

# Model Curriculum

## Borewell Drilling Machine Operator

**SECTOR: INFRASTRUCTURE EQUIPMENT**  
**SUB-SECTOR: EQUIPMENT OPERATIONS**  
**OCCUPATION: MACHINE OPERATION**  
**REF ID: IES/Q0124, V1.0**  
**NSQF LEVEL: 4**



## Certificate

### CURRICULUM COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

**INFRASTRUCTURE EQUIPMENT SKILL COUNCIL**

for the

### MODEL CURRICULUM

Complying to National Occupational Standards of  
Job Role/ Qualification Pack: '**Borewell Drilling Operator**' QP No. '**IES/ Q 0124 NSQF Level 4**'

Date of Issuance: April 1<sup>st</sup>, 2018

Valid up to: March 31<sup>st</sup>, 2020

\* Valid up to the next review date of the Qualification Pack



Authorized Signatory  
(Infrastructure Equipment Skill Council)

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# Borewell Drilling Machine Operator

## CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a “Borewell Drilling Machine Operator”, in the “Infrastructure Equipment” Sector/Industry and aims at building the following key competencies amongst the learner

<b>Program Name</b>	<b>Borewell Drilling Machine Operator</b>		
<b>Qualification Pack Name &amp; Reference ID</b>	IES/Q0124		
<b>Version No.</b>	1.0	<b>Version Update Date</b>	28 June 2018
<b>Pre-requisites to Training</b>	Class 8th 2-3 years' experience as Junior Operator in Drilling Operations		
<b>Training Outcomes</b>	<p><b>After completing this programme, participants will be able to:</b></p> <ul style="list-style-type: none"> <li>• <b>Conduct pre-operation checks on borewell drill machine</b> by inspecting, preparing and testing the functions of all controls and systems of the machine including its monitoring and safety devices.</li> <li>• <b>Carry out borewell drilling operations</b> by inspecting the worksite, understanding the task, planning the methodology and executing it precisely and safely within the allotted resources and time frame.</li> <li>• <b>Carry out regular maintenance of borewell drill equipment</b> by selecting and carrying out the relevant service schedule, diagnosing and rectifying common faults, compiling and submitting reports as per organisations policy.</li> <li>• <b>Comply with worksite health and safety guidelines</b> by following processes and procedures related to personal protective equipment, basic first aid for common injuries at work site, emergency evacuation and disposal of hazardous waste.</li> </ul>		

This course encompasses 4 out of 4 National Occupational Standards (NOS) of “Borewell Drilling Machine Operator” Qualification Pack issued by “Infrastructure Equipment Skill Council”.

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	<b>Carry out pre-operation checks on borewell drilling equipment</b>  <b>Theory Duration</b> (hh:mm) 08:00 <b>Practical Duration</b> (hh:mm) 16:00  <b>Corresponding NOS Code</b> IES/N0170	<ul style="list-style-type: none"> <li>Position and level the borewell drilling equipment as per the slope of the ground.</li> <li>Inspect equipment for structural damages, leakages, condition of tires, tightness of bolts and nuts.</li> <li>Inspect the mast sections for cracks, breaks in chain, and proper greasing.</li> <li>Check all control levers, joysticks, gauges, switches, lights and horns are functional.</li> <li>Check all components in engine, hydraulic, electrical and transmission systems are fitted correctly/not missing</li> <li>Check all levels in the engine (fuel, lube, coolant), hydraulic and transmission systems; top up where necessary</li> <li>Inspect all greasing points/ pivots and ensure lubrication of all moving components.</li> <li>Check availability of casing pipes and drill bits to commence operations.</li> <li>Test the functioning of service and parking brakes</li> <li>Acquire the ability to read and comprehend basic signs, symbols, diagrams, charts and decals on the equipment.</li> <li>Communicate information &amp; instructions using correct tech terms and phrases to team members /supervisor in a clear and concise manner</li> <li>Maintain a logbook to record all checks /activities carried out before starting the drilling.</li> <li>Report defects and problems in time and, if beyond his scope, escalate as necessary</li> </ul>	<ul style="list-style-type: none"> <li>Borewell Drilling Equipment with standard tools and accessories</li> <li>Class room with audio-visual system</li> <li>Manufacturers O and M Manual &amp; Video</li> <li>Safety video</li> <li>PPE Items &amp; Safety Gear</li> <li>Open ground</li> </ul>
2	<b>Carry out borewell drilling operation</b>  <b>Theory Duration</b> (hh:mm) 18:00 <b>Practical Duration</b>	<ul style="list-style-type: none"> <li>Formulate the methodology for execution of tasks as per the site conditions and operational instructions/guidelines.</li> <li>Inspect the site conditions for any obstruction like underground service utilities and overhead power lines.</li> </ul>	<ul style="list-style-type: none"> <li>Borewell Drilling Equipment with standard tools, accessories and equipment.</li> <li>Class room with audio-video system</li> </ul>

