Model Curriculum

Mine Electrician

SECTOR: Mining
SUB-SECTOR: Underground and Open Cast Mines
OCCUPATION: Electrical Maintenance
REF ID: MIN/Q0416, V1.0
NSQF LEVEL: 4

Skill India

SCMS

N·S·D·C National Skill Development Corporation
Transforming the skill landscape

Certificate

COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

SKILL COUNCIL FOR MINING SECTOR

for

MODEL CURRICULUM

Complying to National Occupational Standards of
Job Role/ Qualification Pack: '**Mine Electrician**' QP No. '**MIN/ Q0416 NSQF Level 4**'

Date of Issuance: **December 15th, 2014**

Valid up to*: **March 24th, 2017**

**Valid up to the next review date of the Qualification Pack or the 'Valid up to' date mentioned above (whichever is earlier)*

Authorised Signatory
(Skill Council for Mining Sector)

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Mine Electrician

This program is aimed at training candidates for the job of a "Mine Electrician", in the "Mining & Allied" Sector/Industry and aims at building the following key competencies amongst the learner.

Program Name	**Mine Electrician**		
Qualification Pack Name & Reference ID.	MIN/Q0416		
Version No.	1.0	**Version update date**	24/03/2017
Pre-requisites to Training	ITI/ Higher Secondary		
Training Outcomes	**After completing this programme, participants will be able to:** • Understand the work related requirements • Arrange the electrical equipment to conduct the processes • Install the electrical supply system and electrical equipment • Conduct the actual operations and maintenance procedures • Comply to health and safety measures critical in mines		

This course encompasses 4 out of 4 National Occupational Standards (NOS) of "Mine Electrician" Qualification Pack issued by "Skill Council for Mining Sector".

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	**Introduction** **Theory Duration** (hh:mm) 10:00 **Practical Duration** (hh:mm) 26:00 **Corresponding NOS Code** Bridge Module	• Understand General Discipline in the class room (Do's & Don'ts) • Understand Role of Mine Electrician in mining industry • Understand benching in quarries, dressing of overhangs, undercuts, fencing, first aid and hygiene • Illustrate standing orders in force at the mine. • Demonstrate safety in the vicinity of machinery. • Explain shot-firing and safety regulations. How and where to take shelter. • Practice Basic skills of communication • Learn and Practice Basic reading capabilities to enable reading of signs, notices and/or cautions at site.	Computer With Internet, LCD Projector, Trainer Chair & Pin Up Boards, White Board
2	**Understand job requirements and related processes** (hh:mm) 40:00 **Practical Duration** (hh:mm) 44:00 **Corresponding NOS Code** MIN/N0446	• Understand the work (work output) required from the job and discuss the same with the supervisor • Understand the electrical layout • Refer all work instruction/ related documents to understand requirements from electrical substations/ electrical equipment/ electrical wiring or fixtures • Understand the specifications for various systems within electrical substations/ transmission of electricity/ use/ operation of electrical equipment/ electrical wiring or fixtures as mentioned in the Work Instruction/ SOP/ Control Diagrams • Prepare sketches or follow blueprints to determine the location of wiring or equipment and to ensure conformance to safety codes • Identify the electrical equipment requirements as per the specifications in the work instructions for installation of electrical substations/ electrical equipment/ electrical wiring or fixtures	Helmet, Dust Mask, Goggles, Ear Plug, Gloves, Reflective Jacket, Safety Belt, Gum Boots, Fire Extinguisher Cylinders, First Aid Box, Fire Fighting Charts, First Aid Charts, Computer with Internet, LCD Projector, Trainer Chair & Table, Demonstration Table, Pin Up Boards, White Board, Connection Bushing Terminal, Bus Bar, MCCB, China Clay Oil Filled Insulator, Board Switch, Power Supply Monitor Panel Board, Megger, Solding Iron and Consumables, Clamp Meter, Digital Multi Meter, Switchgear, Screw Driver Set, Neo Tester, Combination Pliers , Nose Pliers , Spanner Set , Adjustable Wrench , Pipe Wrench , Measuring Tape , Hack Saw , Hammer , Chisel , Files Set, Wood Saw , Portable Drill Machin, Bench-Vice & Line-Vice , Modal of sub-station for illustration purpose, Single phase transformer 2 KVA, 3 phase transformer oil filled 10 KVA, 3 phase squirrel cage Induction motors 5HP, Modal of continuity of circuits, heavy duty cutter, electric knife, connector , Lug, wire gauge, battery charger, blow lamp, pulley puller, Hydrometer, tong tester, Cable, Cable tray,

