



PROFICIENCY TESTING PLAN

ZVP 2027/1 – Mechanical Properties of Plastics

Poskytovatel zkoušení způsobilosti při SZK FAST

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1 Basic Information about the Proficiency Testing Program

The aim of the Proficiency Testing Program (PTP) is to compare and evaluate the results of tests conducted on plastics in compliance with selected parts of ČSN EN ISO 527-1, ČSN EN ISO 527-2 [2, 3], ČSN EN ISO 178 [4], ČSN EN ISO 179□1 [5], ČSN EN ISO 868 [6], ČSN EN ISO 306 [7], ČSN EN ISO 75□1, ČSN EN ISO 75□2 [8, 9], ČSN EN ISO 1183□1 [10], ČSN EN ISO 11357-1, ČSN EN ISO 11357-3 [11, 12], ČSN EN ISO 1133□1 [13], ČSN EN ISO 1628□1, ČSN EN ISO 1628□5 [14, 15], ČSN EN ISO 11358□1 [16] and ČSN ISO 3795 [1]. The testing method according to ISO 3795 [1] is out of the range of accreditation of Z7008.

This PT program is running in cooperation with ORLEN Unipetrol RPA s.r.o. – POLYMER INSTITUTE BRNO, odštěpný závod. POLYMER INSTITUTE BRNO will prepare two types of test specimens with label Sample A and Sample B. Test specimens for ISO 3795 will be prepared via compression-moulding with label Sample C.

The program strives to provide objective information about the measuring skills of PTP participants. The basic criterion for participation is timely registration for the program, and the prerequisites for obtaining the Certificate of Participation and the Final Report on the Results of Interlaboratory Comparison are timely payment of the fee and adherence to the schedule.

Important dates:

Registration deadline:	April 30, 2027
Distribution of samples:	May 31, 2027
Realization/initiation of testing:	July 1, 2027
Results sent to the organizer:	July 31, 2027
Presentation of the Certificate of Participation:	September 30, 2027

Submission of test results takes place exclusively via the MyPT customer zone at <https://test.ptprovider.cz/zona>. Results are entered by the laboratory after signing in to their account, in the section of the respective programme.

2 Implementation of the Proficiency Testing Program

2.1 Specifications and Characteristics

Testing laboratories and other institutions interested can register for the PTP. The minimum number of participants in every part of PT program is 5. If the number of participants is close to the minimum, the coordinator will consider the evaluation of PTP results using Horn's procedure to determine the assigned values and the standard deviation. In that case, the participants will be told before PTP materials are distributed. The maximum number of participants is 40.

If the minimum number of participants is not reached, the PT Provider reserves the right to cancel the PTP. This takes place according to Chapter 3 of the "Cancellation and Complaint Proceedings" instructions available on <http://ptprovider.cz/?lang=en>.

ZVP01 ČSN EN ISO 527-1, ČSN EN ISO 527-2 [2, 3]

- Measured property: Tensile modulus
- Unit: MPa
- Number of determinations: 5
- Instructions: **Tensile modulus**: Test specimen type 1A; test speed $v = 1$ mm/min; contact or optical extensometer.

ZVP02 ČSN EN ISO 527-1, ČSN EN ISO 527-2 [2, 3]

- Measured property: Stress at yield
- Unit: MPa
- Number of determinations: 5
- Measured property: Strain at yield
- Unit: %
- Number of determinations: 5
- Instructions: **Stress at yield, strain at yield**: Test specimen type 1A; test speed $v = 50$ mm/min; contact or optical extensometer; limit deformation 20 %.

ZVP03 ČSN EN ISO 527-1, ČSN EN ISO 527-2 [2, 3]

- Measured property: Stress at yield
- Unit: MPa
- Number of determinations: 5
- Instructions: **Stress at yield**: Test specimen type 1A; test speed $v = 50$ mm/min; without extensometer; up to nominal deformation 20 %.

ZVP04 ČSN EN ISO 178 [4]

- Measured property: Flexural modulus
- Unit: MPa
- Number of determinations: 5
- Instructions: **Flexural modulus**: Middle part of test specimen type 1A (80x10x4) mm; test speed $v = 2$ mm/min, span between the specimen supports $L = 64$ mm.

ZVP05 ČSN EN ISO 178 [4]

- Measured property: Flexural strength
- Unit: MPa
- Number of determinations: 5
- Measured property: Flexural strain at flexural strength
- Unit: %
- Number of determinations: 5
- Instructions: **Flexural strength, flexural strain at flexural strength**: Middle part of test

specimen type 1A (80x10x4) mm; test speed $v = 2$ mm/min, to measure up to deflection 12 mm, span between the specimen supports $L = 64$ mm.

