

***Engineering Science
Worksheets
TENSILE TESTER KIT ES6
TENSILE TESTS***

Name	
Date	
Course/Year/Group	

© TecQuipment Ltd 2012

Do not reproduce or transmit this document in any form or by any means, electronic or mechanical, including photocopy, recording or any information storage and retrieval system without the express permission of TecQuipment Limited.

TecQuipment allows you to print and photocopy this document ***only for use with the Engineering Science Kits.***

DB/1012

Blank Page for Notes

Tensile Tests

Aims

To investigate the tensile properties of different materials.

Experiment Setup

As shown in Figure 1, fix the Tensile Tester to the Work Panel:

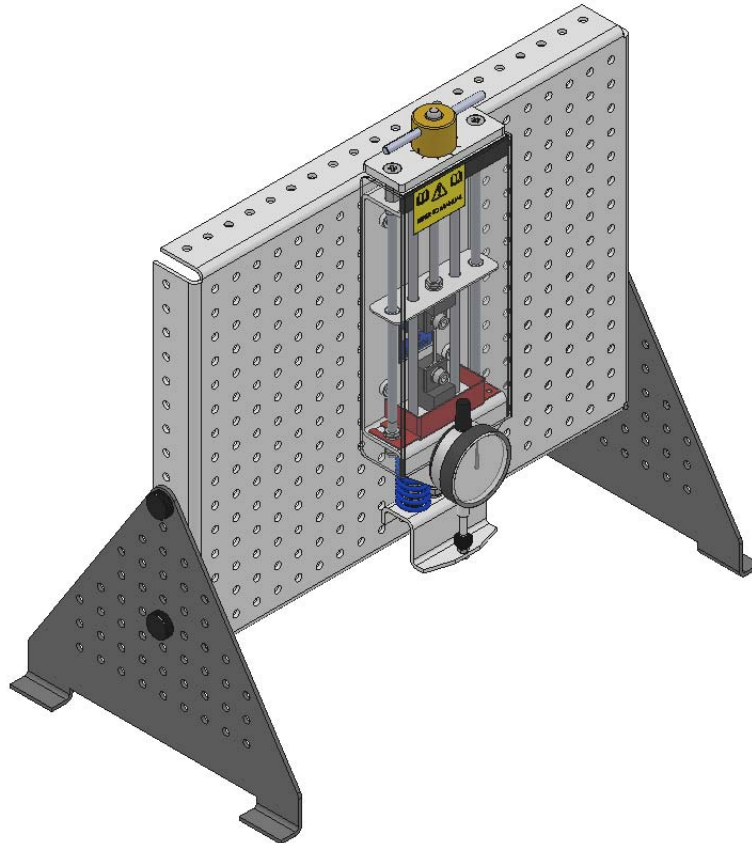


Figure 1 Experiment Setup

Experiment Procedure

1. Read the Guidance Notes (supplied).
2. Choose your specimen and use the Dial Caliper to measure the thickness and width at the gauge length and find its cross-sectional area. For reference, measure and record the original length.
3. Fit the specimen to the Tensile Tester and set the Dial Indicator to zero.

WARNING  **Remember to fit the Safety Guard.**

4. Note the reading on the Vertical Scale.
5. As shown in the blank Results Table, slowly turn the Load Nut clockwise in small 0.2 mm steps up to 5 mm, then larger 1 mm and 10 mm steps until the specimen breaks.

Keep the applied rate consistent (for example: take five seconds to turn the Load Nut through each 0.2 mm and then take five seconds to record the reading).

At each step, record the Dial Indicator value.

NOTE  *For the PVC specimens, after the yield point, the Dial Indicator reading slowly drops each time you turn the Load Nut, and may continue dropping for many minutes.*

For this reason, you must record the value as soon as you change the load to give consistent results.

Metal specimens may not break until an extension of between 1 and 5 mm

PVC specimens may not break until an extension of between 20 and 50 mm

6. To check the elongation, remove the specimen from the tester and push its broken ends together then measure its final length.
7. Convert the Dial Indicator readings into force values.
8. Subtract the Dial Indicator readings from the Load Nut movement readings to find the extension at each step.
9. Convert your force and extension values into stress and nominal strain values.
10. Plot your stress and strain results on the chart paper for your specimen (for best presentation, the steel, PVC and alloy specimens each have their own chart paper).
11. From your charts, note the yield point and tensile strength for each specimen.
12. For each specimen, find the gradient of the elastic region to compare the stiffness of the materials.

