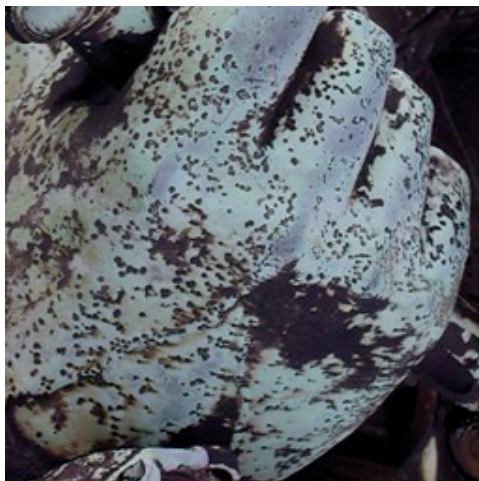




LABORATÓRIO NACIONAL
DE ENGENHARIA CIVIL

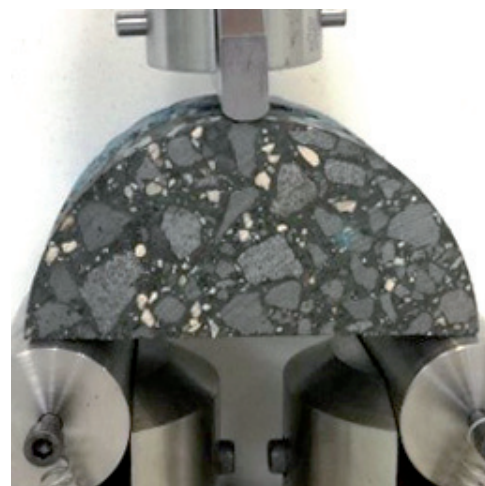
**TESTING
and METROLOGY**



- ISO 17025 transition experience
- Visit of the of Coimbra University
- Crack propagation by semi-circular bending test
- Reference entity in flow measurement
- UEC – Laboratory for Electrochemistry, Corrosion and Protection of Materials

number 9

June 2020



ISO 17025 transition experience

The 2017 version of the ISO / IEC 17025 standard introduced in practice new challenges in the activity laboratories with accredited tests that translate into the fulfillment of requirements associated with a harmonized approach, which has led to the development of a new management system model that supports the integrated management of the 32 laboratory's of LNEC - Tests and Metrology.

In this new approach, information was reorganized and simplified in a visual structure, less descriptive and more flexible. The global revision of the management system was based on guiding the main elements

that characterize the new version of the standard, namely, the digital transition in organizations, the introduction of risk-based thinking, customer orientation, process management, the concept of sampling as laboratory activity, and the obligation to declare measurement uncertainty associated with sampling and testing, the application of decision rules in conformity assessment, the interface with other management systems (ISO 9001).

In this transition, the path started in 2013 that consisted of the integration of operating units into a horizontal entity created at LNEC



newsletter



and called LNEC-EM (Tests and Metrology), the management system being supported by an application document management information technology developed for this purpose. This initiative had an impact immediate reorganization of documents and management of the activity of the operating units, and continuous improvement process,

allowing the development of several collaborative internal projects in matters such as metrological instrumentation management, the sharing of resources and external services, training and technical qualification, among other synergies that significantly enhance the capacity of LNEC. Although there are still aspects to be

improved in this transition process [to the new version of standard], the options taken were validated by the 2019 External Assessment, which allows to conclude that the global review resulted in the improvement of the management system and its adequacy to the current (internal and external) context.

Visit of the of Coimbra University

LNEC received, the visit of Colleagues from the Department of Civil Engineering of the of Coimbra University to some of the LNEC-EM Units, namely, integrated in the Structures, Buildings and Hydraulics and Environment Departments and at the LNEC Scientific Instrumentation . This visit is part of the development of collaborative activities related to the development of quality management systems, with metrological activities in several areas of mutual interest and with the accreditation of tests in the context of Civil Engineering.



