BRNO UNIVERSITY OF TECHNOLOGY

FACULTY OF CIVIL ENGINEERING
institute of building testing

Z 7008

PROFICIENCY TESTING PLAN

ZZB 2024/2 – Strength and elasticity of hardened concrete (ZZB 12390, 6784, 1920 12504, 1542, 731373)

Proficiency Testing Provider at the 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 hardened concrete in compliance with selected parts of EN 12390 – [1–4], ISO 1920-10 [5], EN 12504-4 [6], ČSN 731371 [7], EN 12504-2 [8], ČSN 731373 [9], ČSN 736242 – Appendix B [10], EN 1542 [11], EN 12390-13 [12] and EN 1338 [13] .

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:	**July 31, 2025**
Distribution of samples:	**October 13–17, 2025**
Realization/initiation of testing:	**October 11, 2025**
Results sent to the organizer:	**November 28, 2025**
Evaluation/presentation of Certificate of Participation:	**January 31, 2026**

Submit of test results – exclusively via http://ptprovider.cz/OutcomesCode. To log in, it is necessary to enter the participant's code, which is automatically sent when registering in PTP.

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 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 value and measurement uncertainty. The maximum number of participants is 30. 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 [14] available on http://ptprovider.cz/?lang=en.

Parts of the PT program:

1. **EN 12390-3 [1]**
   - Characteristics: Compressive strength
   - Unit: N/mm^2
   - Specification according to EN 206 [15]: C 30/37
   - Testing specimens: 150 x 150 x 150 mm
   - Number of observations: 3
   - Use the water storage before testing.
2. **EN 12390-5 [2]**
   - Characteristics: Flexural strength
   - Unit: N/mm^2
   - Specification according to EN 206 [15]: C 30/37
   - Testing specimens: 100 x 100 x 400 mm
   - Number of observations: 3
   - Perform by 4-point loading.
   - Use the water storage before testing.
3. **EN 12390-6 [3]**

- Characteristics: Tensile splitting strength
- Unit: N/mm^2
- Specification according to EN 206 [15]: C 30/37
- Testing specimens: 150 x 150 x 150 mm
- Number of observations: 3
- Use the water storage before testing.

4. **EN 12390-7 [4]**

   - Characteristics: Weight Density
   - Unit: kg/m^3
   - Specification according to EN 206 [15]: Ordinary concrete
   - Testing specimens: 150 x 150 x 150 mm
   - Number of observations: 3
   - Instructions:
     (a) Perform with the specimens prior to compressive strength testing according to EN 12390-3 [1].
     (b) Use the water storage before testing.

5. **ISO 1920-10 [5]**

   - Characteristics: Static modulus of elasticity in compression
   - Unit: N/mm^2
   - Specification according to EN 206 [15]: C 30/37
   - Testing specimens: 150 x 300 mm
   - Number of observations: 3
   - 3 specimens for determining the static modulus of elastic. The value of compressive strength of comparative specimens will be provided by PT provider.

6. **EN 12390-13 [12], A method**

   - Characteristics: Static modulus of elasticity in compression
   - Unit: N/mm^2
   - Specification according to EN 206 [15]: C 30/37
   - Testing specimens: 150 x 300 mm
   - Number of observations: 3
   - 3 specimens for determining the static modulus of elastic. The value of compressive strength of comparative specimens will be provided by PT provider.

7. **EN 12390-13 [12], B method**

   - Characteristics: Static modulus of elasticity in compression
   - Unit: N/mm^2
   - Specification according to EN 206 [15]: C 30/37
   - Testing specimens: 150 x 300 mm
   - Number of observations: 3
   - 3 specimens for determining the static modulus of elastic. The value of compressive strength of comparative specimens will be provided by PT provider.

8. **EN 12504-4 [6], ČSN 731371 [7]**
    - Characteristics: Ultrasonic Pulse Velocity, Dynamic modulus of elasticity in compression and tensile
    - Unit: m/s, N/mm^2
    - Specification: 3000 - 4500 m/s, 30 000 – 40 000 N/mm^2
    - Testing specimens: 100 x 100 x 400 mm
    - Number of observations: 3
9. **ČSN 731373 [9], EN 12504-2 [8]**
    - Characteristics: Determination of rebound number
    - Unit: -
    - Specification according to EN 206 [15]: C 30/37
    - Testing specimens: 150 x 150 x 150 mm
    - Number of observations: 3
10. **EN 1542 [11], ČSN 736242 – Appendix B [10]**
    - Characteristics: Measurement of bond strength by pull-off
    - Unit: -
    - Specification according to EN 206 [15]: C 30/37
    - Testing specimens: Concrete slab 400×400×50 mm, diameter 50 mm of the test targets
    - Number of observations: 5
11. **EN 1338 [13] – Annex E**
    - Characteristics: Total water absorption
    - Unit: %
    - Specification: Concrete paving blocks
    - Testing specimens:
        - 200 mm x 165 mm x 60 mm
        - 3 specimens
    - Number of observations: 3
    - Instructions: Prepare samples according to Annex E [13].