Questions and Conclusions

Two of the specimen materials should produce a similar gradient in the elastic region. Why is that?

Why do you think a constant force application rate and temperature are so important for PVC specimens?

Specimen material: Original cross-sectional area (mm² or m²): Original Length (mm):					
Load Nut movement (mm)	Dial Indicator (mm)	Force (N)	Extension (mm)	Stress σ N/m²	Nominal Strain ϵ
0					
0.2					
0.4					
0.6					
0.8					
1.0					
1.2					
1.4					
1.6					
1.8					
2.0					
2.2					
2.4					
2.6					
2.8					
3.0					
3.2					
3.4					
3.6					
3.8					
4.0					
4.2					
4.4					
4.6					
4.8					
5.0					
6.0					
7.0					
8.0					
9.0					
10.0					
20.0					
30.0					
40.0					
50.0					
60.0					
Tensile Strength (N/m²): Yield Stress (N/m²): % Elongation:					

Table 1 Blank Results Table

Specimen material:
Original cross-sectional area (mm^2 or m^2):
Original Length (mm):

Load Nut movement (mm)	Dial Indicator (mm)	Force (N)	Extension (mm)	Stress σ N/m^2	Nominal Strain ϵ
0					
0.2					
0.4					
0.6					
0.8					
1.0					
1.2					
1.4					
1.6					
1.8					
2.0					
2.2					
2.4					
2.6					
2.8					
3.0					
3.2					
3.4					
3.6					
3.8					
4.0					
4.2					
4.4					
4.6					
4.8					
5.0					
6.0					
7.0					
8.0					
9.0					
10.0					
20.0					
30.0					
40.0					
50.0					
60.0					

Tensile Strength (N/m^2):
Yield Stress (N/m^2):
% Elongation:

Table 2 Blank Results Table

Specimen material: Original cross-sectional area (mm² or m²): Original Length (mm):					
Load Nut movement (mm)	Dial Indicator (mm)	Force (N)	Extension (mm)	Stress σ N/m²	Nominal Strain ϵ
0					
0.2					
0.4					
0.6					
0.8					
1.0					
1.2					
1.4					
1.6					
1.8					
2.0					
2.2					
2.4					
2.6					
2.8					
3.0					
3.2					
3.4					
3.6					
3.8					
4.0					
4.2					
4.4					
4.6					
4.8					
5.0					
6.0					
7.0					
8.0					
9.0					
10.0					
20.0					
30.0					
40.0					
50.0					
60.0					
Tensile Strength (N/m²): Yield Stress (N/m²): % Elongation:					

Table 3 Blank Results Table

Specimen material:
Original cross-sectional area (mm^2 or m^2):
Original Length (mm):

Load Nut movement (mm)	Dial Indicator (mm)	Force (N)	Extension (mm)	Stress σ N/m^2	Nominal Strain ϵ
0					
0.2					
0.4					
0.6					
0.8					
1.0					
1.2					
1.4					
1.6					
1.8					
2.0					
2.2					
2.4					
2.6					
2.8					
3.0					
3.2					
3.4					
3.6					
3.8					
4.0					
4.2					
4.4					
4.6					
4.8					
5.0					
6.0					
7.0					
8.0					
9.0					
10.0					
20.0					
30.0					
40.0					
50.0					
60.0					

Tensile Strength (N/m^2):
Yield Stress (N/m^2):
% Elongation:

