



### Detailed plan for ILC/PT

#### 1. PT-provider's identification and address

PT provider UCLSB at "Union of Construction Laboratory Specialists of Bulgaria" Association (UCLSB), 6, Ivan Dimov Str., Gabrovo 5300, Bulstat: 175864757, Person in charge: Eng. Iliyan Iliev.

#### 2. General information about the Technical design

2.1. Interlaboratory technical project MC 02/2020 is organized by an expert team of experts within PT provider UCLSB, consisting of:

- Project manager – eng. Ilian Iliev;
- Project coordinator – eng. Valentin Belovski;
- Material engineer – eng. Ivan Rostovski, Assoc. Prof., PhD;
- Metrologist – en. Ilian Iliev;
- Data collection and encryption expert – eng. Stoyan Minev;
- Technical expert – eng. Lyubomir Brakalov, Assoc. Prof., PhD;

The members of the expert team have the necessary qualification (specialized education), skills and experience in the organization of Interlaboratory comparisons and proficiency testing.

2.2. The procedure of carrying out Interlaboratory technical project MC 02/2020 includes organization, conduct and evaluation of tested material (raw material, product) through participation of laboratories in the interlaboratory comparison and proficiency testing in compliance with established conditions, program, confirmed invitation for participation QF 4.4-3, request for participation QF 4.4-4 and compliance with a proficiency testing instruction QF 4.4-5.

Along with the competence assessment, the purpose of the project is to study the abilities of the laboratories to use the evaluation of the indefiniteness of testing in order to be presented in a more reputable, trustworthy and quality manner during measurement (determination) of indices (characteristics), distinguished for their considerable distraction (uncertainty), inherent to the natural and artificial construction materials.

2.3. The technical project is conducted in accordance with a scheme described in EN ISO/IEC 17043 (Annex A), as follows:

- Split sample testing schemes: The source material shall be divided simultaneously among the laboratories participating in the testing. Enough material shall be preserved for any possible testing and for testing of stability.
- Homogeneity will be determined by appropriate tests by laboratories which perform sampling, homogenization, reduction and splitting of samples in the presence of PT provider and according to its procedures. After assessing the results by the technical expert and authentication (verification of the) homogeneity, the samples will be sent to participants. Otherwise, we proceed to a new homogenization under the current procedures of PT provider.
- An identification code shall be determined for each laboratory, which shall be indicated in the upper right corner of Proficiency testing instruction QF 4.4-5, for the purpose of confidentiality. The PT scheme is applied only once, depending on the frequency of the testing and at the same time it is multilateral, depending on the number of participants.



## PROFICIENCY TESTING PLAN

- Laboratories assume as “true value” (assigned value) and its uncertainty the value obtained by the independent expert through statistical processing of all equal laboratory results.

2.4. The statistical processing is applied in compliance with the requirements of the following statutory documents:

- [1] BDS EN ISO/IEC 17025:2018 (General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:2017))
- [2.1] BDS 17397:2005 Part 1 INTERNATIONAL VOCABULARY OF BASIC AND GENERAL METROLOGICAL TERMS
- [2.2] ISO/IEC GUIDE 99:2008 International vocabulary of metrology — Basic and general concepts and associated terms (VIM), 3th edition, 2012 (2008 with minor changes)
- [3] BAS QR 18, v. 3:2013, PROCEDURE FOR INTERLABORATORY COMPARISONS AND PROFICIENCY TESTINGS.
- [4] EN ISO/IEC 17043:2010: Conformity assessment General requirements for proficiency testing.
  - [5.1] [://www.nist.gov/pml/wmd/labmetrology/roundrobins.cfm](http://www.nist.gov/pml/wmd/labmetrology/roundrobins.cfm)
  - [5.2] [://www.nist.gov/pml/wmd/labmetrology/upload/pt-ilc-report-terminology-guidance-8-4-2011-2.doc](http://www.nist.gov/pml/wmd/labmetrology/upload/pt-ilc-report-terminology-guidance-8-4-2011-2.doc) - 2011-08-04
- [6] IUPAC: The International Harmonized Protocol for Proficiency Testing of Analytical Chemistry Laboratories, 2006, Pure Appl. Chem., 78, No 1, pp. 145-196
- [7] ISO 13528:2015 Statistical methods for use in proficiency testing by interlaboratory comparisons
  - [8.1] ISO 5725:1994 Accuracy (trueness and precision) of measurements methods and results. Part 2. Basic methods for determination of repeatability and reproducibility of a standard measurement method
  - [8.2] Bozhanov E., Vuchkov I., Statistical methods of modeling and optimization of multi-factor objects, S., Technika, 1983
  - [8.3] ISO 21748:2018 (ISO 21748:2017), Guidance to the use of repeatability, reproducibility and trueness estimates in measurement uncertainty evaluation
  - [8.4] [http://en.wikipedia.org/wiki/Welch%27s\\_t\\_test](http://en.wikipedia.org/wiki/Welch%27s_t_test) (Welch – Aspin test)
- [9] Harvey D., Modern analytical chemistry, McGraw-Hill, 2000
- [10] Дёрффель К., Статистика в аналитической химий, М., Мир, 1994
- [11] Eurachem / CITAC Guide, Quantifying uncertainty in analytical measurement, Third Edition, 2012
- [12] Hardened concrete standards
  - [12.1] EN 12390-3:2019 Testing hardened concrete - Part 3: Compressive strength of test specimens.
  - [12.2] EN 12390-7:2019 Testing hardened concrete - Part 7: Density of hardened concrete.
- [13] Aggregate (Fine or all-in) standards
  - [13.1] EN 1097-6:2013, clause 9 Tests for mechanical and physical properties of aggregates - Part 6: Determination of particle density and water absorption.
  - [13.2.] EN 933-9:2009+A1:2013 Tests for geometrical properties of aggregates - Part 9: Assessment of fines - Methylene blue test.
  - [13.3.] EN 1744-1:2009+A1:2012, clause 15.1 Tests for chemical properties of aggregates - Part 1: Chemical analysis.



