

EXERCISE NO. 6

Exercise subject: Influence of temperature on the mechanical properties of polymeric materials

1. Exercise objectives:

- theoretical: studying the mechanical properties of polymer materials and the influence of temperature and processing conditions on those properties; methods of their assessment, with particular emphasis on strength tests under static tension and Charpy impact resistance assessment.
- practical: conducting strength tests of polymer materials under static tension and Charpy impact resistance in differences temperature

2. Theoretical issues:

Mechanical properties of polymer materials (static stretching), impact of plastics (Charpye impact resistance), determination of softening point (Vicat method (VST)), measurement of deflection temperature (HDT), influence of temperature on the mechanical properties of plastics.

3. Literature:

- 1) Crawford R.J. : „Plastics Engineering”, Butterworth-Heinemann 1998.
- 2) Ram A.: “Fundamentals of Polymer Engineering”, Plenum Press, New York 1997.

4. Exercise execution:

Carry out the mechanical properties assessment using the universal strength measuring machine Zwick Roell Z020 TH ALLround Line. Carry out the mechanical properties under static tension tests in accordance with the below standards:

- PN – EN ISO 527 – 1 „Plastics. Determination of mechanical properties under static tension. General principles.”;
- PN – EN ISO 527 – 3 „Plastics. Determination of mechanical properties under static tension. Films and sheets testing conditions”.

Test parameters:

In accordance with the lecturer’s instructions

The Charpy impact test should be performed in accordance with the following standard:

- PN-EN ISO 179-1:2002 “Plastics — Determination of Charpy impact properties”.

Test parameters:

In accordance with the lecturer’s instructions

Carry out the determination for unnotched and notched samples. Samples stored at room and elevated temperature (heated in a dryer immediately before measurement) should be tested.

5. Results reporting:

Describe exercise performance method, provide the results of the implemented determinations, observations and draw conclusions on the influence of the glass fiber content and measurement temperature on the properties of the polypropylene composite.

6. Safety rules:

- I. Conduct the strength tests only in the presence and under the supervision of the lecturer!!!**
- II. All tests and measurements involved in the exercise must be carried out in accordance with the lecturer's instructions.**
- III. Take particular caution while:**
 - operating strength testing machine,**
 - always wear safety glasses while working**