Name and surname:..... Faculty:..... Lab. Group:.....

Name and surname:..... Date:.....

B2 Lab report

Identification of mechanical properties of materials

Toughness and hardness tests

Toughness test – Charpy impact test (acc. to PN-EN 10045)

1. Testing machine

a. Model .....

b. Type .....

2. Environment

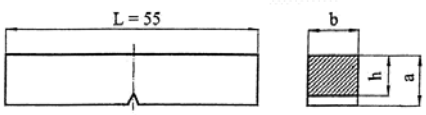
a. Temperature ..... [°C]

3. Specimen specification

a. Specimen material .....

b. Shape and type of a specimen .....

c. Specimen dimensions



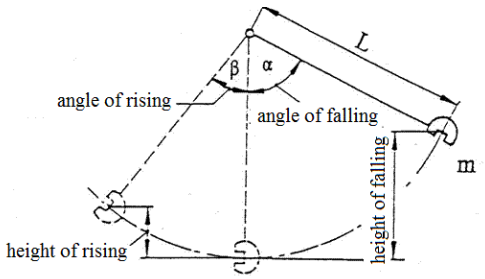
Specimen height a=..... [mm]

Specimen width b=..... [mm]

Specimen height in notched section h=..... [mm]

d. Cross-section area at notch $S_0 = b \cdot h =$..... [mm²]=..... [cm²]

4. Hammer specs



a. Pendulum hammer mass m=..... [kg]

b. Gravitational acceleration g=9,81 $\left[\frac{m}{s^2}\right]$

c. Pendulum hammer weight $F_1 = m \cdot g =$ ..... [N]
d. Pendulum length L = ... [mm] = ... [m]
e. Pendulum energy $A_p =$ ..... [J]
f. Angle of falling $\alpha =$ ..... [°]

5. Toughness calculation

a. Angle of rising $\beta =$ ..... [°]
b. Energy used for specimen breaking
KV = ...[kpm]*9,81 $\left[\frac{m}{s^2}\right]$ = ... [J]
c. Energy used for specimen breaking $KV = F_1 \cdot L(cos\beta - cos\alpha) =$ ..... [J]
d. Toughness (calculated) $KVC = \frac{KV}{S_0} =$ .....$\left[\frac{J}{cm^2}\right]$

Hardness measurement – Brinell method (acc. to PN-EN ISO 6506-1)

1. Testing machine

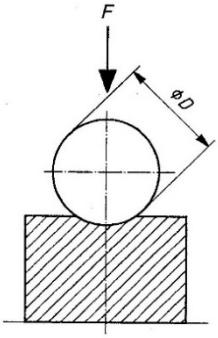
a. Model .....
b. Type .....

2. Specimen specification

a. Specimen material .....
b. Shape and type of a specimen .....
c. Specimen dimensions

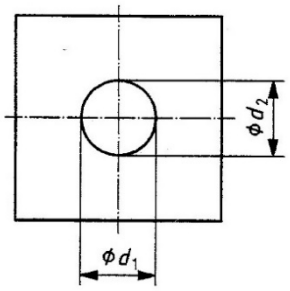
Diameter of specimen ød = ... [mm]
Thickness of specimen g = ... [mm]

3. Test conditions



a. Indenter .....
b. Indenter diameter øD = ... [mm]
c. K-parameter $K = 0{,}102\frac{F}{D^2} =$ ..... $\left[\frac{N}{mm^2}\right]$
d. Nominal value of the loading force
$F = \frac{KD^2}{0{,}102} =$ .....[kG]*9,81 $\left[\frac{m}{s^2}\right]$ = ... [N]
e. Time of applying force ..... [s]
f. Time of loading during measurement ..... [s]

4. Measured values



a. d_1 diameter ød1=……*0,1+……*0,01+……*0,001=…… [mm]
b. d_2 diameter ød2=……*0,1+……*0,01+……*0,001=…… [mm]

c. d_{mean} diameter $\text{ø}d_{mean} = \frac{d_1+d_2}{2}$ =…… [mm]

5. Validity of test

a. Min. Thickness for d_{mean} g_{min}=…… [mm]
b. Check $g \geq g_{min}$

6. Brinell hardness calculation

a. Brinell hardness $HBW \ldots/\ldots\ldots = \frac{0{,}204F}{\pi \cdot D\left(D-\sqrt{D^2-d_{mean}{}^2}\right)}$ =……

Hardness measurement – Rockwell method (acc. to PN-EN ISO 6508-1)

1. Testing machine

a. Model ……
b. Type ……

2. Specimen specification

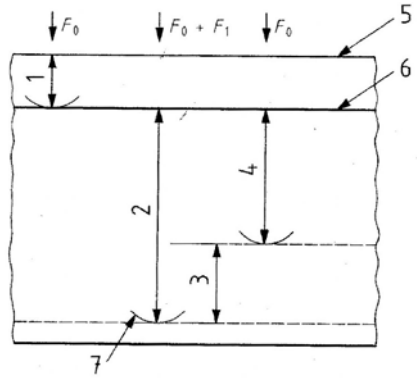
a. Specimen material ……
b. Shape and type of a specimen ……
c. Specimen dimensions

Diameter of specimen ød=…… [mm]
Thickness of specimen g=…… [mm]

3. Test conditions

a. Indenter .....
b. Indenter diameter øD=.....["]=..... [mm]
c. Rockwell hardness scale .....
d. Initial loading force F_0=..... [N]
e. Main loading force F_1=..... [N]
f. Total loading force F= F_0+F_1=..... [N]
g. Time of applying initial force ..... [s]
h. Time of applying total force ..... [s]

4. Measured values



1 – Depth of imprint under F_0
2 – Depth of imprint under F_0+F_1
3 – Elastic return under F_0
4 – Permanent increase in the imprint depth h
5 – Specimen surface
6 – Reference plane
7 – Indenter position

a. Rockwell hardness HR...=$130 - \frac{h}{0{,}002}$=.....
b. Permanent increase in the imprint depth h=..... [mm]

5. Validity of test

c. Min. Thickness g_{min}=..... [mm]
a. Check $g \geq g_{min}$