

ATHLETICS AUSTRALIA FACILITIES & EQUIPMENT COMMITTEE

MEASURING TAPES & BARS, AND WEIGHING MACHINES

Introduction

For information on the IAAF's requirements for calibration of steel tapes, steel bars and weighing machines to be used for measuring records please refer to the IAAF Calibration Handbook. A copy of the relevant part of the Handbook concerning these apparatus is at Appendix A herewith.

The information in this document has been taken from SAA/SNZ HB86.2: 1998 "A guide to the selection, care, calibration and checking of measuring instruments in industry. Part 2: Simple length and angle measuring instruments".

Similar information to that in this document concerning vernier calipers and steel measuring rules can be found in the referenced Australian Standard.

Steel Tape Selection

The Australian Standard HB 86.2 notes that the tapes should meet the requirements of AS 1294. In this regard, tapes that are calibrated to the IAAF requirements will also meet AS 1294.

Australian Standard HB86.2 further notes that steel tapes may be used as either working or reference tapes. In athletics terms reference tapes should only be used for measuring records or used to check the accuracy of other measuring devices or tapes. For most general athletics competitions' horizontal jumps and throws will be measured with fibreglass tapes.

Steel tapes are available as epoxy coated steel tapes with printed scales but for more demanding applications tapes with an etched or engraved scale should be used. Both types are supplied to the same standard so that for athletics purposes the cheaper epoxy coated tape should be satisfactory as a reference tape provided it is properly calibrated.

The majority of steel tapes are supplied, housed in a case with an integral winding drum and winding handle.

Steel tapes to be used for reference purposes should be supplied with a full calibration certificate by the supplier. This will cost more but should be cheaper than buying the tape without a certificate then have to pay for a test laboratory to undertake a calibration test. The supplier should be advised when purchasing the tape that the calibration must meet IAAF requirements.

The manufacturer should advise as to the correct calibration tension for the tape(s) it is supplying. It is usually 50N for 50m and shorter tapes and 100N for 100m tapes.

Care, storage and use

Examine the tape for damage before use. If there is evidence of damage then this should be noted on its history record. If there is doubt as to its accuracy then it should be recalibrated or replaced.

As noted above the tape should only be used for measuring records or check of other measuring devices.

After use the tape should be thoroughly cleaned and wiped dry with a clean soft cloth before it is wound into its drum or into its case.

Care has to be taken so as not to overtension the tape during use and rewinding as this could cause permanent elongation.

Tapes should be stored under cover except when brought out for use. Tapes are calibrated at a standard temperature of 20⁰C and if a tape is left out in the sun so that its temperature exceeds 20⁰C it will measure under the true distance.

Regular Checking

Visually examine the tape for corrosion, bends or kinks in the tape, distortion or wear of the end hook, clarity of numbering and scale marks.

Check the freeness of the winding mechanism.

Calibration

Calibration can only be undertaken by laboratories that are accredited to NATA (National Association of Testing Authorities, Australia) or an equivalent overseas organisation. In this way the calibration can be traced back to the national standards of measurement. The list of accredited laboratories can be found on the NATA website.

The calibration should be undertaken in accordance with the requirements of the IAAF Calibration Handbook and the calibration certificate should have the information listed in the IAAF Calibration Handbook. All these requirements should be made clear to the calibration laboratory, or the steel tape supplier in case of original purchase, when they are asked to price the calibration.

Record Keeping

A complete record of all inspections, checks and calibration must be kept. The apparatus should have an identifying number marked indelibly on the tape apparatus and the calibration dates also marked, so that this will assist locating reference correspondence, plus the calibration tension for measuring tapes so that this tension is used when measuring records or checking other tapes.

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AA Facilities & Equipment Committee
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Steel Measuring Tapes Calibration

Applicable Standards:

ISO 8322-2 1999 Building construction - Measuring instruments - Procedures for determining accuracy in use - Part 2 Measuring tapes, or
BS 4035 Specification for linear measuring instruments for use on building and civil engineering construction works. Steel measuring tapes and retractable steel pocket rules, or
AS 1290.5-1999 Linear measuring instruments used in construction. Part 5: Coated and etched steel measuring tapes.

