

LANGE SKINFOLD CALIPER

Operators Manual



INTRODUCTION

The Lange Skinfold Caliper is a precision instrument specifically designed for the simple, accurate measurement of subcutaneous tissue. Exclusively manufactured by Beta Technology, it is widely recognized by medical and physical fitness professionals as a leader in the field. This manual contains operational information on the Lange Caliper.



Do not begin any program of body composition alteration without the advice of a physician. This manual is not a program for alteration of body/fat composition.

USING THE LANGE SKINFOLD CALIPER

An efficient and practical way to measure body fat is by measuring skinfolds. The Lange Skinfold Caliper assures you of accurate measurements necessary for valid testing.

FOR ACCURATE SKINFOLD MEASUREMENTS

- Take skinfold measurements directly on skin – not through clothing
- Pick up and hold skinfold with thumb and forefinger of one hand. Apply the jaws of the caliper to the skinfold about 1/4 to 1/2 an inch from the fingers holding the fold.
- Do not release the fingers holding the fold. **The caliper should only be used to measure the thickness of the fold, not to hold the skin folded. Any pressure placed on the caliper jaws as a result of their holding the skinfold in a folded state will result in an incorrect higher reading.**
- Measure each of the 4 sites, the triceps, biceps, subscapular and suprailiac. It is only necessary to take 1 measurement at each site for reasonable accuracy. For slightly greater accuracy you can take 2 or 3 measurements at each site and use the average as your measurement.

LOCATING AND MEASURING SKINFOLDS

Locate and measure each skinfold with care. Results may vary if measurements are not consistently taken at the exact locations.

Skinfold sites illustrated are those used to compile the tables contained in this booklet.

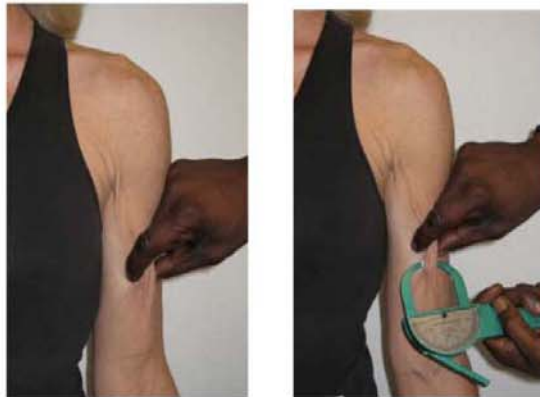
TRICEPS



Between the tip of the olecranon process of the ulna (elbow) and the acromion process of the scapula (shoulder).

1. With a grease pencil, mark the point of the back of the arm midway between the tip of the elbow and the shoulder.*
2. Pick up skinfold with thumb and forefinger of the left hand.
3. Apply jaws of the caliper to the skinfold so that the grease mark is midway between the jaws.
4. Release your thumb from the caliper handle, so that the tips of the caliper have full exertion on the skinfold. Take reading immediately after the first rapid fall.
5. One reading at each site will give reasonable accuracy but if you wish greater accuracy you can take 2 or 3 readings at each site and use the average of these readings.

BICEPS

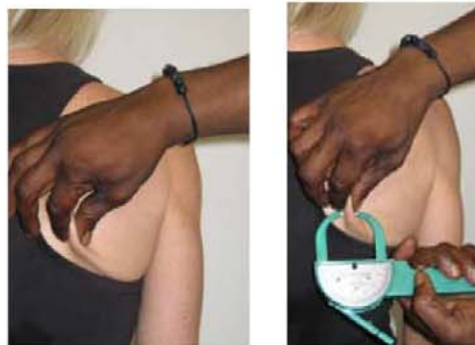


Midpoint muscle belly (This will generally be at a point on the arm just opposite the nipple.)

1. With grease pencil mark the point midway the flexed bicep muscle. Arm to be tested should be relaxed and in a perpendicular position before taking measurement.
2. Following natural fold, pick up skinfold with thumb and forefinger of the left hand.
3. Proceed with steps 3, 4, and 5, in Triceps section.

