

EXPERIMENT - 3

- (a) To find the least count of a screw gauge.
- (b) To find the diameter of a wire using screw gauge

Apparatus : A screw gauge; a wire

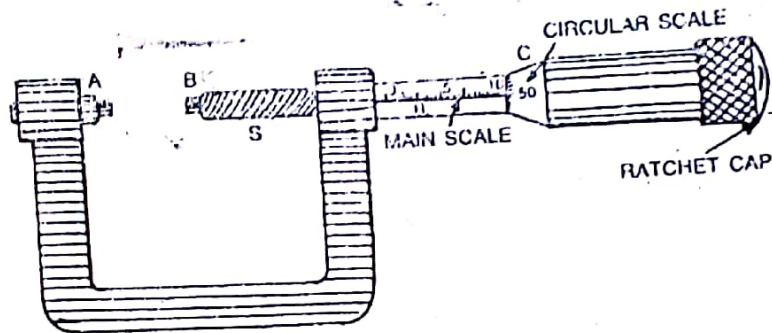


Fig. 2.1. Screw Gauge

Procedure :

- (1) *Determine the least count of the instrument.* In order to do that bring the zero mark of the circular scale into coincidence with the reference line R. Note the reading on the main scale. Give some complete rotation say four or five to the circular scale by turning the ratchet cap and note the readings gives the distance moved by the screw. Calculate the pitch by the relation.

$$\text{Pitch} = \frac{\text{distance moved by the screw}}{\text{number of rotations}}$$

Note the total number of division on the circular scale, then

$$\text{least count} = \frac{\text{pitch}}{\text{total number of division on the circular scale}}$$

- (2) *Find the zero correction i.e.,* screw up until the gap between A and B is just closed and the ratchet arrangement gives a click. If the zero division of the circular scale coincides with the reference line, write the zero error as nil; otherwise reference line may be 'x' division towards positive side of circular scale, then

$$\text{Zero error} = + x \times \text{L.C.}$$

where L.C. is least count

and
$$\text{zero correction} = - x \times \text{L.C.}$$

And if the reference line may be 'x' division towards negative side of zero, the circular scale then

$$\text{Zero error} = -x \times \text{L.C.}$$

and $\text{zero correction} = +x \times \text{L.C.}$

(3) **Diameter of the wire** : In order to find the diameter of a given wire, place it in the gap between A and B. Turn the screw head until the ratchet arrangement gives a click. Note down the reading on the main scale. Read the division of the circular scale coinciding with the reference line. Multiply it by the least count and add it to the number of complete divisions visible on the main scale, i. e., on the main scale.

Turn the wire through a right angle and note the reading again at the same point.

Repeat the observation at least five times, take the mean and correct the reading by applying zero correction.

Observation and calculation :

No. of rotations given to the screw =
Distance moved on the main scale =mm

$$\text{Pitch} = \frac{\text{distance moved on the screw}}{\text{number of rotations}}$$

Total number of divisions on the circular scale =

$$\text{Least count (L.C)} = \frac{\text{pitch}}{\text{no. of division on the circular scale}}$$

zero error = $\pm x \times \text{L.C.}$

zero correction = $\mp x \times \text{L.C.} = \dots\dots\dots\text{cm}$



Observation table for diameter of the wire

Least count of screw gauge = 0.01 mm = 0.001 cm.

Sl. No.	Main scale reading (a) in cm	No. of Circular division coinciding (m)	Observed diameter $d = a + m \times L.C$ in cm
1	0.1	2	0.102
2	0	96	0.096
3	0	94	0.094
4	0	94	0.094
5	0	93	0.093

Mean diameter = 0.095 cm = 0.95 mm.

Calculation for d :

1. $d = a + m \times L.C$
 $= 0.1 \text{ cm} + 2 \times 0.001 \text{ cm}$
 $= 0.102 \text{ cm}$
 $= \underline{\underline{0.102 \text{ mm}}}$

2. $d = a + m \times L.C$
 $= 0 + 96 \times 0.001 \text{ cm.}$
 $= 0.096 \text{ cm}$
 $= \underline{\underline{0.96 \text{ mm.}}}$

Teacher's Signature.....