

Model Curriculum

Hot Mix Plant Operator

SECTOR: INFRASTRUCTURE EQUIPMENT
SUB-SECTOR: EQUIPMENT OPERATIONS
OCCUPATION: OPERATOR
REF ID: IES/Q0114, 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

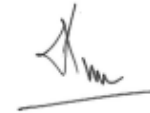
MODEL CURRICULUM

Complying to National Occupational Standards of
Job Role/ Qualification Pack: 'Hot Mix Plant Operator' QP No. 'IES/ Q 0114 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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Hot Mix Plant Operator

CURRICULUM / SYLLABUS

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

Program Name	Hot Mix Plant Operator		
Qualification Pack Name & Reference ID	IES/Q0114		
Version No.	1.0	Version Update Date	01 June 2017
Pre-requisites to Training	Preferably Class 8th Standard Certification Training in Hot Mix Plant Operations preferred Preferably 2 years of experience as Junior Hot Mix Plant 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 hot mix plant. General introduction to hot mix plants, basic working of various components sections, engine, hydraulic and electrical systems, operational controls and instrument panel, preparing machine and related systems for operations • Carry out hot mix plant operations. Properties of materials and aggregates, starting of hot mix plant, loading of materials, monitoring and regulating of mixing, discharging of asphalt, shutting down the plant; post-operative checks • Carry out maintenance and trouble shooting of a hot mix plant. 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 “Hot Mix Plant 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 hot mix plant</p> <p>Theory Duration (hh:mm) 08:00</p> <p>Practical Duration (hh:mm) 20:00</p> <p>Corresponding NOS Code IES/N0140</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 hot mix plants, features, performance and <u>installation basics.</u> • Components and sections of hot mix plant and its functioning to include: <ul style="list-style-type: none"> ○ Cold bin feeder ○ Auto weighing system ○ Conveyor belts; all functions ○ Mixing drums; screeners ○ Bitumen unit ○ Pollution control device ○ Exhaust control system ○ Hot mix surge silo ○ Filler systems • Basics of engine and its systems; procedure for filling and topping up of fuel, coolant, oils. • Basics of electricals; types of motors used in hot mix plant for various ops and its functioning. • Types of aggregates and its physical characteristics • Method of greasing and lubrication different parts of the plant. • Instrument panel/cabin controls and 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. <p>Skills - Core & Professional. Acquire the ability to:</p> <ul style="list-style-type: none"> • Read & understand general 	<ul style="list-style-type: none"> • <u>Scaled Model of Hot Mix Plant for theory sessions</u> • <u>Live Hot Mix 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>instructions/guidelines related to equipment & worksite ops.</p> <ul style="list-style-type: none"> • 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>HM Plant Checks</p> <ul style="list-style-type: none"> • Examine all parts, components and sections of the plant for damage and leakages. • Check all electrical connections and systems including the motors. • Check fuel and lubricant levels in the burners as per requirement. • Check roller filters are free of impurities. • Check bolts and valves are appropriately fixed. • Check conveyor belts for tension, wear and tear; and are working properly. • Check fuel in the power generator as per requirement • Inspect all greasing points and ensure lubrication as applicable. • Check cabin visually for obstructions. Check panel for correct position of controls for starting. • Check all monitoring and warning systems as per operational manual. • Ensure safety equipment in place before operating the plant. <p>Material Checks</p> <ul style="list-style-type: none"> • Ensure requisite amount of aggregates and gravel are present in the hoppers. • Check quantity of bitumen in the plant is as per the mix design requirement • Ensure all the hoppers are clear and free of obstructions. • Ensure water levels in the drum and pollution control bank as per instructions <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 	