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	(hh:mm) 36:00  <b>Corresponding NOS Code</b> IES/N0171	<ul style="list-style-type: none"> <li>Position the equipment and related tools / accessories ensuring stability and safety at the drilling point.</li> <li>Operate the engine as per procedure and check functioning of all the controls, monitoring devices/aids.</li> <li>Select and connect the appropriate drill rods / bits to the rotatory motor and commence drilling</li> <li>Monitor the drilling operations continuously with the aid of all devices and gauges like RPM, temperatures, pressures etc</li> <li>Identify operational slowdowns and initiate necessary actions to rectify the issues.</li> <li>Terminate operations as per procedure by removal of drill bits/rods and position the machine as per the instructions.</li> <li>Conduct walk around check to ascertain condition of equipment and take appropriate action as necessary.</li> <li>Maintain a logbook to record all activities carried out during the drilling.</li> <li>Report defects and problems in time and, if beyond his scope, escalate as necessary</li> <li>Ensure quality service is delivered as committed to achieve high levels of customer satisfaction.</li> </ul>	<ul style="list-style-type: none"> <li>Manufacturers O and M Manual &amp; Video</li> <li>Safety video</li> <li>PPE Items &amp; Safety Gear</li> <li>Open ground</li> </ul>
3	<b>Carry out routine maintenance and troubleshooting of borewell drilling equipment</b>  <b>Theory Duration</b> (hh:mm) 08:00 <b>Practical Duration</b> (hh:mm) 16:00  <b>Corresponding NOS Code</b> IES/N0172	<ul style="list-style-type: none"> <li>Determine the service requirement as per the parameters listed in the maintenance schedule</li> <li>Position the machine correctly and safely before carrying out any maintenance activity</li> <li>Inspect machine for damaged / cracked parts / components and rectify as necessary</li> <li>Inspect and check functioning of all control mechanisms and monitoring devices.</li> <li>Inspect engine, hydraulic &amp; electrical systems and service the various components as per the guidelines.</li> <li>Inspect and service the drill rods, bits and casing as laid down in the maintenance manual</li> <li>Diagnose the defect/ problem and rectify using appropriate tools/eqpt; if need be take advice from supervisor.</li> <li>Complete documentation on prescribed formats legibly and</li> </ul>	<ul style="list-style-type: none"> <li>Borewell Drilling Equipment with standard tools, accessories and equipment.</li> <li>Class room with audio-video system</li> <li>Manufacturers O and M Manual &amp; Video</li> <li>Safety video</li> <li>PPE Items &amp; Safety Gear</li> <li>Lab/workshop/ Covered Shed</li> </ul>

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<p>punctually.</p> <ul style="list-style-type: none"> <li>Report defects and problems in time and escalate, if beyond his scope, as necessary</li> </ul>	
4	<p><b>Comply with Worksite Health and Safety Guidelines</b></p> <p><b>Theory Duration</b> (hh:mm) 06:00</p> <p><b>Practical Duration</b> (hh:mm) 12:00</p> <p><b>Corresponding NOS Code</b> IES/N7601</p>	<ul style="list-style-type: none"> <li>Comply with all safety, health, security and environmental regulations and guidelines at the worksite</li> <li>Utilise Personal Protective Equipment (PPE) and other safety gear related to protection of body in an effective manner.</li> <li>Follow safety measures during operations to ensure that the health and safety of all including members of the public is not at risk.</li> <li>Handle the transportation, storage and disposal of hazardous materials and waste in compliance with workshop health, safety and environmental guidelines</li> <li>Operate various types and grades of fire extinguishers, as applicable to the different categories of equipment</li> <li>Support in administering basic first aid and report to concerned staff in case of an accident</li> <li>Respond promptly and appropriately to an accident/ incident or emergency within limits of one's roles and responsibilities</li> <li>Record and report essential details related to operations, incidents or accidents as per the organisation's procedures.</li> </ul>	<ul style="list-style-type: none"> <li>Borewell Drilling Equipment with standard tools, accessories and equipment.</li> <li>Class room with audio-visual system</li> <li>Organisation's ESH / Safety video</li> <li>PPE Items &amp; Safety Gear</li> <li>Firefighting equipment &amp; Charts</li> <li>First Aid Kit and Charts</li> </ul>
	<p><b>Total Duration</b></p> <p><b>Theory Duration</b> 40:00</p> <p><b>Practical Duration</b> 80:00</p>	<p>Unique Equipment Required:</p> <ul style="list-style-type: none"> <li>Borewell Drilling Equipment with standard tools, accessories and equipment.</li> <li>Class room with audio-video projection system</li> <li>Manufacturers O and M Manual &amp; Video</li> <li>Safety video</li> <li>PPE Equipment: Helmet, gloves, earplugs, goggles, safety shoes</li> <li>Firefighting equipment and 'How to Use' Charts</li> <li>First Aid Box and 'How to Do' Charts</li> <li>Open ground and Lab/Workshop/Covered Shed</li> </ul>	