Table 4 Blank Results Table

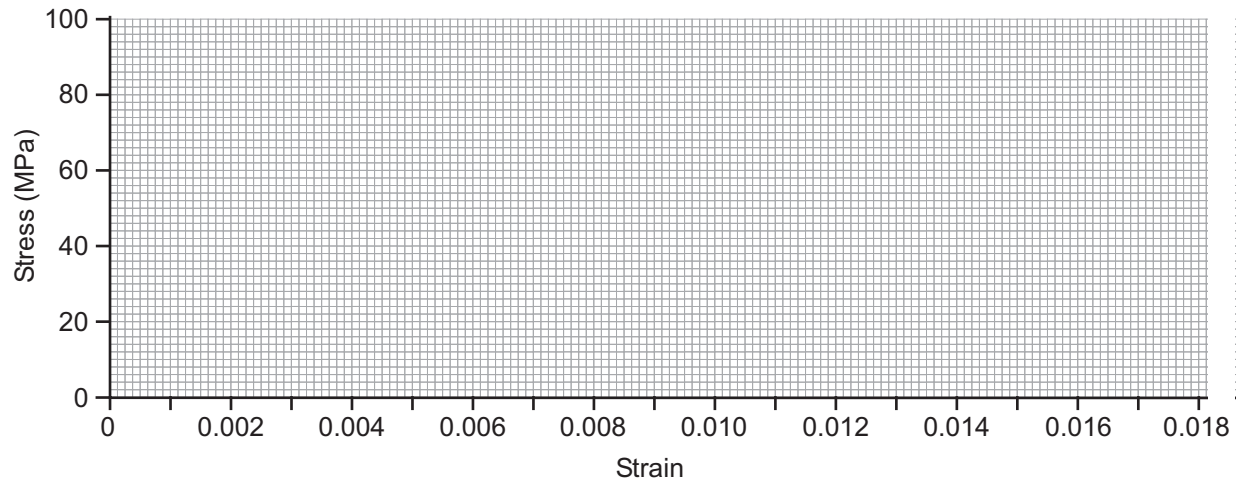


Figure 2 Blank Chart Paper - Aluminium Specimens

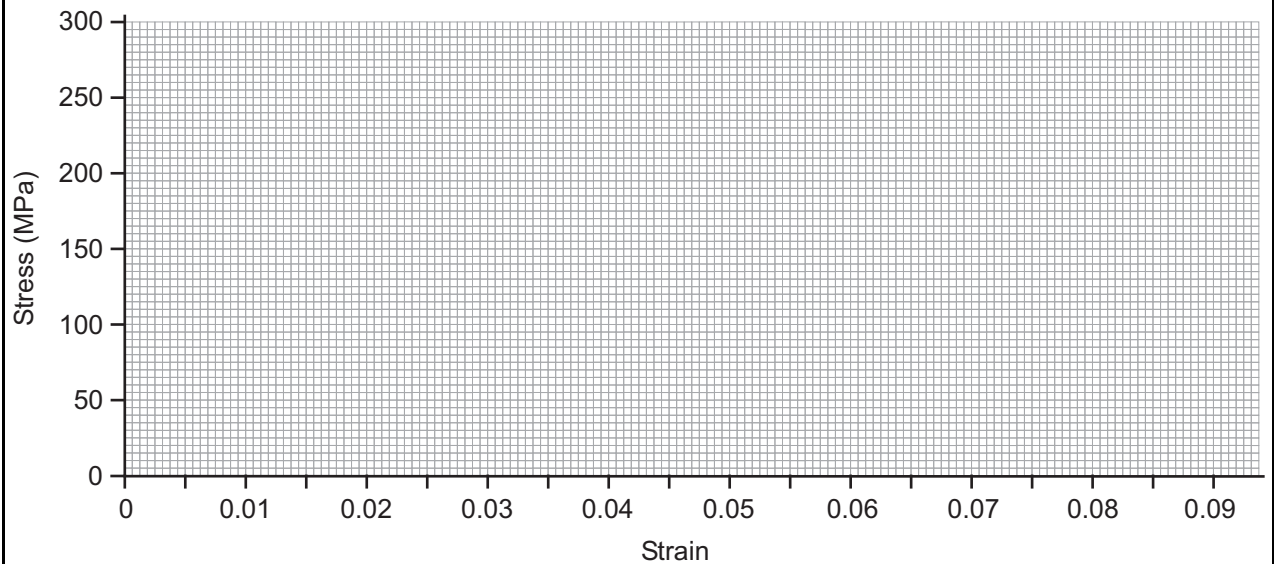


Figure 3 Blank Chart Paper - Duralumin Specimens