**With experience marking site may be eliminated.*

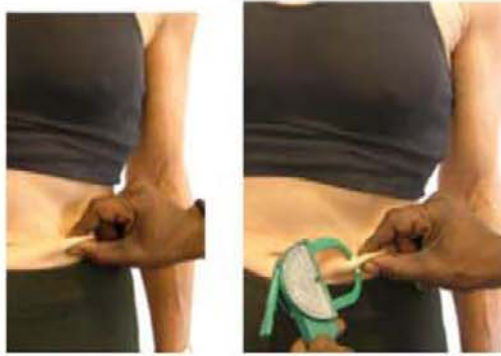
SUBSCAPULAR



Below tip inferior angle scapula 45 degrees to vertical (back – just under shoulder blade.)

1. Pick up skinfold just under the shoulder blade – following the natural fold of the skin.
2. With grease pencil, mark midway the fold. While holding the skinfold approximately 1 inch from the mark, proceed with steps 3, 4, and 5; in Triceps section.

SUPRAILIAC



Above ileac crest in mid-axillary line. (approximately 2.5 cm above hip bone.)

1. Pick up skinfold following the natural fold of the skin (approximately horizontal).
2. With grease pencil, mark midway the fold. While holding the skinfold approximately 1/4 to 1/2 inch from the mark, proceed with steps 3, 4, and 5; in Triceps section.

TO CONVERT SKINFOLD MEASUREMENTS INTO PERCENT OF BODY FAT

For reference. Percent of Body Fat tables based on research involving the 4 skinfold sites illustrated (triceps, biceps, subscapular and suprailiac) follow. Tables A and B are printed with permission of The Mayo Foundation; Tables C and D are printed with permission of The American Alliance for Health, Physical Education, Recreation and Dance. Please refer to publications by these organizations for further information on the subject.

USING THE TABLES: ADULT MEN: TABLE A, ADULT WOMEN: TABLE B

Add up the 4 skinfold measurements, either the single measurements or the averages if you decide to take more than 1 measurement at each site. This will give you the sum of the measurements for all 4 sites. Refer to the appropriate chart for the person being measured, Male or Female. Go down the first column titled "Sum of Skinfold Measurements" until you come to the number that is closest to the sum. Then read across to the line to the appropriate age column. The figure in the column is the percent body fat. The percent body fat number is the percent of the person's total body weight that is fat.

Body Fat and Skinfolds

The equivalent fat content, as a percentage of body weight, for a range of values for the sum of four skinfolds (biceps, triceps, subscapular and suprailiac) of males and females of different ages.

Table A: Males – Read down the first column until you come to the number closest to the sum of the 4 measurements, either the single measurements or the averages.

Then read across to the column for the age bracket of the person being measured. The number in that column is the percent body fat.



| Sum of Skinfold Measurements | TABLE A - ADULT MEN | | | |
|------------------------------|---------------------|---------|---------|-------|
| | Ages | | | |
| | 17 - 29 | 30 - 39 | 40 - 49 | 50+ |
| Percent Body Fat | | | | |
| 15 | 4.8 | - | - | - |
| 20 | 8.1 | 12.2 | 12.2 | 12.6 |
| 25 | 10.5 | 14.2 | 15.0 | 15.6 |
| 30 | 12.9 | 16.2 | 17.7 | 18.6 |
| 35 | 14.7 | 17.7 | 19.6 | 20.8 |
| 40 | 16.4 | 19.2 | 21.4 | 22.9 |
| 45 | 17.7 | 20.4 | 23.0 | 24.7 |
| 50 | 19.0 | 21.5 | 24.6 | 26.5 |
| 55 | 20.1 | 22.5 | 25.9 | 27.9 |
| 60 | 21.2 | 23.5 | 27.1 | 29.2 |
| 65 | 22.2 | 24.3 | 28.2 | 30.4 |
| 70 | 23.1 | 25.1 | 29.3 | 31.6 |
| 75 | 24.0 | 25.9 | 30.3 | 32.7 |
| 80 | 24.8 | 26.6 | 31.2 | 33.8 |
| 85 | 25.5 | 27.2 | 32.1 | 34.8 |
| 90 | 26.2 | 27.8 | 33.0 | 35.8 |
| 95 | 26.9 | 28.4 | 33.7 | 36.6 |
| 100 | 27.6 | 29.0 | 34.4 | 37.4 |
| 105 | 28.2 | 29.6 | 35.1 | 38.2 |
| 110 | 28.8 | 30.1 | 35.8 | 39.0 |
| 115 | 29.4 | 30.6 | 36.4 | 39.7 |
| 120 | 30.0 | 31.1 | 37.0 | 40.4 |
| 125 | 30.5 | 31.5 | 37.6 | 41.1 |
| 130 | 31.0 | 31.9 | 38.2 | 41.8 |
| 135 | 31.5 | 32.3 | 38.7 | 42.4 |
| 140 | 32.0 | 32.7 | 39.2 | 43.0 |
| 145 | 32.5 | 33.1 | 39.7 | 43.6 |
| 150 | 32.9 | 33.5 | 40.2 | 44.1 |
| 155 | 33.3 | 33.9 | 40.7 | 44.6 |
| 160 | 33.7 | 34.3 | 41.2 | 45.1 |
| 165 | 34.1 | 34.6 | 41.6 | 45.6 |
| 170 | 34.5 | 34.8 | 42.0 | 46.10 |
| 175 | 34.9 | - | - | - |
| 180 | 35.3 | - | - | - |
| 185 | 35.6 | - | - | - |
| 190 | 35.9 | - | - | - |
| 195 | - | - | - | - |
| 200 | - | - | - | - |
| 205 | - | - | - | - |

