



## Tolerance

How is it that nuts from one supplier and bolts from another supplier work together? The answer lies in tolerance, also known as 'acceptance criteria'. The tolerance is the agreed allowable variation in the shape of the nuts and bolts that allow them to still fit together.



Tolerance

is the maximum acceptable difference between the actual value of a quantity and the value specified for it

For example, if an electrical resistor has a specification of 10 ohms and there is a tolerance of  $\pm 10\%$  on that specification, the minimum acceptable resistance would be 9 ohms and the maximum would be 11 ohms.

## What affects your measurements?

Many factors can reduce accuracy or precision and increase the uncertainty of your measurement result. Some of the most common are:

- Environmental conditions – changes in temperature or humidity can expand and contract materials as well as affect the performance of measurement equipment.
- Inferior measuring equipment – equipment which is poorly maintained, damaged or not calibrated will give less reliable results.
- Poor measuring techniques – having consistent procedures for your measurements is vital.
- Inadequate staff training – not knowing how to make the right measurement, not having the confidence to challenge the results and not being willing to seek advice can all have a negative impact.



How important is measurement in your environment – do you encourage a 'measurement right first time' culture?

## Traceability and calibration

When we talk about traceability of measurements, we mean that the measurements can be related to a national standard through a documented unbroken chain of calibrations.

The primary standards at NPL are used to calibrate reference (secondary) standards held by accredited calibration laboratories. These reference standards are subsequently used to calibrate working standards, which may be company master standards owned by industry or hospitals, for example.