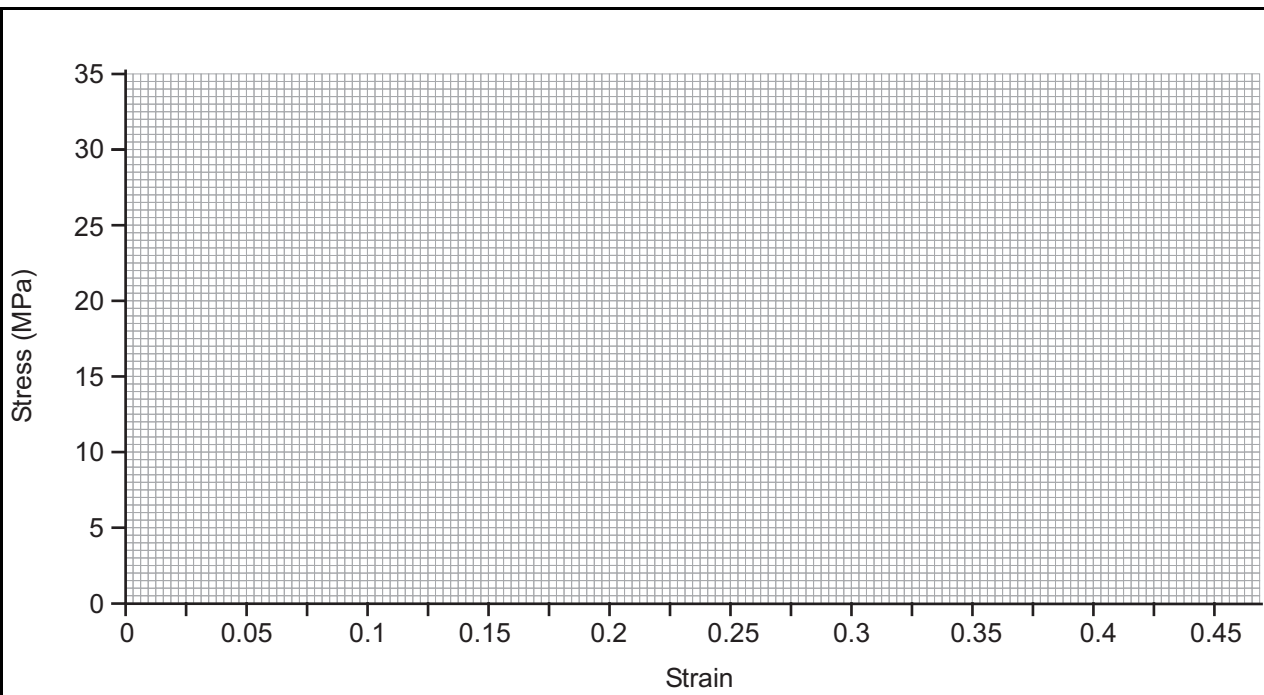


Figure 4 Blank Chart Paper - PVC Specimens

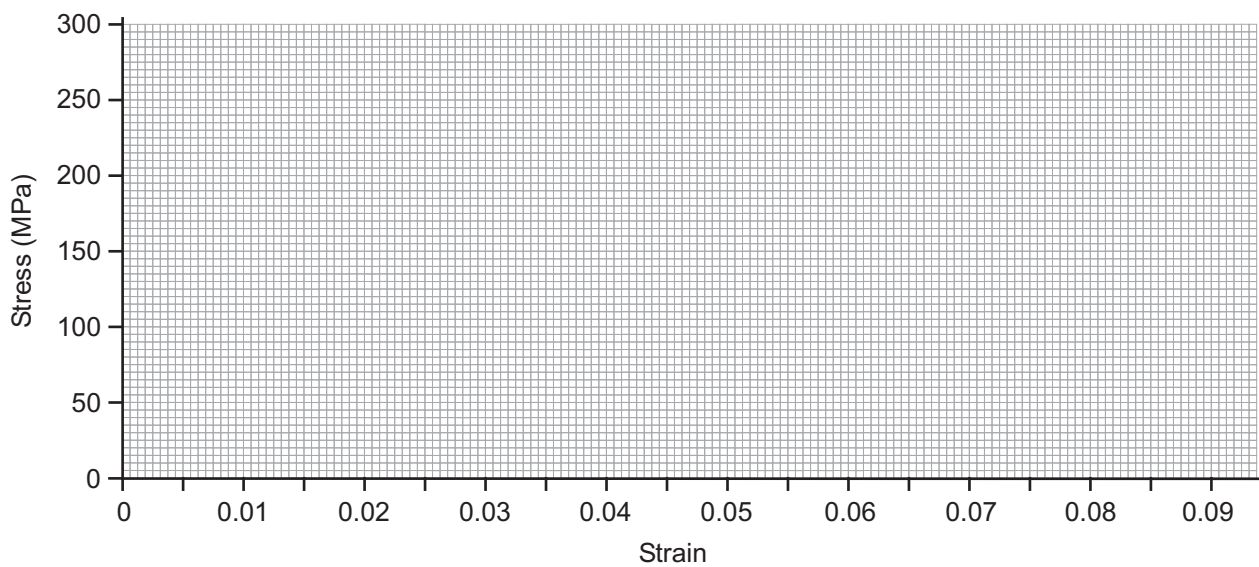


Figure 5 Blank Chart Paper - Steel Specimens

Notes

