



NATIONAL OCCUPATIONAL STANDARD FOR WINDING ENGINE OPERATOR

NOS.WE0.01 FIRST EDITION

APPROVING AUTHORITY

This National Occupational Standard has been prepared and published under the authority of the Zambia Qualifications Authority Board on 7th May, 2021.

ZAMBIA QUALIFICATIONS AUTHORITY

The Zambia Qualifications Authority Act No. 13 of 2011 was enacted by the Government of the Republic of Zambia to ***“provide for the development and implementation of a national qualifications framework; establish the Zambia Qualifications Authority; provide measures to ensure that standards and registered qualifications are internationally comparable; and provide for matters connected with, or incidental to the foregoing”***. Among other functions, ZAQA is responsible for ***determining national standards for any occupation***, through various sector specific National Occupational Standards Development Teams (NOSDTs).

REVISION OF NATIONAL OCCUPATIONAL STANDARDS

National Occupational Standards shall be revised every after **5 years**, or whenever necessary, by the issue of either amendments or of revised editions. It is important that users of National Occupational Standards (NOS) should ascertain that they are in possession of the latest amendments or editions.

NOS DEVELOPMENT TEAM RESPONSIBLE

This National Occupational Standard was prepared by the Mining National Occupational Standards Development Team, upon which the following organisations were represented:

1. Alfred H. Knight
2. CNMC Luanshya Copper Mines
3. Copperbelt University
4. First Quantum Minerals Limited
5. Geological Survey Department (Ministry of Mines and Minerals Development)
6. Kansanshi Mining Plc
7. Kitwe Trades School
8. Mines Safety Department (Ministry of Mines and Minerals Development)
9. Ministry of Labour and Social Security
10. Northern Technical College
11. Sino-Zam College of Science and Technology
12. Solwezi Trades Training Institute
13. University of Zambia
14. Zambia Qualifications Authority

ACKNOWLEDGEMENT

The Zambia Qualifications Authority would like to acknowledge the invaluable support of the following stakeholders that participated in the development of this National Occupational Standard:

1. Eng. Victor Chongo (Alfred H. Knight)
2. Eng. Evaristo Mwenya (CNMC Luanshya Copper Mines)
3. Prof. Peter R.K. Chileshe (Copperbelt University)
4. Dr. Godwin Mooba Beene (First Quantum Minerals Limited – Country Office)
5. Eng. Mutumbi Ng’uni (Geological Survey Department/Ministry of Mines and Minerals Development)
6. Eng. Teza Kasengele (First Quantum Minerals Limited - Kansanshi Mining Plc)
7. Mrs. Chanda Bwalya Catherine (Kitwe Trade School)
8. Eng. Abiyudi Sakala (Mines Safety Department/Ministry of Mines and Minerals Development)
9. Eng. George Kashinka and Mr. Chansa Kapema (Ministry of Labour and Social Security)
10. Eng. Moses Chilekwa (Northern Technical College)
11. Capt. Eng. Dennis Kaonga (Sino-Zam College of Science and Technology)
12. Tech. Kelvin Chama (Solwezi Trades Training Institute)
13. Dr. Samuel F. Kangwa (University of Zambia)
14. Mr. Modest Hamalabbi (ZAQA)
15. Mr. Fidelis Cheelo (Zambia Qualifications Authority)
16. Eng. James Mwewa (Zambia Qualifications Authority)
17. Miss. Womba Soneka (Zambia Qualification Authority)

TABLE OF CONTENTS

FOREWORD.....	iv
JUSTIFICATION.....	iv
ACRONYMS AND ABBREVIATIONS.....	v
GLOSSARY OF TERMS.....	vi
1. OVERVIEW.....	1
2. SCOPE.....	2
3. PERSONAL ATTRIBUTES (VALUES, ETHICS AND ATTITUDES).....	2
4. UNITS AND ELEMENTS.....	2
5. EQUIPMENT, TOOLS AND CONSUMABLE MATERIALS.....	15
6. DILEMMAS/CHALLENGES AND COMPLEXITIES FOR A JOB HOLDER.....	15
7. WORKING CONDITIONS/ENVIRONMENT.....	15
8. PARTIES INVOLVED/INTERACTING WITH THE JOB HOLDER OR TRAINEE..	16
9. PHYSICAL DEMANDS ON THE BODY.....	16
ANNEX A.....	17
ANNEX B.....	18

FOREWORD

The Zambia Qualifications Authority (ZAQA) is a statutory body under the Ministry of Higher Education established by ZAQA Act No. 13 of 2011 to ***“provide for the development and implementation of a national qualifications framework; provide measures to ensure that standards and registered qualifications are internationally comparable; and provide for matters connected with, or incidental to the foregoing”***.

