BRNO UNIVERSITY OF TECHNOLOGY

Z 7008

FACULTY OF CIVIL ENGINEERING
institute of building testing

PROFICIENCY TESTING PLAN

ZZ 2019/1 – Soil Testing
(ZZ 17892, 13286)

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

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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 soils in compliance with EN ISO 17892-1 [1] through EN ISO 17892-12 [2], EN 13286-2 [3] and EN 13286-47 [4]. 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:	**08/31/2019**
Distribution of samples:	**10/07/2019 – 10/11/2019**
Realization/initiation of testing:	**10/21/2019**
Results sent to the organizer:	**11/30/2019**
Evaluation/presentation of Certificate of Participation:	**01/31/2020**

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 [5] available on www.szk.fce.vutbr.cz/en.

Parts of the PT program:

1. **EN ISO 17892-1** [1]
   - Characteristics: Water content
   - Units: %
   - Range of observed parameters: 5 – 30 %
   - Number of determinations: 3
2. **EN ISO 17892-3** [6]
   - Characteristics: Particle density
   - Units: Mg/m^3
   - Range of observed parameters: 2,6 – 2,75 Mg/m^3
   - Number of determinations: 3
3. **EN ISO 17892-4** [7]
   - Characteristics: Particle size distribution
   - Units: %
   - Range of observed parameters: It can not be determined in advance
   - Expected sieves used: 64, 32, 16, 8, 4, 2, 1, 0.5, 0.25, 0.125, 0.063 mm
   - Number of determinations: 1
4. **EN ISO 17892-5** [8]
   - Characteristics: Incremental loading oedometer test
   - Units: MPa

- Range of observed parameters: It can not be determined in advance
- Number of determinations: 3
- **Instructions**:
  (a) Dry the required amount of soil at 105°C
  (b) Homogenize the soil
  (c) Sieve through a mesh with 4 mm aperture
  (d) Moisturize to the prescribed water content ~~16 %~~ 13 %[1]
  (e) Leave to rest in a plastic bag for 24 hours
  (f) Compact to a Proctor standard
  (g) Cut out samples for the indicated tests from the compacted soil
  (h) Cut out the sample from approximately half the height of the compacted soil
  (i) Pour water over the sample after loading to 50 kPa (consolidation level)
  (j) Perform the test at stress levels: 100, 200 and 400 kPa
  (k) No reconsolidation
  (l) Evaluate the tangent modulus values between levels - see standard CEN ISO / TS 17892-5 [8]

5. **EN ISO 17892-7** [9]

- Characteristics: Unconfined compressive strength, Strain at failure
- Units: MPa, %
- Range of observed parameters: It can not be determined in advance
- Number of determinations: 3
- **Instructions**:
  (a) Dry the required amount of soil at 105°C
  (b) Homogenize the soil
  (c) Sieve through a mesh with 4 mm aperture
  (d) Moisturize to the prescribed water content ~~16 %~~ 13 %[2]
  (e) Leave to rest in a plastic bag for 24 hours
  (f) Compact to a Proctor standard
  (g) Cut out samples for the indicated tests from the compacted soil
  (h) Perform the test with two cylinder specimens of 38 mm in diameter and 76 mm in height
  (i) Compress the cylinders at the rate of 1 mm/min
  (j) Calculate the average value

6. **CEN ISO/TS 17892-10** [10]

- Characteristics: Effective shear parameters
- Units: ° / kPa
- Range of observed parameters: It can not be determined in advance
- Number of determinations: 1
- **Instructions**:
  (a) Dry the required amount of soil at 105°C
  (b) Homogenize the soil
  (c) Sieve through a mesh with 4 mm aperture
  (d) Moisturize to the prescribed water content ~~16 %~~ 13 %[3]

[1] changed 10/10/2019
[2] changed 10/10/2019
[3] changed 10/10/2019

(e) Leave to rest in a plastic bag for 24 hours
(f) Compact to a Proctor standard
(g) Cut out samples for the indicated tests from the compacted soil
(h) Perform the test with four specimens at stress levels: 50, 100, 200 and 300 kPa
(i) After loading, pour water over the samples and leave to consolidate for 24 hours
(j) Shear the samples at the rate 0,01 mm/min

7. **EN ISO 17892-12** [2]
   - Characteristics: Atterberg limits
   - Units: -
   - Range of observed parameters: 20 – 70, 10 – 30
   - Number of determinations: 3
   - **Instructions**: The measured quantity depends on the type of soil or its consistency.
   - Determination of liquid limit:
     - Instrumentation according to the article 4.2 [2]
     - Procedure by article 5.3 [2]
     - Calculation by article 6.2 [2]
   - Determination of plasticity limit:
     - Instrumentation according to the article 4.4 [2]
     - Procedure by article 5.5 [2]
     - Calculation by article 6.4 [2]
8. **EN 13286-2** [3]
   - Characteristics: Proctor
   - Units: kg/m^3, %
   - Range of observed parameters: It can not be determined in advance
   - Number of determinations: 1
   - **Instructions**: Use a A type Proctor compaction mold.
9. **EN 13286-47** [4]
   - Characteristics: ~~CBR~~ IBI[4]
   - Units: %
   - Range of observed parameters: It can not be determined in advance
   - Number of determinations: 1
   - **Instructions**: Use water content ~~16 %~~ 13 %[5], without saturation.

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.

[4] changed 11/21/2019
[5] changed 10/10/2019

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 [5]

- 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 ISO 17892-1. *Geotechnical investigation and testing - Laboratory testing of soil - Part 1: Determination of water content*. 2015.

[2] EN ISO 17892-12. *Geotechnical investigation and testing - Laboratory testing of soil - Part 12: Determination of liquid and plastic limits*. 2018.

[3] EN 13286-2. *Unbound and hydraulically bound mixtures - Part 2: Test methods for laboratory reference density and water content - Proctor compaction*. 2011.

[4] EN 13286-47. *Unbound and hydraulically bound mixtures - Part 47: Test method for the determination of California Bearing ratio, immediate bearing index and linear swelling*. 2012.

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

[6] EN ISO 17892-3. *Geotechnical investigation and testing - Laboratory testing of soil - Part 3: Determination of particle density*. 2016.

[7] EN ISO 17892-4. *Geotechnical investigation and testing - Laboratory testing of soil - Part 4: Determination of particle size distribution*. 2017.

[8] EN ISO 17892-5. *Geotechnical investigation and testing - Laboratory testing of soil - Part 5: Incremental loading oedometer test*. 2017.

[9] EN ISO 17892-7. *Geotechnical investigation and testing - Laboratory testing of soil - Part 7: Unconfined compression test*. 2018.

[10] CEN ISO/TS 17892-10. *Geotechnical investigation and testing - Laboratory testing of soil - Part 10: Direct shear tests*. 2005.