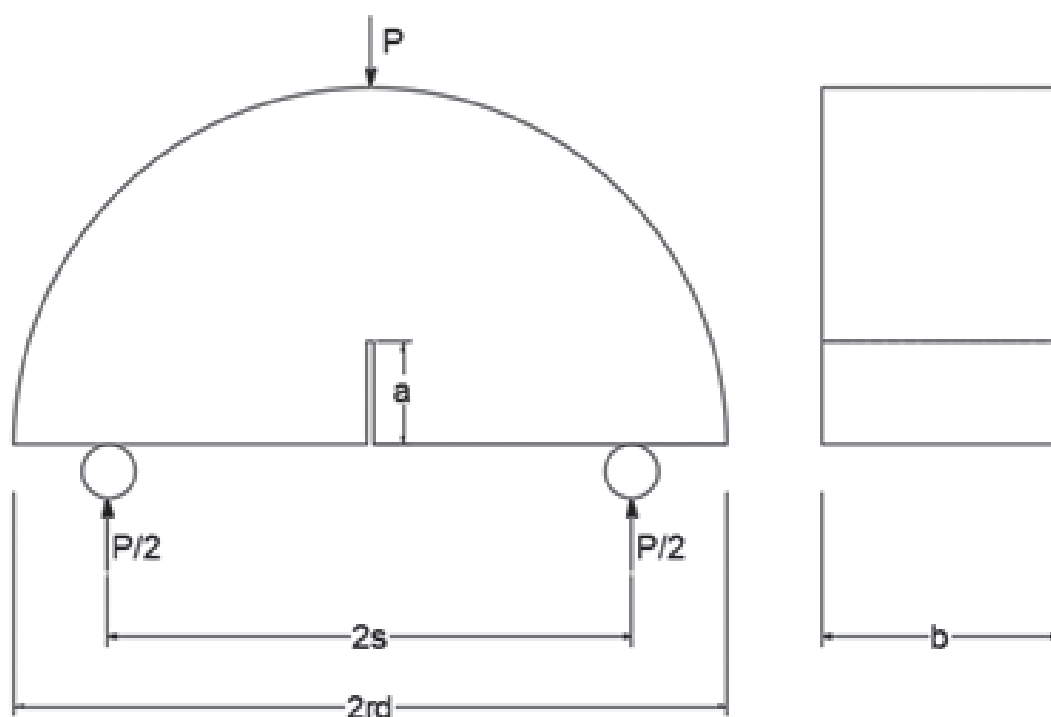
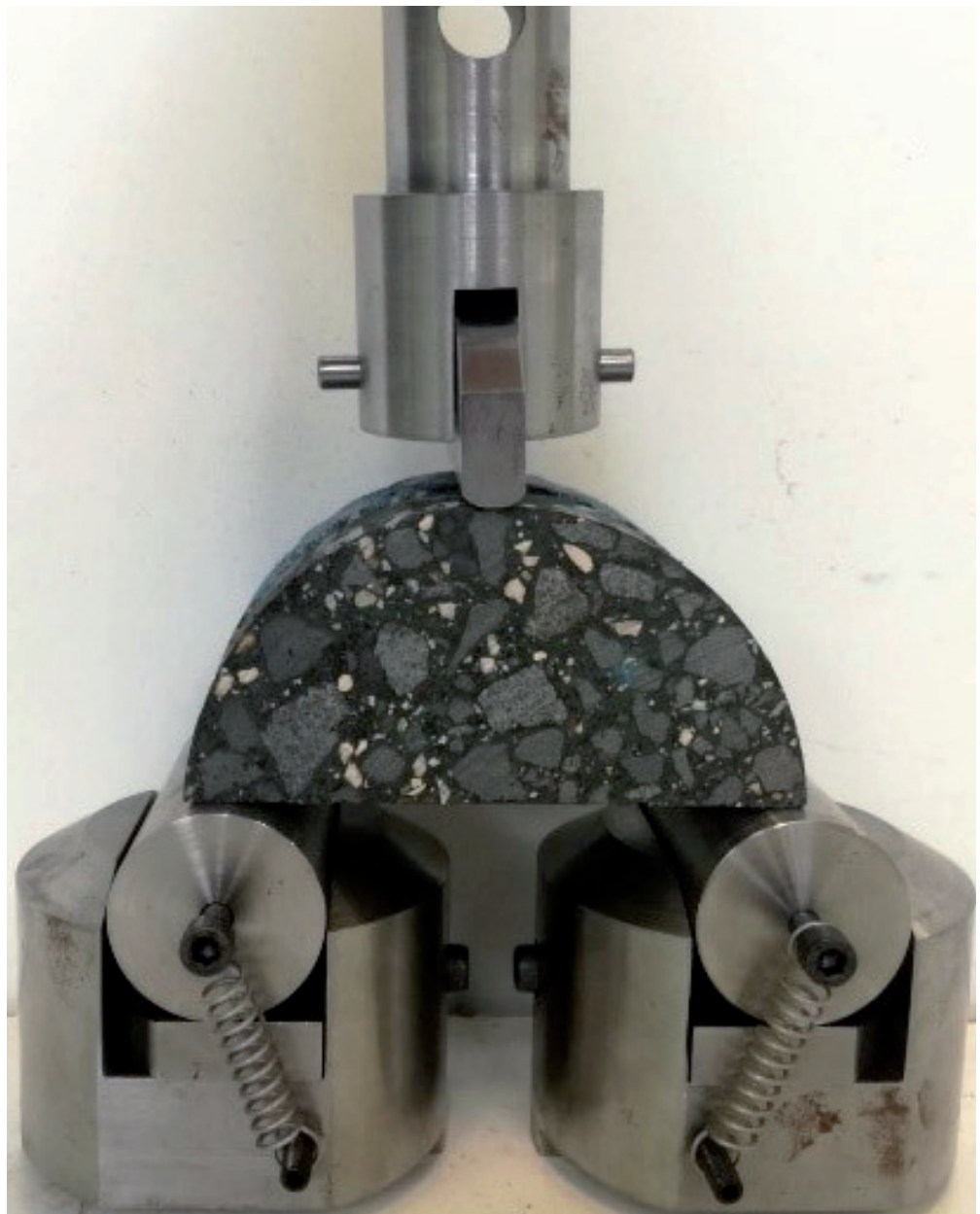
Crack propagation by semi-circular bending test