Grand Total Course Duration: **120 Hours, 0 Minutes**

(This syllabus/ curriculum has been approved by **Infrastructure Equipment Skill Council**)

## Trainer Pre-requisites for Job role: “Borewell Drilling Machine Operator” mapped to Qualification Pack: “IES/Q0124, v1.0”

Sr. No.	Area	Details
1	<b>Description</b>	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack “IES/Q 0124 Version 1.0”.
2	<b>Personal Attributes</b>	Aptitude for conducting training, with strong communication and interpersonal skills. Passion for training and developing others; well-organised; and a team player. Eager to learn and keep oneself updated with the latest in the mentioned field.
3	<b>Minimum Educational Qualifications</b>	Class 10 <sup>th</sup>
4a	<b>Domain Certification</b>	Certified for Job Role: “ <u>Borewell Drilling Machine Operator</u> ” mapped to QP: “ <u>IES/Q 0124 – Version 1.0</u> ”. Minimum accepted score 70%. Desired: Certification Training in Borewell Drilling Operations & Maintenance
4b	<b>Platform Certification</b>	Certified for Job Role: “ <u>Trainer</u> ” mapped to Qualification Pack: MEP/Q0102 Minimum accepted score 80%.
5	<b>Experience</b>	<ul style="list-style-type: none"> <li>• Have 3 to 4 years’ site experience in Borewell Drilling Operations.</li> <li>• Have 1 to 2 years’ experience in conducting O and M training programs.</li> </ul>



<b>Assessment_Criteria</b>	
<b>Job Role</b>	<b>Borewell Drilling Machine Operator</b>
<b>Qualification Pack</b>	<b>IES/Q 0124 Version 1.0</b>
<b>Sector Skill Council</b>	<b>Infrastructure Equipment</b>

<b>Sr. No.</b>	<b>Guidelines for Assessment</b>
1	Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC
2	The assessment for the theory part will be based on knowledge bank of questions created by the SSC
3	Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
4	Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below)
5	Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criterion
6	To pass the Qualification Pack, trainee should score a minimum of 70% of aggregate marks to successfully clear the assessment
7	In case of unsuccessful completion, the trainee may seek reassessment on the Qualification Pack

<b>Compulsory NOS</b>				<b>Marks Allocation</b>			
<b>Total Marks: 100</b>				<b>Total Marks</b>	<b>Out Of</b>	<b>Theory</b>	<b>Skills Practical</b>
<b>Assessment outcomes</b>	<b>Assessment Criteria for outcomes</b>		<b>Total Marks</b>	<b>Out Of</b>	<b>Theory</b>	<b>Skills Practical</b>	
1. IES/N0170 Carry out Pre-operation checks on bore well drilling equipment	PC1.	check for tires-damages, wheels-loose lug bolts, bent rims, cracks and bulges and replace if required as per the set procedures	<b>30</b>	2	1	1	
	PC2.	check for levelling of the machine as per the slope on the ground		2.5	0.5	2	
	PC3.	inspect if levers and control cables are in proper working conditions		3	1	2	
	PC4.	check if all mounting bolts are tightened		2.5	0.5	2	
	PC5.	check the mast for proper greasing, cracks, bolts and breaks in chain		2.5	0.5	2	
	PC6.	check fluid levels of engine crank case, radiator coolant and battery electrolyte levels fill up if needed		2	1	1	
	PC7.	check rear axle- Steer cylinders for damage, leaks, secure pivot pins, damaged hydraulic hoses etc.		3	1	2	
	PC8.	check if gauges, switches, joysticks, foot controls and horn are in operational condition		3	1	2	
	PC9.	inspect the condition of hose/pipes/clamps for normal functioning		2.5	0.5	2	

