



Model Curriculum

MINING SHOT FIRER/BLASTER

SECTOR: Mining

SUB-SECTOR: Open Cast and Underground Mines

OCCUPATION: Mining Operations

REF ID: MIN/Q0428, V1.0

NSQF LEVEL: 4



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: '**Mining Shot Firer or Blaster**' QP No. '**MIN/Qo428 NSQF Level 4' V1.0**

Date of Issuance: **December 21st, 2018**

Valid up to*: **December 21st, 2019**

*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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Mining Shot Firer or Blaster

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a “Mining Shot Firer or Blaster”, in the “Mining & Allied” Sector/Industry and aims at building the following key competencies amongst the learner.

| | | | |
|--|---|----------------------------|------------|
| Program Name | Mining Shot Firer or Blaster | | |
| Qualification Pack Name & Reference ID. | MIN/Q0428 | | |
| Version No. | V1.0 | Version update date | 21/12/2018 |
| Pre-requisites to Training | Class X and statutory certificate | | |
| Training Outcomes | <p>After completing this programme, participants will be able to:</p> <ul style="list-style-type: none"> • Discuss onsite health and safety measures related to blasting operations and the use of personal protective equipment. • Explain the types of explosives used in mines • Demonstrate various steps involved in storing, transporting and handling explosives used for blasting in the mines. • Use basic tools, equipment, and materials used in blasting operations. • Charge blast holes correctly and on time. • Carry out blasting operations safely in opencast and underground mines. • Follow procedures related to dealing with misfires while keeping safety norms in consideration. • Follow Environment Health and Safety norms. | | |

This course encompasses 3 out of 3 National Occupational Standards (NOS) of “Mining Shot Firer or Blaster” Qualification Pack issued by “Skill Council for Mining Sector”.

| S. No. | Module Name | Key Learning Outcomes | Equipment Required |
|--------|--|---|--|
| 1. | <p>Introduction</p> <p>Theory Duration (hh:mm) 10:00</p> <p>Practical Duration (hh:mm) 20:00</p> <p>Corresponding NOS Code Bridge Module</p> | <ul style="list-style-type: none"> Identify explosives and their classification into low explosives and high explosives. State major factors to be kept in mind for selecting explosives. Recall blasting concepts and safety precautions during blasting. Explain blast initiation system, safety fuels, detonators, NONEL, etc. its application and limitation. Explain proper stemming and firing sequence. Define procedure of taking shelters during blasting. Examine proper connection of blast hole section. List the duties of the shot-firer as per norms outlined in mining regulations. Recall the procedure of transporting, handling of explosive and its SOP. | <p>LCD Projector, dummy detonator, dummy explosive, dummy Exploder ,Copper Scraper, Stemming Rod, Blasting Cable, Packer /Spacer, Crimper, dummy Safety Fuse / Codex, Signaling Torch, Red Flag, Alarming System</p> |
| 2. | <p>Receive and Handle Explosive materials on Site</p> <p>Theory Duration (hh:mm) 20:00</p> <p>Practical Duration (hh:mm) 45:00</p> <p>Corresponding NOS Code MIN/N0479</p> | <ul style="list-style-type: none"> Demonstrate the competence to receive and handle explosive materials. Identify the explosive quantity which is required for blasting operations. Analyze the effects of blast induced and its environmental impacts. Evaluate the use of personal protective equipment. Design authorization of blast specification | <p>Dummy detonator, dummy explosive, dummy Exploder Copper Scraper, Stemming Rod, Blasting Cable, Packer /Spacer, Crimper, dummy Safety Fuse / Codex, Signaling Torch, Red Flag, Alarming System</p> |
| 3 | <p>Charge blast holes, Blast to specification and deals with misfires</p> <p>Theory Duration: (hh:mm) 20:00</p> <p>Practical Duration: (hh:mm) 70:00</p> <p>Corresponding</p> | <ul style="list-style-type: none"> Evaluate charge blast holes and blasting specification. Inspect blast sites prior to charging by checking and profiling of the drill holes Identify blast specification and confirm the charge. Prepare the explosive materials and charging blast holes with the explosive materials Examine and clear to secure specified danger zone in compliance with the operational and organizational rules. Execute firing with proper clearance by ensuring good sounding, warning system. Inspect blast site prior to and after detonation. | <p>Dummy detonator, dummy explosive, dummy Exploder Copper Scraper, Stemming Rod, Blasting Cable, Packer /Spacer, Crimper, dummy Safety Fuse / Codex, Signaling Torch, Red Flag, Alarming System</p> |

