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CALIBRATION BOXES FOR TESTING MACHINES

Calibration boxes are metal vessels filled with mercury. The change in volume of the vessel under load, and indirectly the load on the box, is measured by a screw micrometer.

They are supplied, commercially, for either tensile or compressive loads and of capacities suited for the testing machines usually required in measuring the properties of materials.

The Bureau of Standards has used this apparatus with the testing machines in its laboratory and, although the work is incomplete, gives the following information for those interested in this device.

Sensibility

The calibration box used here will indicate a change in load of one-half of one per cent for loads of one-tenth or more of the capacity.

Constancy

When loaded several times in a testing machine the calibration box has given the same reading for a given load indicated by the testing machine within, of course, the sensibility mentioned above.

As the calibration box is steel there is no reason to believe that the reading will change with normal use, age, or reasonable temperature changes.

Accuracy

The readings of the calibration box used by this Bureau agrees with the load indicated by standard testing machines within one-half of one per cent at loads of one-tenth or more of the capacity of the box.



Proving levers, (with standard weights), and tensile or compressive bars are frequently used for calibrating testing machines. In the choice of a calibration apparatus, the following points may be considered:

The proving lever if properly designed is sensitive and accurate but the standard weights for use with them are not readily portable.

Usually the readings of a testing machine are verified only to 10,000 pounds if levers are used.

The calibration bars are readily portable but must usually be designed and made by the user.

An extensometer sufficiently sensitive to indicate a change in load of one-half of one per cent is not readily obtained. Great care is required in transporting and using a bar of this kind to avoid injuring or changing the adjustment of the extensometer.

The calibration box, weighing about the same as a calibration bar, is readily portable. The readings are quickly and conveniently obtained. Persons, without previous experience, following the printed instructions accompanying the device have obtained readings which appear consistent.

One user has had difficulty with leakage around the glass tube which, when the apparatus is infrequently used, has made it necessary to spend one or two hours refilling with mercury and getting the air out of the instrument.

A brass guard to prevent breakage of the glass tube has also been found desirable.