Among other functions, ZAQA is responsible for ***“determining national standards for any occupation”***, through various sector specific National Occupational Standards Development Teams (NOSDTs) of experts composed of representation from appropriate authorities, government departments, industry, academia, regulators, consumer associations and non-governmental organisations, etc.

This National Occupational Standard (NOS) has been developed by the Mining National Occupational Standards Development Team in accordance with the procedures and guidelines of ZAQA. All users should ensure that they have the latest edition of this publication as National Occupational Standards are revised from time to time.

This NOS shall be used by, among others, industry, employers, quality assurance bodies, awarding and professional bodies and education and training institutions, as a benchmark to identify training needs, develop job profiles/descriptions, develop curricula and learning programmes, in various sectors where the occupation exists. In the Mining sector, demonstration of competence against this NOS may be required in order to run a business or practice a craft or profession.

JUSTIFICATION

A winding engine is a steam or electric engine at the top of a mine shaft that powers the winding drum, thus hoisting and lowering a cage or skip by means of a winding rope. In mining, the winding engine is usually called a hoist or winder. Winding Engine Operators are indispensable to the mining industry, especially in underground mining operations. This is because winding is quite possibly the most important of all deep mining operations, in many cases being responsible for bringing to the surface, not only the whole output, but is also often the only means by which workers can enter and leave the mine.

As such the Winding Engine Operators should be equipped with knowledge and skills necessary for the safe operation of the winding engine, such as bringing a winding system safely to rest even in the event of failure of a component.

This National Occupational Standard highlights core knowledge, skills, competences and personal attributes that Winding Engine Operators must possess to be successful in their jobs.

ACRONYMS AND ABBREVIATIONS

CS	Core Skill
NOS	National Occupational Standard
NOSDT	National Occupational Standards Development Team
OK	Organisational Knowledge
PC	Performance Criteria
PS	Professional Skill
RK	Regulatory Knowledge
RPL	Recognition of Prior Learning
TK	Technical Knowledge
WEO	Winding Engine Operator
ZAQA	Zambia Qualifications Authority
ZQF	Zambia Qualifications Framework
SOPs	Standard Operating Procedure

GLOSSARY OF TERMS

For the purposes of this NOS, the following terms and definitions shall apply:

Core Skills/Generic Skills: are a group of skills that are key to learning and working in today's world. These skills are typically needed in any work environment. In the context of the NOS, these include communication related skills that are applicable to most job roles.

Function: is an activity necessary for achieving the key purpose of the sector, occupation, or area of work, which can be carried out by a person or a group of persons. Functions are identified through functional analysis and form the basis of NOS.

Job Title: defines a unique set of functions that together form a unique employment opportunity in an organisation.

Knowledge and Understanding: are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.

National Occupational Standards (NOS): are statements of the standards of performance individuals must achieve when carrying out functions in the workplace, together with specifications of the underpinning knowledge and understanding. They are precise descriptions of what an individual is expected to be able to do in his/her work role.

National Occupational Standards (NOS) Code: is a unique reference code that identifies a NOS.

National Occupational Standards Development Team (NOSDT): means an established group of national stakeholders/experts responsible for the development of National Occupational Standards within a specific economic sector or occupation.

Occupation: is a set of job roles, which perform similar/related set of functions in an industry.

Organisational Context: includes the way the organisation is structured and how it operates, including the extent of operative knowledge that managers have in their relevant areas of responsibility.

Performance Criteria: are statements that together specify the standard of performance required when carrying out a task.

Scope: is the set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on the quality of performance required.

Sector: is a conglomeration of different business operations having similar businesses and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.

Sub Sector: is derived from a further breakdown based on the characteristics and interests of its components.

Technical Knowledge: is the specific knowledge needed to accomplish specific designated responsibilities.

