### Thermocouples

#### Types • Conductor Combinations • Characteristics • National and International Standards

<table>
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<tr>
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<th>Tolerances (See note A below)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>National and International Standards</td>
<td>V/°C</td>
<td>°C</td>
<td>Class</td>
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<td>500°C</td>
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</table>

Note A:
1. The tolerances are expressed either as a deviation in degrees Celsius or as a function of the actual temperature.
2. The conductor materials are normally applied in smooth tubing specified in the table for temperature ranges and in flat strip for temperature ranges below 600°C. The tolerance for temperature ranges below 0°C is ±0.2°C.
3. Type B, E, and J thermocouples are not officially recognized standards for Type T. If thermocouples are required to be used for very high temperature applications, the following tolerances should be used:
   - ±0.5°C for temperature ranges above 400°C
   - ±1.0°C for temperature ranges above 400°C

**Conductors**
- NICKEL - CHROMIUM (Nicrosil, Nisil, Advance, Cupron, Fe-Cu)
- TUNGSTEN (5% Rhenium), (3% Rhenium)
- COPPER - NICKEL (Constantan, Advance, Cupron)
- IRON (Magnetic, Armco, Maraging, Stainless plus Nickel)
- NICKEL - SILICON-MAGNESIUM (Silmulon, Silclad, Stainless plus Nickel)
- PLATINUM (10% Rhodium)
- PLATINUM (15% Rhodium)

**Standards**
- BS EN 60 584.1:1996
- DIN EN 60584-1:1996
- NF EN 60 584.1:1996

**Tolerance Values**
- ±1.0°C
- ±1.5°C
- ±2.5°C
- ±4.5°C
- ±(1 +0.003 (t - 1100))°C
- ±11.0% ±100°C
- ±16.7% ±100°C
- ±25.0% ±100°C
- ±50.0% ±100°C
- ±66.7% ±100°C
- ±100.0% ±100°C
- ±200.0% ±100°C
- ±300.0% ±100°C
- ±500.0% ±100°C
- ±833.3% ±100°C
- ±1666.6% ±100°C
- ±2000.0% ±100°C

**Conductor Combinations**
- TUNGSTEN 5% RHENIUM
- TUNGSTEN 3% RHENIUM
- COPPER - NICKEL
- NICKEL - ALUMINIUM
- TUNGSTEN - 5% RHENIUM
- TUNGSTEN - 3% RHENIUM
- COPPER - IRON
- COPPER - CHROMIUM

**Approximate Generated EMF Change**
- ±1V/°C
- ±5V/°C
- ±8V/°C
- ±15V/°C

**Temperature Ranges**
- ±10°C
- ±40°C
- ±200°C
- ±400°C
- ±1000°C

**Tolerance Values**
- ±0.0025
- ±0.0075
- ±0.0125
- ±0.0225
- ±0.0375
- ±0.0750
- ±0.1250
- ±0.2500
- ±0.5000
- ±1.0000
- ±2.0000
- ±4.0000

**Notes**
- Most suited to oxidising atmospheres, it has a wide temperature range and is the most commonly used.
- Used in reducing atmospheres where an ungrounded thermocouple sensor is not practicable due to high temperatures.
- Commonly used in the plastics moulding industry.
- Not recommended for use in oxidising atmospheres due to the high temperature limit of the rhenium.
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