	PC10. check for the availability of casing pipes and drill bits to start the process		1.5	0.5	1
	PC11. check for service brake and parking brake operation		1.5	0.5	1
	PC12. maintain a pre-operational check logbook to record all activities performed before starting the drilling operation		2	1	1
	PC13. report the defects precisely to the supervisor if beyond scope of role		2	1	1
	<b>Total</b>		<b>30</b>	<b>10</b>	<b>20</b>
2. IES/N0171 Carry out bore well drilling operation	PC1. inspect the site visually for any source of obstruction or for any personnel in the circumference/ check for near high raise natural or man-made structure / high voltage lines/wind pattern	<b>35</b>	2	1	1
	PC2. park the vehicle at the drilling point and pull the lever to extend the stabilizer legs to stabilize the vehicle		1	0	1
	PC3. start the engine and check the controls of operating panel for normal functioning		1	0	1
	PC4. choose the appropriate casing pipe as per the requirement		1	0	1
	PC5. attach the pipe to the gripper casing pipe and connect it to the rotate motor attached to the rig mast		1.5	0	1.5
	PC6. drill the casing pipe into the ground until it reaches the surface of the hard rock and leave the pipe inside the ground		2	1	1
	PC7. choose the appropriate drill rods and connect them to the rotator motor		2	1	1
	PC8. connect the appropriate drill bit to the hammer that is attached to the drill rod		2	1	1
	PC9. start the drilling of drill rods inside the casing pipe		1.5	0	1.5
	PC10. monitor air & hydraulic pressure gauge, engine & compressor temperature gauge		2	0.5	1.5
	PC11. monitor RPM, air discharge temperature and pressure, engine water temperature and pressure and sump pressure displayed in the compressor unit		2.5	1	1.5
	PC12. monitor hydraulic oil filter clog indicator, air filter element and compressor air filter elements		2.5	1	1.5
	PC13. provide the appropriate inputs to the machine through controls for connecting the drill rods safely to the next drill rod until the required output is		2	1	1

	achieved				
	PC14. coordinate with junior operators at regular intervals while operating the machine for better performance		2	1	1
	PC15. change the drill bits if the drilling process slows down by monitoring the rotations per minute (RPM) levels		2	1	1
	PC16. ensure that the drill rod is removed from the ground		1.5	0.5	1
	PC17. stop the rotator motor		0.5	0	0.5
	PC18. detach the drill bits from the rotator motor		1	0	1
	PC19. take mast and stabilizer legs to the home position		1	0.5	0.5
	PC20. turn off the engine and remove the ignition key		1	0	1
	PC21. maintain a logbook to record all activities performed		1.5	0.5	1
	PC22. report the defects precisely to the supervisor if beyond scope of the role		1.5	1	0.5
	<b>Total</b>		<b>35</b>	<b>12</b>	<b>23</b>
3. IES/N0172 Carry out maintenance and troubleshooting of the bore well drilling equipment	PC1. determine the service requirement for the equipment as per the scheduled maintenance	<b>20</b>	1.5	0.5	1
	PC2. replenish coolants, lubricants and fluids as per the running of the machine or as per the operational manual		1.5	0.5	1
	PC3. service lubrications system, electrical service system, and stabilizing system of the bore well drilling machine		1.5	0.5	1
	PC4. service mast as per the usage of the equipment		1.5	0.5	1
	PC5. check battery levels and condition of the terminals and carry out minor adjustments if required		1.5	0.5	1
	PC6. ensure all the tools are kept in the designated place after usage as per the organizational guidelines		1.5	0.5	1
	PC7. ensure the main power is turned off from panel completely before carrying out maintenance work		1.5	0.5	1
	PC8. ensure that appropriate tools are used while troubleshooting		1.5	0.5	1
	PC9. diagnose the problem and identify appropriate repair procedures		1.5	0.5	1
	PC10. report defects precisely to the supervisor if beyond scope of his role		1.5	0.5	1
	PC11. dispose waste as per the guidelines of the site/ organization		2	0.5	1.5

	PC12. complete all documentation as per the prescribed standards in a timely manner		1	0.5	0.5
	PC13. report defects precisely to the supervisor if beyond scope of role		2	1	1
	<b>Total</b>		<b>20</b>	<b>7</b>	<b>13</b>
4. IES/N7601 Comply with worksite health and safety guidelines	PC1. comply with safety, health, security and environment related regulations/guidelines at the work site	<b>15</b>	1.5	0.5	1
	PC2. use Personal Protective Equipment (PPE) and other safety gear as applicable to the equipment and the worksite		2.5	0.5	2
	PC3. follow safety measures during operations to ensure that the health and safety of self or others (including members of the public) is not at risk		2	1	1
	PC4. carry out operations as per the manufacturer's and worksite related health and safety guidelines		1.5	0.5	1
	PC5. handle the transport, storage and disposal of hazardous materials and waste in compliance with worksite health, safety and environmental guidelines		1.5	0.5	1
	PC6. operate various grades of fire extinguishers, as applicable		1.5	0.5	1
	PC7. Support in administering basic first aid and report to concerned team members, as required, in case of an accident		1.5	0.5	1
	PC8. respond promptly and appropriately to an accident/ incident or emergency situation, within limits of role and responsibility		1.5	0.5	1
	PC9. record and report details related to operations, incidents or accidents, as applicable		1.5	0.5	1
	<b>Total</b>		<b>15</b>	<b>5</b>	<b>10</b>
<b>Grand Total</b>			<b>100</b>	<b>34</b>	<b>66</b>