

VERIFICATION OF METAL TAPES

Department of Commerce and Labor

BUREAU OF STANDARDS

Washington

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Under the provisions of an act of Congress approved March 3, 1901, establishing the Bureau of Standards, this Bureau is authorized, among other things, to compare steel and other metal tapes used in engineering, surveying, and manufacturing with the United States Bench Standard. The Bureau is now equipped with two steel Bench Standards of 150 feet and 50 meters length, respectively, so that comparisons can be made of tapes either supported throughout their entire length or at certain intervals. Steel tapes will be received for comparison subject to the following regulations:

I. REGULATIONS.

1. INTERVALS.—The total length and as many divisions as may be desired will be tested, the fee depending upon the number of divisions compared.

In many cases it is sufficient to know the correction for the full length of the tape only. For measuring distances greater or less than the full length of the tape, it is unnecessary to test more than a few additional subdivisions. For example, any distance in even feet greater or less than the full length of a 100-foot tape may be accurately measured if the corrections are known for its entire length, for each 10-foot subdivision, and for each foot of the first 10 feet.

2. TENSION.—Unless otherwise directed, the tapes of 100 feet or less graduated into customary units will be compared under a tension of 10 pounds, and at 20 pounds for tapes over 100 feet; similarly, metric tapes of 30 meters length or less at 5-kg tension and tapes over 30 meters at 10 kg. Tapes will also be tested at any other tension requested between 5 and 60 pounds, or between 2 and 25 kg. If desired, the Bureau will ascertain at what tension (to the nearest 0.5 pound or 0.25 kg) the tape is most nearly correct at the customary temperature and so certify it.

Spring balances submitted with tapes will be tested and the fee for the same charged, unless the Bureau is specially requested not to make this test. No test will be made of tension handles bearing the terminal mark, since they are necessarily used in determining the tape's length. Such tapes, however, will not be given a Bureau of Standards identification number. (See Regulation 5 below.)

3. SUPPORTS.—The sender should clearly specify the method of support desired, otherwise tapes will be compared supported throughout their entire length. If specially requested, they will be tested either (a) supported at intervals of every 10 or every 25 feet or multiples of either up to 150 feet, or, (b) for metric tapes, at every 5 meters or every 12.5 meters or multiples of either up to 50 meters, or, (c) both supported throughout and at intervals. For tapes supported at intervals only those intermediate divisions at which the tape is supported will be tested.

4. TEMPERATURE.—The corrections of the Bench Standard have been determined for 62° F. temperature for the customary units and at 20° C. for the metric units. Steel tapes

will be compared with the Bench Standard at room temperature, usually between 21° and 26° C. (70° and 79° F.), and the coefficient of the tape assumed to be the same as that of the bench for reducing the lengths to the customary temperatures, 62° F. and 20° C., at which they are certified.

It is necessary only for the most accurate geodetic work to determine the coefficient of expansion, and as this determination involves considerable time, labor, and expense those who wish this done should first correspond with the Bureau as to the accuracy desired, the time available to do the work, and the fee to be charged.

5. SERIAL IDENTIFICATION NUMBER.—A Bureau of Standards serial identification number similar to that shown below

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will be stamped or etched upon the back of the tape near the zero mark if both the initial and terminal marks are on a single piece of metal ribbon, unless the tape is in error by a large amount. The same number will be engraved upon spring balances accompanying tapes when they are not in error by more than one-quarter of a pound. A tape on which the initial mark is a wire loop, or where the terminal mark is on a spring balance or tension handle sent with the tape, or a tape which has its graduations on pieces of solder on the tape or on sleeves that are liable to come off will not be stamped with the identification number.

6. GRADUATION OF TAPES.—The Bureau does not make a practice of graduating tapes, but will undertake in special cases to place such graduations if for any reason the manufacturers will not undertake it. The fee for this, given in the schedule below, does not cover the comparison of the intervals graduated and their certification.

7. MODULUS.—Young's modulus of elasticity will be determined when desired for tapes which have all the graduations on a steel ribbon of uniform cross section.

8. TAPES WITHOUT REELS.—Attention is called to the additional charge for tapes which are not wound on a reel. This is to cover the additional cost of handling the tape during test.

9. GEODETIC COMPARATOR.—When an accuracy greater than one part in 200,000 is necessary, the Bureau will compare tapes of suitable length on a geodetic comparator with which it is equipped. Special prices for such a comparison will be quoted upon application.

II. SCHEDULE OF FEES.

The following revised schedule of fees for comparison of tapes has been established:

SCHEDULE 3.—STEEL TAPES, SUPPORTED AT INTERVALS OR THROUGHOUT THE ENTIRE LENGTH.

