# Thermal Expansion Coefficient Converter (1/K, µm/m·K, µin/in·°F)

Convert a linear thermal expansion coefficient between 1/K, µm/(m·K) and µin/(in·°F), and give the length change of a member for a temperature change.

**Method:** Unit definitions per NIST SP 811 and the SI Brochure (exact where defined)

## Input parameters

Unit system: SI

| Parameter | Value | Unit |
|---|---|---|
| Expansion coefficient (choose its unit) | 12.000 | µm/(m·K) |
| Member length | 10.000 | m |
| Temperature change | 50.000 | K |

## Calculated results

| Parameter | Value | Unit |
|---|---|---|
| 1/K | 1.2000e-05 | 1/K |
| µm/(m·K) | 12.000 | µm/(m·K) |
| µin/(in·°F) | 6.6667 | µin/(in·°F) |
| Length change | 6.0000 | mm |

**Notes for this case**

• 1 µm/(m·K) is $10^{-6}$ per kelvin; because a Fahrenheit degree is 5/9 of a kelvin, 1 µin/(in·°F) = 1.8 × $10^{-6}$ per kelvin. Carbon steel is about 12, stainless steel 16–17, aluminium 23 and copper 17 µm/(m·K) near room temperature; the mean coefficient rises with temperature, so use the value for the temperature range. A 10 m steel member heated by 50 K grows about 6 mm.

## Formula and method

$$\Delta L = \alpha L \Delta T, \quad 1\ \mu\text{in}/(\text{in}\cdot^\circ\text{F}) = 1.8\ \mu\text{m}/(\text{m}\cdot\text{K})$$

### Variables

| | | |
|---|---|---|
| $\alpha$ | Expansion coefficient (choose its unit) | 1/K |
| $L$ | Member length | m |
| $\Delta T$ | Temperature change | K |
| $\Delta L$ | Length change | m |

### Method and standards

Expansion units.

### Assumptions and limits

- Linear expansion; mean coefficient.

### References

Unit definitions per NIST SP 811 and the SI Brochure (exact where defined)

## Report details

| | |
|---|---|
| Report reference | FCC-HW7Z-4REG (the same inputs always give the same reference) |
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| Calculator | Thermal Expansion Coefficient Converter (1/K, µm/m·K, µin/in·°F) |
| Method last reviewed | 17 November 2026 |
| Software release | FireCAD Calc, release of 22 November 2026 |
| Release checks | 2 reference cases of this calculator, computed independently, are checked on every release |

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

### This calculator online

https://calc.firecad.com/general/unit-conversions/thermal-expansion-coefficient-converter

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.