Table B: Females - Read down the first column until you come to the number closest to the sum of the 4 measurements, either the single measurements or the averages.

Then read across to the column for the age bracket of the person being measured. The number in that column is the percent body fat.

| Sum of Skinfold Measurements | Ages | | | |
|------------------------------|------------------|---------|---------|------|
| | 16 - 29 | 30 - 39 | 40 - 49 | 50+ |
| | Percent Body Fat | | | |
| 15 | 10.5 | - | - | - |
| 20 | 14.1 | 17.0 | 19.8 | 21.4 |
| 25 | 16.8 | 19.4 | 22.2 | 24.0 |
| 30 | 19.5 | 21.8 | 24.5 | 26.6 |
| 35 | 21.5 | 23.7 | 26.4 | 28.5 |
| 40 | 23.4 | 25.5 | 28.2 | 30.3 |
| 45 | 25.0 | 26.9 | 29.6 | 31.9 |
| 50 | 26.5 | 28.2 | 31.0 | 33.4 |
| 55 | 27.8 | 29.4 | 32.1 | 34.6 |
| 60 | 29.1 | 30.6 | 33.2 | 35.7 |
| 65 | 30.2 | 31.6 | 34.1 | 36.7 |
| 70 | 31.2 | 32.5 | 35.0 | 37.7 |
| 75 | 32.2 | 33.4 | 35.9 | 38.7 |
| 80 | 33.1 | 34.3 | 36.7 | 39.6 |
| 85 | 34.0 | 35.1 | 37.5 | 40.4 |
| 90 | 34.8 | 35.8 | 38.3 | 41.2 |
| 95 | 35.6 | 36.5 | 39.0 | 41.9 |
| 100 | 36.4 | 37.2 | 39.7 | 42.6 |
| 105 | 37.1 | 37.9 | 40.4 | 43.3 |
| 110 | 37.8 | 38.6 | 41.0 | 43.9 |
| 115 | 38.4 | 39.1 | 41.5 | 44.5 |
| 120 | 39.0 | 39.6 | 42.0 | 45.1 |
| 125 | 39.6 | 40.1 | 42.5 | 45.7 |
| 130 | 40.2 | 40.6 | 43.0 | 46.2 |
| 135 | 40.8 | 41.1 | 43.5 | 46.7 |
| 140 | 41.3 | 41.6 | 44.0 | 47.2 |
| 145 | 41.8 | 42.1 | 44.5 | 47.7 |
| 150 | 42.3 | 42.6 | 45.0 | 48.2 |
| 155 | 42.8 | 43.1 | 45.4 | 48.7 |
| 160 | 43.3 | 43.6 | 45.8 | 49.2 |
| 165 | 43.7 | 44.0 | 46.2 | 49.6 |
| 170 | 44.1 | 44.4 | 46.6 | 50.0 |
| 175 | - | 44.8 | 47.0 | 50.4 |
| 180 | - | 45.2 | 47.4 | 50.8 |
| 185 | - | 45.6 | 47.8 | 51.2 |
| 190 | - | 45.9 | 48.2 | 51.6 |
| 195 | - | 46.2 | 48.5 | 52.0 |
| 200 | - | 46.5 | 48.8 | 52.4 |
| 205 | - | - | 49.1 | 52.7 |
| 210 | - | - | 49.4 | 53.0 |

In two-thirds of the instances the error was within +/-3% of the body weight as fat for the woman and +/-5% for the men.

