

UNIVERSITY OF NEW SOUTH WALES

DEPARTMENT OF SURVEYING

STANDARD TAPE

Description: The Standard Tape is a 100m/310 ft. steel surveying tape of cross-section  $\frac{1}{8}$  inch x  $\frac{1}{50}$  inch, graduated and numbered at 0, 25, 50, 75 and 100 metres and at 100, 200, 300 and 310 ft. The tape also has auxiliary graduations at 15, 40, 65 and 90 metres. At each end of the tape there is a brass sleeve and an eye. The brass sleeve at the leading end is marked "15 70". This tape was examined at the National Standards Laboratory (CSIRO) in March 1969 and has been marked "APT 3246" at that laboratory. Identifying colour patches of araldite have been placed on either side of the graduations, yellow for metres and red for feet. The zero graduation is identified by a yellow and a red patch. The tape is on a wooden reel with stand.

Standardisation: The lengths of the 0/25m, 0/5m, 0/75m, 0/100m, 0/100 ft, 0/200 ft, 0/300 ft, 0/310 ft intervals of the tape, on a flat horizontal frictionless surface at a tension of 15 lbs. and a temperature of 20°C (68°F) have been determined from comparison with Laboratory Standards. The results of these determinations are given below.

Interval	Length on the flat at 15 lbs. tension and 20°C.
0/25m	24.999 5m
0/50m	49.999 7m
0/75m	74.999 7m
0/100m	99.999 6m
0/100 ft.	100.003 9ft.
0/200 ft.	200.007 3ft.
0/300 ft.	300.011 1ft.
0/310 ft.	310.011 1ft.

The values given in the table are considered to be accurate within  $\pm 1$  part in 100,000. All the measurements were made on that part of the graduation line within approximately 0.3mm of the graduated edge of the tape.

The weight per unit length of the tape was found to be 0.0269 lb/m, or 0.0082 lb/ft.

The value of the linear coefficient of thermal expansion of the tape may be assumed as  $11 \times 10^{-6}$  per deg.C or  $6 \times 10^{-6}$  per deg.F.

Note: The auxiliary graduations at 15, 40, 65 and 90 metres were not examined.

## Care and Maintenance

The utmost care must be exercised at all times when using this tape. Only members of staff or senior students under direct staff supervision are permitted to use this tape. When unwinding from, or winding on to the reel, the tape should not be allowed to drag on the ground. After measurements have been made with the tape, it should be wiped clean and a thin film of RP7 (anti-corrosion fluid) applied to it. Cotton waste and a bottle of RP7 for this purpose are in the accessory box.

## Accessories 14.3.83

- 3 Thermometers
- 1 Brush for cleaning scale blocks
- 2 ~~4~~ Magnifying glasses
- 2 Cord pulley cylinders
- 2 Spindles for cord pulleys
- 1 ~~2~~ Allan keys for pulley cylinders
- 0 ~~1~~ 1 Bridge for holding 300 ft. end of working tape
- ✓ 1 Slide for reading 0ft end of working tape
- ✓ 1 Bottle RP7 and cotton waste
- Cords and clips
- Weights 2 10lb (including hooks)
- 4 5lb.

## General Comments

The Standard Base is oriented approximately North-South and therefore during the mid-day hours when the base is in direct sunlight, reliable estimates of the tape temperature cannot be made. Therefore, if accurate standardisation is required, measurements should be confined to the early/mid morning and mid/late afternoon periods or made on overcast days.

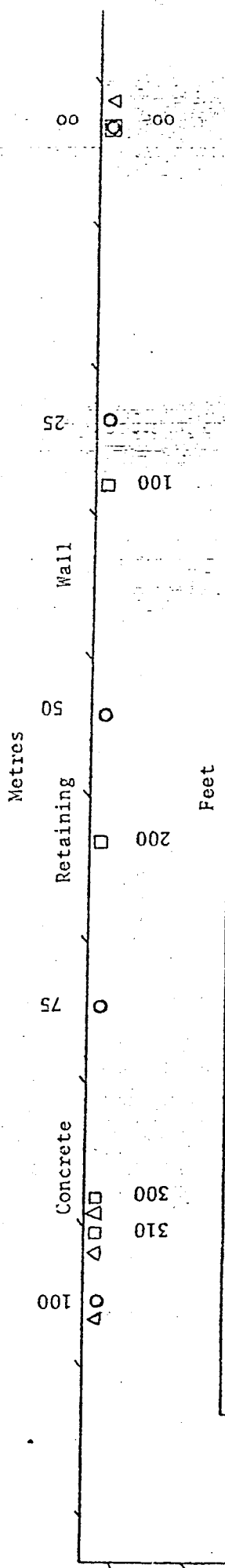
Care should be exercised with the tensioning of tapes which are to be standardised. The tape should be unwound and passed over the base. The eye at the 300 ft. end of the tape should be placed over the stud on the zero block, the bridge placed in position and then the weight applied gently.

