

Model Curriculum

Crusher Operator

SECTOR: INFRASTRUCTURE EQUIPMENT
SUB-SECTOR: EQUIPMENT OPERATIONS
OCCUPATION: OPERATOR
REF ID: IES/Q0112, 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

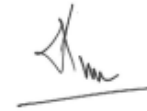
MODEL CURRICULUM

Complying to National Occupational Standards of
Job Role/ Qualification Pack: 'Crusher Operator' QP No. 'IES/ Q 0112 NSQF Level 4'

Date of issuance: June 1st, 2017

Valid up to: April 30th, 2018

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



Authorized Signatory
(Infrastructure Equipment Skill Council)

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Crusher Operator

CURRICULUM / SYLLABUS

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

Program Name	Crusher Operator		
Qualification Pack Name & Reference ID	IES/Q0112		
Version No.	1.0	Version Update Date	01 June 2017
Pre-requisites to Training	Preferably Class 8th Standard Certification Training in Crushing Operations preferred Preferably 2 years of experience as Junior Crusher Operator.		
Training Outcomes	<p>After completing this programme, participants will be able to:</p> <ul style="list-style-type: none"> • Carry out pre-operation checks on a crusher. General introduction to crushers, basic working of parts and systems; engine, hydraulic and electrical, operational controls and instrument panel, preparing machine for operations • Carry out crusher operations. Properties of materials and aggregates, starting of crusher, loading of materials, monitoring and regulating flow, shutting down and post-operative checks • Carry out maintenance and troubleshooting of crusher. General maintenance procedures and periodic service schedule; common faults and their diagnosis; reports and documents. • Comply with worksite health and safety guidelines. Health, safety and environment policies; personal protective equipment, fire-fighting equipment, basic first aid for common injuries at work site 		

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

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	<p>Carry out pre-operation checks on a crusher</p> <p>Theory Duration (hh:mm) 08:00</p> <p>Practical Duration (hh:mm) 20:00</p> <p>Corresponding NOS Code IES/N0134</p>	<p>Organisational Context: Acquire a working knowledge of the following:</p> <ul style="list-style-type: none"> Organisation structure, reporting and escalation line. Performance standards and procedures in the company. Work target and review mechanism with supervisor Location and process for storage and disposal of waste. Safety policy of the organisation and emergency procedures <p>Technical Knowledge: Understand the fundamentals of the following:</p> <ul style="list-style-type: none"> Different types of crushing equipment, features, performance and <u>installation procedures</u>: <ul style="list-style-type: none"> Static Wheeled Tracked Parts and systems of crushers and its functioning to include: <ul style="list-style-type: none"> Control Panel Dump & Surge Hopper Feeders & Screeners Jaw and Cone Crusher Vertical Shaft Impactor Conveyor Belts <u>Basics of Engine</u> and its systems; procedure for filling and topping up of fuel, coolant, oils. <u>Basics of Electricals</u>; types of motors used in crushers and its functioning. <u>Basics of Hydraulics</u>; types of pumps and motors and its functioning Types of aggregates and its physical characteristics Method of greasing and lubrication different parts of the equipment Cabin controls and Instrument panels; their operation. Optimal working condition of components and monitoring systems Documents and log books to be maintained for recording activities. Procedures for reporting defects if beyond his scope. 	<ul style="list-style-type: none"> <u>Scaled Model of a Crusher for theory sessions</u> <u>Live Crusher Plant at nearby project site for practical sessions</u> Class room with audio-video system Manufacturers O and M Manual & Video Safety video PPE Items & Safety Gear

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<p>Skills - Core & Professional. Acquire the ability to:</p> <ul style="list-style-type: none"> • Read & understand general instructions/guidelines related to equipment & worksite ops. • Write and record any incidents & deviations on the prescribed formats. • Orally communicate information & instructions to co-workers in a clear and concise manner. • Plan and organise work related tasks with all concerned in most efficient and cost effective way. <p>Performance Criteria: Execute the following tasks and procedures:</p> <p>Crusher Equipment Checks</p> <ul style="list-style-type: none"> • Conduct visual inspection of crusher parts and systems for any leakages/damage. • Check movable parts like conveyor belts, rollers, stringers for wear and tear. • Check the feeder systems for any wear and tear. • Check power connections of the electrical/diesel generators. • Check fuel in the power generator is as per requirement • Check fittings, bolts, bearings, pads and linings in each sub unit. • Check VSI (Vertical Shaft Impactor) tips, liners etc • Check/clean the filters of impurities as applicable • Inspect all greasing points/ moving joints and lubricate as applicable. • Inspect the screeners are suitable for the production requirements. • <u>Wheeled crusher:</u> Check condition of tyres for cuts /damage and air pressure; wheel bolts/nuts and brakes. • <u>Tracked crusher:</u> Check condition of track pads, bolts and nuts; tighten as necessary. • Check all monitoring and warning systems as per operational manual. • Ensure safety equipment in place before operating the plant. 	