Modified from Durman J.V.G.A., and Womersley, J. Body fat assessed from total body density and its estimation from skinfold thickness. *Measurements on 481 men and women aged from 16 to 72 years. Br. J. Nutr.*...32:7797.1974 by permission of the Nutritional Society.

From tables on page 279 of *Mayo Clinic Diet Manual Fifth Edition* published by W.B. Saunders Company of Philadelphia 1981; by permission of Mayo Foundation and Cambridge University Press, publishers of the *British Journal of Nutrition*.

YOUTH: TABLES C AND D

The technique for measuring youths is the same as for adults. However, only 2 measurements are necessary for the following Tables. These are the triceps and subscapular. To use the Tables you simply add these 2 readings together. Only a single measurement at each site will provide reasonably accurate results but if slightly more accuracy is desired, 2 or 3 readings at each site can be taken and then averaged.

The following Tables for youths do not convert skinfold measurements into bodyfat. There is no reliable data for this because of the wide variation in physical development of children as they grow. The Tables instead show how the sum of the 2 skinfolds compares on a percentile basis with the national averages of youths of the same age. The relationship of skinfold thickness to body fat in children and individuals under 17 is addressed by The American Alliance for Health, Physical Education, Recreation and Dance in the publication *Lifetime Health Related Physical Fitness Test Manual* as follows: "The percentile value reflects the percentage of boys and girls in the national sample who had or exceeded that skinfold thickness. To illustrate, for a 15-year-old girl, the 25th percentile for the sum of the triceps and subscapular skinfolds is 34 mm. This shows that the sum of the skinfolds was 34 mm or more in 25% of the girls aged 15. As shown, the higher the skinfold readings, the lower the percentile. Thus, low percentile rankings reflect a higher degree of fatness."

TABLE C: YOUTH BOYS PERCENTILE NORMS.

Ages 6 – 18 for Sum of Triceps plus Subscapular Skinfolds (mm) for Boys***

| | | Age of Youth – Boys | | | | | | | | | | | | | | | | |
|----------------------------------|--------------------------------------------|---------------------|----|----|----|----|----|----|----|----|----|----|----|--|--|--|--|--|
| | | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | | | | | |
| National Percentile Average Norm | Sum of Tricep and Subscapular Measurements | | | | | | | | | | | | | | | | | |
| | 99 | 7 | 7 | 7 | 7 | 7 | 8 | 8 | 7 | 7 | 8 | 8 | 8 | | | | | |
| | 95 | 8 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | | | | | |
| | 90 | 9 | 9 | 9 | 10 | 10 | 10 | 10 | 10 | 9 | 10 | 10 | 10 | | | | | |
| | 85 | 10 | 10 | 10 | 10 | 11 | 11 | 10 | 10 | 10 | 11 | 11 | 11 | | | | | |
| | 80 | 10 | 10 | 10 | 11 | 11 | 12 | 11 | 11 | 11 | 11 | 11 | 11 | | | | | |
| | 75 | 11 | 11 | 11 | 11 | 12 | 12 | 11 | 12 | 11 | 12 | 12 | 12 | | | | | |
| | 70 | 11 | 11 | 11 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | | | | | |
| | 65 | 11 | 11 | 12 | 12 | 13 | 13 | 13 | 12 | 12 | 13 | 13 | 13 | | | | | |
| | 60 | 12 | 12 | 12 | 13 | 13 | 14 | 13 | 13 | 13 | 13 | 13 | 13 | | | | | |
| | 55 | 12 | 12 | 13 | 13 | 14 | 15 | 14 | 14 | 14 | 13 | 14 | 14 | | | | | |
| | 50 | 12 | 12 | 13 | 14 | 14 | 16 | 15 | 15 | 14 | 14 | 14 | 14 | | | | | |
| | 45 | 13 | 13 | 14 | 14 | 15 | 16 | 15 | 16 | 14 | 15 | 15 | 16 | | | | | |
| | 40 | 13 | 13 | 14 | 15 | 16 | 17 | 16 | 17 | 15 | 16 | 16 | 16 | | | | | |
| | 35 | 13 | 14 | 15 | 16 | 17 | 19 | 17 | 18 | 16 | 18 | 17 | 17 | | | | | |
| | 30 | 14 | 14 | 16 | 17 | 18 | 20 | 19 | 19 | 18 | 18 | 18 | 19 | | | | | |
| | 25 | 14 | 15 | 17 | 18 | 19 | 22 | 21 | 22 | 20 | 20 | 20 | 21 | | | | | |
| | 20 | 15 | 16 | 18 | 20 | 21 | 24 | 24 | 25 | 23 | 22 | 22 | 24 | | | | | |
| | 15 | 16 | 17 | 19 | 23 | 24 | 28 | 27 | 29 | 27 | 25 | 24 | 26 | | | | | |
| 10 | 18 | 18 | 21 | 26 | 28 | 33 | 33 | 36 | 31 | 30 | 29 | 30 | | | | | | |
| 5 | 20 | 24 | 28 | 34 | 33 | 38 | 44 | 46 | 37 | 40 | 37 | 38 | | | | | | |