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		defects beyond his scope.	
2	<p>Carry out hot mix plant operations.</p> <p>Theory Duration (hh:mm) 30:00</p> <p>Practical Duration (hh:mm) 75:00</p> <p>Corresponding NOS Code IES/N0141</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"> All the basics of plant operations as listed under pre-op checks. Besides, Starting procedure as per correct sequence and specs. Operating the various systems to ensure efficient production. Monitoring systems to ensure optimal output of plant. Stopping procedure including emergency stop button Various hand signals, safety & emergency signs at project site. Basic computer and MS Office applications & printer settings. Basics of SCADA or other systems if applicable 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 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. 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"> Starting of various systems in the 	<ul style="list-style-type: none"> Scaled Model of Hot Mix Plant for theory sessions Live Hot Mix Plant at nearby project site for practical sessions 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
		<p>correct order to include</p> <ul style="list-style-type: none"> ○ Heating the bitumen pipeline before ops to clear residues. ○ Heating of bitumen 12 hours before mixing/ as per specs ○ Turning on exhaust motors to clear dust from filler elevators ○ Turning on power generator to supply power to hot mix plant ○ Switching on the hot mix plant as per sequential procedure. <ul style="list-style-type: none"> ● Test running of hot mix plant for functional checks. <p>HM Plant Operations.</p> <ul style="list-style-type: none"> ● Feed numeric and operational data into computer system for asphalt production as per mix design. ● Turn on the hot mix plant as per procedure and ensure proper flow of materials, through both visual means and control panel indicators. ● Control the speed and flow of different materials into the drum as per the required output. ● Monitor / observe gauges /indicators to ensure conformance to processing specs. ● Coordinate with co- workers to ensure regular flow of raw materials in the appropriate hoppers. ● Check output is as per requirements and monitor weigh hopper for appropriate flow into surge silo. ● Coordinate with vehicle operators for collecting the output efficiently. ● In crisis operate emergency button to disconnect power to the plant <p>Safety during operations</p> <ul style="list-style-type: none"> ● Ensure PPE is worn especially dust mask when moving around the plant. ● Ensure proper communication through correct hand signals and eye contact <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 	
3	<p>Carry out routine maintenance and trouble shooting of hot</p>	<p>Organisational Context: Acquire working knowledge of the following:</p> <ul style="list-style-type: none"> ● Emergency organisation structure and 	<ul style="list-style-type: none"> ● Scaled Model of Hot Mix Plant for theory sessions

Sr. No.	Module	Key Learning Outcomes	Equipment Required
	<p>mix plant.</p> <p>Theory Duration (hh:mm) 14:00</p> <p>Practical Duration (hh:mm) 35:00</p> <p>Corresponding NOS Code IES/N0142</p>	<p>maintenance policy.</p> <ul style="list-style-type: none"> • 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. • Replenish lubricants and coolants as per manufacturers specs • Lubricate/grease all the moving joints/pivot pins and control levers <p>Basic Trouble Shooting:</p> <ul style="list-style-type: none"> • Identify service needs and defects through visual inspection. • Monitor indicators that signal need for replacement of parts • Arrange for and assist repairs or replacement of defective components. • Diagnosing the defect/ problem and rectify; if need be seek advice from supervisor. <p>Documentation & Reporting:</p> <ul style="list-style-type: none"> • Maintain all records/documents as per company policy. • Report defects and problems in time 	<ul style="list-style-type: none"> • <u>Live Hot Mix 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
		and escalate as necessary	
4	<p>Comply with Worksite Health and Safety Guidelines</p> <p>Theory Duration (hh:mm) 08:00</p> <p>Practical Duration (hh:mm) 20:00</p> <p>Corresponding NOS Code IES/N7601</p>	<p>Organisational Context. Acquire working knowledge of the following:</p> <ul style="list-style-type: none"> Health, safety, environmental (HSE) policies and guidelines of the company & their importance Contact details of personnel responsible for HSE related matters & in case of emergencies. Location of first aid room / station and assembly points. Reporting channel and documentation procedure for all HSE related matters. <p>Technical Knowledge. Understand the fundamentals of the following:</p> <ul style="list-style-type: none"> OEMs guidelines for health, safety and security requirements. Types, use and importance of Personal Protective Equipment (PPE) Types of common hazards and risks at worksite and preventive measures. In case of emergencies procedure to stop/ shut down machinery. Common injuries and appropriate basic first aid treatment. Firefighting equipment: Basic knowledge of handling and using them. Guidelines for transport, storage and disposal of hazardous materials and waste Safety signs/symbols and warnings used in worksites and their meaning <p>Skills - Core & Professional. Acquire the ability to:</p> <ul style="list-style-type: none"> In addition to the core and generic skills listed above 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. 	<ul style="list-style-type: none"> Scaled Model of Hot Mix Plant for theory sessions Live Hot Mix Plant at nearby project site for practical sessions Class room with audio-video system Organisation's ESH / Safety video PPE Items & Safety Gear Firefighting equipment & Charts First Aid Kit and Charts

