

Trenchless Technology Operator Qualification Programme

Trade Skill Evaluation at Competency level – 1

**COMPETENCE:
BASIC COMPETENCE**TTOQP 5
BC 5.1AUGER BORING
BASIC OPERATOR**Background**

The auger horizontal earth boring method calls for a high level of operator skill. Since the success of an auger bore depends to a great extent on the initial set up, the operator must know how to construct the bore pit for the soil conditions encountered and how to set up the equipment. A skilled operator would know at all times the location of the cutting head with respect to the leading edge of the casing. He or she should be able to interpret changed conditions in soil and take corrective actions for the same. He should also know when to check the alignment and grade and perform corrective measures.

We propose competency standards for Qualifications of operators in this document. Persons desirous of operating these machines need to display the minimum qualifications in order to handle pipe installation 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 Auger boring machines needs to undertake the prescribed competency tests at defined intervals to get the certification as a qualified operator. At no point of time any machine owner/operator would permit non-certified or persons with expired certificates to operate the drilling machines.

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 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 decide clear bore path depending on location and depth of existing utilities.
- Ability to understand maps, plans and reports on existing networks such as GPR report.
- Capacity to assemble and set up the auger unit correctly under varying job site conditions.
- Ability of selecting the suitable bore method and drilling fluid technique in correspondence with the soil conditions.
- Ability to plan the bore, set up the bore and finally drill the hole.
- Ability to install casing and carrier pipes.
- Ability to assemble and disassemble the auger/boring tools and maintaining them.
- Ability to balance the Auger train center line
- Ability to anticipate problems in machine.
- Ability to carry out common maintenance and problem solving measurements independently.

MINIMUM PERFORMANCE STANDARDS

While executing the auger boring operations the operators need to display the following minimum qualifications:

1. Safety during work

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- 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. Machine 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.
- 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 bore plan drawings comprising type, size and location of all machine 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 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 operate the Auger boring Machines independently:

1. Reading and writing in vernacular language.
2. Ability to conduct area and volume calculations.
3. Understanding about lubricating fluid mix.
4. Understanding about different types of cuttings coming out of the bore holes and actions needed to avoid related accidents.



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Operator

Level Structure Auger Boring

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 Auger boring machines 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. Auger Boring units

- General operation techniques;
- Type of drilling units and basic selection criteria;
- Cutting head and auger flight;
- Power units for rotating cutting head and auger flight;
- Steel casings and pipe jacking system;
- Control, track system and technique;
- Lubrication system;
- Line and Grade Control;

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 of drilling fluids and spoils with remedial measures / precautions;

D. Project realization

- Job site set-up (mini/midi);
- Documentation of system basics;
- Daily job reports;
- Bore log files.

E. Pipe lubrication Selection

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

F. Shaft design and construction

- Sizing shafts;

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

G. Boring

- Cutter heads;
 - ⇒ Types of cutter heads
 - ⇒ Cutter heads selection considerations
 - ⇒ Construction and mode of operation;

H. Guidance and control system

- Walk-over system
- Waterline System
- Mechanical Line and Grade Control Systems
- Electrical Line and Grade Control Systems
- Guided boring method
- Steerable Line and Grade Control Systems

I. Pipe material & design considerations

Casing pipe

- Casing pipe material
- Basics of the technical standards and norms
- Casing Pipe Design considerations;
 - ⇒ Axial loads
 - ⇒ Dimension tolerance
 - ⇒ Testing of casing pipe

Product pipe

- Product pipe materials
- Casing spacers
- Product pipe installation considerations

J. Jacking system

- Jacking frame
- Hydraulic jacks
- Hydraulic pressures pump
- Thrust block
- Anchoring system
- Intermediate jacking station

K. Recording and monitoring

- Distance
- Machine torque & thrust
- Steering jack pressure and position
- Inclination and position
- Rate of excavation and penetration

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.