°C<br>(2000°F) | 1000°C<br>(1800°F) | 870°C<br>(1600°F)  | 760°C<br>(1400°F) |
| Platinum – 10% Rhodium                     | S                      |                    |                    |                    | 1480°C<br>(2700°F) |                   |
| Platinum – 13% Rhodium                     | R                      |                    |                    |                    | 1480°C<br>(2700°F) |                   |

™ Trademark Hoskins Mfg. Co.

\* Magnetic

| STANDARD WIRE GAUGES IN DECIMALS OF AN INCH AND MM |                    |                        |
|----------------------------------------------------|--------------------|------------------------|
| B&S Wire Gauge                                     | Diameter in Inches | Diameter in Millimeter |
| 8                                                  | .1285              | 3.264                  |
| 14                                                 | .0641              | 1.628                  |
| 16                                                 | .0508              | 1.291                  |
| 20                                                 | .0320              | .8818                  |
| 24                                                 | .0201              | .5106                  |

|                                      |                             |
|--------------------------------------|-----------------------------|
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## Accuracy of IPS Thermocouple Wire

IPS insulated and bare thermocouple wire is matched to meet standard initial calibration tolerances (Standard limits) for temperatures above 0°C as given in ANSI MC96.1 and shown in the table.

Wire conforming to special initial calibration tolerances (Special limits), and wire with certified traceable calibration is available on request. Designate special limit grade wire using a double ANSI symbol (e. g. KK, JJ).

Thermocouple wire may be used to manufacture a thermocouple, keeping in mind the temperature limitations of wire size.

## Color Code & Initial Calibration Tolerances Thermocouple wire

| Type                                                   | Color Code              | Initial Calibration Tolerances                                                                                                                        |                                                          |                                                          |
|--------------------------------------------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|
| Wire Alloys                                            | +/- Individual (Jacket) | Temperature Range                                                                                                                                     | Standard Limits                                          | Special Limits                                           |
| **Iron (+) vs. Constantan(TM) (-)<br>ANSI Symbol = J   | white/red (brown)       | +32°F (0°C) to +545°F (+285°C)<br>+545°F (+285°C) to +1400°F (+750°C)                                                                                 | +/- 4°F (2.2°C)<br>+/- .75%                              | +/- 2°F (1.1°C)<br>+/- .4%                               |
| CHROMEL® (+) vs. **ALUMEL® (-)<br>ANSI Symbol = K      | yellow/red (brown)      | -330°F (-200°C) to -165°F (-110°C)<br>-165°F (-110°C) to +32°F (0°C)<br>+32°F (0°C) to +545°F (+285°C)<br>+545°F (+285°C) to +2300°F (+1250°C)        | +/- 2%<br>+/- 4°F (2.2°C)<br>+/- 4°F (2.2°C)<br>+/- .75% | +/- 2°F (1.1°C)<br>+/- .4%                               |
| Copper (+) vs. Constantan(TM) (-)<br>ANSI Symbol = T   | blue/red (brown)        | -330°F (-200°C) to -85°F (-65°C)<br>-85°F (-65°C) to +270°F (+130°C)<br>+270°F (+130°C) to +660°F (+350°C)                                            | +/- 1.5%<br>+/- 1.8°F (1°C)<br>+/- .75%                  | +/- .8%<br>+/- .9°F (.5°C)<br>+/- .4%                    |
| CHROMEL® (+) vs. Constantan(TM) (-)<br>ANSI Symbol = E | purple/red (brown)      | -330°F (-200°C) to -270°F (-170°C)<br>-270°F (-170°C) to +480°F (+250°C)<br>+480°F (+250°C) to +640°F (+340°C)<br>+640°F (+340°C) to +1600°F (+900°C) | +/- 1%<br>+/- 3°F (1.7°C)<br>+/- 3°F (1.7°C)<br>+/- .5%  | +/- 1.8°F (1°C)<br>+/- 1.8°F (1°C)<br>+/- .4%<br>+/- .4% |
| Nicrosil(TM) (+) vs. Nisil(TM) (-)<br>ANSI Symbol = N  | orange/red (brown)      | +32°F (0°C) to +545°F (+285°C)<br>+545°F (+285°C) to +2300°F (+1250°C)                                                                                | +/- 4°F (2.2°C)<br>+/- .75%                              | +/- 2°F (1.1°C)<br>+/- .4%                               |

NOTE: Percent limits apply directly to temperature in °C units, but for °F equivalents are applied to the numbers of °F above or below the ice point (+32°F).

(i.e. Limit (°F) = (Temp. °F-32°F) x Percentage)

Thermocouple wire cannot be expected to meet the limits of error at temperatures below the ice point unless specified at time of purchase.

\*\* Magnetic

\* CHROMEL® and ALUMEL® are registered Trademarks of Hoskins Manufacturing Company. IPS reserves the right to substitute equivalent product to CHROMEL® and ALUMEL® at any time.

|                                      |                             |
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