12. **EN 1338 [13] – Annex F**
    - Characteristics: Tensile splitting strength
    - Unit: MPa
    - Specification: Concrete paving blocks
    - Testing specimens:
      - 200 mm x 165 mm x 60 mm
      - 8 specimens
    - Number of observations: 8
    - Instructions:
      - Prepare samples according to Annex F [13].
      - Testing procedure F.3.
      - The correction factor for a thickness of 60 mm is k 0.87.
      - Add fracture load to the results.
13. **EN 1338 [13] – Annex G**
    - Characteristics: Abrasion resistance
    - Unit: mm
    - Specification: Concrete paving blocks
    - Testing specimens:
      - 200 mm x 165 mm x 60 mm
      - 3 specimens
    - Number of observations: 6
    - Instructions:
      - The samples must be cut in half due to the specified abrasive drop height (100 mm).
      - Perform 2 determinations on each sample.
14. **EN 1339 [16] – Annex F**
    - Characteristics: Flexural strength and flexural load
    - Unit: MPa a kN
    - Specification: concrete paving slab
    - Use pads under the upper and lower bearings of the size and material defined in EN 1339 Annex F, paragraph F1 [16].
    - Testing specimens:
      - 290 x 290 x 45 mm
      - 6 specimens
    - Number of observations: 6

2.2 Ensuring Homogeneity and Stability

PT Provider employees and any suppliers 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 testing items are provided in cooperation with BETOTECH, s.r.o., Beroun 660, Beroun. 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 molds from the same material for one type of test,
5. storing all specimens together under identical conditions,
6. checking all specimens before dispatching to participants.
7. Store the test specimens for strength tests in accordance with Article 5.5.2 of EN 12390-2 [17]. The PT organiser prefers to store in water. Otherwise, follow the requirements of the relevant standards.
8. The four sides of the test specimens according to EN 12390-8 [18] are adapted according to Article 6.1 of this standard.
9. The test specimens for frost resistance test according to ČSN 731322 [19] are subjected to homogeneity test by resonance method according to ČSN 731372 [20].

2.3 Instructions for Eliminating Major Sources of Errors and Risks

Participants of the PTP are required to:

- Ensure that samples are stored and transported in accordance with EN 12390-2 [17],
- Handle proficiency testing items in the same manner as most routinely tested samples,
- Follow the instructions of the PT provider responsible for the implementation of the PTP, particularly regarding the type of test performed, the number of determinations of results, and the timing of the testing,
- Report measurement uncertainty in accordance with their documented procedures, including the appropriate coverage factor. Unless otherwise specified, participants shall use a coverage factor of 2, corresponding to a confidence level of approximately 95
- 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,
- Submit the results of the proficiency testing items, including measurement uncertainties, to the PT provider by the deadline specified in section 1.

3 Procedures used in the Statistical Analysis of Laboratory Results

Procedures used in the statistical analysis of proficiency testing programs can be found here: http://ptprovider.cz/?lang=en.

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 [14]
- 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

[1] EN 12390-3. *Testing hardened concrete - Part 3: Compressive strength of test specimens*. 2020.

[2] EN 12390-5. *Testing hardened concrete - Part 5: Flexural strength of test specimens*. 2020.

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[4] EN 12390-7. *Testing hardened concrete - Part 7: Density of hardened concrete*. 2020.

[5] ISO 1920-10. *Testing of concrete - Part 10: Determination of static modulus of elasticity in compression*. 2016.

[6] EN 12504-4. *Testing concrete - Part 4: Determination of ultrasonic pulse velocity*. 2005.

[7] ČSN 731371. *Non-destructive testing of concrete - Method of ultrasonic pulse testing of concrete*. 2011.

[8] EN 12504-2. *Testing concrete in structures - Part 2: Non-destructive testing - Determination of rebound number*. 2013.

[9] ČSN 731373. *Non-destructive testing of concrete - Determination of compressive strength by hardness testing methods*. 2011.

[10] ČSN 736242. *Design and construction of pavements on road bridges*. 2010.

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[13] EN 1338. *Concrete paving blocks - Requirements and test methods*. 2004.

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[15] EN 206:2013+A2:2021. *Concrete - Specification, performance, production and conformity*. 2021.

[16] EN 1339. *Concrete paving flags – Requirements and test methods*. 2003.

[17] EN 12390-2. *Testing hardened concrete - Part 2: Making and curing specimens for strength tests*. 2020.

[18] EN 12390-8. *Testing hardened concrete - Part 8: Depth of penetration of water under pressure*. 2020.

[19] ČSN 73 1322. *Determination of frost resistance of concrete*. 2003.

[20] ČSN 731372. *Non-destructive testing of concrete - Testing of concrete by resonance method*. 2012.