



PROFICIENCY TESTING PLAN

**ZK 2023/1 – Aggregate Testing
(ZK 933, 1097, 1367, 137, 721179)**

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Approved: May 24, 2022
Approved: May 24, 2022
Approved: May 24, 2022

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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 aggregate in compliance with selected parts of EN 933 [1–6], EN 1097 [7–12], EN 1367 [13–15], TP137 [16] and ČSN 72 1179 [17] standards. 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:	2/28/2023
Distribution of samples:	4/17/2023 – 4/21/2023
Realization/initiation of testing:	5/2/2023
Results sent to the organizer:	6/5/2023
Evaluation/presentation of Certificate of Participation:	6/30/2023

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. 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 [18] available on <http://ptprovider.cz/?lang=en>.

Parts of the PT program:

1. EN 933-1 [1]

- Characteristics: Particle size distribution
- Units: %
- Material: Fine aggregate
- Amount: cca 2,5 kg
- Range of observed parameters: max G_c 80/20
- Number of determinations: 3
- Perform using sieves with aperture size 4, 2, 1, 0,5 0.25, 0.125 a 0.063 mm – dry sample without washing.
- A collective sample will be prepared from which you prepare 3 sub-specimens.

2. EN 933-3 [2]

- Characteristics: Flakiness index (FI)
- Units: %
- Material: Coarse aggregate
- Amount: cca 3 kg
- Range of observed parameters: max FI_{35}
- Number of determinations: 3
- Perform 3 times on the same sample.

3. EN 933-4 [3]

- Characteristics: Shape index (SI)
- Units: %
- Material: Coarse aggregate
- Amount: cca 1.5 kg
- Range of observed parameters: max SI_{40}
- Number of determinations: 3
- Perform 3 times on the same sample.

4. EN 933-8 [4]

- Sand equivalent test (SE)
- Units: -
- Material: Coarse aggregate
- Amount: cca 1 kg
- Range of observed parameters: -
- Number of determinations: 3
- An aggregate sample will be prepared, from which the laboratory will prepare 3 partial batches.
- Perform the test according to EN 933-8 + A1 [1], Annex A.

5. EN 933-9 [5]

- Characteristics: MB value
- Units: g/kg
- Material: Fine aggregate
- Amount: cca 1.5 kg
- Range of observed parameters: -
- Number of determinations: 3
- A collective sample will be prepared from which you prepare 3 sub-specimens.
- Preparation of test runs according to Chapter 4 of EN 933-9 [5].

6. EN 933-10 [6]

- Characteristics: Grading of filler aggregates
- Units: %
- Material: Filler
- Range of observed parameters: -
- Number of determinations: 3
- A collective sample will be prepared from which you prepare 3 sub-specimens.

7. EN 1097-1 [7]

- Characteristics: Determination of the resistance to wear M_{DE}
- Units: -
- Material: Coarse aggregate
- Range of observed parameters: max M_{DE} 20
- Number of determinations: 1
- One unwashed sample weighing at least 5 kg will be prepared in accordance with § 6 EN 1097-1 [7].

8. EN 1097-2, chapt. 5 [8]

- Characteristics: Determination of resistance to fragmentation LA
- Units: -
- Material: Coarse aggregate
- Range of observed parameters: max LA_{30}
- Number of determinations: 1
- One unwashed specimen weighing 15 – 20 kg will be prepared in accordance with clause 5.2 EN 1097-2 [8].

9. EN 1097-2, chapt. 6 [8]

- Characteristics: Determination of resistance to fragmentation SZ
- Units: %
- Material: Coarse aggregate
- Range of observed parameters: max SZ_{26}
- Number of determinations: 1
- One unwashed specimen will be prepared in accordance with clause 6.2 EN 1097-2 [8].

10. EN 1097-3 [9]

- Characteristics: Determination of loose bulk density and voids ρ_b, V
- Units: $\text{Mg/m}^3, \%$
- Material: Fine aggregate
- Amount: cca 10 kg
- Range of observed parameters: -
- Number of determinations: 3
- A collective sample will be prepared from which you prepare 3 sub-specimens.

11. EN 1097-5 [10]

- Characteristics: Water content (W)
- Units: %
- Material: Fine aggregate
- Amount: cca 3 kg
- Range of observed parameters: -
- Number of determinations: 3
- A collective sample will be prepared from which you prepare 3 sub-specimens.

12. EN 1097-6, Chapt.. 8 [11]

- Characteristics: Determination of apparent particle density and water absorption (ρ_a, WA_{24})
- Units: $\text{Mg/m}^3, \%$
- Material: Coarse aggregate
- Amount: cca 5 kg
- Range of observed parameters: -
- Number of determinations: 3
- A collective sample will be prepared from which you prepare 3 sub-specimens.