		• Ensure that the required electrical equipment is procured from the store or vendor before starting the process	line tester, lead acid Batteries, Gate end box with female socket: single font, single door and stand mounted with bottom cable entry system, No/Nc push buttons, Electric Grinder
3	**Install the electrical supply/ sub-station and Equipment** **Theory Duration** (hh:mm) 10:00 **Practical Duration** (hh:mm) 150:00 **Corresponding NOS Code** MIN/N0447	• Install the required electrical supply systems including transformers, generators, circuit breakers, isolators, bus bars, measuring equipment for voltage, current, power, energy, frequency, RPM, wiring, fuses, earthing, switchboard, control panels, relays etc. as per the required specifications. • Install required electrical equipment like motors, fans, lighting, ACs, heaters, compressors, pumps etc. Install and commission other mining machinery. • Conduct a test process to ensure the performance of installed electrical equipment as per the defined specifications • Make modifications in the parameters (by selecting the right program from the machine control system) if required and ensure alignment with the prescribed standard • Ensure the setting up of the parameters of electrical equipment.	Helmet, Dust Mask, Goggles, Ear Plug, Gloves, Reflective Jacket, Safety Belt, Gum Boots, Fire Extinguisher Cylinders, First Aid Box, Fire Fighting Charts, First Aid Charts, Computer with Internet, LCD Projector, Trainer Chair & Table, Demonstration Table, Pin Up Boards, White Board, Connection Bushing Terminal, Bus Bar, MCCB, China Clay Oil Filled Insulator, Board Switch, Power Supply Monitor Panel Board, Megger, Solding Iron and Consumables, Clamp Meter, Digital Multi Meter, Switchgear, Screw Driver Set, Neo Tester, Combination Pliers , Nose Pliers , Spanner Set , Adjustable Wrench , Pipe Wrench , Measuring Tape , Hack Saw , Hammer , Chisel , Files Set, Wood Saw , Portable Drill Machin, Bench-Vice & Line-Vice , Modal of sub-station for illustration purpose, Single phase transformer 2 KVA, 3 phase transformer oil filled 10 KVA, 3 phase squirrel cage Induction motors 5HP, Modal of continuity of circuits, heavy duty cutter, electric knife, connector , Lug, wire gauge, battery charger, blow lamp, pulley puller, Hydrometer, tong tester, Cable, Cable tray, line tester, lead acid Batteries, Gate end box with female socket: single font, single door and stand mounted with bottom cable entry system, No/Nc push buttons, Electric Grinder
4	**O&M of electrical supply/ sub-station and equipment** **Theory Duration** (hh:mm) 28:00 **Practical Duration** (hh:mm) 150:00 **Corresponding NOS Code**	• Run the installed electrical equipment in the substation and the electric system to generate and distribute the electricity to the entire mine area with back-ups and redundancies. • Repair and maintain the different electrical equipment as per manufacturers guidelines, SOPs, and as per the statutory requirements (if any) • Carry out predictive, preventive and break down maintenance for generators, transformers, circuit breakers, isolators, bus bars, control panels, switchboards, wiring, protective relays etc. Adhere to the maintenance schedule as guided by electrical supervisors.	Helmet, Dust Mask, Goggles, Ear Plug, Gloves, Reflective Jacket, Safety Belt, Gum Boots, Fire Extinguisher Cylinders, First Aid Box, Fire Fighting Charts, First Aid Charts, Computer with Internet, LCD Projector, Trainer Chair & Table, Demonstration Table, Pin Up Boards, White Board, Connection Bushing Terminal, Bus Bar, MCCB, China Clay Oil Filled Insulator, Board Switch, Power Supply Monitor Panel Board, Megger, Solding Iron and Consumables, Clamp Meter, Digital Multi Meter, Switchgear, Screw Driver Set, Neo Tester, Combination Pliers , Nose Pliers , Spanner Set , Adjustable Wrench , Pipe Wrench , Measuring Tape , Hack Saw , Hammer , Chisel , Files Set, Wood Saw , Portable Drill Machin, Bench-Vice & Line-Vice , Modal of sub-station for illustration

