



# Model Curriculum

## Gas Detector

**SECTOR:** Mining  
**SUB-SECTOR:** Underground Mines  
**OCCUPATION:** Mine Rescue/Health  
**REF ID:** MIN/Q0412, 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: 'Gas Detector' QP No. 'MIN/Qo412, V1.0, NSQF Level 4'

Date of Issuance: **June 06<sup>th</sup>, 2019**

Valid up to\*: **June 06<sup>th</sup>, 2021**

*\*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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# Gas Detector

## CURRICULUM / SYLLABUS

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

<b>Program Name</b>	Gas Detector		
<b>Qualification Pack Name &amp; Reference ID.</b>	MIN/Q0412		
<b>Version No.</b>	1.0	<b>Version update date</b>	06.06.2019
<b>Pre-requisites to Training</b>	Class X and Possesses Gas Testing Certificate from DGMS		
<b>Training Outcomes</b>	<p><b>After completing this program, participants will be able to:</b></p> <ul style="list-style-type: none"> <li>• Pre-operation checks in gas detecting unit</li> <li>• Explain different gases, their reactions and their effects.</li> <li>• Conduct underground gas testing in regular interval</li> <li>• Perform shift operation of the gas detector.</li> <li>• Identify the rate of emission of the adsorbed gas like CH<sub>4</sub> from the rock</li> <li>• Identify the percentage/ concentration of different gases like CO, CO<sub>2</sub>, etc.</li> <li>• Handle Flame Safety Lame, P.S Tube, Metheno-meter or Multi Gas Detector.</li> <li>• Check all types of gases in mine Environment by Gas detector.</li> <li>• Maintain a safe working condition/ventilation in mine for working person.</li> </ul>		

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

Sr. No.	Module	Key Learning Outcomes	Equipment Required
1	<p><b>Introduction</b></p> <p><b>Theory Duration</b> (hh:mm) 08:00</p> <p><b>Practical Duration</b> (hh:mm) 15:00</p> <p><b>Corresponding NOS Code</b> <b>Bridge Module</b></p>	<ul style="list-style-type: none"> <li>Discuss the general discipline in the class room (Do's &amp; Don'ts)</li> <li>Explain the role of Gas Detector in mining industry</li> <li>Describe about types of entrance in underground mine</li> <li>Identify dressing of loose, sumps, levels, first aid and hygiene</li> <li>Illustrate the standing orders in force at the mine.</li> <li>Practice safety in the vicinity of machinery.</li> <li>Characterize the shot-firing and safety regulations.</li> <li>Discuss the safe method for shifting the shelter &amp; Justify location for shifting the shelter is safe &amp; as per regulation.</li> <li>Apply the basic skills of communication</li> <li>Examine the basic reading capabilities to enable reading of signs, notices and/or cautions at site.</li> </ul>	<p>Projector System, Posters, Graph etc.</p>
2	<p><b>Pre Operation check:</b></p> <p><b>Theory Duration</b> (hh:mm) 16:00</p> <p><b>Practical Duration</b> (hh:mm) 40:00</p> <p><b>Corresponding NOS Code</b> <b>MIN/N0437</b></p>	<ul style="list-style-type: none"> <li>Examine the different types of Gas Detector instrument used in underground mine.</li> <li>Check the least count of the gas detecting equipment.</li> <li>Inspect &amp; identified all meters' readings are proper and functioning correctly.</li> <li>Examine for any problem in detector such as oil level in safety lamp, battery level of detector</li> <li>Determine the area for installation of detector.</li> <li>Examine that the safety lamp is in the correct position when it is in the use.</li> <li>Inspect that the right type of gas detector is used in different location.</li> <li>Check threshold limit of the gas detecting equipment.</li> <li>Examine the proper locking of flame safety lamp.</li> <li>Examine equipment is in a serviceable condition and has been calibrated correctly</li> <li>Examine that the glass of flame safety lame is in the good condition.</li> <li>Examine the condition of P.S. Detector and ensure that they are not broken.</li> <li>Use and interpret color of P.S Detector.</li> <li>Decide the time of Inspection.</li> <li>Examine the proper oxidant allow to pass into flame safety lamp.</li> <li>Determine that the Environment gases percentage in safe working conditions</li> </ul>	<p>Gas chamber, Multi gas detector, LPG Gas cylinder ,Safety lamp, CO gas cylinder</p>
3	<p><b>Operation and Running of Gas detecting unit</b></p> <p><b>Theory Duration</b> (hh:mm) 30:00</p>	<ul style="list-style-type: none"> <li>Clean the equipments before and after use.</li> <li>Check all the equipments before and after use.</li> <li>Examine the regular charging of the digital type gas detectors.</li> <li>Use different types gas detector for different gases according to gas weight compared to air, before perform any observation.</li> <li>Detect the gases from lower side to upper side in case of the detectable gas weight is lighter then air, which always present towards roof side</li> </ul>	<p>Gas chamber, Multi gas detector, LPG Gas cylinder ,Safety lamp, CO gas cylinder</p>