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| | NOS Code MIN/N0480 | <ul style="list-style-type: none"> Take charge of misfires by identifying types and position of misfire. Take remedial action for misfires and recover explosive materials. | |
| 4 | Health and Safety Theory Duration (hh:mm) 10:00 Practical Duration (hh:mm) 15:00 Corresponding NOS Code MIN/N0901 | <ul style="list-style-type: none"> Recall health and safety measures critical for personnel working in open-cast mines. Comply with occupational health and safety regulations adopted by the employer. Follow mining operations procedures with respect to materials handling and accidents. Explain the safety guidelines specified by Directorate General of Mine Safety (DGMS). | Fire Extinguisher Cylinders, First Aid Box, Fire Fighting Charts, First Aid Charts |
| | Total Duration Theory Duration (hh:mm) 60:00 Practical Duration (hh:mm) 150:00 | Unique Equipment Required: Helmet, Dust Mask, Goggles, Ear Plug, Gloves, Reflective Jacket, Safety Belt, Gum Boots | |

Grand Total Course Duration: 210 Hours, 0 Minutes

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

Trainer Prerequisites for Job role: “Mining Shot Firer or Blaster” mapped to Qualification Pack: “MIN/Q0428, 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 “ <u>MIN/Q0428 V1.0</u> ”. |
| 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 or B-Tech in Mining |
| 4a | Domain Certification | Certified for Job Role: “Mining Shot Firer or Blaster” mapped to QP: “ <u>MIN/Q428, V1.0</u> ”. Minimum accepted score is 80% |
| 4b | Platform Certification | Recommended that the Trainer is certified for the Job Role: “Trainer”, mapped to the Qualification Pack: “ <u>MEP/Q0102</u> ”. Minimum accepted score as per SSC guideline is 80%. |
| 5 | Experience | <ol style="list-style-type: none"> 1. Class X/ ITI– 6 years 2. Diploma in Mining – 5 years 3. B-Tech in Mining – 4 years |

Annexure: Assessment Criteria

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|---|--|
| Assessment Criteria for Mining Shot Firer or Blaster | |
| Job Role | Mining Shot Firer or Blaster |
| Qualification Pack | MIN/Q0428,V1.0 |
| 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 these 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 |
| 1.MIN/ N0479 (Receive and Handle Explosive Materials On-Site) | PC1. Obtain all explosive materials correctly and check conformity with the requirements of the blasting specification. | 35 | 1.5 | 1 | 0.5 |
| | PC2. Complete the records accurately and make them available to authorized persons. | | 1 | 0.5 | 0.5 |
| | PC3. Handle the explosive materials and move safely in accordance with operational and organizational procedures and relevant legislation requirements. | | 1.5 | 1 | 0.5 |
| | PC4. Contain all explosive materials safely and securely and take precautions to avoid any loss or damage. | | 1.5 | 1 | 0.5 |
| | PC5. Separate the explosives and detonators and handle them in conformity with operational and organizational rules and procedures and in accordance with relevant legislation. | | 1.5 | 1 | 0.5 |
| | PC6. Apply the approved routes when transporting explosive materials. | | 1.5 | 0.5 | 1 |

