



## **PROFICIENCY TESTING PLAN**

**ZZB 2022/2 – Strength and elasticity of hardened concrete  
(ZZB 12390, 6784, 1920 12504, 1542, 731373)**

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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:

<b>Registration deadline:</b>	<b>7/31/2022</b>
<b>Distribution of samples:</b>	<b>10/10/2022 – 10/14/2022</b>
<b>Realization/initiation of testing:</b>	<b>10/24/2022</b>
<b>Results sent to the organizer:</b>	<b>10/31/2022</b>
<b>Evaluation/presentation of Certificate of Participation:</b>	<b>1/31/2023</b>

**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<sup>2</sup>
- 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<sup>2</sup>
- 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<sup>2</sup>
- 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<sup>3</sup>
- 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<sup>2</sup>
- 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<sup>2</sup>
- 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<sup>2</sup>
- 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<sup>2</sup>
- Specification: 3000 - 4500 m/s, 30 000 – 40 000 N/mm<sup>2</sup>
- 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 300x300x80mm, 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.

**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 [16]. 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 [17] are adapted according to Article 6.1 of this standard.
9. The test specimens for frost resistance test according to ČSN 731322 [18] are subjected to homogeneity test by resonance method according to ČSN 731372 [19].

## 2.3 Instructions for the Elimination of Main Error Sources

PTP participants have the obligation:

- to store and transport the test specimens according to EN 12390-2 [16],
- 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,
- to adhere to the rules and principles of ethical conduct, as well as to regulations governing health and safety at work and fire safety, and to use exclusively electrical devices and facilities with a valid inspection report,
- to send the test results obtained during proficiency testing, including measurement uncertainties, to the PT Provider by the set deadline (see part 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.
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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.
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- [9] ČSN 731373. *Non-destructive testing of concrete - Determination of compressive strength by hardness testing methods*. 2011.
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- [11] EN 1542. *Products and systems for the protection and repair of concrete structures - Test methods - Measurement of bond strength by pull-off*. 2000.
- [12] EN 12390-13. *Testing hardened concrete - Part 13: Determination of secant modulus of elasticity in compression*. 2014.
- [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 12390-2. *Testing hardened concrete - Part 2: Making and curing specimens for strength tests*. 2020.
- [17] EN 12390-8. *Testing hardened concrete - Part 8: Depth of penetration of water under pressure*. 2020.
- [18] ČSN 73 1322. *Determination of frost resistance of concrete*. 2003.
- [19] ČSN 731372. *Non-destructive testing of concrete - Testing of concrete by resonance method*. 2012.