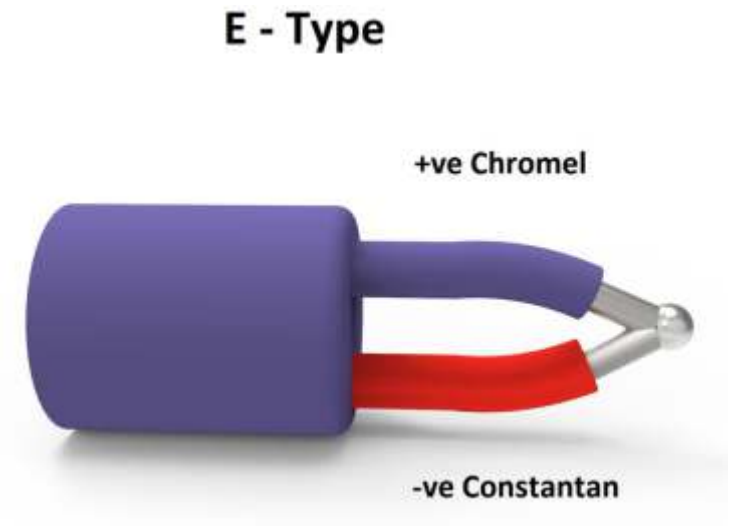
THERMO ELECTRIC CORPORATION

Type- E

Introduction:

The Type E thermocouple is a commonly used thermocouple which provides stronger signal and higher accuracy as compared to Type K and Type J at moderate temperature range of 1000°F and lower. The Type E has higher stability when compared to type K thermocouple due to which it provide good accuracy.



Why To Prefer Type E Thermocouple:

- Has the Highest EMF produced per degree than any other standard Thermocouple.
- Provide High output (68μV/°C) due to which it is well suited to cryogenic use.
- Provide High Resistance against corrosion.
- It is non-magnetic
- Provide wide-range of -50°C to +740°C and narrow range of -110°C to +140°C.
- Type E can come in variety of designs suited to different applications:-
    i. **Mineral Insulated Type E:-**Metal sheath insulated with magnesium oxide powder also called MIMS.
    ii. **Cable/Wire Type E:-** Flexible sensors in PVC,PTFE or Glass Fibre. Many cold and hot-end designs.
    iii. **Type E with Metal Sheath:-** High Temperature design with metal protection sheath.
    iv. **Type E Inserts:-** Rigid metal tubes and ceramic insulators are commonly used in pocket, thermowell or head assemblies.

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THERMOCOUPLE CONDUCTOR COMBINATION TYPE	INTERNATIONAL COLOUR CODE TO IEC 5843:1989	AMERICAN TO ANSI/MC96.1	JAPANESE TO JIS C 1610-1981
E			

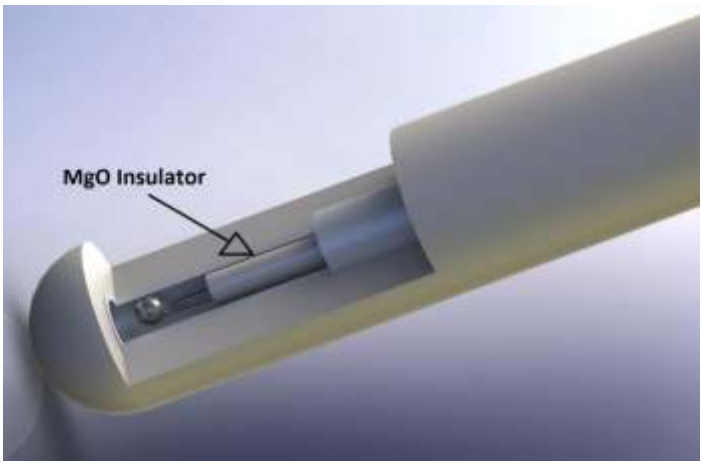
Composition:-

In Type E Thermocouple positive leg is composed of approximately 90% nickel, 10 % chromium which is commonly known as Chromel and a negative leg, which is approximately 95% nickel, 2% aluminum, 2% manganese and 1% silicon commonly known as Constantan.