	<p><b>Practical Duration</b> (hh:mm) 65:00</p> <p><b>Corresponding NOS Code</b> <b>MIN/N0438</b></p>	<ul style="list-style-type: none"> <li>• Detect the gases from upper side to lower in case of the detectable gas weight is heavy than air, which always present towards floor side</li> <li>• Demonstrate the safe process in case of detectable gas percentage is going up higher and in risky level.</li> <li>• Explain corrective action in case of the detectable gases (H<sub>2</sub>,H<sub>2</sub>S,CH<sub>4</sub> etc.) are inflammable and high in percentage.</li> <li>• Describe the process of detecting gases in any abandoned area.</li> <li>• Examine that wick of flame safety lamp and ensure its is not extinguish.</li> <li>• Examine for electrical supply in underground mine on the time of gas leakage.</li> <li>• Check that charging, stemming or firing of shot holes is not allowed in areas where methane is found /detected.</li> <li>• Follow proper communication to improve reporting of shift operation.</li> <li>• Create documentation of problems / incidents and Report to safety officer.</li> <li>• Record shift operation particulars, including start and end time, gas accumulation record.</li> <li>• Use the measured data accurately on log books using the appropriate format.</li> <li>• Detect any observation in any mine district or level.</li> <li>• Check all documents are available to all appropriate authorities to inspect.</li> <li>• Define the manufacturer's instructions for care and safe operation of the equipment.</li> </ul>	
4	<p><b>Health and Safety</b></p> <p><b>Theory Duration</b> (hh:mm) 18:00</p> <p><b>Practical Duration</b> (hh:mm) 48:00</p> <p><b>Corresponding NOS Code</b> <b>MIN/N0901</b></p>	<ul style="list-style-type: none"> <li>• Compute all Compliance with safety, health, security and environment related regulations /guidelines at the work site.</li> <li>• Make use of Personal Protective Equipment (PPE) and other safety gear such as, respiratory protection, eye protection, ear protection and hand protection.</li> <li>• Apply safety measures during operations to ensure that the health and safety of self or others (including members of the public) is not at risk.</li> <li>• Demonstrate all operations as per the manufacturer's and worksite related health and safety guidelines.</li> <li>• Outline safety regulations and procedures with regard to worksite hazards and risks.</li> <li>• Operate various grades of fire extinguishers, as applicable.</li> <li>• Support in administering basic first aid and report to concerned team members, as required, in case of an accident.</li> <li>• Respond promptly and appropriately to an accident/ incident or emergency situation, within limits of your role and responsibility.</li> <li>• Record and report details related to operations, incidents or accidents, as applicable</li> <li>• Create all documentation within stipulated time, in case of any accident.</li> </ul>	<p>Fire Extinguisher Cylinders, First Aid Box, Fire Fighting Charts, First Aid Charts</p>

<b>Total Duration</b>	<b>Unique Equipment Required:</b>  Computer With Internet, LCD Projector, Helmet, Dust Mask, Goggles, Ear Plug, Gloves, Reflective Jacket, Safety Belt, Gum Boots/ Safety shoes
<b>Theory Duration</b> 72:00	
<b>Practical Duration</b> 168:00	

Grand Total Course Duration: 240 Hours, 0 Minutes  
(This syllabus/ curriculum has been approved by SSC: Skill Council for Mining Sector)