Sr. No.	Module	Key Learning Outcomes	Equipment Required
		<ul style="list-style-type: none"> 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. 	
	<p>Total Duration</p> <p>Theory Duration 60:00</p> <p>Practical Duration 150:00</p>	<p>Unique Equipment Required:</p> <ul style="list-style-type: none"> <u>Scaled Model of Hot Mix Plant for theory sessions</u> <u>Live Hot Mix Plant at nearby project site for practical sessions</u> 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: “Hot Mix Plant Operator” mapped to Qualification Pack: “IES/Q0114, 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 0114 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: “ <u>Hot Mix Plant Operator</u> ” mapped to QP: “ <u>IES/Q 0114 – Version 1.0</u> ”. Minimum accepted score 70%. Desired: Certification Training in Hot Mix Plant Operations & Maintenance
4b	Platform Certification	Certified for Job Role: “ <u>Trainer</u> ” 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 Hot Mix Plant Operations. • At least 1 to 2 years’ experience in conducting O and M training programs.

Assessment Criteria	
Job Role	Hot Mix Plant Operator
Qualification Pack	IES/Q 0114 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/N0140 Carry out pre-operation checks on a hot mix plant	PC1.Conduct visual inspection around the hot mix plant for oil leaks in different parts of the plant	30	2	1	1
	PC2.Check for various electrical connection including the motors used in the plant		1	0	1
	PC3.Ensure the conveyor belts is in proper working condition as per the manufacturer's instructions		2	1	1
	PC4.Check if the roller filters are free of impurities		2	0	2
	PC5.Check whether the bolts and other valves are appropriately fixed		2	1	1
	PC6.Ensure that the power generator has enough amount of diesel as per the plant requirement		1	0	1

	PC7. Inspect all incoming electrical connections and the motors in the plant		2	1	1
	PC8. Check panel to ensure that controls are in correct position for starting		2	0	2
	PC9. Check if the fuel and lubricant levels in the burners is as per the requirement		2	1	1
	PC10. Visually check the cabin for any obstructions		1	0	1
	PC11. Check monitoring and warning systems as per the operational manual		2	1	1
	PC12. Ensure that the required amount and size of coarse aggregate and gravels are present in the hoppers		2	1	1
	PC13. Check if the quantity of the bitumen in the plant is as per the requirement of the mix design		1	0	1
	PC14. Ensure all the hoppers are clear and free from the obstructions		2	0	2
	PC15. Maintain a checking/maintenance logbook to record all activities performed before starting the compactor		2	1	1
	PC16. Maintain a checking/maintenance logbook to record all activities performed before starting the operation		2	1	1
	PC17. Report defects precisely to the supervisor if beyond scope of the role		2	0	2
		Total	30	9	21
2. IES/N0141 Carry out hot mix plant operations	PC1. Heat the pipeline of the bitumen before starting the operation to clear the residual from previous operations	35	1	0	1

	PC2. Heat the bitumen 12 hours before mixing at a temperature of 150-160 degrees Celsius or as per the manufacturer's instructions		1	0	1
	PC3. Turn on the exhaust motor to clear the dust from the filler elevators as per the set procedures		2	1	1
	PC4. Turn on the power generator switch to supply power to the hot mix plant		0.5	0	0.5
	PC5. Turn on the hot mix plant by pressing on the appropriate switches		2	1	1
	PC6. Test run the hot mix plant for checking the normal functioning		1	0	1
	PC7. Ensure there is enough heated bitumen in the tank by checking on the control panel		1	0	1
	PC8. Feed the numeric data and operational data into a computer system for asphalt plant production activities as per the mix design		0.5	0	0.5
	PC9. Turn on the hot mix plant as per the manufacturer's instructions		2	1	1
	PC10. Start components in correct order manually or through computer controls		1	0	1
	PC11. Ensure proper flow of materials into the mixing drum visually and by monitoring the indicators on the control panel		1	0	1
	PC12. Control the speed and flow of different materials in the drum as per the required output		1.5	1	0.5