Type E Insulation Material:-

In E Type Thermocouple mainly MgO insulation is used. Due to many desirable characteristics of MgO such as fast response, compact size, broad temperature range, formability, weld ability, durability, accuracy, thermal shock and vibration resistance makes it an excellent choice for virtually all laboratory or process applications. The standard MgO insulation consist of ANSI/ASTM standard limits of error conductor material and standard (96%) pure insulation.

MgO Insulation provide initial calibration tolerances for thermocouple at the temperature range of 0 to 750 °C. Its standard tolerance is +2.2°C or +0.75°C % which best suits for these thermocouple.



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Type E Temperature Range:

- Thermocouple grade wire, -454 to 1600°F (-270 to 870°C)
- Extension wire, 32 to 392°F (0 to 200°C)

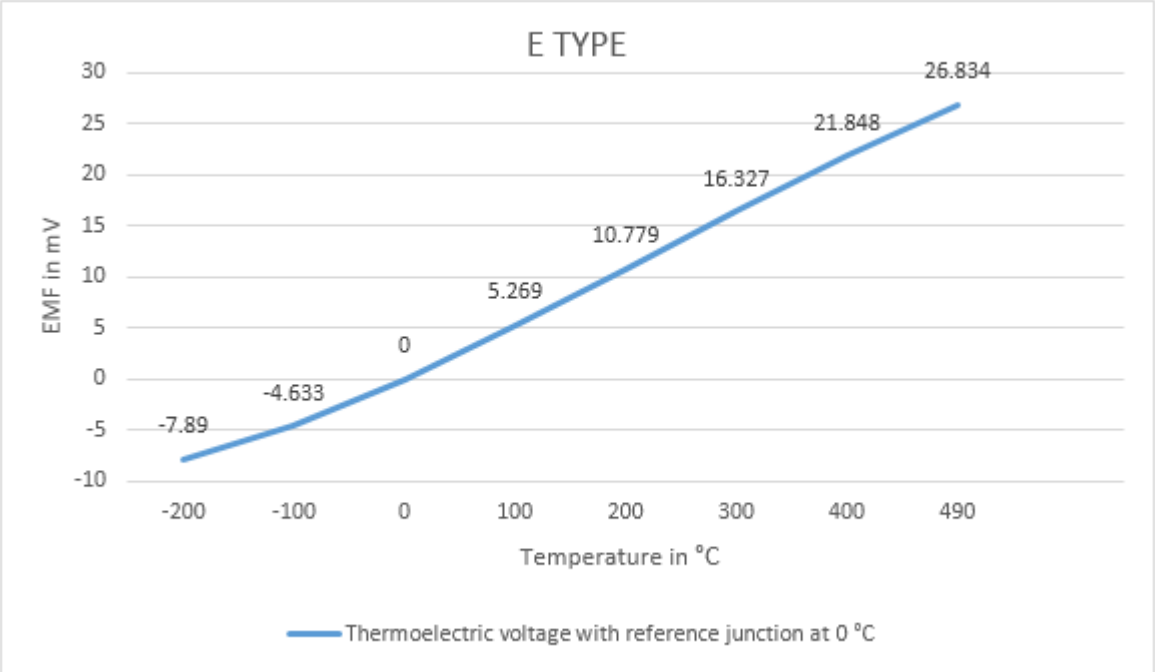
Type E Accuracy (whichever is greater):

- Standard: +/- 1.7°C or +/- 0.5°C %
- Special Limits of Error: +/- 1.0°C or 0.4°C %

Tolerance Class:-

Type	Temperature range (°C)				Tolerance class (°C)	
	Continuous		Short-term		One	Two
	Low	High	Low	High		
E	0	+800	−40	+900	−40 – 375: ±1.5 375 – 800: ±0.004×*T*	−40 – 333: ±2.5 333 – 900: ±0.0075×*T*

EMF Vs Temperature Graph for K Type Thermocouple:-



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Pros and Cons:-

Pros:

- Can be used in Sub-zero, Oxidizing and Inert applications.
- Provides highest output per degree Celsius (68μV/°C).
- Fast response applications.
- Stable Output throughout the temperature range.
- High Accuracy.

Cons:

- Not suitable for vacuum or low oxygen applications.
- Type E thermocouples should not be used in Sulphuric environment.
- Costly when compared to Type K.

Uses:

- For Cryogenic Applications.
- Applications where magnetic fields are generated as E type is non-magnetic in nature.
- Aerospace industry where fast response is required.
- Gas temperature measurement in a flow chamber.