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<p>Material Checks</p> <ul style="list-style-type: none"> • Ensure requisite amount of raw material are present at the site before commencement of operations. • Coordinate with other vehicle operators for procurement of raw materials as per organisational standards <p>Reporting & Documentation</p> <ul style="list-style-type: none"> • Maintain a log book to record all actions done before starting operations. • Follow laid down procedure for reporting defects beyond his scope. 	
2	<p>Carry out crusher operations.</p> <p>Theory Duration (hh:mm) 30:00</p> <p>Practical Duration (hh:mm) 75:00</p> <p>Corresponding NOS Code IES/N0135</p>	<p>Organisational Context: Acquire working knowledge of the following:</p> <ul style="list-style-type: none"> • Procedures and guidelines related to breakdown & maintenance services. • Location of tools and equipment and procedure for issue and return. • Safety policy of the organisation and emergency drills. <p>Technical Knowledge. Understand the fundamentals of the following:</p> <ul style="list-style-type: none"> • Basics of equipment operations listed under pre-op checks. • Starting procedure as per correct sequence and specs. • Operating the various systems to ensure efficient production. • Monitoring systems to ensure optimal output/productivity. • Stopping procedure including emergency shutdown. • Various hand signals, safety & emergency signs at project site. • Documents and log books to be maintained for recording activities. • Procedures for reporting defects and mal-functions if beyond his scope. <p>Skills - Core & Professional. Acquire the ability to:</p> <ul style="list-style-type: none"> • In addition to core and generic skills listed above • Interpret signage at project work site correctly. • Use correct terminology while interacting with others at site • Help plan work schedule in time bound and cost effective way. 	<ul style="list-style-type: none"> • <u>Scaled Model of Crusher Plant for theory sessions</u> • <u>Live Crusher Plant at nearby project site for practical sessions</u> • Adequate stocks of aggregates and consumables. • Class room with audio-video system • Manufacturers O and M Manual & Video • Safety video • PPE Items & Safety Gear

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<ul style="list-style-type: none"> Help identify operational slow-downs and take timely remedial action. <p>Performance Criteria. Execute the following tasks and procedures:</p> <p>Preparatory Activities.</p> <ul style="list-style-type: none"> Read work orders to determine specifications for production. Examine materials, both visually and with hands, to ensure conformance. Clean work area and check for obstructions. Dislodge and clear jammed materials from machinery. Transfer materials between work areas using appropriate moving eqpt and tools <p>Crushing Operations.</p> <ul style="list-style-type: none"> Start the machine as per sequential procedure and ensure proper flow of materials; after setting the mill gauges Monitor / observe gauges /indicators to ensure continuity of flow and efficient operation. Coordinate with co- workers to ensure regular flow of raw materials into the crusher. Test by weighing/measuring materials/ products at specified intervals to ensure conformance to standards. Coordinate with vehicle operators for collecting the output safely and efficiently. <p>Safety during operations</p> <ul style="list-style-type: none"> Ensure PPE is worn especially dust mask; eye goggles and safety gloves when operating the equipment. Identify various hazards at work site like flying stones etc and take appropriate preventive measures. Maintain positive eye contact with co-workers/other eqpt operators. Perform lockout and tag out whenever necessary. <p>Reporting and Documentation</p> <ul style="list-style-type: none"> Maintain log book to record all activities (input and output flow) carried out. Report any defects which are beyond his scope to the supervisor 	