The results of all calibrations of the Standard Base and standardisations of working tapes are to be recorded in a book kept specially for this purpose with the apparatus. A uniform system of recording this information will enable us to (a) gauge the stability of the base and (b) list the standardisation of all survey tapes.

We are indebted to the School of Mechanical and Industrial Engineering for allowing us to use the wall at the rear of their building. It should be brought to the attention of students using the Standard Base facility that some offices and classrooms are located in this area. Shouting will not be permitted and noise is to be kept to a minimum.

G.G. BENNETT,  
Senior Lecturer,  
Department of Surveying

March 1969.



MECHANICAL ENGINEERING

LABORATORY BUILDING

Legend

- Foot Scales
  - Metre Scales
  - △ Pulley Brackets
- LAYOUT OF TAPE STANDARDISING BASE

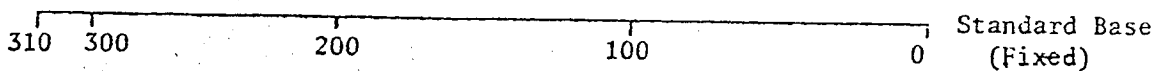
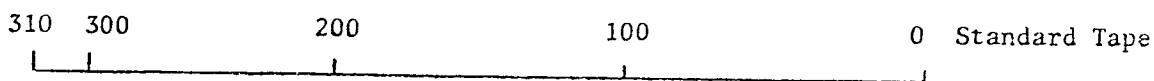
DEPARTMENT OF SURVEYING

UNIVERSITY OF NEW SOUTH WALES

Not to scale

Example (Feet)

Stage 1 : Calibration of the Standard Base



Date: 21/3/69

Observers: A,B,C, & X,Y,Z.

Tension: 15lbs

Scale Measurements L & R\*

	310	300	200	100	0
1.	L 0.008	L 0.010	L 0.007	L 0.002	R 0.005
2.	L 0.020	L 0.021	L 0.018	L 0.012	L 0.004
3.	R 0.003	R 0.003	R 0.005	R 0.009	R 0.017

Temperature		
74°	75°	76°

Mean Temperature

75° F

Corrections for temperature\*\*  $(75-62) \times 6 \times 10^{-6} \times 100 = +0.008$   
 " " " 200 = +0.016  
 " " " 300 = +0.023  
 " " " 310 = +0.024

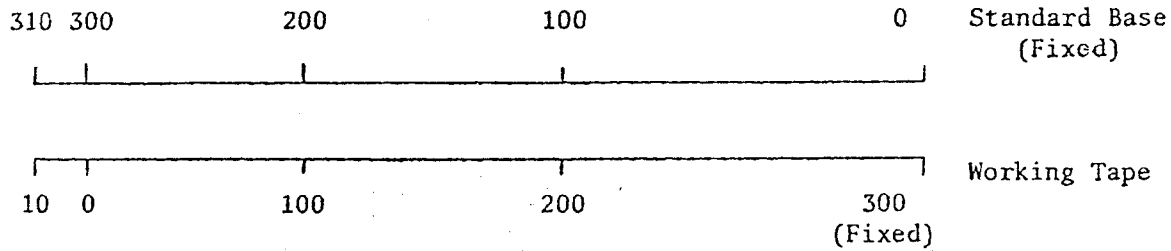
Intervals

		310-0	300-0	200-0	100-0
Reduced	1	309.987	299.985	199.988	99.993
Tape	2	4	3	6	2
Measurements	3	6	6	8	2
Mean		309.986	299.985	199.987	99.992
Temperature Correction		+ 24	+ 23	+ 16	+ 8
Final distances		310.010	300.008	200.003	100.000

L & R refer to the scale graduations to the left and right of the scale zero respectively as viewed by the observer facing the Standard Base.

\* The Standard Tape is of correct length at 62° F/15lbs.

Example (Feet)



Date: 21/3/69

Observers: A,B,C, & X,Y,Z.

Tension: 15lbs

Tape No. 99

Scale Measurements L & R

10	0	100	200
R 0.018	R 0.020	R 0.010	R 0.003

Temperature		
78°	78°	79°

Mean Temperature

78° F

	10-0	0-100	0-200	0-300
Standard <small>(See Stage 1)</small>	10.002	100.005	200.008	300.008
Measured	9.998	100.010	200.017	300.020
Difference	+4*	-5	-9	-12

Temperature at which Working Tape is of correct length

Interval	Temperature
0-100	$78^{\circ} + \frac{1}{6 \times 10^{-6}} \left( \frac{+5 \times 10^{-3}}{100} \right) = 86^{\circ}$
0-200	$78^{\circ} + \frac{1}{6 \times 10^{-6}} \left( \frac{+9 \times 10^{-3}}{200} \right) = 86$
0-300	$78^{\circ} + \frac{1}{6 \times 10^{-6}} \left( \frac{+12 \times 10^{-3}}{300} \right) = 85$

Mean 85° F.

\* If this difference is significant then the reader link should be adjusted.