Unit Title: gives a clear overall statement about what the incumbent should be able to do.

1. OVERVIEW

This is an introductory section providing a brief summary and specific information or commentary about the content of the NOS and the targeted sector and occupation to help the user judge whether it is relevant to them.

NOS Code	NOS.WEO.01
Occupation	Mining Operations
Job Title	Winding Engine Operator
Job Description	A Winding Engine Operator ensures execution of activities related to the winding engine
Job Purpose	To operate the winding engine connected to the mine shaft.
ZQF Level	4
Sector	Mining
Sub sector	Underground and Opencast Mines
Other Economic Sector(s) in which the Occupation is Practiced	Energy
Other Similar Jobs that can be performed by the Winding Engine Operator	Winding Engine Manager/Supervisor/Foreman
Minimum Educational Job Entry Qualification(s)	Level 3 Certificate
Practicing License Requirements (if any)	Membership with and practicing license from Engineering Institution of Zambia; Registration and examination under Zambian Mining Regulations MR 1417, MR1421 and MR 1425
Training/RPL (Suggested)	<ol style="list-style-type: none"> 1. Refresher training if absent from the mine for a period of one year or more. 2. Winding engine systems and operation. 3. Mine and machine safety. 4. Basic quality management. 5. 5S workplace organisation methods
Minimum Job Entry Age	25 years
Prior Experience (Suggested)	1-2 years as learner winding engine driver under supervision in smaller material shafts
Performance Criteria	As described in the Units under Section 4

2. SCOPE

This National Occupational Standard specifies the fundamental knowledge and understanding, skills and competences that Winding Engine Operators must possess to be successful in their jobs.

3. PERSONAL ATTRIBUTES (VALUES, ETHICS AND ATTITUDES)

This job requires interpersonal skills, ability to plan and prioritise, quality consciousness, safety orientation, physique to sustain strenuous conditions, ability to use fingers, hands and feet with ease to complete the assigned task (dexterity), high precision and sensitivity to problem solving and sensitivity towards safety for self, others and equipment as well as sober-minded and mature.

4. UNITS AND ELEMENTS

This National Occupational Standard is divided into 4 units representing the tasks that a job holder should undertake in his/her day-to-day work. Each unit is further broken down into elements depicting the number of activities to be carried out for the successful execution of a particular task.

UNIT 1 [This unit is about preparing the winding engine for activities that need to be carried out during a shift].

Unit No.	01
Unit Title	Prepare use of winding engine
Description	This unit is about preparing the winding engine for activities that need to be carried out during transport of workers and material from surface to the underground of a mine and vice versa.
Scope	This unit covers the following: <ul style="list-style-type: none"> • Conducting of pre-operation checks. • Recording and reporting details.
Performance Criteria (PC) w.r.t. the Scope	
Element	Performance Criteria (PC)
Conduct pre-operation checks	To be competent, the individual must be able to: <p>PC1. Check oil and fluid levels in hydraulic system, transfer gear boxes and any other associated system.</p> <p>PC2. Conduct pre-operation checks to ensure the operation of Winding is proper, smooth and with ease.</p> <p>PC3. Conduct proper inspection and check of safety and control devices installed, and ensure are functioning as specified in the relevant equipment manual and operating standards.</p> <p>PC4. Examine winder brakes and emergency brakes.</p> <p>PC5. Ensure operation of emergency, overwind, slack rope protection devices.</p> <p>PC6. Check the controlling system of the winding engine.</p> <p>PC7. Assess the drum for proper laying of winding rope on the drum pitch.</p> <p>PC8. Examine the operating levers and other associated systems (e.g. foot brake, hand brake, hoisting/un-hoisting lever and so on) and locking devices.</p>
Record and report details	To be competent, the individual must be able to: <p>PC9. Maintain winding engine report book to record all activities performed on the winding engine.</p> <p>PC10. Liaise with relevant mining and engineering officials for any issues.</p> <p>PC11. Immediately inform supervisor/ engineer of problems arising in operation of winding engine regarding any defect or malfunction observed.</p>
Knowledge and Understanding (K)	
A. Organisational Context (Knowledge of the company/ organisation and its processes)	The individual on the job must demonstrate knowledge and understanding of: <p>OK1. Job specific documents e.g. daily maintenance checklist and its importance.</p> <p>OK2. Risk and impact of not following defined procedures/work instructions.</p> <p>OK3. Escalation matrix for reporting identified problems.</p> <p>OK4. Cost of equipment and loss for the company that results from damage of equipment.</p> <p>OK5. All direct/ indirect cost of accidents to the company.</p> <p>OK6. Implications of delays in process to the company.</p>