Sr. No.	Module	Key Learning Outcomes	Equipment Required
3	<p>Carry out routine maintenance and trouble shooting of a crusher.</p> <p>Theory Duration (hh:mm) 14:00</p> <p>Practical Duration (hh:mm) 35:00</p> <p>Corresponding NOS Code IES/N0136</p>	<p>Organisational Context: Acquire working knowledge of the following:</p> <ul style="list-style-type: none"> Emergency organisation structure and maintenance policy. Location of special tools and equipment/ accessories. <p>Technical Knowledge. Understand the fundamentals of the following:</p> <ul style="list-style-type: none"> Maintenance and service Schedule including related checklists. Common defects and general causes for breakdown. Documents and log books to be maintained for recording activities. Procedures for reporting defects if beyond his scope. <p>Skills - Core & Professional. Acquire the ability to:</p> <ul style="list-style-type: none"> In addition to core and generic skills listed above; Plan maintenance & servicing keeping operational needs in mind. <p>Performance Criteria. Execute the following tasks and procedures:</p> <p>Routine Maintenance:</p> <ul style="list-style-type: none"> Assess the right service schedule by tracking machine operating hours. Carry out scheduled maintenance as per manufacturers specs Clean all filters and replace as necessary. Check bearings of gear boxes, rollers and motors Replenish/replace lubricants, coolants and screeners as per specs Lubricate/grease all the moving joints/pivot pins and control levers regularly. Check crusher plates, liners and other critical parts for wear and tear; take necessary action to restore. Carry out periodic structural inspection and take corrective measures like welding etc. Adjust crusher settings: before, during and after operations <p>Basic Trouble Shooting:</p> <ul style="list-style-type: none"> Identify service needs and defects 	<ul style="list-style-type: none"> Scaled Model of Crusher Plant for theory sessions Live Crusher Plant at nearby project site for practical sessions Class room with audio-video system Manufacturers O and M Manual & Video Safety video PPE Items & Safety Gear

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<ul style="list-style-type: none"> Use correct PPE and other safety gear while in the work site. <p>Performance Criteria. Execute the following tasks and performances:</p> <ul style="list-style-type: none"> Comply with safety, health, environment and security related regulations & guidelines at work. Correct use of Personal Protective Equipment (PPE) and other safety gear at work site. Follow safety measures during operations to ensure health and safety of self and others; general public not at risk. Operate fire extinguishers as applicable. Support in administering basic first aid for common injuries at work site. Record and report details as related to operations, incidents or accidents as applicable. 	
	Total Duration Theory Duration 60:00 Practical Duration 150:00	<p>Unique Equipment Required:</p> <ul style="list-style-type: none"> Scaled Model of Crusher Plant for theory sessions Live Crusher Plant at nearby project site for practical sessions Adequate stocks of aggregates and consumables. Class room with audio-video projection system Manufacturers O and M Manual & Video; Safety video PPE Equipment: Helmet, masks, gloves, earplugs, goggles, safety shoes Firefighting equipment and 'How to Use' Charts First Aid Box and 'How to Do' Charts 	

Grand Total Course Duration: **210 Hours, 0 Minutes**

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

Trainer Pre-requisites for Job role: “Crusher Operator” mapped to Qualification Pack: “IES/Q0112, v1.0”

Sr. No.	Area	Details
1	Description	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack “IES/Q 0112 Version 1.0”.
2	Personal Attributes	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	Minimum Educational Qualifications	Class 8 th ; preferably 10 th
4a	Domain Certification	Certified for Job Role: “Crusher Operator” mapped to QP: “IES/Q 0112 – Version 1.0”. Minimum accepted score 70%. Desired: Certification Training in Crusher Operations & Maintenance
4b	Platform Certification	Certified for Job Role: “Trainer” mapped to Qualification Pack: SSC/1402. Minimum accepted score 70%.
5	Experience	<ul style="list-style-type: none"> • Around 3 to 4 years’ site experience in Crusher Operations. • At least 1 to 2 years’ experience in conducting O and M training programs.

Assessment Criteria	
Job Role	Crusher Operator
Qualification Pack	IES/Q 0112 Version 1.0
Sector Skill Council	Infrastructure Equipment

Sr. No.	Guidelines for Assessment
1	Criteria for assessment for Qualification Pack has been laid down based on the NOS's. Each Performance Criteria (PC) has been assigned marks proportional to its importance within NOS.SSC will also lay down proportion of marks for Theory and Skill Practical for each PC.
2	The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3	Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below)
4	Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criteria.
5	To pass the Qualification Pack, every trainee should score a minimum of 40% in each NOS and 60% aggregate
6	In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification pack.

Assessment Outcomes	Assessment Criteria for the outcome	Total Mark	Marks Allocation		
			Out Of	Theory	Skills Practical
1. IES/N0134 Carry out pre-operation checks on a crusher	PC1.Conduct visual inspection around the crushing equipment	30	3	1	2
	PC2.Check for power connections electrical/diesel generators including fuel checks		2	0	2
	PC3.Ensure the moveable parts in crushers like conveyor belts, rollers, stringers, etc. are free from wear and tear		2	0	2
	PC4.Check if all the filters are free of impurities		3	1	2
	PC5.Lubricate all the moving joints of the crushers as per the operational manual		3	1	2
	PC6.Check all the feeders for any wear and tear or malfunctioning		2	0	2
	PC7.Check the fittings, bolts, bearings, pads and lining in each		2	1	1