ZVP06 ČSN EN ISO 179 [5]

- Measured property: Charpy unnotched impact strength
- Unit: kJ/m^2
- Number of determinations: 10
- Instructions: **Charpy unnotched impact strength**: Test specimen type 1 (80x10x4) mm; without notch; preferentially use pendulum with energy 2 J (alternatively 1 J or 4 J); edgewise; span between the specimen supports $L = 62$ mm.

ZVP07 ČSN EN ISO 179 [5]

- Measured property: Charpy notched impact strength (note: notch made by distributor)
- Unit: kJ/m^2
- Number of determinations: 10
- Instructions: **Charpy notched impact strength** (note: notch made by distributor): Test specimen type 1 (80x10x4) mm; notch type A (notch tip radius 0.25 mm, remaining width at notch tip 8 mm); preferentially use pendulum with energy 1 J (alternatively 0.5 J or 2 J); edgewise; span between the specimen supports $L = 62$ mm.

ZVP08 ČSN EN ISO 179 [5]

- Measured property: Charpy notched impact strength (note: notch made by laboratory)
- Unit: kJ/m^2
- Number of determinations: 10
- Instructions: **Charpy notched impact strength** (note: notch made by laboratory): Test specimen type 1 (80x10x4) mm; distributed without notch - notch will make laboratory: notch type A (notch tip radius 0.25 mm, remaining width at notch tip 8 mm); preferentially use pendulum with energy 1 J (alternatively 0.5 J or 2 J); edgewise; span between the specimen supports $L = 62$ mm, send 1 notched and not tested specimen to POLYMER INSTITUTE BRNO for checking quality of notching.

ZVP09 ČSN EN ISO 868 [6]

- Measured property: Shore hardness D
- Unit: °
- Number of determinations: 5
- Instructions: **Shore hardness D**: Test specimen (20x20) mm; time-interval 15 s.

ZVP10 ČSN EN ISO 306 [7]

- Measured property: Vicat softening temperature VST/A/50
- Unit: °C
- Number of determinations: 3

- Instructions: **Vicat softening temperature VST/A/50**: Test specimen (20x20) mm; load 10 N; temperature uniform rate 50 °C/h; temperature of the heating equipment shall not be higher 40 °C at the start of each test.

ZVP11 ČSN EN ISO 306 [7]

- Measured property: Vicat softening temperature VST/B/50
- Unit: °C
- Number of determinations: 3
- Instructions: **Vicat softening temperature VST/B/50**: Test specimen (20x20) mm; load 50 N; temperature uniform rate 50 °C/h; temperature of the heating equipment shall not be higher 40 °C at the start of each test.

ZVP12 ČSN EN ISO 75□1, ČSN EN ISO 75□2 [8, 9]

- Measured property: Temperature of deflection under load, method A
- Unit: °C
- Number of determinations: 3
- Instructions: **Temperature of deflection under load, method A**: Narrow central part of the multipurpose test specimen 1A (80x10x4) mm; flexural stress at the test-specimen surface 1.80 MPa; start temperature of heating equipment shall be 25 °C; temperature uniform rate 120 °C/h; edgewise; span between lines of contact of the test specimen and the specimen supports L = 64 mm.

ZVP13 ČSN EN ISO 75□1, ČSN EN ISO 75□2 [8, 9]

- Measured property: Temperature of deflection under load, method B
- Unit: °C
- Number of determinations: 3
- Instructions: **Temperature of deflection under load, method B**: Narrow central part of the multipurpose test specimen 1A (80x10x4) mm; flexural stress at the test-specimen surface 0.45 MPa; start temperature of heating equipment shall be 25 °C; temperature uniform rate 120 °C/h; edgewise; span between lines of contact of the test specimen and the specimen supports L = 64 mm.

ZVP14 ČSN EN ISO 1183□1 [10]

- Measured property: Density
- Unit: kg/m³
- Number of determinations: 3
- Instructions: **Density**: Test specimen (30x10x4) mm; method A-immersion method; recommended immersion liquid - ethanol; temperature 23.0 °C.

ZVP15 ČSN EN ISO 11357-1, ČSN EN ISO 11357-3 [11, 12]

- Measured property: Melting temperature T_{m1}
- Unit: °C
- Number of determinations: 3
- Measured property: Enthalpy of fusion ΔH_{m1}
- Unit: J/g
- Number of determinations: 3
- Instructions: **Melting temperature T_m , enthalpy of fusion ΔH_m** : Compression molded film (thickness 0.4 mm); purge gas - nitrogen; heat from 50 °C to 180 °C at rate 10 °C/min; crucible closed with lid; baseline: from 60°C till 150°C.

ZVP16 ČSN EN ISO 11331 [13]

- Measured property: Melt mass-flow rate
- Unit: g/10min
- Number of determinations: 3
- Instructions: **Melt mass-flow rate**: Granules; nominal load 2.16 kg; test temperature 230 °C; time of measurement from 5 s up to 10 s.