* The norms for age 17 may be used for age 18.

** Based on data from Johnston F.E., D.V. Hamill and S. Lemeshow (1) *Skinfold Thickness of Children 6-11 Years (Series, II, No. 120, 1972)*, and (2) *Skinfold Thickness of Youths 12 – 17 Years (Series II, No. 132, 1974)*. U.S. National Center for Health Statistics, U.S. Department of HEW, Washington D.C.

TABLE D: YOUTH GIRLS PERCENTILE NORMS.

Ages 6 – 18 for Sum of Triceps plus Subscapular Skinfolts (mm) for Girls***

| National Percentile Average Norm | Age of Youth - Girl | | | | | | | | | | | | |
|----------------------------------|--------------------------------------------------------|----|----|----|----|----|----|----|----|----|----|----|--|
| | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | |
| | Total Body Fat Measurement from Tricep and Subscapular | | | | | | | | | | | | |
| 99 | 8 | 8 | 8 | 9 | 9 | 8 | 9 | 10 | 10 | 11 | 11 | 12 | |
| 95 | 9 | 10 | 10 | 10 | 10 | 11 | 11 | 12 | 13 | 14 | 14 | 15 | |
| 90 | 10 | 11 | 11 | 12 | 12 | 12 | 12 | 13 | 15 | 16 | 16 | 16 | |
| 85 | 11 | 12 | 12 | 12 | 13 | 13 | 13 | 14 | 16 | 17 | 18 | 18 | |
| 80 | 12 | 12 | 12 | 13 | 13 | 14 | 14 | 15 | 17 | 18 | 19 | 19 | |
| 75 | 12 | 12 | 13 | 14 | 14 | 15 | 15 | 16 | 18 | 20 | 20 | 20 | |
| 70 | 12 | 13 | 14 | 15 | 15 | 16 | 16 | 17 | 19 | 21 | 21 | 22 | |
| 65 | 13 | 13 | 14 | 15 | 16 | 16 | 17 | 18 | 20 | 22 | 22 | 23 | |
| 60 | 13 | 14 | 15 | 16 | 17 | 17 | 17 | 19 | 21 | 23 | 23 | 24 | |
| 55 | 14 | 15 | 16 | 16 | 18 | 18 | 19 | 20 | 22 | 24 | 24 | 26 | |
| 50 | 14 | 15 | 16 | 17 | 18 | 19 | 19 | 20 | 24 | 25 | 25 | 27 | |
| 45 | 15 | 16 | 17 | 18 | 20 | 20 | 21 | 22 | 25 | 26 | 27 | 28 | |
| 40 | 15 | 16 | 18 | 19 | 20 | 21 | 22 | 23 | 26 | 28 | 29 | 30 | |
| 35 | 16 | 17 | 19 | 20 | 22 | 22 | 24 | 25 | 27 | 29 | 30 | 32 | |
| 30 | 16 | 18 | 20 | 22 | 24 | 23 | 25 | 27 | 30 | 32 | 32 | 34 | |
| 25 | 17 | 19 | 21 | 24 | 25 | 25 | 27 | 30 | 32 | 34 | 34 | 36 | |
| 20 | 18 | 20 | 23 | 26 | 28 | 28 | 31 | 33 | 35 | 37 | 37 | 40 | |
| 15 | 19 | 22 | 25 | 29 | 31 | 31 | 35 | 39 | 39 | 42 | 42 | 42 | |
| 10 | 22 | 25 | 30 | 34 | 35 | 36 | 40 | 43 | 42 | 48 | 46 | 46 | |
| 5 | 26 | 28 | 36 | 40 | 41 | 42 | 48 | 51 | 52 | 56 | 57 | 58 | |

* The norms for age 17 may be used for age 18.

