

TENSILE TESTING MACHINE - strength of mat'ls

Cat: MF4665-001 with 3x rolls of wire

DESCRIPTION:

This instrument is used in the study of 'Strength Of Materials'. A thin wire has a tensile force applied to it and the wire's stretch is measured at various forces. The force is removed and the return to the original length is observed (elasticity). At a certain force, the wire no longer returns to its original length. As the wire stretches and approaches the point of breaking, the diameter of the wire reduces.

Different wire metals and different wire diameters are chosen and a useful study of Tensile Strength and Young's Modulus is performed. **Rolls of wire supplied:**

Copper: 0.37mm (28swg), Brass: 0.32mm (30swg), Iron: 0.28mm (32swg).

MF4665-001 tensile test machine



Physical size: 540x95x326mm LxWxH

Weight: 1.65 kg

The inset picture shows the dial indicator and the method the indicator is driven. The roller has a flat ledge that presses down on the plunger to hold zero point. As the wire stretches, the flat ledge rises to allow the plunger to move to indicate the exact dimension of the stretch. The weights on a carrier can be seen tied to the wire being stretched.

**SET UP AND GENERAL USE OF THE EQUIPMENT:**

We recommend that the unit is clamped to a table top by a G-clamp or it can operate unclamped if desired. If the unit is clamped, reliable and repeatable operation is easier to achieve.

One end of a sample wire is clamped under one of the 3x clamp terminal screws provided. Sample wire lengths of 500, 400 or 300mm long can be used depending on which clamp screw is used to hold the end of the wire. It is important that the wire is in a straight horizontal line and is not dragged around any obstruction. The wire can run in the gap of the unused clamping screws if they are loosened off.

One end of the chosen sample wire is carefully clamped under one of the clamp screws and, after gently tensioning it horizontally, it is passed around the wide groove in the large plastic pulley for at least 1x complete turn. A standard 50gm weight set hanger with the weights removed is attached to the other end of the wire so that the weight hanger does not touch the table top. The tensile force in the wire at this time would be 50gms and this should be sufficient to keep the wire gently taut.

It is most important that the pulley and wire are in close contact and that the wire cannot slip on the pulley.

Observe the plastic pulley. Notice that one part of the pulley is cut away to press on to a sensitive dial indicator which can read in 0.01mm increments. It is important that the cut away part (operating face) of the pulley that is pressing on the dial indicator is close to horizontal when the wire is first loaded into the instrument.

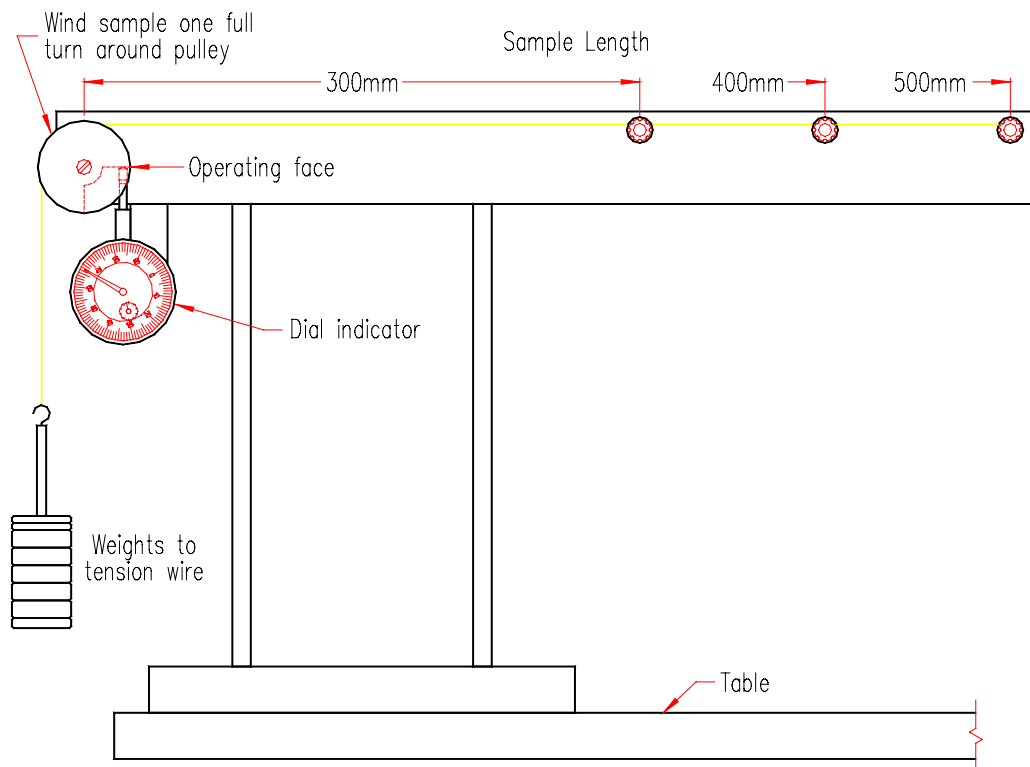
To adjust this, gently raise the weight hanger to reduce the tension on the wire and slightly rotate the plastic pulley clockwise inside the loop of wire until the operating face is just slightly below horizontal, then gently reapply the tension leaving the operating face slightly below horizontal and operating on the dial indicator.

To zero the dial indicator, rotate its outer knurled ring so that the pointer aligns with the zero mark.

Now, if say 50gm or 100gm extra weight is added to the weight carrier, the pointer will move a little because the wire stretches a little thus causing the pulley to rotate a little and to move the dial indicator (backwards).

If the weight is carefully removed, the dial indicator should return to zero. This demonstrates elasticity in the metal wire.

NOTE: The dial indicator reads change in length and the direction of pointer rotation is not important. Count the divisions moved from zero by the pointer and ignore the number markings on the dial. Each division is 0.01mm movement and 1 full turn is 1mm.



TENSILE STRENGTH AND ELASTICITY OF WIRES

Experiment Procedure:

Use your Student Notes or text books for all calculation relating to Strength Of Materials.

- Take a sample wire and measure its diameter.
- Take one end of the wire and clamp it firmly in one of the small clamps on the right hand end of the instrument.
- Take the other end and gently wrap it 1 turn around the plastic pulley and allow it to hang vertically down. Attach it to a weight hanger (see instructions above for setting the dial indicator etc.).
- The dial indicator reading can be considered to be Zero. Rotate the front ring of the dial to align the pointer with the zero mark.
- As weights are gently loaded and unloaded from the weight hanger, the stretch and recovery dimensions of the sample can be easily read and documented.
- Modulus of Elasticity, Yield Points and Breaking Points of the various types of wire samples can easily be determined fairly accurately.

NOTE: Do not forget that the carrier for the weights has a mass of 50gm and this must be added to the weight totals used.

- To repeat the experiment with a different length sample, simply clamp the new sample wire under a different clamp screw to provide the length you want.
- Combinations of various initial lengths and various diameters of the same metals and different metals are possible for experimental results.

Designed and manufactured in Australia