I. TAPES GRADUATED INTO FEET.

(a) For total length not greater than 100 feet	\$0.75
(b) For total length of 200 feet, including comparison of the 100-foot division	1.25
(c) For total length of 300 feet, including comparison of the 100-foot and 200-foot divisions	1.75
(d) For each additional 100-foot interval50
(e) For comparing tapes both supported throughout and supported at intervals there will be an additional charge for each 100-foot length of30

II. TAPES GRADUATED INTO METERS.

(f) For total length not greater than 50 meters75
(g) For total length of 100 meters, including comparison of the 50-meter division	1.25
(h) For each additional 50-meter interval50
(i) For comparing tapes both supported throughout and supported at intervals there will be an additional charge for each 50-meter length of50

III. GENERAL CHARGES.

(j) For each further subdivision compared.....	\$0.10
<i>Determination of the length at an additional tension.</i>	
(k) For tapes included above under (a) and (f).....	.10
(l) For tapes included above under (b) and (g).....	.20
(m) For each additional 100-foot or 50-meter interval there will be an additional charge for an additional tension of.....	.10
(n) For determining the tension to the nearest 0.5 pound or 0.25 kilogram at which the tape is most nearly correct at the standard temperature there will be a charge for each 100-foot interval or 50-meter interval in addition to the charges under items I and II of.....	.25
<i>Determination of modulus of elasticity.</i>	
(o) For special determination of the modulus of elasticity for tapes included above under (a) and (f).....	.75
(p) For the same for each additional interval of 100 feet or 50 meters there will be an additional charge of....	.25
<i>Miscellaneous charges.</i>	
(q) For testing spring balances accompanying steel tapes.....	.25
(r) For graduating tapes, each line (this does not include the comparison of the lines).....	.50
(s) For tapes not sent on a reel there will be an additional charge for each 100-foot or 50-meter length or fraction thereof of.....	.25
(t) Discount from above fees of 20 per cent will be allowed when tapes are submitted in lots of ten or more.	
(u) Items not covered in the above schedule will be charged at moderate rates.	

III. CERTIFICATION.

The certificate furnished by the Bureau of Standards will contain the following data:

- (a) Description of tape.
- (b) Bureau of Standards number, where allowed. (See Regulation 5, above.)
- (c) Name of party for whom tape is compared.
- (d) The name of the maker.
- (e) Method of support of tape.
- (f) Tension at which the tape is compared and at which it should be used.
- (g) Correction of each interval compared, at the standard temperature, which is 62° Fahrenheit for customary tapes and 20° centigrade for metric tapes.
- (h) Temperature at which comparison is made and the assumed coefficient of expansion used in the computation of the length for the standard temperature.
- (i) Bureau of Standards test number.
- (j) Date of the comparison.
- (k) The signature of the Director.
- (l) The seal of the Bureau.
- (m) Special remarks, when necessary.

IV. DIRECTIONS FOR SUBMITTING TAPES.

APPLICATION FOR TEST.—The request (in writing) should specify the intervals which it is desired to have compared, the method of support, the tension to be used, and any other details of test desired. If more than one tape is submitted at a time, reference numbers should be used to identify the tapes if they are to be tested differently.

IDENTIFICATION MARKS.—Tapes and the packages in which they are shipped should both be plainly marked to facilitate identification, preferably with the name of the manufacturer or shipper, and a special reference number given to each article, which should be referred to in the correspondence concerning the test. After receipt at the Bureau, the Bureau of Standards test number should also be used.

SHIPPING DIRECTIONS.—Tapes should be securely packed in cases or packages which may be used in returning them to the owner. In all cases transportation charges are payable by the party desiring the test, and *should be prepaid*.

ADDRESS.—Articles and communications should be addressed simply “Bureau of Standards, Department of Commerce and Labor, Washington, D. C.,” and not to members of the Bureau staff. Delays incident to other forms of address will thus be avoided.

RETURN OF TAPES.—Tapes will be returned by express, charges “collect,” unless otherwise arranged for. Articles are not returned until all charges due the Bureau have been paid.

REMITTANCES.—Fees, in accordance with the schedule given above, should be remitted by money order drawn to the order of the “Bureau of Standards,” and should be sent with the test whenever practicable. Delays in forwarding fees involve corresponding delays in the return of articles tested, as the articles are held until the fees due thereon have been paid.

S. W. STRATTON,
Director.

Approved:

CHARLES NAGEL,
Secretary.

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