

## TEST COVERAGE

In order to verify the above competencies, the test is aimed to evaluate the workers' knowledge in the following fields:

### A. Basics of Mathematics / Natural Sciences

- Units and their conversion
- Calculation of cross-section and volumes (i.e. annuli, pits)
- Basic of technical mechanics (power, torque, tension)
- Work, energy, capacity
- Basics of fluid mechanics (hydrostatic pressure, flow-rate, viscosity, pressure loss in fluids)

### B. Spray lining Units

- General operation techniques;
- Spray lining units and basic selection criteria;
- Pipe cleaning system;
- Pipeline condition assessment system;

### C. Project Basics

- Location plans and terrain profiles;
- Basics of classification of soils and physical characteristics of subsoil;
- Basics of detection techniques like cable locator, GPR.
- Classification of the subsoil;
- Ground water conditions;
- Line installation plans (overhead lines, lines installed underground);
- Basics of subsurface investigation (geo-radar);
- Practical training.
- Pollution hazards and remedial measures / precautions;

### D. Project Realization

- Pipeline failures and performance requirements;
- Consequences of pipeline failure and management of failure;
- Defects identification and evaluation of the causes;
- Pipeline material specifications;
- Pipeline failure detection & location techniques;
- Job site set-up;
- Documentation of system basics;
- Daily job reports.

### E. Pipeline Inspection and Condition Assessment

- Preliminary pipeline system analysis and evaluation;
- Assessment of condition and material of existing pipeline;
- Assessment of defects, cracks, holes, open joints etc;
- Inflow and infiltration analysis;

### F. Pipeline Cleaning

- Control and diversion of flows;
- Cleaning encrustation, scales, deposits of silt and blockages;

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- Pipeline cleaning precautions;
- Pollution control measures;
- Removal of intruding materials;
- Disposal of waste.

**G. Liner Materials & Design Considerations**

**Liner materials;**

- Liner materials
  - ⇒ Cement mortar
  - ⇒ Epoxy resins
- Basics of the technical standards and norms
- Special handling features

**Liner Design considerations;**

- Host pipe material and condition
- Depth of existing pipeline
- Length of Lining
- Need for bypassing
- Number of Services
- Groundwater conditions

**H. Spray lining Tools**

**Lining tools;**

- Winch;
  - ⇒ Set-up;
  - ⇒ Mode of operation.
- Spraying machine;
  - ⇒ Construction and mode of operation;
  - ⇒ Field of application.
- Pumps, regulators, valves, hoses;
  - ⇒ Set-up;
  - ⇒ Mode of operation.

**Investigation tools;**

- Survey/inspection Vehicle;
  - ⇒ Assembly and mode of operation;
  - ⇒ Field of application.
- CCTV operation equipment;
  - ⇒ Component and mode of operation;
  - ⇒ Field of application.

**I. Recording and Monitoring**

- Recording every manhole and structure;
- Lining length;
- Recording of measured thickness of the liner;
- Recording of physical properties of the installed material
- Monitoring and recording defects, cracks, holes, open joints;
- Inclination and position;
- Rate of application.

**J. Authority regulations / Safety at work / Environmental protection / Work sheets**



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Level Structure Spray Lining

- Responsible persons;
- Work safety;
- Water protection;
- Pollutant and noise emission;
- Regulations for handling dangerous materials and agents;
- Basics of working and civil laws for drilling operations (liability, negligence etc.);
- Regulatory guidelines;
- Relevant laws, rules and regulations;
- Work sheet standards.