Trenchless Technology Operator Qualification Programme

Trade Skill Evaluation at Competency level – 1

COMPETENCE:	TTOQP 2	CCTV PIPELINE CONDITION ASSESSMENT
BASIC COMPETENCE	BC 2.1	BASIC OPERATOR

Background

Pipeline condition through inline closed circuit television survey to assess the internal condition and material of the buried pipelines including precise measurement of the length & diameter/cross sections, invert levels and other physical attributes of buried pipelines, identification of all defects, joints and connections, measurement and recording of their location/position, sizes & conditions of such pipelines including provision of survey report and records of the conditions, both through video recording in PAL format on a new VHS cassette as well. Accurate assessment of the pipeline condition, performed by experienced and trained personnel, is necessary so that decision could be made on the rehabilitation system to be adopted.

We propose competency standards for Qualifications of operators in this document. Persons desirous of operating CCTV survey/inspection units need to display the minimum qualifications for the pipeline condition assessment successfully and reliably. Indian Society for Trenchless Technology, the apex organization to promote the application of Trenchless Technology under its Trenchless Technology Operator Qualification Programme is conducting this process in India and other South Asian Nations.

Any operator of these equipments needs to undertake the prescribed competency tests at defined intervals to get the certification as a qualified operator. At no point of time any equipment owner/operator would permit non-certified or persons with expired certificates to operate the CCTV survey/inspection units.

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 CCTV Pipeline Condition Assessment:

- 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.
- Capacity to set up the CCTV unit correctly under varying job site conditions.
- Ability to anticipate problems in setup.
- 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 to ascertain changes in pipe material or size
- Ability to locate the buildings constructed over pipelines which are not shown on the plans.
- Ability to locate Pipe where it differs from the alignment shown on the plans.
- Ability to evaluate Video times and distances at start, finish, all connections and defects
- Ability to ensure that distances of all attributes, service connections and locations of pipes are located and recorded

MINIMUM PERFORMANCE STANDARDS

While carrying out Pipeline condition assessment through CCTV survey, 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 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 equipment and related tooling worked out and the scope of work understood;
ii. The work is executed as per plan;

3. Knowledge and use of equipment and tooling

i. Proper identification of survey/inspection units.
ii. Proper storage of equipment and tooling;
iii. Proper use of flow control equipment;
iv. Proper use of gas detection equipment.

4. Knowledge of equipment operating procedure and sequence

i. 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 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 equipment operator identified the proper tools for work.
4. The equipment operator knows the use of specific tool.
5. The work is done as per plan.
6. Operator knows how to make equipment ready for use.
7. Proper earthing is provided.
8. Proper polarity is confirmed.
9. Loose connections are checked.
10. All the defects in different type of equipments are clearly identified.
11. Possible remedy to the defects identified is given.
12. 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 CCTV survey/inspection units 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 different obstruction that can be encountered.
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 CCTV survey/inspection units required for site works.

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. CCTV Pipeline Condition Assessment Process

- Pipeline Condition Assessment techniques;
- CCTV Pipeline Condition Assessment units and basic selection criteria;
- Manhole Inspection;
- Cleaning of the pipeline;
- Pre-Rehabilitation Survey;
- Final CCTV Survey.

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 of drilling spoils with 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. Initial CCTV Survey 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;
- Recording of the initial condition.

F. Pipeline Cleaning

- Control and diversion of flows;
- Cleaning encrustation, scales, deposits of silt and blockages;
- Pipeline cleaning precautions;
- Pollution control measures;
- Removal of blockages.

G. CCTV Performance Necessity

- Type and Quality of Electronic Systems, Television Camera, Lighting and Monitor;
- Video Playback and resolution;
- CCTV Focus/Iris/Illumination adjustment;
- Quality Control Procedure;
- Acceptable Level of accuracy;
- Causes of Picture distortion and precautions;

H. CCTV Survey Tools and Investigation Requirements

CCTV Survey tools;

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

Investigation Requirements;

- CCTV Camera Prime Position;
- CCTV Camera Speed;
- Variable Scan Camera;
- Linear Measurement;
- Data Display and video recording.

I. Recording and Monitoring

- Recording every manhole and structure;
- Monitoring of Laterals/Specific Defects;
- Accurate location of photographic camera Chainage;
- Recording of physical condition of the pipeline;
- Monitoring and recording defects, cracks, holes, open joints;
- Inclination and position;
- Time of inspection.

J. 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.