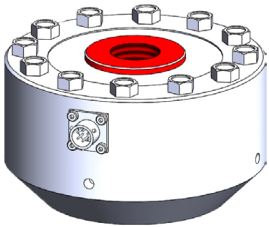




COMMON CALIBRATION MEASUREMENT ERRORS

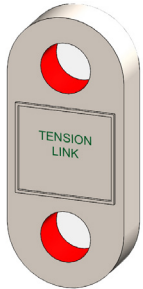
Loading Through the Shoulder Versus Thread Loading



- Different types of load cells will act differently when thread loaded or shoulder loaded.
- Varying the thread depth on a shear web type load cell can result in measurement errors up to 0.5 % or more. The recommended practice to avoid these errors is to lock an integral threaded adapter into this type of load cell. If an Integral Adapter cannot be locked into place, we recommend the cell be shoulder loaded and the adapter should be supplied by the end user.

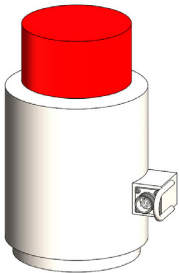
Note: Non shear web type cells may have additional errors from shoulder loading and the end user's adapters should be supplied for calibration. We have observed errors up to 1 % when varying adapters.

Tension Type Links Pin Size is Critical



- Errors of up to 20 times that of the manufacturer's specification are possible, if the proper pin size is not used
- Recommendation is to send the pin used with the instrument to best replicate calibration.
- If the pin is not available, Morehouse will list the pin size used to calibrate the device on the certificate of calibration.
- It is quite probable the instrument will not meet manufacturer's specifications, if a different type or size pin is used.

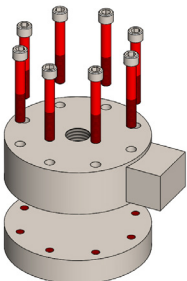
Top Block Adapter Hardness and Flatness



- Using a top adapter with a different hardness value may affect the strain level in the load cell column or web; and therefore, result in different measurement outputs.
- We have observed errors of up to 0.15% from varying the material on top compression pads.
- We highly recommend the end user send us the top adapter they are using with the load cell
- Adapters, and even load cell bases, that are not flat may produce additional errors. We have conducted several tests and have found repeatability errors to be about 3 times higher, when the compression pads or load cell base is not flat.

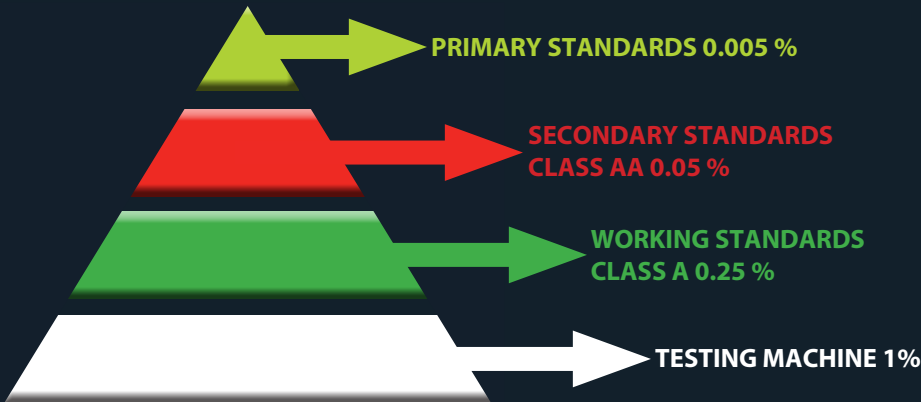
Note: Please send any top blocks used with the load cell. We can grind adapters flat for an additional fee.

Bolting A Load Cell Thread Class and Torque Applied



- We recommend bolting a load cell to a base prior to sending it to us for calibration.
- Error sources from different class of threads and different bolting procedures can be quite large.
- If the load cell must be bolted to a base, the bolts used to attach it to a base should be sent in as well as a base of similar material and flatness to what it is being used with should be sent in
- Variability between technicians, bolts, flatness base, etc., will increase measurement error and may be difficult to quantify.





PRIMARY STANDARDS

are required to calibrate Secondary Standards. Primary Standards can be used to calibrate working standards as this will often result in the lowest possible verified range of forces.

SECONDARY STANDARDS

are required to calibrate Working Standards. They cannot calibrate other Secondary Standards.

WORKING STANDARDS

are used to calibrate Testing Machines to ASTM E4.

TOP 3 ASTM E74 CALIBRATION MISTAKES

1

Designation of Verified Range of Forces

Some labs have used a force-measuring instrument's Class AA verified range of forces to assign another Class AA verified range of forces on another force-measuring instrument. This should never happen. A force-measuring instrument with a Class AA verified range of forces cannot be used to assign another Class AA verified range of forces; A force-measuring instrument with a Class A verified range of forces cannot assign another Class A verified range of forces.

Do not assign a Class AA verified range of force, unless you are calibrating with primary standards accurate to better than 0.005 %.

Do not assign a Class A verified range of forces unless you are calibrating the force-measuring instrument using a secondary standard with a Class AA verified range of forces which was calibrated with deadweight primary standards.

2

Zero can be used as the first calibrated test point.

This is not true in any way possible. In the ASTM E74 standard, the following sections point to this not being allowed.

Section 8.6.2 "The verified range of forces shall not include forces outside the range of forces applied during the calibration. If the lower force limit is less than the lowest non-zero calibration force applied, then the lower force limit of the verified range of forces is equal to the lowest calibration force applied."

Section 7.2.1 "In no case should the smallest force applied to be below the lower force limit of the force-measuring instrument as defined by the values: 400 x resolution for Class A verified range of forces 2000 x resolution for Class AA verified range of forces"

Do not assign a Class A or Class AA verified range of forces below the first non-zero force point.

Note: We have observed numerous labs violating this rule! If your verified range of forces is less than the first non-zero test point, your calibration provider is not following ASTM E74 and measurement traceability is lost.

3

A Calibration interval of one year is required for all force-measuring instruments not meeting the stability criteria set forth in ASTM E74

Calibration Intervals Per ASTM E74:

New Devices are calibrated at a one-year interval per Section 11.2 "New devices shall be calibrated at an interval not exceeding one year to determine stability"

Section 11.2.1 states "Force-measuring instruments shall demonstrate changes in the calibration values over the range of use during the recalibration interval of less than 0.032 % of reading for force-measuring instruments and systems used over the Class AA verified range of forces and less than 0.16 % of reading for those instruments and systems used over the Class A verified range of forces"

Section 11.2.2 states "Force-measuring instruments not meeting the stability criteria of 11.2.1 shall be recalibrated at intervals that shall ensure the stability criteria are not exceeded during the recalibration interval"

If the instrument is not new and meets the criteria, A two- year calibration interval can be assigned. If the stability is not met, an interval must be selected to ensure stability will be met. This could mean a 16-month interval, or it could mean 10 days. (Note: The maximum calibration interval is two years and this includes any force-measuring instrument)

OUR GUARANTEE!

We are so confident in our ability to meet your needs that we will perform a calibration, send you the data, and only charge you if you are satisfied with the results.