UPAVMAT / LNEC-EM (Pavements and Materials for Transport Infrastructures Laboratory – www.lnec.pt), with the support of LNEC's Scientific Instrumentation Centre (CIC), implemented the laboratory test for assessing the behaviour of bituminous samples for crack propagation using the semi-circular method according to NP EN 12697-44-en: 2019 – Bituminous mixtures; Test methods; Part 44: Crack propagation by semi-circular bending test;

The test is carried out on four semi-circular samples, obtained from: compacted cylindrical samples according to NP EN 12697-31: 2019-en: 2019 – Bituminous mixtures; Test methods; Part 31: Specimen preparation by gyratory compactor; cores taken from bituminous mixtures slabs produced in laboratory, according to NP EN 12697-33: 2019-en – Bituminous mixtures; Test methods; Part 31: Preparation of samples by roller compactor; cores taken from a bituminous compacted layer according to NP EN 12697-27: 2017-en – Bituminous mixtures: test methods Part 27: Sampling.

This test intends to characterize, in laboratory, the mechanical behaviour of bituminous mixtures subjected to a uniaxial load under a constant deformation rate of (5.0 ± 0.2) mm/min, by the evaluation of the resistance to crack propagation.

Illustratively, a simulation of the testing assembly is shown in the figure, taking into account the scheme proposed in the applicable standard.