	PC13. Observes gauges, dials, and operation of machinery to ensure conformance to processing specifications.		2	1	1
	PC14. Monitor the temperature of the bitumen regularly by checking the indicators on the control panel		0.5	0	0.5
	PC15. Coordinate with the co-workers to ensure regular supply of raw materials in the appropriate hoppers		2	1	1
	PC16. Ensure removal of obstructions if any during the operations		1	0	1
	PC17. Ensure water supply in the mixing drum and pollution bank as per the manufacturer's instructions		1	0	1
	PC18. Check the output is as per the mix design/customer requirements		1.5	1	0.5
	PC19. Monitor the weigh hopper for appropriate flow of output		1	0	1
	PC20. Ensure proper flow of hot mix in hot mix surge silo as per the requirement		2	1	1
	PC21. Coordinate with the vehicle operators for collecting the output		1	0	1
	PC22. Monitor for proper functioning of the hot mix plant as per the requirement		0.5	0	0.5
	PC23. Turn off the plant operation during emergencies by pressing the emergency switch button		1	0	1
	PC24. Inform supervisor of any problems while operating the hot mix plant		2	1	1
	PC25. Wear dust masks when working around the plant		1	0	1

	PC26. Make positive eye contact with other equipment operators at the site before crossing in front of or behind the equipment		1	0	1
	PC27. Wear all PPE while sampling asphalt binder and for all operations		1	0	1
	PC28. Record input and output flow as per the desired formats of the organization		2	1	1
		Total	35	10	25
3. IES/N0142 Carry out routine maintenance and troubleshooting of the hot mix plant	PC1. Assess the right service schedule by tracking machine operating hours	20	2	1	1
	PC2. Arrange for and perform scheduled maintenance, such as replace worn parts such as belts, roller bearings, etc.		1	0	1
	PC3. Perform basic maintenance, such as change spark plug, grease controls, cleaning of conveyor belts		1	0	1
	PC4. Check bearings at the burner end of the slinger conveyor for excessive heating		1	0.5	0.5
	PC5. Replenish coolants, lubricants and fluids regularly as per the manufacturer's instructions		2	1	1
	PC6. Change filter, clean and change flame-eye regularly as per the operating hours/manufacturer's instructions		1	0	1
	PC7. Inspect silos, fuel tanks for leaks or scattering of concrete or limestone regularly		0.5	0	0.5
	PC8. Lubricate all pins and pivot points regularly as per the machine manuals/manufacturer's instructions		2	1	1

	PC9. Check battery levels and condition of the terminals and carry out minor adjustments if required		1	0	1
	PC10. Identify service needs, defects, and hazardous conditions through visual inspection		1	0	1
	PC11. Arrange for and assist repair or replacement of defective components, such as motor, burner, temperature control		2	1	1
	PC12. Read indicators that signal need for replacement, such as air filter on compressor		1.5	0.5	1
	PC13. Identify missing or defective components or controls as per the equipment drawings		0.5	0	0.5
	PC14. Comply with safety requirements, such as confined space, lock-out procedures		1.5	0.5	1
	PC15. Maintain records and documentation relating to service, such as log books, repair lists, etc.		1	0	1
	PC16. Follow reporting procedures as laid down by the employer		1	0.5	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		2	1	1

	PC4. Carry out operations as per the manufacturer's and worksite related health and safety guidelines		2	1	1
	PC5. Handle the transport, storage and disposal of hazardous materials and waste in compliance with worksite health, safety and environmental guidelines		2	0	2
	PC6. Operate various grades of fire extinguishers, as applicable		1	0	1
	PC7. Support in administering basic first aid and report to concerned team members, as required, in case of an accident		2	1	1
	PC8. Respond promptly and appropriately to an accident/ incident or emergency situation, within limits of your role and responsibility		1	0	1
	PC9. Record and report details related to operations, incidents or accidents, as applicable		2	1	1
		Total	15	5	10