ZVP17 ČSN EN ISO 16281, ČSN EN ISO 16285 [14, 15]

- Measured property: Viscosity
- Unit: ml/g
- Number of determinations: 3
- Instructions: **Viscosity**: PET granules; solvent is mixture of phenol/1,2-dichlorobenzene (weight out 1 part by mass of phenol (analytical grade) and dissolve in 1 part by mass of 1,2-dichlorobenzene(analytical grade). Work to an accuracy of 1 % or better in the weightings.); warming and dissolving at temperature 70°C; measure viscosity at temperature 25°C.

ZVP18 ČSN EN ISO 113581 [16]

- Measured property: Filler content
- Unit: %
- Number of determinations: 3
- Instructions: **Filler content**: Central part of test specimen type 1A; material: PP + glass fibers. Procedure:
 - purge gas - nitrogen, heat from 23 °C to 520 °C at rate 40 °C/min,
 - purge gas - change nitrogen to air at 520 °C; heat from 520 °C to 750 °C at rate 20 °C/min
 - purge gas - air: heat from 750 °C to 850 °C at rate 10 °C/min.

ZVP19 ČSN ISO 3795 [1]

- Measured property: Burning Rate

- Unit: mm/min
- Number of determinations: 5
- Instructions: **Flammability** (out of range of accreditation): Compression-moulded test specimens (5 test specimens, dimensions: (230 × 70 × 3) mm); material: PP + filler. Procedure:
- Bunsen Burner (diameter 9.5 mm, temperature 843°C), marks on each test specimen in distance 40 mm and 140 mm of any edge of test specimen,
- burning rate (mm/min),
- horizontal orientation of test specimens.

2.2 Ensuring Homogeneity and Stability

PT Provider employees and any suppliers whose services they may utilize are aware of the significance of the homogeneity and stability of test specimens for the results of the Proficiency Testing Program. Proficiency test items are provided in cooperation with ORLEN Unipetrol RPA s.r.o. - POLYMER INSTITUTE BRNO, branch plant, Tkalcovská 36/2, 602 00 BRNO. The homogeneity and stability of specimens is ensured in the following ways:

1. the material used for the production of samples is always taken from the same production and is of the same production date; and/or
2. by dividing the specimens produced in different batches in order to ensure specimen homogeneity during testing of physical-mechanical and durability properties,
3. using a single type of mold-release preparation,
4. using a single type of compression frame for one type of test specimens,
5. storing all specimens together under identical conditions,
6. checking all specimens before dispatching to participants.

2.3 Instructions for Eliminating Major Sources of Errors and Risks

PTP participants have the obligation:

- testing specimens will be conditioned according to EN ISO 11403-1,
- to handle the proficiency testing materials in the same way they handle the majority of routinely tested samples,
- to follow the instructions of the PT Provider employee responsible for the PTP, especially regarding the type of testing carried out, the number of result determinations and the PT schedule,
- to state measurement uncertainties in accordance with their documented procedures, including the corresponding expansion coefficient. Participants will use expansion coefficient 2, which approximately represents the 95% reliability level, unless stated otherwise,
- adhere to the rules and principles of ethical behavior, avoiding unfair practices that could negatively impact the evaluation of the PT program,
- follow occupational health and safety and fire protection regulations, using only electrical

equipment and instruments with valid inspections,

- to send the test results obtained during proficiency testing, including measurement uncertainties, to the PT Provider by the set deadline the participant received in the confirmation e-mail.

3 Procedures used in the Statistical Analysis of Laboratory Results

Procedures used in the statistical analysis of proficiency testing programs can be found at ptprovider.cz.

4 Certificate of Participation and the Final Report on the Results of Interlaboratory Comparison

The PT Provider gives expert commentary on participant efficiency evaluation in the Final Report as part of training courses the PT Provider organises. The Final Report preserves the anonymity of the PTP participants. Each participant, or the participant's test results, is represented by an ID number. The Certificate of Participation in the PT programme is part of the Final Report. The Certificate is unique to each participant and includes the participant's ID number.

5 Safeguards for Confidentiality

The identity of PTP participants is confidential and only known to persons/subjects involved with the PTP. All participant information is considered confidential by the PT Provider. The participant may renounce this confidentiality for the purposes of discussion and mutual assistance until the PTP results are obtained. The PT Provider reveals the proficiency testing results to no third party with the sole exception of a written request by a regulatory authority submitted prior to the commencement of the PTP and which has been granted a written consent by the PTP participants.

6 Related Documents

- Quality Handbook of the PT Provider at the SZK FAST
- Cancellation and Complaint Proceedings available at <http://ptprovider.cz/?lang=en> [17]
- MPA 20 – 01 - . . . for application of EN ISO/IEC 17043 Concordance Assessment – General Requirements for Proficiency Testing in the Accreditation System of the Czech Republic.

References

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- [17] *Cancellation and Complaint Proceedings – available at www.ptprovider.cz*.