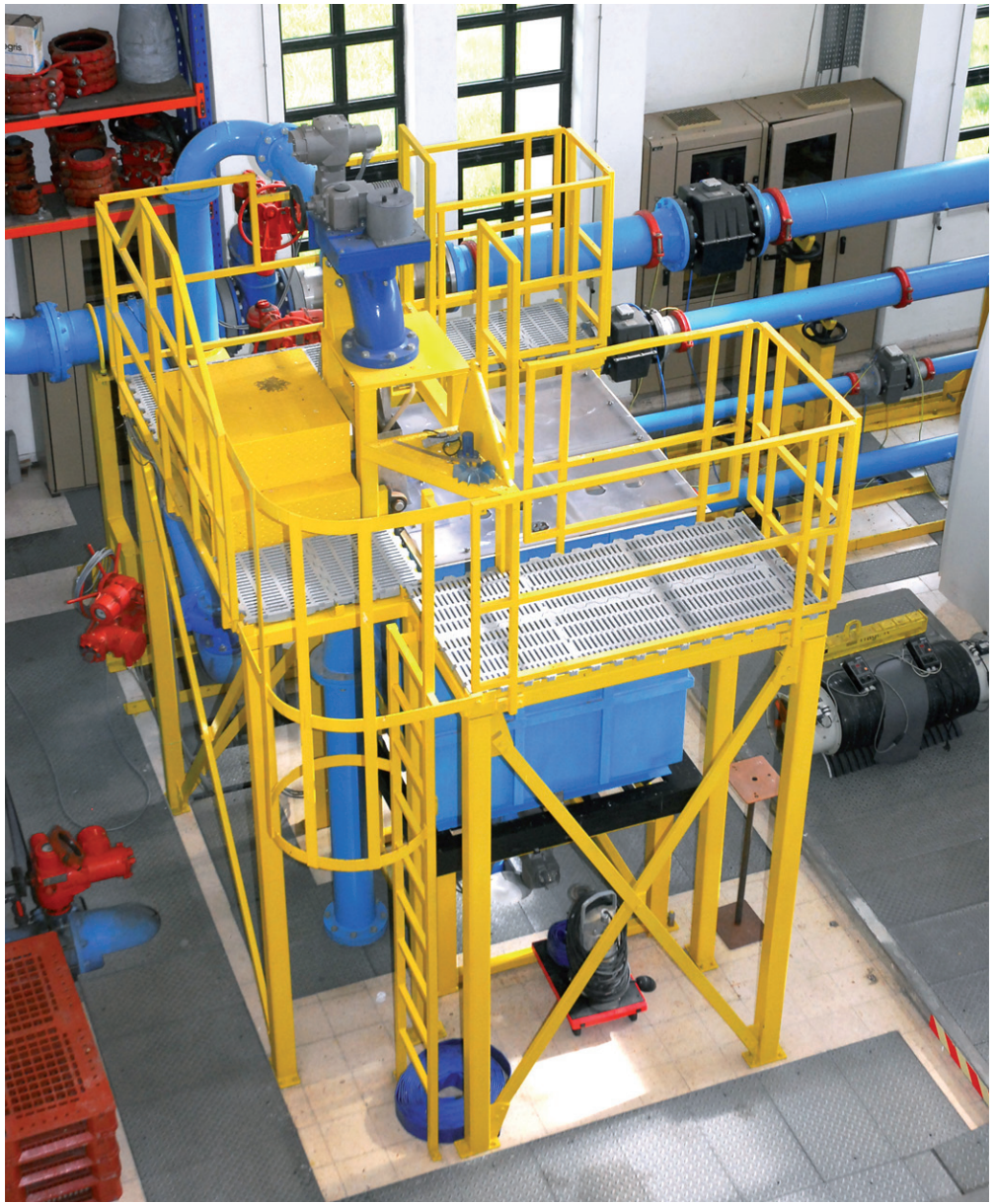
Reference entity in flow measurement

LNEC has a unique infrastructure in Portugal, dedicated to calibration and metrological tests of standards and equipment used in hydraulics. Its ability to test equipment applied in a wide range of nominal diameters (from DN65 to DN400) and with significant flow velocities (reaching volumetric flow rates up to $0.500 \text{ m}^3 / \text{s}$) stands out.

This metrological infrastructure of reference in the international context resulted from the cooperation that was established in the 1990s with the National Engineering Laboratory, NEL (UK), with facilities in Scotland, being the Designated Institute for flow measurement in the United Kingdom. Since then, the infrastructure now called UHM (Metrological Hydraulic Unit) has provided a service to the various entities linked to water resources, carrying out studies and providing traceability to equipment that measures flow.

Today, this infrastructure continues to evolve, developing its competences as a reference entity in flow measurement, promoting international contacts with similar entities and establishing important partnerships for the future, supporting management entities and industry, and supporting areas of LNEC's research.

