



## **PROFICIENCY TESTING PLAN**

**ZMC 2024/1 – Mortar, cement, fine-grained cement composites  
(ZMC 196, 1015, 13892, 12004-2)**

**Proficiency Testing Provider at the SZK FAST  
Veveří 95, 602 00 Brno  
Czech Republic**

**szk.fce.vutbr.cz  
ptprovider.cz**

Coordinator  
Supervisor  
Approved for PT Provider

Assoc. Prof. Ing. Tomáš Vymazal, Ph.D.  
Ing. Petr Misák, Ph.D.  
Assoc. Prof. Ing. Tomáš Vymazal, Ph.D.

Approved: October 24, 2024  
Approved: October 24, 2024  
Approved: October 24, 2024

## Contents

<b>1 Basic Information about the Proficiency Testing Program</b>	<b>2</b>
<b>2 Implementation of the Proficiency Testing Program</b>	<b>2</b>
2.1 Specifications and Characteristics . . . . .	2
2.2 Ensuring Homogeneity and Stability . . . . .	6
2.3 Instructions for Eliminating Major Sources of Errors and Risks . . . . .	6
2.4 PTP Schedule . . . . .	6
<b>3 Procedures used in the Statistical Analysis of Laboratory Results</b>	<b>6</b>
<b>4 Certificate of Participation and the Final Report on the Results of Interlaboratory Comparison</b>	<b>7</b>
<b>5 Safeguards for Confidentiality</b>	<b>7</b>
<b>6 Related Documents</b>	<b>7</b>

## 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 Mortar, cement a fine-grained cement in compliance with selected parts of EN 196 [1–4], EN 1015 [5–12], EN 13892-2 [13] and EN 12004-2 [14].

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>Application deadline:</b>	<b>31st August 2025</b>
<b>Sample distribution:</b>	<b>13th–17th October 2025</b>
<b>Test implementation/start:</b>	<b>10th November 2025</b>
<b>Submission of results to the organizer:</b>	<b>12th December 2025</b>
<b>Evaluation by:</b>	<b>31st January 2026</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 [15] available on <http://ptprovider.cz/?lang=en>.

Parts of the PT program:

#### 1. EN 196-1 [1]

- Characteristics: Strength
- Units:  $N/mm^2$
- Range of observed parameters: CEM I 42,5 R
- Amount of material: 5 kg of dry material
- Number of determinations:
  - after 2 days: 3 x bending strength, 6 x compressive strength
  - after 7 days: 3 x bending strength, 6 x compressive strength
  - after 28 days: 3 x bending strength, 6 x compressive strength

#### 2. EN 196-2 (Art. 4.4.1) [2]

- Characteristics: Determination of loss on ignition
- Units: %
- Range of observed parameters: CEM I 42,5 R
- Amount of material: 0.5 kg of dry material
- Number of determinations: 3

**3. EN 196-2 (Art. 4.4.2) [2]**

- Characteristics: Determination of sulphate content
- Units: %
- Range of observed parameters: CEM I 42,5 R
- Amount of material: 0.5 kg of dry material
- Number of determinations: 3

**4. EN 196-2 (Art. 4.4.3) [2]**

- Characteristics: Determination of the residue insoluble in hydrochloric acid and sodium carbonate
- Units: %
- Range of observed parameters: CEM I 42,5 R
- Amount of material: 0.5 kg of dry material
- Number of determinations: 3

**5. EN 196-2 (Art. 4.4.4) [2]**

- Characteristics: Determination of the residue insoluble in hydrochloric acid and potassium hydroxide
- Units: %
- Range of observed parameters: CEM I 42,5 R
- Amount of material: 0.5 kg of dry material
- Number of determinations: 3

**6. EN 196-2 (Art. 4.4.5) [2]**

- Characteristics: Determination of sulphite content
- Units: %
- Range of observed parameters: CEM I 42,5 R
- Amount of material: 0.5 kg of dry material
- Number of determinations: 3

**7. EN 196-2 (Art. 4.4.6) [2]**

- Characteristics: Determination of manganese content
- Units: %
- Range of observed parameters: CEM II 42,5 R
- Amount of material: 5 kg of dry material
- Number of determinations: 3

**8. EN 196-3 [3]**

- Characteristics: Setting time, Soundness
- Units: min., mm
- Range of observed parameters: CEM I 42,5 R
- Amount of material: 5 kg of dry material
- Number of determinations: 3

**9. EN 196-10 [4]**

- Characteristics: Determination of  $Cr^{6+}$  content
- Units: %
- Range of observed parameters: CEM II 42,5 R
- Amount of material: 5 kg of dry material
- Number of determinations: 3

**10. EN 1015-1 [5]**

- Characteristics: Granularity
- Units: %
- Range of observed parameters: min. M 2.5
- Amount of material: 5 kg of dry material
- Number of determinations: 3

**11. EN 1015-3 [6]**

- Characteristics: Consistence
- Units: mm
- Range of observed parameters: min. M 2.5
- Amount of material: 5 kg of dry material
- Number of determinations: 3

**12. EN 1015-6 [7]**

- Characteristics: Density of fresh mortar
- Units:  $kg/m^3$
- Range of observed parameters: min. M 2.5
- Amount of material: 5 kg of dry material
- Number of determinations: 3

**13. EN 1015-10 [8]**

- Characteristics: Density of hardened mortar
- Units:  $kg/m^3$
- Range of observed parameters: min. M 2.5
- Amount of material: 5 kg of dry material
- Number of determinations: 3

**14. EN 1015-11 [9]**

- Characteristics: Strength
- Units:  $N/mm^2$
- Range of observed parameters: min. M 2.5
- Amount of material: 5 kg of dry material
- Number of determinations: 3
- Amount of water will be declared after delivering of sample.

