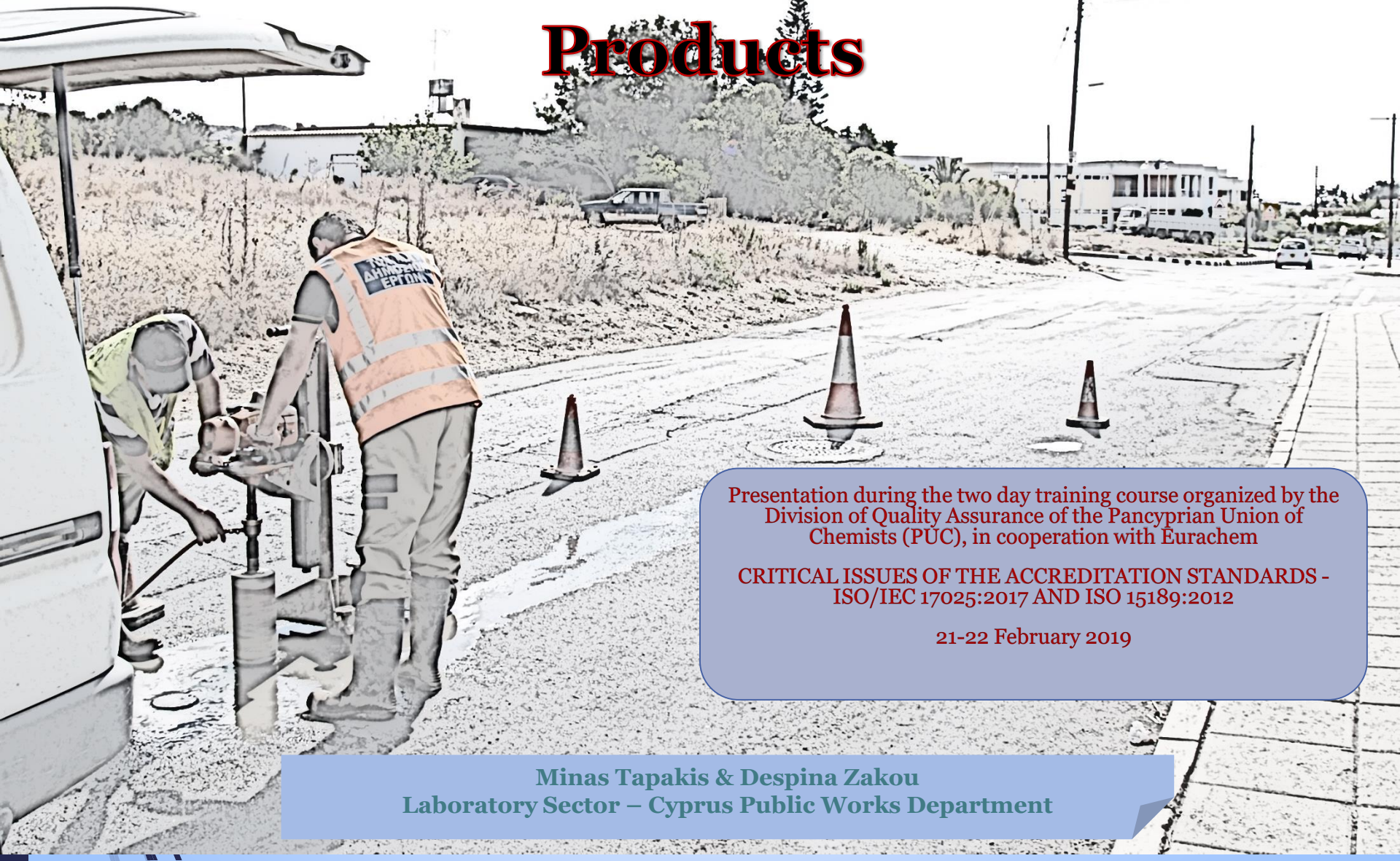


Experiences on Reference Materials for Construction Products



Presentation during the two day training course organized by the Division of Quality Assurance of the Pancyprian Union of Chemists (PUC), in cooperation with Eurachem

**CRITICAL ISSUES OF THE ACCREDITATION STANDARDS -
ISO/IEC 17025:2017 AND ISO 15189:2012**

21-22 February 2019

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Construction products

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Aggregates (gravel, sand etc)



Asphalt concrete



Bitumen



Concrete



Precast concrete products (kerbs, flags, pavers etc)