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|--|---|--|-----|-----|-----|
| | PC7. Display relevant danger notices in conformity with operational and organizational rules and procedures and with relevant legislation. | | 1.5 | 0.5 | 1 |
| | PC8. Understand the location and area for blasting and requirements to conform with the overall development plans of the site | | 1.5 | 1 | 0.5 |
| | PC9. Understand the quality and extent of mineral materials for removal and confirm with the relevant persons (e.g. manager; explosives supervisor; blasting team; contractors: geotechnical specialist) and the operational requirements | | 1.5 | 1 | 0.5 |
| | PC10. Survey the geological makeup of the ground and mineral strata visually and evaluate for matching with the specified requirements | | 1.5 | 1 | 0.5 |
| | PC11. Identify the geological anomalies of the blast site visually and take into account in the blast design | | 1.5 | 1 | 0.5 |
| | PC12. Collect and record the dimensional information in accordance with the blast specification requirements | | 1 | 0.5 | 0.5 |
| | PC13. Ensure that the output of the blast is confirmed to meet with the site requirements | | 1.5 | 0.5 | 1 |
| | PC14. Determine the extent of the blast from the production requirements, the fragmentation and geological makeup of the ground and mineral strata, face provision and availability and drill size | | 1.5 | 0.5 | 1 |
| | PC15. Understand the effects of a blast on plant, buildings, external features and the surrounding environment | | 1.5 | 1 | 0.5 |
| | PC16. Understand the drill plan | | 1.5 | 0.5 | 1 |
| | PC17. Identify the potential hazards and danger sources and record in the blast specification | | 1.5 | 1 | 0.5 |
| | PC18. Carry out the work to approved procedures and practices and in compliance with statutory requirements | | 1.5 | 0.5 | 1 |
| | PC19. collect information from previous blasts at the site and examine and evaluate in formation in determining the blast design | | 1.5 | 1 | 0.5 |
| | PC20. Analyse constraints and capabilities of plant and equipment used for moving and processing mineral materials and factor the same in the blast design | | 1.5 | 1 | 0.5 |

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|--|--|-------|-----|------|------|
| | PC21. determine types of explosive materials, method of initiation and blasting system and clearly stipulate in accordance with operational and organization rules and procedures and compliance with legislative requirements | | 1 | 0.5 | 0.5 |
| | PC22. ensure rules and procedures for the storing, transporting and handling of explosives are clearly established which comply with legislative requirements | | 1 | 0.5 | 0.5 |
| | PC23. Ensure that requirements for safety and security of the blast operations are clearly identified and communicated | | 1 | 0.5 | 0.5 |
| | PC24. Obtain authorization of the blast specification in accordance with operational and organizational rules and procedures and comply with legislative requirements | | 1.5 | 0.5 | 1 |
| | PC25. Communicate the agreed upon blast specifications to concerned stakeholders, in accordance with operational and organizational rules and procedures and comply with legislative requirements | | 1.5 | 0.5 | 1 |
| | | Total | 35 | 18.5 | 16.5 |
| 2. MIN/ N0480 (Charge Blast Holes, Blast to Specification and deal with misfires) | PC1. Check each blast hole is checked for condition, dimension, angle, inclination and direction, as appropriate, to ensure it is suitable for charging to the blast specification. | 35 | 1.5 | 1 | 0.5 |
| | PC2. Identify, record and report any variations to the blasting specification and confirm with the appropriate persons. | | 1 | 0.5 | 0.5 |
| | PC3. Prepare the required quantities of explosives in accordance with the blast specification | | 1.5 | 1 | 0.5 |
| | PC4. Check the explosives to ensure they conform, in quantity and type, to the blasting specification. | | 1.5 | 1 | 0.5 |
| | PC5. Charge the blast holes in accordance with the blasting specification | | 1.5 | 1 | 0.5 |
| | PC6. Place detonators and primers accurately in conformity with the blasting specification | | 1.5 | 1 | 0.5 |
| | PC7. Identify and report the variations between the specification and the actual conditions at the time of charging in conformity with operational and organizational rules and procedures | | 1.5 | 1 | 0.5 |