- [14] Provider’s procedures
  - [14.1] QP 4.6.1 HANDLING THE TEST OBJECTS
  - [14.2] QP 4.7.2 ASSESSMENT OF THE ASSIGNED VALUE OF PARAMETERS AND ENSURING ITS QUALITY AND ASSESSMENT OF THE PARTICIPANT'S PERFORMANCE IN ILC.
- [15] Other documents related to the tests and ILC
  - [15.1] ASTM C670 - 15 Standard Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials

**3. Subcontracted activities**

UCLSBA will use as subcontractor Construction and testing center at "TPA" EOOD, Sofia for Hardened concrete and Aggregate (Fine or all-in) but only for sampling, homogenization, reduction and splitting of samples under the control (supervision) of the PT provider.

The UCLSBA representatives during the process of sample preparation will be the project manager – eng. Ilian Iliev, project coordinator – eng. Valentin Belovski and material engineer - eng. Ivan Rostovski, Assoc. Prof., PhD.

Homogeneity will be determined by appropriate tests by the subcontracted laboratories the presence of PT provider and according to its procedures. After assessing the results by the technical expert and authentication (verification of the) homogeneity, the samples will be sent to participants. Otherwise, we proceed to a new homogenization under the current procedures of PT provider.

**4. Participation criteria and evaluation of adequacy**

Accredited laboratories from Executive Agency “Bulgarian Accreditation Service” are invited to participate, as well as CABs accredited by other accreditation bodies and laboratories in a process of accreditation, with long-term practical experience and laboratories willing to prove their competence through their participation.

The processing, analysis and evaluation of the results shall be carried out by the technical expert in compliance with the documents indicated in section 2.4.

The project will include only evaluations (estimates) that are appropriate for ILC.

**5. Number and type of expected participants in the proficiency testing scheme**

On the basis of the experience gained by PT provider UCLSB in the conduct of proficiency testing, the expected number of laboratories is around 60, provided that all of them are from the construction industry. The minimum number of participants in project MC 02/2020 is 5.

**6. Choice of measurements or specifications for complete identification of the methods**

Interlaboratory technical project MC 02/2020 shall cover the following products: Hardened concrete and Aggregate (Fine or all-in), according to the indicated standards and indices in the following table:

Test subject	Code of the standard	Name of the standard	Tested parameters (characteristics)
Hardened concrete	EN 12390-3:2019	Testing hardened concrete - Part 3: Compressive strength of test specimens.	Compressive strength <span style="background-color: #90EE90;">■</span>
	EN 12390-7:2019	Testing hardened concrete - Part 7: Density of hardened concrete.	Density of hardened concrete <span style="background-color: #90EE90;">■</span>



Test subject	Code of the standard	Name of the standard	Tested parameters (characteristics)
Aggregate (Fine or all-in)	EN 1097-6:2013, clause 9	Tests for mechanical and physical properties of aggregates - Part 6: Determination of particle density and water absorption.	Particle density, ( $\rho_a$ , $\rho_{rd}$ , $\rho_{ssd}$ ) <span style="background-color: #90EE90;">ua</span>
	EN 1097-6:2013, clause 9	Tests for mechanical and physical properties of aggregates - Part 6: Determination of particle density and water absorption.	Water absorption, (WA <sub>24</sub> ) <span style="background-color: #90EE90;">ua</span>
	EN 933- 9:2009+A1:2013	Tests for geometrical properties of aggregates - Part 9: Assessment of fines - Methylene blue test.	Methylene blue value <span style="background-color: #90EE90;">ua</span>
	EN 1744- 1:2009+A1:2012, clause 15.1	Tests for chemical properties of aggregates - Part 1: Chemical analysis.	Potential presence of humus <span style="background-color: #90EE90;">ua</span>

