

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. Pipe Ramming units

- General operation techniques;
- Type of Ramming units and basic selection criteria;
- Spoil removal system;
- Pipe lubrication 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 bore path investigation (geo-radar);
- Practical training.
- Pollution hazards and remedial measures / precautions;

D. Project realization

- Job site set-up;
- Documentation of system basics;
- Daily job reports;

E. Pipe lubrication

- Fluid types;
- Functions and compositions;
- Measuring lubricating fluid requirements;
- Selection criteria;
- Lubrication plant.

F. Spoil removal methods

- Compressed Air
- Water Jetting
- Auger
- Pipe Shovel

G. Shaft design and construction

- Sizing shafts;

- Shaft excavation support methods;
- Groundwater control methods;
- Lateral earth, groundwater and surcharge pressure considerations;
- Launching and exit seal requirements.

H. Ramming pipe material & design considerations

Pipe material consideration;

- Pipe yield strength
- Wall thickness of the pipe
- Pipe dimensioning
- Buckling safety of the pipe
- Basics of the technical standards and norms
- Special handling features

Pipe Design considerations;

- Route layout
- Depth of installation
- Pipe end and overcut
- Ground condition

I. Ramming tools

- Cradle with air cushion
 - ⇒ Construction and mode of operation;
 - ⇒ Field of application.
- Pneumatic Hammer or Pipe Ram Device;
 - ⇒ Construction and mode of operation;
 - ⇒ Field of application.
- Air Compressor or Pneumatic / Hydraulic power source:
 - ⇒ Construction and mode of operation;
 - ⇒ Field of application.
- Ramming Cones or Collets;
 - ⇒ Construction and mode of operation;
 - ⇒ Field of application.
- Cutting shoe;
 - ⇒ Construction and mode of operation;
 - ⇒ Field of application.

J. Recording and monitoring

- Distance
- Machine thrust
- Inclination and position
- Rate of installation

K. Authority regulations / safety at work / environmental protection / work sheets

- 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.