Thus, novelties in the flow metrology in Portugal are coming, and its realization is expected this year, supporting the development of the competences and capacities of water community today and in the coming years.

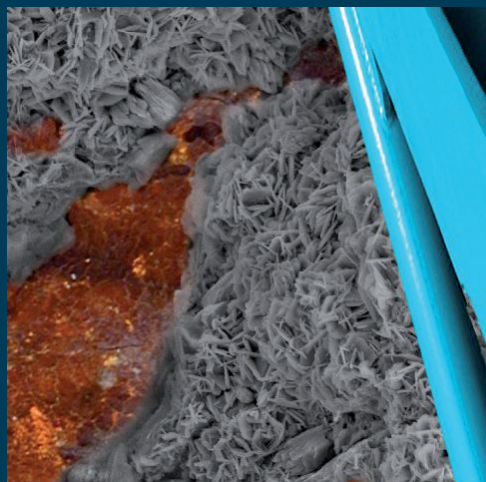


UEC

Laboratory for Electrochemistry, Corrosion and Protection of Materials

Overview

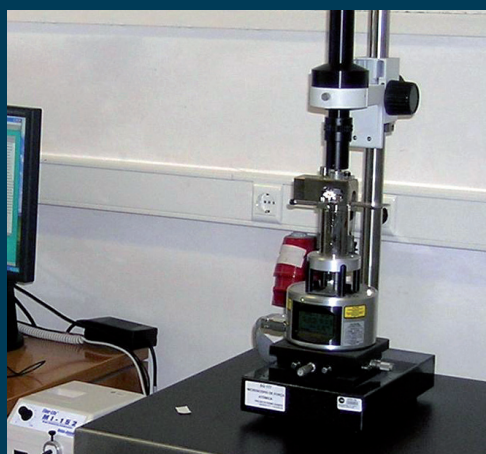
The Laboratory for Electrochemistry, Corrosion and Protection of Materials (UEC) is integrated in the Metallic Materials Unit of the Materials Department of LNEC.



Field of expertise

UEC develops activity related with electrochemistry, corrosion and protection of materials, including:

- Assessment of performance of metallic materials and anticorrosive protection systems;
- Inspection and corrosion diagnosis;
- Corrosion prevention and mitigation;
- Corrosion monitoring;
- Evaluation of environmental corrosivity;
- Topographic, morphological and localized electrochemical characterization of surfaces and thin films.



Testing

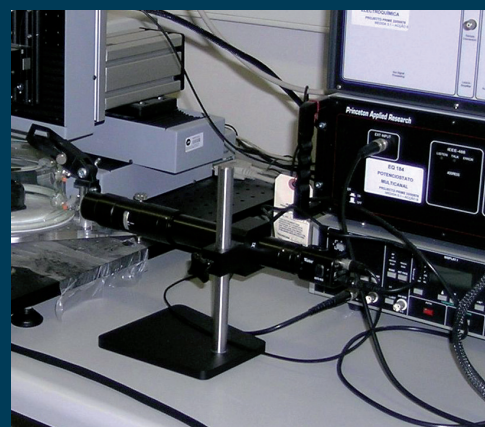
UEC performs different tests for characterization of the electrochemical behaviour of surfaces and for corrosion diagnosis, mitigation and prevention, such as:

- Corrosion rate and corrosion potential tests;
- Stress corrosion cracking tests;



- Resistivity tests;
- Tests to evaluate the effects of additions on reinforcement corrosion;
- Resistance to cathodic delamination tests;
- Tests to evaluate anticorrosive protection systems
- Potentiostatic / potentiodynamic / electrochemical impedance spectroscopy tests;

- Accelerated corrosion tests in artificial atmospheres;
- Corrosion diagnosis tests;
- Non-destructive test methods for assessing corrosion;
- Tests for assessing the corrosivity of water;
- Electrochemical tests for assessing surface behaviour;
- Tests for the nanoscale characterization of surfaces.



Other services

UEC supports studies requested by different public or private bodies, construction stakeholders, infrastructure owners and producers of construction products, in particular:

- Development and qualification of new products;
- Expertise on pathologies of materials;
- Characterization and conformity assessment of materials and products.

