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Are You Always "Investigation-Ready?"

An overweight aircraft crashes, a bridge fails, a building collapses. Accidents occur as the end product of a chain of events; a series of small failures, each one linked to the next. Prevent any one of them, and you break the chain; the accident cannot occur.

After every major accident, investigators examine every link in that chain of events. These investigations are detailed and comprehensive; they will include manufacturer's calibration records for testing instruments used in the production of materials and structures. Public reports of poor calibration management and record keeping, whether contributing to the accident or not, promote doubt and distrust among your customers about your quality standards.

It's clear that the more you know about how testing equipment is calibrated and verified the better prepared you are to effectively assess a calibration service's qualifications and capabilities. However, even the basic terms calibration and verification are confusing to many people.

Calibration is simply the process of comparing an unknown value to a known value. To calibrate a device is to compare the output of that device with the output of a similar but highly accurate device called a "standard". Using load cells as an example, the load cell being calibrated (the unknown) and the standard load cell (the known) are mounted and a range of loads is applied. Because they are in series, both load cells experience identical loads and therefore the output values should also be identical. The calibration result is the difference between the two values, otherwise known as the measurement error.

Verification is the subsequent evaluation of the calibration result against the expected performance specification for the equipment. The performance specification dictates the limits of the measurement errors for the device under test. If the measurement errors throughout the range are less than the specified limits, the device is verified as conforming to its performance specification. If the errors are greater than the specified limits, the device is verified as not conforming to its performance specification. Note that in either case, conforming or not conforming, the equipment is still considered to be verified.

A common misconception is that calibration means adjusting the output of a device to bring its performance "within limits." Any adjustment made to the output of the device is separate from the calibration and verification process, and must be followed by a further calibration and verification to prove the adjustment was successful.

To summarize, calibration is the physical process of taking comparative measurements from your device against a standard device, and verification is the analytical process of comparing the resulting measurement errors against the performance specification of your device. Verification is, of course, not possible without the preceding calibration. However, verification is so closely related to calibration that they are treated as two inseparable parts of the same process.

Will the next headline bring your company into sharp focus? It can happen any time. Make sure you know the importance of, and the difference between, calibration and verification, and that your calibration records are ready for scrutiny at all times.





Q. Can you give me a letter certifying that my test is in accordance with a specific ASTM or ISO standard?

A. Well, no, we can't do that. But before you gasp in astonishment and start to look around for a manufacturer that can, let's discuss the reasons why.

A test standard details many things to which a material test must conform. Many of these are under Instron's full control – for example, the rate of load application of a testing machine or the software algorithm code for a particular calculation.

But the test must also conform to many things outside of Instron's control, such as the [specimen alignment](#), the choice of [grips](#) and [jaw faces](#), and the set up of the test control parameters.

When Instron certifies that a test instrument "meets the requirements of an ASTM or ISO standard", we are confirming that the items under our control have been measured, validated, and verified in accordance with our [ISO 9001 certification](#). We also publish letters of conformance that detail the extensive test processes that we apply to our software products.

The final certification of the actual test and associated test results must come from you. But you can rest assured that the testing equipment that you are using, when properly maintained and regularly calibrated, fully meets the requirements of the published standards.

Q. What does accreditation mean and how does it affect testing standards?

A: The International Laboratory Accreditation Cooperation (ILAC) is an international organization of laboratory and inspection accreditation bodies such as National Voluntary Laboratory Accreditation Program (NVLAP), United Kingdom Accreditation Service (UKAS), Comité Français d'Accréditation (COFRAC) and so on. Accreditation of a calibration laboratory proves its competence, capability and performance.

A [calibration service](#) will always follow an internationally accepted standard where it is available. Many standards exist to cover the verification of materials testing equipment. One of the best known is ASTM E4 - Standard Practices for Force Verification of Testing Machines.

In cases where standards do not exist, an accredited calibration laboratory can produce a custom procedure for verification and submit this for approval from their accrediting body. If an ILAC member approves a procedure, you can be sure that the work done is to the highest standard.

Our [current accreditation certificates](#) are available for download.



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