** Based on data from Johnston F.E., D.V. Hamill and S. Lemeshow (1) Skinfold Thickness of Children 6-11 Years (Series, II, No. 120, 1972), and (2) Skinfold Thickness of Youths 12 – 17 Years (Series II, No. 132, 1974). U.S. National Center for Health Statistics, U.S. Department of HEW, Washington D.C.

Tables from Lifetime Health Related Physical Fitness Test Manual, AAHPERD, Reston, VA., 1980. With permission of The American Alliance for Health, Physical Education, Recreation and Dance.

STANDARDS AND EVALUATIONS

You have taken skinfold measurement as illustrated and have converted the information into percent of body fat. Knowing what percent of total body weight is fat allows you to evaluate and structure weight control and exercise programs to individual needs. Use this information to monitor individual progress.

The percentage of body fat you strive for will be dependent upon the program you are following. No evidence found indicates a particular percentage of body fat constitutes optimal health.

However, for purposes of comparison, much information is available. Dr. Kenneth Cooper addresses ideal percentages of body fat from an aerobic and athletic standpoint in these publications, while the Mayo Clinic Manual approaches the subject from a nutritional viewpoint. Other information is available from the Government Printing Office and your local library.

Referring to publications written by authorities in the health and physical fitness field will aid you in estimating guidelines for “ideal” percentages of body fat.

CALIBRATION

Lange Skinfold Caliper is factory-calibrated to accuracy of +/- 1 mm. Calibration may be checked with a Gauge Block, P/N 010729. If the unit is not calibrated properly, return to the Service Center at Lange Caliper Service Center 7621 E. Joy Road, Ann Arbor, MI 48105.

CLEANING



Do not submerge Caliper in water. Do not subject to steam or excessive heat. Caliper may be surface cleaned with mild detergent and water. When necessary, tips may be cleaned with alcohol. Do not allow jaws to snap shut. Close gently

SELECTED REFERENCES

AAHPERD Lifetime Health Related Physical Fitness Test Manual, The America Alliance for Health, Physical Education, Recreation and Dance; Reston, VA, 1980.

Cooper, Kenneth H., M.D., M.P.H., *The Aerobics Way*, M. Evans and Company, Inc., New York, 1977.

Lindner, Peter, M.D., F.I.C.A., F.R.S.H., and Daisy, R.N., C.R.T., *How to Assess Degrees of Fatness*. Peter Lindner, M.D., Beta Technology, Santa Cruz, CA, U.S.A. 1973.

Mayo Clinic Diet Manual, The Mayo Foundation, W.B. Saunders, Co., Phil. PA, 1981

REPAIRS

Units in warranty are repaired at no charge. Out of warranty repairs are made on a flat rate basis. Service includes all necessary repairs, including cleaning, lubricating, calibrating, and replacing the crystal. Contact Customer Service at (800) 287-5901, or visit the Service Center at www.langeservicecenter.com.

Publication is printed in China.

GAUGE BLOCK, CODE 010729, FOR THE LANGE SKINFOLD CALIPER (NOT INCLUDED WITH CALIPER)

Figure 1 **diagram** of the gauge block **cannot** be used to check calibration. The calibration block is a separate purchase.

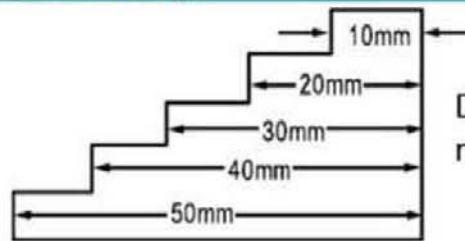


Diagram is not to scale.

Figure 1. Gauge Block

This gauge block is used to check the Calibration of the Lange Skinfold Caliper code #014921.

CALIBRATION VERIFICATION INSTRUCTIONS

Open the pivoted tips and place tips on block steps as shown in Figure 1. Compare needle indication on dial face at various steps of the block. If the unit is not calibrated properly, call: 800-742-4478.



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