Thermoplastic paint for road markings



Soils

Major tests for construction products

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- Gradation
- Water absorption
- Compaction of asphalt roads

Physical Tests



- Resistance to breaking
- Compressive strength of concrete
- Strength of concrete pipes, flags, kerbs, pavers

Mechanical tests



- Methylene Blue
- Magnesium sulphate resistance
- Soluble binder content

Chemical tests



Implications for failed tests

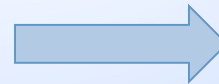
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- ▶ If after testing, specimens are found out of the specification limits the contractor or producer may face the following:
 - financial penalties on contractors by PWD
 - order to destruct and re-construct of the works by PWD
 - withdrawal of materials from the market by the Ministry of Interior (Competent Authority for Construction Products)
 - restrictions on the sale of the materials by the Ministry of Interior (Competent Authority for Construction Products)



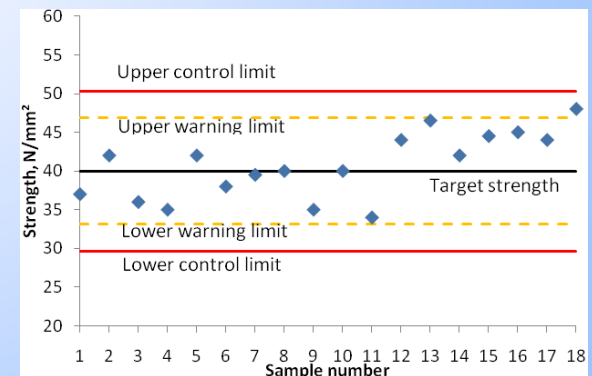
Reference Materials: General issues [1/2]

- ▶ Lack of reference materials for the majority of tests (with a few exceptions)
- ▶ Possible reason:
 - Many tests are destructive, thus no repetition is feasible.
 - Alteration of properties when immerse and/or heat (asphalt & concrete)?
 - Reference materials on local basis?



Reference Materials: General issues [2/2]

- ▶ The inherent variability of the products is large.
 - Even within the same production batch.
- ▶ Addressing the issue by EN standards or specifications
 - Increasing the specimen quantity of a sample (up to 8 specimens for precast concrete products mechanical testing)
 - Imposing “additional factors” e.g. Required compressive strength of concrete specimens \geq nominal + 4 N/mm²
 - Requiring the use of control charts on materials
 - etc.



Reasons to address the issue

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(a) Follow CYS-
AB regulations

(b) To confirm
laboratory
methods &
procedures

(c) To verify
that results are
valid

Supplementary solutions to enhance the reliability of everyday testing

(a) Follow CYS-AB regulations

(b) To confirm laboratory methods & procedures

Especially for “critical” tests

(c) To verify that results are valid

Conventional Solutions adopted by PWD Laboratory Sector [1/2]

1. Collaboration with manufacturers to choose samples of known properties to be used as “in-house reference materials”
 - e.g. When sampling flags from a manufacturer for breaking strength, we were advice to sample only from the middle section of the casting mold of the machine



Conventional Solutions adopted by PWD Laboratory Sector [2/2]

2. Prepare in-house testing samples,
 - Division of a large laboratory sample into smaller test specimens. Use in-house procedure for laboratory samples division and sample preparation.
 - Preparation of concrete specimens from the same batch
3. Implement a procedure for control checks.
 - Where allowed by the sample, blind testing of the same material. Statistical analysis and evaluation of the results



Supplementary Solutions adopted by PWD Laboratory Sector to enhance reliability of results [1/2]

4. The procedure for “blind sampling” includes testing material from the intra-laboratory scheme
5. Repeat test on out of limits specimens
 - decision depends on result
 - different operator where possible
 - from in-situ samples or material discarded during reduction



Supplementary Solutions adopted by PWD Laboratory Sector to enhance reliability of results [2/2]

5. Examine “surrogate test” or “similar test” results
 - e.g. Compare results from testing Gradation and Flakiness Index since both require sieving
 - e.g. Test for Methylene Blue and for Sand Equivalent are most of times highly correlated
6. Notice historic evidence when possible
 - e.g. It is rather unlikely that a washed limestone sand will result in high methylene blue values
 - e.g. Certain quarries produce only a single product in a single operation from a single origin, therefore gradation will normally be the same



Thank you for your attention

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