## Trainer Prerequisites for Job role: “Gas Detector” mapped to Qualification Pack: “MIN/Q0412, 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 <u>“MIN/Q0412, V1.0”</u> .
2	<b>Personal Attributes</b>	Aptitude for conducting training, and pre/ post work to ensure competent, employable candidates at the end of the training. Strong communication skills, interpersonal skills, ability to work as part of a team; a passion for quality and for developing others; well-organized and focused, eager to learn and keep oneself updated with the latest in the mentioned field.
3	<b>Minimum Educational Qualifications</b>	10 <sup>th</sup>
4a	<b>Domain Certification</b>	Certified for Job Role: “Gas Detector” mapped to QP: <u>“MIN/Q0412, V1.0”</u> . Minimum accepted score as per SSC guideline is 80%
4b	<b>Platform Certification</b>	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	<b>Experience</b>	<ol style="list-style-type: none"> <li>For Class X/ITI and Possesses Gas Testing Certificate from DGMS with 6 years relevant experience</li> <li>For Diploma in Mining and Possesses Gas Testing Certificate from DGMS with 5 years relevant experience</li> <li>For B-Tech in Mining and Possesses Gas Testing Certificate from DGMS with 4 years relevant experience</li> </ol>



## Annexure: Assessment Criteria

<b>Assessment Criteria for Gas Detector</b>	
<b>Job Role</b>	<b>Gas Detector</b>
<b>Qualification Pack</b>	<b>MIN/Q0412, V1.0</b>
<b>Sector Skill Council</b>	<b>Mining</b>

### 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 of the theory/knowledge will be based on written test/viva-voce or both while skill test shall be hands on practical. Behavior and attitude will be assessed while performing the task.
3. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training Centre (as per assessment criteria given)
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/ N 0437 (Pre Operation check)	PC1. Check least count of the gas detecting equipment.	<b>30</b>	6	4	2
	PC2. Inspect physical condition of the gas detecting equipment like flame safety lamp, multi gas detectors, methano meters, toxi meters etc.		6	3	3
	PC3. Operate and record readings of the gas detecting equipment in the fresh air. If any extraneous results are obtained in the fresh air in the general atmosphere on the surface, it should be reported to the concerned official.		6	3	3
	PC4. Ensure that testing equipment is in a serviceable condition and has been calibrated correctly		6	3	3
	PC5. Check threshold limit of the gas detecting equipment.		6	4	2

		Total	30	17	13
2. MIN/ N 0438 (Operation and Running of Gas detecting unit)	PC1. Measure the percentage of oxygen at every place in the mine where persons are require to work or pass. (For eg: at every place in the mine where persons are required to work or pass, the air should not contain less than 19 percent of oxygen or more than 0.5 percent of carbon dioxide or any noxious gas in quantity likely to affect the health of any person)	40	5	2.5	2.5
	PC2. Measure the percentage of inflammable gas in an underground coal mine according to the regulations made for the purpose. (For ex: the percentage of inflammable gas should not exceed 0.75 in the general body of the return air of any ventilating district and 1.25 in any place in the mine)		5	2.5	2.5
	PC3. Measure the percentage of other noxious gases like CO, H2S in the general body of air.		5	2.5	2.5
	PC4. Measure the presence of inflammable gas and other noxious gas in the part of mine which is not in use and have not yet been sealed off , once in 7 days.		5	2.5	2.5
	PC5. Observe and report any variation over the threshold limits for the percentage of different gases as laid down in statute is observed , it should be reported to the manager/concerned official.		4	3	1
	PC6. Conduct air sampling at regular intervals as per the regulation for the detailed laboratory analysis of the concentration of different gases.		4	3	1
	PC7. Maintenance of flame safety lamp like cleaning of inner and outer gauzes and glass, lids and other parts of flame safety lamp		4	3	1

	PC8.Ensure Regular charging of the digital type gas detectors.		4	2	2
	"PC9. Ensure the maintenance and management of the following records: • Different gases detected with their concentration. • Places, date and time of inspection for the purpose of detection of gases. • Places from where the air samples have been collected with date and time of collection. The analysis report obtained from the laboratory shall also be recorded."		4	2	2
3. MIN/ N0901 (Health and Safety)	PC1. Comply with occupational health and safety regulations adopted by the employer.	<b>Total 30</b>	<b>40</b>	<b>23</b>	<b>17</b>
	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
	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.

**Total**

3	2	1
<b>30</b>	<b>20</b>	<b>10</b>