Tape Tension:

50m or shorter 50N
longer than 50m 100N or the tape manufacturer's specified tensile force

Test Temperature:

20°C

Accuracy:

±(0.5 mm + 0.1 mm/m)

Graduation Test Intervals:

Every 10m for initial and subsequent calibrations.

Recalibration Intervals:

Every four years or after damage/repair of the tape.

Limitation on Use:

The calibrated steel tape should not be used for other than measuring records or checking the accuracy of other working tapes.

Steel Measuring Bars Calibration

Applicable Standards:

BS 4372 1968 Specifications for engineer's steel measuring rules

Test Temperature:

20°C

Accuracy:

±(0.5 mm + 0.1 mm/m)

Graduation Test Intervals:

Every 1m for initial and subsequent calibrations.

Recalibration Intervals:

Every four years or after damage/repair of the bar.

Limitation on Use:

The calibrated steel tape should be used for checking the accuracy of other working measuring bars.

CALIBRATION OF WEIGHING MACHINES

Applicable Standards:

As laid down by the national laboratory accreditation authority.

Test Temperature:

20°C

Accuracy:

± 0.1 gram

Reading

To the next lower graduation if it is not an even graduation.

Test Intervals:

Every 0.5kg from 0.5kg to 10kg for initial and subsequent calibrations.

Recalibration Intervals:

Every year or after damage/repair of the machine.

Limitation on Use:

The weighing machine should be located on a firm flat surface and not be moved.

Comment:

When implements and other equipment are being check weighed at the stadium the mass shall be recorded to the next lower gram unless the mass measured is an even gram. The current calibration certificate shall accompany record applications for the weighing apparatus used to check the mass of the implement before and after the competition.

Test and Calibration Reports

The test and/or calibration reports should provide all the necessary information for verifying that the measuring device is suitable for use in IAAF competitions.

The following information should be included in each report:

- A title
- Name and address of the laboratory, and the location where the testing/calibrations were carried out, if different from the address of the location.
- Unique identification of the test/calibration document, including on each page an identification to ensure that the page is recognised as part of the document and a clear identification of the end of the document.
- Name and address of the client.
- Identification of the method used.
- Description, condition and identification of the item tested or calibrated.
- Date of receipt of the test/calibration item where applicable and the date the work was carried out.
- Reference to the sampling plan and procedures used by the laboratory or other bodies where applicable.
- Results with, where appropriate, the units of measurement.
- Name, function and signature or equivalent identification of the person authorising the test/calibration document.
- A statement on the estimated uncertainty of measurement where applicable
- A statement to the effect that the results relate only to the item tested or calibrated where appropriate.
- Where necessary for the interpretation of the test results the following shall be included:
 1. Deviations, additions or exclusions from the test method, and specific test conditions, e.g. environmental conditions.
 2. A statement of compliance/non-compliance with requirements and/or specifications.
 3. Additional information required by specific methods or clients.
 4. Opinions and interpretations where appropriate and needed.
 5. Additional information required by specific methods or clients.

Calibration Certificates in addition to the information listed above shall include also where necessary for the interpretation of calibration results:

- Conditions, e.g. environmental conditions during calibration that have an influence on the measurement results.
- Uncertainty of measurement and/or a statement of compliance with an identified metrological specification
- Evidence that the measurements are traceable.

- If a statement of compliance with a specification is made, the clauses of the specification, which are met or not met, must be identified.
- Where a statement of compliance is made omitting the measurement results and associated uncertainties, the laboratory must record and retain those results.
- The uncertainty of measurement must be taken into account when statements of compliance are made.
- The calibration results before and after adjustment or repair, if available, must be reported.
- Calibration certificates or labels must not contain any recommendation on the calibration interval except when requested by the client.

When testing and calibration results are obtained from sub-contractors, the results of tests performed by sub-contractors must be clearly identifies.

Where calibration work has been sub-contracted, the laboratory performing the work must issue the calibration certificate to the contracting laboratory.

Amendments to a test report or calibration certificate after issue must be in the form of another document and include reference to the original document. If a new test report or calibration certificate is required, it must be uniquely identified and include reference to the original it replaces.