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| | PC8. Return the explosive materials which are surplus to requirements to store and correctly package and label and maintain the records | | 1 | 0.5 | 0.5 |
| | PC9. Interpret and implement the approved procedures and practices for disposal of surplus materials | | 1 | 0.5 | 0.5 |
| | PC10. Connect the ignition system for the explosive accurately in conformity with the blast specification | | 1.5 | 1 | 0.5 |
| | PC11. Protect the connections against adverse environmental conditions, premature ignition and mechanical damage | | 1.5 | 1 | 0.5 |
| | PC12. Implement operational safety procedures whilst preparing the initiation circuit and connecting the ignition system in conformity with approved procedures and practices | | 1 | 0.5 | 0.5 |
| | PC13. Check the ignition system and initiation sequences thoroughly in accordance with operational and organizational rules and procedures and relevant legislation | | 1 | 0.5 | 0.5 |
| | PC14. Clear and secure the specified danger zone effectively in compliance with operational and organizational rules and procedures and the blast specification | | 1 | 0.5 | 0.5 |
| | PC15. Provide clear notification to public of intention to fire the explosive | | 1 | 0.5 | 0.5 |
| | PC16. Maintain security of exploder in compliance with relevant explosives regulations, operational and organizational rules and procedures | | 1 | 0.5 | 0.5 |
| | PC17. Fire the explosive when all safety precautions have been taken and verified | | 1.5 | 1 | 0.5 |
| | PC18. Inspect the blast area (including where applicable, the face, crest and pile) thoroughly in accordance with site rules and operational procedures | | 1.5 | 1 | 0.5 |
| | PC19. Provide the all clear on satisfaction that the area is safe and the blasting operation is complete | | 1.5 | 1 | 0.5 |
| | PC20. Record the type and quantity of explosive materials and means of initiation in accordance with organizational and operational procedures | | 1 | 0.5 | 0.5 |
| | PC21. Recognize misfires correctly and communicate to appropriate person(s) | | 1 | 0.5 | 0.5 |

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| | PC22. Clearly mark the located misfire in accordance with operational and organizational rules and procedures | | 1.5 | 1 | 0.5 |
| | PC23. Secure the exclusion zone in conformity with operational and organizational rules and procedures | | 1.5 | 1 | 0.5 |
| | PC24. Record and report the method of dealing with the misfire clearly and accurately in accordance with operational and organizational procedures | | 1 | 0.5 | 0.5 |
| | PC25. Secure the area of recovery for unexploded explosive and isolate until recovery has been carried out and the area made safe | | 1.5 | 1 | 0.5 |
| | PC26. Ensure that the method of recovery used for unexploded charges minimizes the risk of accidental initiation and is in conformity with operational and organizational rules and procedures for misfires | | 1.5 | 1 | 0.5 |
| | PC27. Ensure that explosives and detonating devices are recovered and disposed of correctly and safely | | 1.5 | 1 | 0.5 |
| | | Total | 35 | 21.5 | 13.5 |
| 3.MIN/ N0901 (Health and Safety) | PC1. Comply with occupational health and safety regulations adopted by the employer. | 30 | 3 | 2 | 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 | | 3 | 2 | 1 |
| | PC4. Comply with safety regulations and procedures in case of fire hazard. | | 3 | 2 | 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 | 1.5 | 0.5 |
| | PC7. Perform storage and transport of hazardous materials compliant with safety guidelines prescribed by DGMS. | | 2 | 1.5 | 0.5 |
| | PC8. Deal with misfires as per statutory requirement | | 2 | 1 | 1 |
| | PC9. Identify characteristics of post-blast fumes and take necessary precautions. | | 3 | 2 | 1 |

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|--|--|-------|----|----|----|
| | PC10. Wears safety gear such as hard hat, respiratory protection, eye protection, ear protection | | 3 | 2 | 1 |
| | PC11. Follow the manufacturer's instructions for care and safe operation of the equipment. | | 3 | 2 | 1 |
| | | Total | 30 | 20 | 10 |