Trenchless Technology Operator Qualification Programme

Trade Skill Evaluation at Competency level – 1

COMPETENCE:	TTOQP 8	CURED-IN-PLACE PIPE (CIPP)
BASIC COMPETENCE	BC 8.1	BASIC OPERATOR

Background

Cured-in-place pipe technique is a trenchless rehabilitation method for reconstruction of existing sewer lines by forming a new pipe within an existing deteriorated pipe to restore the flow capacity of the pipe. The system has many variants and can be designed to provide different wall thicknesses to meet particular needs. CIPP system of pipeline rehabilitation has its own unique set of requirements that operators need to understand and must be qualified to meet them. Present document identifies a set of standards for a qualified professional operating the apparatus/equipments required for CIPP. These sets of qualification standards define the minimum technical qualifications one needs to possess for handling pipe rehabilitation through CIPP 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 CIPP 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.
- Capacity to assemble and set up the CIPP unit correctly under varying job site conditions.
- Ability to understand maps, plans and reports on existing networks such as GPR report
- Ability to assess 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 of selecting the suitable technique in correspondence with the pipeline condition.
- Ability to evaluate the compatibility of the resin used with the rehabilitation process
- Awareness of the curing process and requirements.
- Ability to locate Pipe where it differs from the alignment shown on the plans.
- Ability to anticipate problems in setup.
- 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;
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 consumables;
iv. Proper use of tools.

4. Knowledge of machine operating procedure and sequence

i. Apparatus/equipments are 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.
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 CIPP plan drawings comprising type, size and location of all apparatus/equipments/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 apparatus/equipments 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 apparatus/equipments 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 operate the apparatus/equipments required for the CIPP 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 apparatus/equipments required for the CIPP 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. Cured in Place Pipe Units

- General operation techniques;
- CIPP units and basic selection criteria;
- Liner insertion system;
- Pipeline condition assessment system;
- Curing 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. CIPP Materials & Design Considerations

Liner materials;

- Liner materials
  - ⇒ Unsaturated polyester resins;
  - ⇒ Vinyl ester and epoxy resin system;
  - ⇒ Polyethylene-felt tube;
- 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. Curing

- Methods of curing;
- Precautions during curing;
- Purpose of curing;
- Advantages of curing.

I. CIPP Tools

CIPP tools;

- Winch;
  - ⇒ Set-up;
  - ⇒ Mode of operation.
- Boilers;
  - ⇒ Component and mode of operation;
  - ⇒ Field of application.
- Blowers;
  - ⇒ Component 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.

J. 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 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.