**15. EN 1015-12 [10]**

- Characteristics: Adhesion
- Units:  $N/mm^2$
- Range of observed parameters: min. M 2.5
- Amount of material: 5 kg of dry material
- Number of determinations: 5

**16. EN 1015-18 [11]**

- Characteristics: Capillary absorption coefficient ( $C_m$ )
- Units:  $kg/(m^2 \cdot \sqrt{min})$
- Range of observed parameters: min. M 2.5
- Amount of material: 5 kg of dry material
- Number of determinations: 6

**17. EN 1015-19 [12]**

- Characteristics: Water vapor flow
- Units:  $kg/m^2 \cdot s \cdot Pa$
- Range of observed parameters: min. M 2.5
- Amount of material: 5 kg of dry material
- Number of determinations: 3
- Storage of samples - 26 days at 50% humidity
- Salt: LiCl

**18. EN 13892-2 [13]**

- Characteristics: Tensile strength when bent and compressed
- Units:  $N/mm^2$
- Range of observed parameters: CT-C30-F5
- Amount of material: 5 kg of dry material
- Use the mixing method according to EN 13892-1 [16], art. 4.4
- Number of determinations: 3

**19. EN 12004-2, Chapter 8.1 [14]**

- Characteristics: Open time
- Units:  $N/mm^2$
- Range of observed parameters: C2T
- Amount of material: 8 kg of dry material
- Number of determinations: 1 x after 10 min. and 1 x after 30 min.
- Non-excluded values only – 10 values after 10 min. and 10 values after 30 min.
- Two tiles needed.

**20. EN 12004-2, Chapter 8.2 [14]**

- Characteristics: Slippage
- Units: mm
- Range of observed parameters: C1T
- Amount of material: 6 kg of dry material
- Number of determinations: 3

**21. EN 12004-2, Chapter 8.3.3.2 [14]**

- Characteristics: Adhesion
- Units:  $N/mm^2$
- Range of observed parameters: C1, C2
- Amount of material: 6 kg of dry material
- Number of determinations: 1
- Non-excluded values only – maximum of 10 values.

**22. EN 12004-2, Chapter 8.3.3.3 [14]**

- Characteristics: Adhesion
- Units:  $N/mm^2$
- Range of observed parameters: C1, C2
- Amount of material: 6 kg of dry material
- Number of determinations: 1
- Non-excluded values only – maximum of 10 values.

**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. The homogeneity and stability of specimens is ensured in the following ways:

1. the material used for the production of specimens is always taken from the same production and is of the same production date; and/or
2. via homogenization of the dry mixture for mortar production in a mixer,
3. by checking the material before its dispatch to the participants.

**2.3 Instructions for Eliminating Major Sources of Errors and Risks**

PTP participants have the obligation:

- 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 (see part 1).

**2.4 PTP Schedule**

All other information, forms and records not included in this document are accessible in updated form at <http://ptprovider.cz/?lang=en>.

**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> [15]
- 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 196-1. *Methods of testing cement - Part 1: Determination of strength*. 2016.
- [2] EN 196-2. *Method of testing cement - Part 2: Chemical analysis of cement*. 2013.
- [3] EN 196-3. *Methods of testing cement - Part 3: Determination of setting times and soundness*. 2017.
- [4] EN 196-10. *Methods of testing cement - Part 10: Determination of the water-soluble chromium (VI) content of cement*. 2017.
- [5] EN 1015-1. *Methods of test for mortar for masonry - Part 1: Determination of particle size distribution (by sieve analysis)*. 1999.
- [6] EN 1015-3. *Methods of test for mortar for masonry - Part 3: Determination of consistence of fresh mortar (by flow table)*. 2000.
- [7] EN 1015-6. *Methods of test for mortar for masonry - Part 6: Determination of bulk density of fresh mortar*. 1999.
- [8] EN 1015-10. *Methods of test for mortar for masonry - Part 10: Determination of dry bulk density of hardened mortar*. 2000.
- [9] EN 1015-11. *Methods of test for mortar for masonry - Part 11: Determination of flexural and compressive strength of hardened mortar*. 2000.
- [10] EN 1015-12. *Methods of test for mortar for masonry - Part 12: Determination of adhesive strength of hardened rendering and plastering mortars on substrates*. 2000.
- [11] EN 1015-18. *Methods of test for mortar for masonry - Part 18: Determination of water absorption coefficient due to capillarity action of hardened mortar*. 2003.
- [12] EN 1015-19. *Methods of test for mortar for masonry - Part 19: Determination of water vapour permeability of hardened rendering and plastering mortars*. 1999.



- [13] EN 13892-2. *Methods of test for screed materials - Part 2: Determination of flexural and compressive strength*. 2003.
- [14] EN 12004-2. *Adhesives for ceramic tiles - Part 2: Test methods*. 2017.
- [15] *Cancellation and Complaint Proceedings* – available at [www.ptprovider.cz](http://www.ptprovider.cz).
- [16] EN 13892-1. *Methods of test for screed materials - Part 1: Sampling, making and curing specimens for test*. 2003.