Trenchless Technology Operator Qualification Programme

Trade Skill Evaluation at Competency level – 1

COMPETENCE:	TTOQP 7	SLIPLINING
BASIC COMPETENCE	BC 7.1	BASIC OPERATOR

Background

Sliplining technique involves drawing of a new liner pipe into an existing defective pipe by pulling it through in a single continuous length and grouting the resulting annulus between the new lining and the old pipe. Through sliplining lengths of pipe up to several hundred meters at a time can be installed, large radius bends in the existing pipeline can be accommodated, and structurally sound and leak-free piping system with improved flow characteristics can be installed at a fast rate. The sliplining technique, though appear simple, require highly qualified and technically skilled professional handling the operation. Present document identifies a set of standards for a qualified professional performing sliplining operation. These sets of qualification standards define the minimum technical qualifications one needs to possess for renewal of existing utility successfully.

PRIOR ACHIEVEMENT EVIDENCE

Persons undergoing this certification should have a Degree/Diploma in Civil, Electrical, Mechanical or Trenchless Engineering from any recognized institution or 10th + 4 years relevant experience.

PERFORMANCE STANDARD

Qualified candidate should be able to display competence in the following sections of Sliplining works:

- Ability to consider the most important basics of jobsite preparation when planning the complete project.
- Awareness of general safety precautions and ability to use them at site.
- Awareness of electrical safety precautions and ability to use them at site.
- Ability to understand maps, plans and reports on existing networks such as GPR report
- Awareness of the process of calculating the buckling resistance of a free-standing pipe.
- Ability to ascertain the pipeline conditions considered to be unsafe.
- Ability to identify the build-up and encrustation on pipes such as silt, fatty products, calcification.
- Ability to assess defects, cracks, holes, open joints, infiltration, exfiltration.
- Ability to evaluate the compatibility of the material used to withstanding all anticipated loads
- Awareness of the pressure cleaning process.
- Ability to carry out grouting of the annulus between the old and the new pipes.
- Ability to carry out common maintenance and problem solving measurements independently.

MINIMUM PERFORMANCE STANDARDS

While doing the renovation work the operators need to display the following minimum qualifications:

1. Safety during work

i. General precautions necessary for safety of structure and operators;
ii. General precautions necessary for safety of machine/equipment;
iii. Necessary Aids for safety are used without fail;

2. Read working drawings / Sketches and proceed with work

i. Given a set of drawings / sketch requirement of machine and related tooling worked out and the scope of work understood;
ii. The work is executed as per drawings / sketches;

3. Knowledge and use of equipment and tooling

i. Proper identification of equipment tools.
ii. Proper parking/storage of equipment and tooling;
iii. Proper use of materials;
iv. Proper use of tools.

4. Knowledge of machine operating procedure and sequence

i. Machine/equipment is properly connected to desired power points and all related accessories are connected properly.
ii. Voltage, frequency, current potential, and polarity are checked.

5. Knowledge about defects, their remedy and acceptance limit

i. Identified the defects of machine/equipment.
ii. Remedy to the defects is known.
iii. Acceptance limit as per standard code is known.

PERFORMANCE EVIDENCE

1. Helmet, Hand Shields, Safety Goggles, Gloves etc. are used.
2. Operator's health is fit before he goes to job.
3. The machine operator identified the proper tools for work.
4. The machine operator knows the use of specific tool.
5. For a set of approved sliplining plan drawings comprising type, size and location of all machine and tools demonstrated for all requirements as per performance criteria.
6. The work is done as per demand of drawings.
7. Operator knows how to make machine/equipment ready for use.
8. Proper earthing is provided.
9. Proper polarity is confirmed.
10. Loose connections are checked.
11. All the defects in different type of machine are clearly identified.
12. Possible remedy to the defects identified is given.
13. Variation allowed as per codes are very well known.

SUPPLEMENTARY (KNOWLEDGE) EVIDENCE

In addition to the prior achievement evidence a trainee needs to display the following supplementary knowledge evidence for the course completion and being permitted to perform sliplining work independently:

1. Reading and writing in vernacular language.
2. Ability to conduct area and volume calculations.
3. Understanding about drilling fluid mix.
4. Understanding about sewage bypass system required to avoid hindrance in the work and accidents.
5. Possession of knowledge of various basic construction norms;
6. Possession of knowledge of basic electrical hazard prevention methods;
7. Awareness about basic operator's manual for machine/equipment required for the sliplining work.

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. Sliplining Units

- General operation techniques;
- Sliplining units and basic selection criteria;
- Pipe Fusion system;
- Pipeline condition assessment system;
- Pipe Grouting 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;
- Pipeline cleaning precautions;
- Pollution control measures;
- Removal of intruding materials;
- Disposal of waste.

G. Entry and Exit Pits

- Sizing pits;
- Location of the pits;
- Groundwater control methods;
- Lateral earth, groundwater and surcharge pressure considerations;
- Entry and exit seal requirements.

H. Liner Materials & Design Considerations

Liner materials;

- Liner materials
  - ⇒ Glass Reinforced Plastic (GRP) liner
  - ⇒ Polyethylene (PE) liner
  - ⇒ High Density Polyethylene (HDPE) liner
  - ⇒ PolyVinyl Chloride (PVC) liner
  - ⇒ Ethylene Polypelene Diene Monomer (EPDM) liner
- 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

I. Grouting of annular space

- Grouting materials;
- Methods of grouting;
- Precautions during grouting;
- Purpose of grouting;
- Advantages of grouting.

J. Sliplining Tools

Installation tools;

- Winch;
  - ⇒ Set-up;
  - ⇒ Mode of operation.
- Nose cone;
  - ⇒ 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.

K. Recording and Monitoring

- Recording every manhole and structure;
- Lining length;
- Recording of winding force;
- Monitoring and recording defects, cracks, holes, open joints;
- Inclination and position;
- Rate of installation.

L. 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.