BRNO UNIVERSITY OF TECHNOLOGY

Z 7008

FACULTY OF CIVIL ENGINEERING
institute of building testing

PROFICIENCY TESTING PLAN

ZZB 2023/1 – Strength and durability of hardened concrete
(ZZB 12390, 480-11, 731322, 731324, 731326)

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 [1–3], EN 480-11 [4], ČSN 731322 [5], ČSN 731324 [6] and ČSN 731326, method A and C [7].

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:	**1/31/2023**
Distribution of samples:	**4/17/2023 – 4/21/2023**
Realization/initiation of testing:	**5/2/2023**
Results sent to the organizer:	**6/16/2023**
Presentation of the Certificate of Participation:	**7/14/2023**

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. 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 [8] available on ptprovider.cz. The maximum number of participants is 40.

Parts of the PT program:

1. **EN 12390-3 [1]**
   - Characteristics: Compressive strength
   - Unit: N/mm^2
   - Specification according to EN 206 [9]: C 30/37
   - Testing specimens: 150 x 150 x 150 mm
   - Number of observations: 3
   - Use the water storage before testing.
2. **EN 12390-7 [2]**
   - Characteristics: Weight Density
   - Unit: kg/m^3
   - Specification according to EN 206 [9]: 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.

3. **EN 12390-8 [3]**
   - Characteristics: Depth of penetration of water under pressure
   - Unit: mm
   - Specification according to EN 206 [9]: XF2
   - Testing specimens: 150 x 150 x 150 mm
   - Number of observations: 3
   - Instructions:
     (a) Perform with any side face of the cubes, i.e. not the top nor bottom.
     (b) The sides of the cubes have been treated according to article 7.1 of EN 12390-8 [3].
4. **EN 480-11 [4]**
   - Characteristics: Total air content; A300; L
   - Unit: %, %, mm
   - Specification according to EN 206 [9]: 3 – 7
   - Testing specimens: 150 x 150 x 150 mm
   - Number of observations: 1 (2 specimens)
   - Instructions:
     (a) The samples will be prepared by the participants themselves according to article 6 in EN 480-11[4].
     (b) The mixture formula will be provided by the organiser.
5. **ČSN 731322 [5]**
   - Characteristics: Freeze-thaw resistance
   - Unit: -
   - Specification according to EN 206 [9]: C30/37
   - Testing specimens: 100 x 100 x 400 mm
   - Number of observations: 3+3 (100 cycles)
   - Instructions:
     (a) For the determination of the observed property of hardened concrete, 6 beam specimens sized 100 x 100 x 400 mm will be provided.
     (b) Record the results after 100 cycles.
     (c) Freezing and thawing takes place in cycles for concretes exposed to temperatures as low as -20°C.
     (d) Frost resistance coefficient is the ratio of the arithmetic average of flexural strength of the frozen beams to the arithmetic average of flexural strength of reference beams.
6. **ČSN 731324 [6]**
   - Characteristics: R_o
   - Unit: %
   - Specification according to EN 206 [9]: -
   - Testing specimens: 7.07 x 7.07 x 7.07 mm
   - Number of observations: 3/6
   - Instructions: 3 or 6 cube specimens sized 7.07mm ± 2% (depending on the number of participants) will be supplied for the determination of the observed property of hardened concrete.

7. **ČSN 731326, method A [7]**
    - Characteristics: Freeze-thaw resistance
    - Unit: g/m^2
    - Specification according to EN 206 [9]: XF2
    - Testing specimens: 150 x 150 x 150 mm
    - Number of observations: 3 x 100 cycles
    - Instructions: Three cube specimens sized 150 mm will be provided by the organiser for the determination of the observed property of hardened concrete.
8. **ČSN 731326, method C [7]**
    - Characteristics: Freeze-thaw resistance
    - Unit: g/m^2
    - Specification according to EN 206 [9]: XF2
    - Testing specimens: Cylinder 50 x 150mm
    - Number of observations: 3 x 75 cycles
    - Instructions: 3 cylinder specimens (offcuts) of 150 mm in diameter and 50 mm height will be supplied for the determination of the observed property of hardened concrete.
9. **EN 12390-9 [10]**
    - Characteristics: Freeze-thaw resistance – Scaling
    - Unit: g/m^2
    - Specification according to EN 206 [9]: XF2
    - Testing specimens: 3 cubes - 150 x 150 x 150 mm
    - Number of observations: 4

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 [11]. 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 [3] are adapted according to Article 6.1 of this standard.
9. The test specimens for frost resistance test according to ČSN 731322 [5] are subjected to homogeneity test by resonance method according to ČSN 731372 [12].

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 [11],
- 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 [8]
- 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 12390-7. *Testing hardened concrete - Part 7: Density of hardened concrete*. 2020.

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

[4] EN 480-11. *Admixtures for concrete, mortar and grout - Test methods - Part 11: Determination of air void characteristics in hardened concrete*. 2006.

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

[6] ČSN 73 1324. *Determination of grindability of concrete*. 2003.

[7] ČSN 73 1326. *Resistance of cement concrete surface to water and defrosting chemicals*. 2003.

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

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

[10] CEN/TS 12390-9. *Testing hardened concrete - Part 9: Freeze-thaw resistance - Scaling*. 2007.

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

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