**7. Instructions and directions to participants (including levels of data protection, confidentiality), encoding of participants both individually and in the report.**

The laboratories receive electronically “Invitation for participation” QF 4.4.-3 in the interlaboratory comparison and proficiency testing and “Request for participation” QF 4.4-4 in the interlaboratory comparison and proficiency testing. After expiration of the time limit for confirmation of participation by the compliance evaluation bodies, the project coordinator, on the basis of “Request for participation” QF 4.4-4, draws up a list QL 4.4-1 “List of applied participants” and submits it to the data collection and encryption expert. The expert, in his turn, draws up a new list of participants which contains the laboratory code and the sample code QL 4.4-2 “Encrypted list of participants”, which is kept by the data collection and encryption expert until completion and recording of the documentation of the relevant interlaboratory comparison and testing.

Then the laboratories/compliance evaluation bodies obtain the samples, accompanied by a “Protocol of sample receipt” QF 4.4-6 and “Instruction for conducting of proficiency testing” QF 4.4-5. Within the stipulated time limit the laboratories individually determine each selected characteristics/index. Upon receipt of the test samples, the laboratories also receive “test result sheets” QF 4.4-7 where the unique code of the relevant laboratory is indicated, as well as the sample code, known only to the data collection and encryption expert. QF 4.10-1 “Declaration of confidentiality” is also signed.

Confidentiality of the results until their final submission is achieved in the following manner: the coordinator notifies the compliance evaluation body that a test sample is being sent, so that they get ready for its receipt. The encrypted sample is transported to the compliance evaluation body, packed in a manner ensuring its identity, intactness, anonymity and metrological resistance. Upon acceptance the compliance evaluation body fills in a “Protocol of sample receipt” QF 4.4-6 which is sent back to the coordinator. After completion of the testing and assessment of the uncertainty, the compliance evaluation body fills in quality forms QF 4.4-7 “Test result sheets” which contain the minimum necessary information and the participant’s code. The “Test result sheets” QF 4.4-7 are sent to the data collection and encryption expert in charge of the information. The data collection and encryption expert collects the results in QL 4.4-3 “Codified list of results”/which list contains only sample codes, laboratory codes and results, without names/ and delivers them to an independent expert for processing and a general and individual assessment. The technical expert has signed a declaration of confidentiality QF 4.10-1, according to which the disclosure of information is prohibited. Notwithstanding the above, he does not have any access to primary information about the compliance and testing evaluation body.



As evidenced from the above, there is a division of the information flow and the movement of samples, which ensures anonymity and impartiality of the participants and the independent expert.

On the other part, the participating compliance evaluation bodies (CEB) and the coordinators undertake not to disclose information from Interlaboratory technical project MC 02/2020 the report and the results in any form, unless requested for reference purposes by SNAS or another authorized state authority. Upon submission of results before such a body, CEB undertake to notify it of the confidential nature of the interlaboratory comparison. The results may also be used for CEB audit but this shall also be guaranteed by a declaration of confidentiality on behalf of the auditor. This is why all participants in interlaboratory comparisons and testing also sign declarations of confidentiality, which are an integral part of Interlaboratory technical project MC 02/2020.

**8. Transport of samples:** The organizers shall transport the materials in appropriate packaging, with individual indexation and accompanying letter to each laboratory.

**9. Carrying out testing:** The testing laboratories undertake not to use in the course of testing external information that could suggest the results obtained by other laboratories. Therefore the tests need to be performed as quickly as possible. Participants may be excluded from the scheme for gross infringements.

**10. Completing the inter-laboratory comparison and proficiency testing:** The deadline for submitting the full documentation shall be specified in the instructions accompanying each test subject. The statements of tests shall be sent to the organizer's electronic address specified in the instructions.

**11. Reading and assessing the results of ILC/PT:** The final report (QF 4.8-1) shall be prepared by the technical expert - eng. Lyubomir Brakalov, Assoc. Prof., PhD, within the deadline set out in the instructions, and shall contain statistically processed results and conclusions on the efficiency of the process. The report will include the following evaluation criteria and the participants': /bias - deviation; z - score;  $\zeta$  – evaluation/. A document (Certificate QF 4.9-1) related to the participation of the laboratories to the inter-laboratory comparison and proficiency testing shall be attached.

## **12. Participant feedback**

QF 5.7-1 "Feedback sheet" is filled in. During the entire period of conducting Interlaboratory technical project MC 02/2020 the director of the relevant laboratory – participant or another person authorized for this purpose, maintains direct connection only with the Technical coordinator of the Project.

## **13. Planning or participation in technical meetings with the participants**

If necessary, a meeting for discussion of the method of preparation of samples, testing method, the final results and the final report is conducted. This usually becomes necessary in case of considerable dispersion of the results.

**Approved by:**  
**Manager of PT provider UCLSB at UCLSBA: eng. Ilian Iliev**