	MIN/N0448	• Inspect electrical equipment to identify electrical risks, hazards, defects, or the need for adjustment or repair, and to ensure compliance with relevant statutes. • Diagnose malfunctioning systems, apparatus, or components, using test equipment and hand tools to locate the cause of a breakdown and correct the problem. • Test electrical systems or continuity of circuits in electrical wiring, equipment, or fixtures, using testing devices, such as ohmmeters, voltmeters, ammeters, energy meters, or oscilloscopes, to ensure compatibility and safety of system. • Conduct all the tests and checks required for safe operation of the electrical equipment as per the statute. • Operate and maintain the electrical equipment and maintain records as per the statutory requirements.	purpose, Single phase transformer 2 KVA, 3 phase transformer oil filled 10 KVA, 3 phase squirrel cage Induction motors 5HP, Modal of continuity of circuits, heavy duty cutter, electric knife, connector , Lug, wire gauge, battery charger, blow lamp, pulley puller, Hydrometer, tong tester, Cable, Cable tray, line tester, lead acid Batteries, Gate end box with female socket: single font, single door and stand mounted with bottom cable entry system, No/Nc push buttons, Electric Grinder
5	**Health and safety** **Theory Duration** (hh:mm) 20:00 **Practical Duration** (hh:mm) 62:00 **Corresponding NOS Code** MIN/N0901	• Comply with occupational health and safety regulations adopted by the employer. • Follow mining operations procedures with respect to materials handling and accidents • Follow the correct safety steps in case of accident or major failure • Comply with safety regulations and procedures in case of fire hazard. • Operate various grades of fire extinguishers. • Work responsibly and as safe and careful as possible so as not to put the health and safety of self or others at risk, including members of the public • Perform storage and transport of hazardous materials compliant with safety guidelines prescribed by DGMS. • Deal with misfires as per statutory requirement • Identify characteristics of post-blast fumes and take necessary precautions. • Wears safety gear such as hard hat, respiratory protection, eye protection, ear protection • Follow the manufacturer's instructions for care and safe operation of the equipment.	Helmet, Dust Mask, Goggles, Ear Plug, Gloves, Reflective Jacket, Safety Belt, Gum Boots, Fire Extinguisher Cylinders, First Aid Box, Fire Fighting Charts, First Aid Charts, Computer with Internet, LCD Projector, Trainer Chair & Table, Demonstration Table, Pin Up Boards, White Board, Connection Bushing Terminal, Bus Bar, MCCB, China Clay Oil Filled Insulator, Board Switch, Power Supply Monitor Panel Board, Megger, Solding Iron and Consumables, Clamp Meter, Digital Multi Meter, Switchgear, Screw Driver Set, Neo Tester, Combination Pliers , Nose Pliers , Spanner Set , Adjustable Wrench , Pipe Wrench , Measuring Tape , Hack Saw , Hammer , Chisel , Files Set, Wood Saw , Portable Drill Machin, Bench-Vice & Line-Vice , Modal of sub-station for illustration purpose, Single phase transformer 2 KVA, 3 phase transformer oil filled 10 KVA, 3 phase squirrel cage Induction motors 5HP, Modal of continuity of circuits, heavy duty cutter, electric knife, connector , Lug, wire gauge, battery charger, blow lamp, pulley puller, Hydrometer, tong tester, Cable, Cable tray, line tester, lead acid Batteries, Gate end box with female socket: single font, single door and stand mounted with bottom cable entry system, No/Nc push buttons, Electric Grinder

	Total Duration **Theory Duration** **108:00** **Practical Duration** **432:00**	**Unique Equipment Required:**

Grand Total Course Duration: 540 Hours, 0 Minutes

(This syllabus/ curriculum has been approved by SSC: Skill Council for Mining Sector)

Trainer Prerequisites for Job role: "Mine Electrician" mapped to Qualification Pack: "MIN/Q0416"

Sr. No.	Area	Details
1	**Description**	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack "MIN/Q0416".
2	**Personal Attributes**	This job requires sensitivity to problem solving, safety orientation, reading, writing and communication skills and good agility. The person should be of good physical condition with good vision and must pass through periodic medical tests.
3	**Minimum Educational Qualifications**	Class X/ ITI or Diploma in Mining/ Mechanical or B-Tech in Mining/ Mechanical
4a	**Domain Certification**	Certified for Job Role: "Mine Electrician" mapped to QP: "MIN/Q416, v1.0". Minimum accepted score is 80%
4b	**Platform Certification**	Recommended that the Trainer is certified for the Job Role: "Trainer", mapped to the Qualification Pack: "MEP/Q0102". Minimum accepted score as per SSC guidelines is 80%.
5	**Experience**	1. ITI Electrical – 6 years 2. Diploma in Electrical – 5 years 3. B-Tech in Electrical – 4 years

Annexure: Assessment Criteria

Assessment Criteria for Mine Electrician	
Job Role	Mine Electrician
Qualification Pack	MIN/Q0416
Sector Skill Council	Skill Council for Mining Sector

Guidelines for Assessment

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. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training centre (as per assessment criteria below)
4. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training centre based on this criteria
5. To pass the Qualification Pack , every trainee should score a minimum of 70% in every NOS
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

