


# Gauge Length and Measuring Range

*Understanding basic extensometer parameters and selecting an appropriate instrument*

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## Gauge Length (for Axial Extensometers)

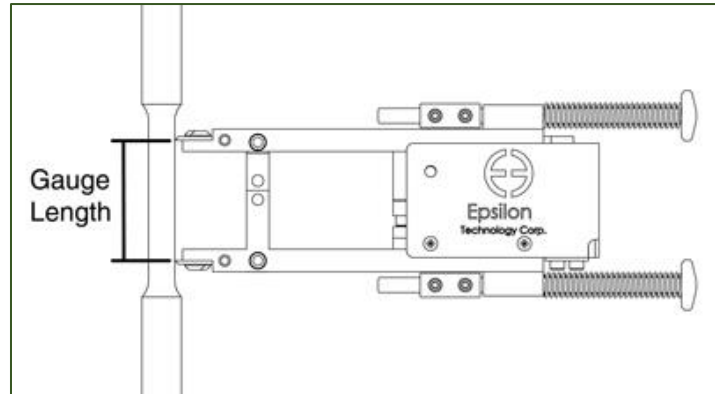
Extensometer Gauge Length is the distance between the extensometer's initial measuring points on the specimen. If you are using a testing standard, check the standard for extensometer gauge length requirements.

 *Many test standards specify the specimen dimensions and corresponding extensometer gauge length.*

Many specimens have a reduced section that is slightly longer than the extensometer's gauge length.

### Selecting a gauge length

Where possible, longer gauge length specimens and extensometers are generally preferable for many reasons. Gauge lengths of 1-2" (25-50mm) are most commonly selected, and tend to help overcome a host of potential challenges – *not limited to the extensometer* – when testing with shorter gauge lengths. Lengths < 10mm are more challenging, and < 6mm should be considered generally selected only where necessary.

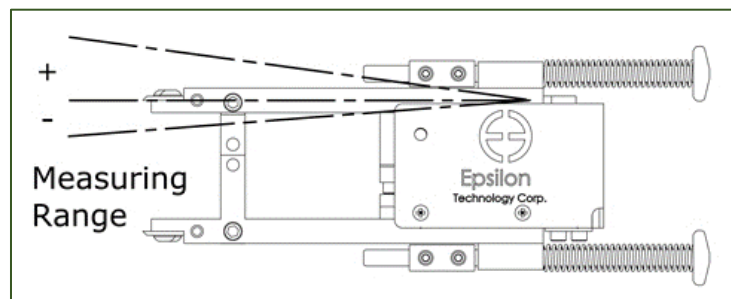


*Extensometer gauge length of 25mm or greater is generally recommended for most applications in order to mitigate a wide variety of testing challenges not enumerated here.*

*For CODs, a gauge length of 10mm or greater is generally recommended.*

## Measuring Range

Measuring Range is the measuring capacity of the extensometer in tension (+) or compression (-) in units of % strain, maximum extension, or maximum deflection.



*Continued on next page →*

*When measuring range is in units of % strain, this means the maximum extension as a percentage of the gauge length.*

$$\epsilon = \frac{\Delta L}{L_0}$$

### Selecting a measuring range

Estimate the maximum strain or extension you will need to measure, such as the total strain when the extensometer is removed after offset yield or the elongation at fracture. Select a measuring range for the extensometer that meets or exceeds this range.

Extensometer measuring ranges of 25-50% elongation are most commonly selected. There may be ergonomic, dynamic and other disadvantages to selecting a measuring range which is significantly more than the range of interest (*e.g. >100% for a <1% range test*), and there is generally little advantage to selecting a range <10% elongation.



*Extensometer measuring range of 20-50% $\epsilon$  is generally suitable for most applications, even if the measurement of interest is <1% $\epsilon$ .*

*For CODs, recommended ranges vary according to the application.*

Epsilon's technical sales staff may recommend a specific gage length and/or measuring range for your application based on a variety of considerations, including:

- Application requirements
- Specimen geometry and material type
- Data acquisition system (DAQ) performance
- Dynamics
- Ergonomics & fitment
- Measurement accuracy and resolution
- Electrical output limitations
- Limits of physical construction



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