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CALIBRATION

What is Calibration?

Calibration is the process of comparing a measuring instrument against a measurement *standard* to establish the relationship between the values indicated by the instrument and those of the standard (*standard* in measurement is considered to be the reference base). The purpose of calibration is to eliminate or reduce bias in your measurement system relative to the reference base. The calibration procedure compares an "unknown" or test item(s) or instrument with reference standards according to a specific algorithm.

Do all measuring instruments need to be calibrated?

All measuring devices usually need to be calibrated - whether they are simple devices or state-of-the-art systems - because certain characteristics change with time. There are situations where an instrument need not be calibrated, for example where its readings are 'for information only' and their accuracy has little or no impact on the test, product or service being provided.

How often should an instrument be calibrated?

Calibration frequency can be established using manufacturer's recommendations. In some cases, commercial calibration laboratories can suggest intervals for particular instruments. There are two main considerations when determining the calibration frequency. Firstly, the instrument's reproducibility should be taken into account - new devices should be calibrated frequently in order to establish their reproducibility. Secondly, the required uncertainty of measurement should be assessed. If the instrument's reproducibility is shown, by successive calibrations, to be substantially better than the uncertainty required then the interval between calibrations can be extended. At the other extreme, where the instrument's reproducibility approaches the uncertainty needed, the calibration intervals should be much shorter.

To provide confidence in the accuracy of calibration results, the measurement must show *traceability*. This means that all results associated with a calibration – including those relating to the calibration of the measurement standard used - must be traceable back to standards held at a national measurement institute, through an unbroken chain of comparisons and where each link has stated measurement uncertainties. In addition, it is important that appropriate equipment and procedures are used in the calibration process, in that they are used by trained and authorized personnel operating in an experimental environment.

Why perform calibrations?

- To improve the measurement accuracy and reliability of the instrument
- To reduce the number of end-products rejected because they are outside acceptable tolerances
- To provide products with reduced and more competitive tolerances, better reliability, and access to quality-conscious markets
- To minimize unnecessary rework and delays, resulting in customer dissatisfaction
- To eliminate health and safety, legal and regulatory issues