	crushers of the crushing unit as per the operational manual				
	PC8. Inspect the screeners for its suitability with the production requirement		1	0	1
	PC9. Check Vertical Shaft Impactor (VSI) crusher, tips, liners, etc.		2	1	1
	PC10. Check the tyre condition for required air pressure, cut/damage in wheeled crusher as per the operational manual.		1	0	1
	PC11. Check the wheel bolts, brakes, etc. in wheeled crusher		1	0	1
	PC12. Check and tighten the track pads bolts, nuts, etc. in tracked crusher as per the production requirements		2	1	1
	PC13. Check the hoses, pipes for any leakage and take actions if necessary		0.5	0	0.5
	PC14. Ensure optimal working conditions of the motors used for different functions in the crushing unit		1.5	1	0.5
	PC15. Ensure there is enough raw materials at the site before starting the operation		0.5	0	0.5
	PC16. Coordinate with other vehicle operators for procurement of the raw material as per standards of the organisation		1.5	1	0.5
	PC17. Maintain a checking/maintenance logbook to record all activities performed before starting the operation		0.5	0	0.5
	PC18. Report defects precisely to the supervisor if beyond scope of the role		1.5	1	0.5

		Total	30	9	21
2. IES/N0135 Carry out crushing operations	PC1.Read work orders to determine production specifications and information	35	3	1	2
	PC2.Examine materials, ingredients, or products, visually or with hands, to ensure conformance to established standards		3	1	2
	PC3.Clean work areas and check for obstructions before starting the operations		1	0	1
	PC4.Inspect chains, gear box, rollers, belts, scrolls, etc. for signs of wear during the operation		2	1	1
	PC5.Dislodge and clear jammed materials or other items from machinery and equipment using appropriate tools		1	0	1
	PC6.Transfer materials, supplies, and products between work areas, using moving equipment and hand tools as per the standards of the organisation		2	1	1
	PC7.Follow production operating procedures to start up, shut down, and optimize the process		1	0	1
	PC8.Start or stop machine as per the signals and messages received from junior operators/ helpers		1	0	1
	PC9. Set mill gauges as per the fineness required for the grind		2	1	1
	PC10.Monitor equipment to ensure continuity of flow, safety, and efficient operation, and to detect malfunctions		1	0	1

	PC21.Adhere to environmental guidelines		1	0	1
	PC22.Record input and output flow as per the desired formats of the organization		2	0	2
		Total	35	10	25
3. IES/N0136 Carry out maintenance and troubleshooting of the crusher	PC1.Arrange for and perform scheduled maintenance as the organizational standards	20	2	1	1
	PC2.Check the tyre condition – proper air pressure, any cut/damage in wheeled crusher regularly		1	0	1
	PC3.Check bearings at gearboxes, rollers and motors as per the operational manual		1	0	1
	PC4.Replenish coolants, lubricants, fluids and screeners as and when required		2	1	1
	PC5.Inspect oil, fuel tanks for leaks and take necessary actions as per the operational manual		1	0	1
	PC6.Lubricate all the moving parts at regular intervals		1	0	1
	PC7.Perform periodic equipment structural inspection and corrective measures like welding when required		2	1	1
	PC8.Adjust the crusher settings before, during and after the operation		1	0	1
	PC9.Check crusher plate, liners, other critical parts conditions and take corrective measures immediately		2	1	1

	PC10. Identify service needs, defects, hazardous conditions and take daily, weekly, monthly and yearly preventive or corrective maintenance		1	0	1
	PC11. Arrange for and assist repair or replacement of defective components		2	1	1
	PC12. Read indicators that signal need for replacement		1	0	1
	PC13. Identify missing or defective components or controls and replace them with genuine OEM recommended components		0.5	0	0.5
	PC14. Comply with safety requirements		0.5	0	0.5
	PC15. Maintain records and documentation relating to service, such as log books, repair lists, etc.		1.5	1	0.5
	PC16. Follow reporting procedures as laid down by the employer		0.5	0	0.5
		Total	20	6	14
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	15	2	1	1
	PC2. Use Personal Protective Equipment (PPE) and other safety gear as applicable to the equipment and the worksite		1	0	1
	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		1	0	1
	PC4. Carry out operations as per the manufacturer's and worksite related health		2	1	1

	and safety guidelines				
	PC5.Handle the transport, storage and disposal of hazardous materials and waste in compliance with worksite health, safety and environmental guidelines		1	0	1
	PC6.Operate various grades of fire extinguishers, as applicable		2	1	1
	PC7.Support in administering basic first aid and report to concerned team members, as required, in case of an accident		1	0	1
	PC8.Respond promptly and appropriately to an accident/ incident or emergency situation, within limits of your role and responsibility		3	1	2
	PC9.Record and report details related to operations, incidents or accidents, as applicable		2	0	2
		Total	15	4	11