				Marks Allocation	
		Total Mark (100)	Out Of	Theory	Skills Practical
	PC1. Understand the work (work output) required from the job and discuss the same with the supervisor	25	4	2.5	1.5
	PC2. Understand the electrical layout		4	2.5	1.5
	PC3. Refer all work instruction/ related documents to understand requirements from electrical substations/ electrical equipment/ electrical wiring or fixtures		4	2	2
	PC4. Understand the specifications for various systems within electrical substations/ transmission of electricity/ use/ operation of electrical equipment/ electrical wiring or fixtures as mentioned in the Work Instruction/ SOP/ Control Diagrams		4	2.5	1.5

	PC5. Prepare sketches or follow blueprints to determine the location of wiring or equipment and to ensure conformance to safety codes		3	1.5	1.5
	PC6. Identify the electrical equipment requirements as per the specifications in the work instructions for installation of electrical substations/ electrical equipment/ electrical wiring or fixtures		3	1.5	1.5
	PC7. Ensure that the required electrical equipment is procured from the store or vendor before starting the process		3	1.5	1.5
		Total	**25**	**14**	**11**
2. MIN/ N 0447(Install the electrical supply/ sub-station and equipment)	PC1. Install the required electrical supply systems including transformers, generators, circuit breakers, isolators, bus bars, measuring equipment for voltage, current, power, energy, frequency, RPM, wiring, fuses, earthing, switchboard, control panels, relays etc. as per the required specifications.	**25**	5	3	2
	PC2. Install required electrical equipment like motors, fans, lighting, ACs, heaters, compressors, pumps etc. Install and commission other mining machinery.		5	3	2
	PC3. Conduct a test process to ensure the performance of installed electrical equipment as per the defined specifications		5	3	2
	PC4. Make modifications in the parameters (by selecting the right program from the machine control system) if required and ensure alignment with the prescribed standard		5	3	2
	PC5. Ensure the setting up of the parameters of electrical equipment.		5	3	2
		Total	**25**	**15**	**10**

3. MIN/ N 0448(O&M of electrical supply/ sub-station and equipment)	PC1. Run the installed electrical equipment in the substation and the electric system to generate and distribute the electricity to the entire mine area with back-ups and redundancies.	**25**	3	2	1
	PC2. Repair and maintain the different electrical equipment as per manufacturers guidelines, SOPs, and as per the statutory requirements (if any)		3	2	1
	PC3. Carry out predictive, preventive and break down maintenance for generators, transformers, circuit breakers, isolators, bus bars, control panels, switchboards, wiring, protective relays etc. Adhere to the maintenance schedule as guided by electrical supervisors.		4	2	2
	PC4. Inspect electrical equipment to identify electrical risks, hazards, defects, or the need for adjustment or repair, and to ensure compliance with relevant statutes.		3	2	1
	PC5. Diagnose malfunctioning systems, apparatus, or components, using test equipment and hand tools to locate the cause of a breakdown and correct the problem.		3	2	1
	PC6. Test electrical systems or continuity of circuits in electrical wiring, equipment, or fixtures, using testing devices, such as ohmmeters, voltmeters, ammeters, energy meters, or oscilloscopes, to ensure compatibility and safety of system.		3	2	1
	PC7. Conduct all the tests and checks required for safe operation of the electrical equipment as per the statute.		3	2	1
	PC8. Operate and maintain the electrical equipment and maintain records as per the statutory requirements.		3	2	1
		Total	**25**	**16**	**9**

4. MIN/ N0901 (Health and Safety)	PC1. Comply with occupational health and safety regulations adopted by the employer.	**25**	2	1	1
	PC2. Follow mining operations procedures with respect to materials handling and accidents		3	2	1
	PC3. Follow the correct safety steps in case of accident or major failure		2	1	1
	PC4. Comply with safety regulations and procedures in case of fire hazard.		2	1	1
	PC5. Operate various grades of fire extinguishers.		3	2	1
	PC6. Work responsibly and as safe and careful as possible so as not to put the health and safety of self or others at risk, including members of the public		2	1	1
	PC7. Perform storage and transport of hazardous materials compliant with safety guidelines prescribed by DGMS.		3	2	1
	PC8. Deal with misfires as per statutory requirement		2	1.5	0.5
	PC9. Identify characteristics of post-blast fumes and take necessary precautions.		2	1.5	0.5
	PC10. Wears safety gear such as hard hat, respiratory protection, eye protection, ear protection		2	1	1
	PC11. Follow the manufacturer's instructions for care and safe operation of the equipment.		2	1	1
		Total	**25**	**15**	**10**