13. EN 1097-7 [12]

- Characteristics: Determination of the particle density of filler (ρ_f)
- Units: Mg/m^3
- Material: Filler
- Range of observed parameters: -
- Number of determinations: 1

14. EN 1367-1 [13]

- Characteristics: Resistance to freezing and thawing (F)
- Units: %
- Material: Coarse aggregate
- Amount: cca 10 kg
- Range of observed parameters: max F_4
- Number of determinations: 3
- A collective sample will be prepared from which you prepare 3 sub-specimens.

15. EN 1367-2 [14]

- Characteristics: Magnesium sulfate test (MS)
- Units: %
- Material: Coarse aggregate
- Amount: cca 5 kg
- Range of observed parameters: max MS_{35}
- Number of determinations: 1
- A cumulative sample will be prepared. The laboratory will prepare 2 partial samples.

16. EN 1367-3 [15]

- Characteristics: Weight loss (M_I), Strength loss (S_{LA})
- Units: %, %
- Material: Coarse aggregate
- Range of observed parameters: -
- Number of determinations: 3

17. TP 137 Appendix 1 and 2 [16]

- Characteristics: Reactivity of aggregates in connection with alkalis
- Units: %
- Material: Coarse aggregate
- Amount: cca 1 kg
- Range of observed parameters: -
- Number of determinations: 1

18. TP 137 Appendix 1 and 2 [16]

- Characteristics: Reactivity of aggregates in connection with alkalis
- Units: %
- Material: Coarse aggregate
- Amount: cca 1 kg
- Range of observed parameters: -
- Number of determinations: 1

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. preparing the material for the preparation of samples from one bearing,
2. the distribution of bodies made of more bearings so as to ensure homogeneity of bodies in the field of testing of related characteristics,
3. by review the material before releasing participants.

2.3 Instructions for the Elimination of Main Error Sources

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,
- 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).

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> [18]
- 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 933-1. *Tests for geometrical properties of aggregates - Part 1: Determination of particle size distribution - Sieving method*. 2012.
- [2] EN 933-3. *Tests for geometrical properties of aggregates - Part 3: Determination of particle shape - Flakiness index*. 2012.
- [3] EN 933-4. *Tests for geometrical properties of aggregates - Part 4: Determination of particle shape - Shape index*. 2008.
- [4] EN 933-8. *Tests for geometrical properties of aggregates - Part 8: Assessment of fines - Sand equivalent test*. 2015.
- [5] EN 933-9. *Tests for geometrical properties of aggregates - Part 9: Assessment of fines - Methylene blue test*. 2013.
- [6] EN 933-10. *Tests for geometrical properties of aggregates - Part 10: Assessment of fines - Grading of filler aggregates (air jet sieving)*. 2010.
- [7] EN 1097-1. *Tests for mechanical and physical properties of aggregates - Part 1: Determination of the resistance to wear (micro-Deval)*. 2011.
- [8] EN 1097-2. *Tests for mechanical and physical properties of aggregates - Part 2: Methods for the determination of resistance to fragmentation*. 2020.
- [9] EN 1097-3. *Tests for mechanical and physical properties of aggregates - Part 3: Determination of loose bulk density and voids*. 1999.
- [10] EN 1097-5. *Tests for mechanical and physical properties of aggregates - Part 5: Determination of the water content by drying in a ventilated oven*. 2008.
- [11] EN 1097-6. *Tests for mechanical and physical properties of aggregates - Part 6: Determination of particle density and water absorption*. 2014.
- [12] EN 1097-7. *Tests for mechanical and physical properties of aggregates - Part 7: Determination of the particle density of filler - Pycnometer method*. 2008.
- [13] EN 1367-1. *Tests for thermal and weathering properties of aggregates - Part 1: Determination of resistance to freezing and thawing*. 2007.
- [14] EN 1367-2. *Tests for thermal and weathering properties of aggregates - Part 2: Magnesium sulfate test*. 2010.
- [15] EN 1367-3. *Tests for thermal and weathering properties of aggregates - Part 3: Boiling test for "Sonnenbrand basalt"*. 2001.

- [16] TP 137. *Příloha 1 a 2 – Reaktivnost kameniva s alkáliemi.*
- [17] ČSN 721179. *Determination of reactivity of aggregates in connection with alkalies.* 2004.
- [18] *Cancellation and Complaint Proceedings – available at www.ptprovider.cz.*