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DEPARTMENT OF COMMERCE
BUREAU OF STANDARDS
WASHINGTON

Letter
Circular
LC 251

(July 23, 1928)

HAVING STANDARD WEIGHTS TESTED BY THE BUREAU OF STANDARDS

Under regulations briefly outlined in subsequent sections, the Bureau tests and certifies the accuracy of standards submitted, but it does not manufacture or sell such standards nor does it, except in rare instances, correct those that are not sufficiently accurate.

Weights used in ordinary commercial transactions should be tested by the local or State weights and measures officials. They are accepted for test by this Bureau only in exceptional circumstances.

Weights may be submitted for test by the manufacturer or the owner. When it is intended in the case of weights being purchased, that they be tested by the Bureau, the purchaser, to protect himself, should specify that they conform to the Bureau of Standards requirements for weights of the desired class. Such weights may be shipped to the Bureau directly from the factory or warehouse, and forwarded by the Bureau to the purchaser.

SUBMITTING WEIGHTS FOR TEST

A written request for the testing should be sent when the weights are shipped. This should always indicate the class of weights submitted, and if two different tests are available in that class, the character of test desired. Sufficient information should also be given to enable the Bureau to identify the package.

If weights have already been used as standards in exacting work, and it is important to know what their corrections were at the close of such work, this fact should be stated; otherwise, weights are carefully cleaned before being tested.

Weights should be packed tightly. Sets in covered cases generally need extra packing inside the case. The very small sheet metal weights are especially likely to work out of place and be damaged.

Address packages and correspondence "Bureau of Standards, Washington, D. C."



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CLASSES OF STANDARD WEIGHTS

Six "classes" of standard weights are recognized and tested by this Bureau. Of these, Classes A, B, and C form the commercial group while Classes M, S, and S2 include laboratory standards.

Class A standards are required to be made of a single piece of metal. The larger weights of this class are, at the present time, usually made of bronze, gold-plated. They are intended for such purposes as primary State standards. The correction for each weight, given to a high degree of precision, is included in the certificate, and new weights are given a three months' test for constancy.

Class B standards must be just as accurate as those of Class A, but the requirements as to structure are not so severe, and they are certified merely as correct within the required tolerances.

Class C includes high grade "test weights", such as are intended primarily for testing the scales and weights used in ordinary commercial transactions. The errors allowable on these weights are five times those of Class B, but only one-tenth of the errors allowable on weights in use for ordinary trade. They are certified as correct within the prescribed tolerances.

Class M standards are required to be one-piece weights. They are suitable either for laboratory weighings of extreme precision such as one part in a million or better, or for very reliable reference standards. Either of two tests may be given them; the High Precision Test or the Moderate Precision Test. In both cases the correction for each weight is certified, but in the former test the corrections are certified to a higher degree of precision. To obtain this it is necessary to determine the volume of each of the larger weights by hydrostatic weighings. In the Moderate Precision Test the corrections are certified only to the same precision as for weights of Class S, with the result that the density of the weights may generally be assumed from the average density of the material of which they are made.

Class S includes high grade "analytical", and similar laboratory weights. The larger weights are commonly made with a knob merely screwed into the body. These weights must not show excessive variations in value under ordinary variations in the humidity of the air. Either of two tests may be given these weights: the Determination of Corrections, or the Tolerance Test. In the former test the corrections are certified; in the latter the Bureau certifies merely that the errors are not more than the prescribed tolerances.

Class S2 includes laboratory weights of the grade commonly recognized as "second quality analytical" or "students' sets". The allowable errors are five times those of Class S, but the

structure of the weights is generally about the same as in Class S. These weights are certified as correct within the prescribed tolerances.

Information as to the precision to which corrections will be certified for weights of Classes A, M, or S, and lists of tolerances for any class will be supplied on application to this Bureau. Full details as to specifications, tolerances, and precision of corrections together with other information as to standard weights and some of the methods of testing them are given in Bureau of Standards Circular No. 3, which may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C., at a cost of 15 cents.

FEES

Fees depend on the nature of the testing done. They are given in Test Fee Schedules 221 to 227 inclusive, copies of which will be supplied on request.

Fees are charged on all tests except those conducted for Federal or State institutions.

Fees should be paid in advance. When payment does not accompany the request for test, bills are generally sent out before the testing is done. Consequently the payment of these bills does not necessarily insure the immediate shipment of the weights.

TIME REQUIRED FOR TESTS

The most usual reason for failure to test and return weights promptly is the amount of work on hand at the time the weights are received. Work is received so irregularly that delays from this cause have sometimes reached many weeks. Recently, however, the delay due to this cause, has seldom amounted to more than 3 or 4 weeks.

New Class A standards must remain at the Bureau for more than three months because of the 3 months' constancy test.

For an ordinary set of Class S weights a period of about two weeks is required to determine whether they are sufficiently stable under variations in the humidity of the air. The cleaning, testing, checking, packing, and certification are likely to extend through another week.

For weights of other classes the time required can not be as accurately estimated and periods of from two or three days to about one month may be required, depending on the precision necessary to be obtained and on the number and denominations of the weights. The tolerance tests can be made

more quickly than the determination of corrections, largely because they do not require work of as high precision. High precision work requires relatively very much more time than work of lower precision.

When it is very important that standards be away from the laboratory or office submitting them as short a time as possible, arrangements may be made in advance to have the work done at a particular time. However, this should not be asked where it can be avoided, since under such arrangements the test must often be postponed to a somewhat later time than would otherwise be required.

CERTIFICATION AND SHIPMENT

When weights conform to the specifications and tolerances of one of the recognized classes of standards, a "certificate" is issued on completion of the test, and each weight of the commercial group is impressed with a seal, unless this is impracticable or inadvisable. For weights not conforming to the requirements a "report" is issued.

As a rule each set is treated as a whole, but when a few weights of a set are not sufficiently accurate the set may be split, a certificate being issued for the satisfactory portion and a report for the incorrect weights.

When certified weights are shipped from the Bureau, either the inner wrappings or the shipping case will be sealed, and will bear the Bureau of Standards Test Number together with any other numbers or letters that may be necessary for identification.