	OK7. Locally prepared emergency response/ disaster management plan.
A. Technical Knowledge	<p>The individual on the job must demonstrate knowledge and understanding of:</p> <p>TK1. Layout and functioning of the control levers and their operation (foot brake, operating levers, hoisting/un-hoisting, and locking devices).</p> <p>TK2. Mechanism and operation of prestart working device and associated systems (automatic speed recorder, depth indicator, slow banking, over speeding and so on).</p> <p>TK3. Electrical control systems and equipment of operations.</p> <p>TK4. Drive motor mechanism for smooth running and operation of the system.</p> <p>TK5. Common troubles and troubleshooting techniques.</p> <p>TK6. Signage, mining area signs and other safety and emergency signals.</p> <p>TK7. Code of signalling and signalling systems and relevant SOPs for safe operation of winding engine.</p> <p>TK8. Response to emergencies such as fire, accident, major failure, and so on.</p>
B. Regulatory context (Knowledge of Mines Safety Rules and Regulations)	<p>The individual on the job must demonstrate knowledge and understanding of:</p> <p>RK1. Different types of mines and details of the mine he/she is working in.</p> <p>RK2. Mine organisation, time keeping, need for discipline and punctuality.</p> <p>RK3. Haulages, tunnels and shafts in underground mines, dressing of the roof, stable and unstable strata.</p> <p>RK4. Instructions to ensure that any instructions concerning the safe operation of the winding plant are logged in the statutory logbooks.</p> <p>RK5. Duties of workmen/helpers.</p> <p>RK6. Provision of wages, working hours and accident. Compensation as per Mines and Minerals Act and Workers' Compensation Act.</p> <p>RK7. Mining safety procedures.</p> <p>RK8. Impact of violating safety procedures.</p>
Skills (S)	
A. Core Skills/ Generic Skills	Writing Skills
	<p>The individual on the job must be able to:</p> <p>CS1. Note down observations (if any) related to operations of the winding engine in the winding engine drivers' log book.</p> <p>CS2. Fill out administrative forms.</p>
	Reading Skills
	<p>The individual on the job must be able to:</p> <p>CS3. Read and comprehend operator's manual.</p> <p>CS4. Read and analyse the available data about the site.</p> <p>CS5. Read and comprehend banners/ signage.</p>

	<p>Oral Communication (Listening and Speaking skills)</p>
	<p>The individual on the job must be able to:</p>
	<p>CS6. Communicate with supervisors and peers effectively, in an appropriate manner.</p>
<p>B. Professional Skills</p>	<p>Plan and Organise</p>
	<p>The individual on the job must be able to:</p>
	<p>PS1. Plan and organise the work orders and jobs received from the supervisor/ other teams.</p>
	<p>PS2. Organise all process/ equipment manuals so that sorting out/ accessing information is easy.</p>
	<p>Judgment and Critical Thinking</p>
	<p>The individual on the job must be able to:</p>
	<p>PS3. Ensure deviations from safe operating standards are conveyed to the appointed relevant personnel, and exercise decision making to mitigate potential damage to personnel and equipment.</p>
<p>PS4. Use reasoning skills to identify and resolve basic problems.</p>	
<p>PS5. Ensure deviations from safe operating standards are conveyed to the appointed relevant personnel, and exercise decision making to mitigate potential damage to personnel and equipment.</p>	
<p>Desire to Learn and Take Initiatives</p>	
<p>The individual on the job must be able to:</p>	
<p>PS6. Follow instructions and work on areas of improvement identified.</p>	
<p>PS7. Complete the assigned tasks with minimum supervision.</p>	
<p>PS8. Complete the job defined/ assigned by the supervisor within the agreed timelines and quality norms.</p>	
<p>Problem Solving and Decision Making</p>	
<p>The individual on the job must be able to:</p>	
<p>PS9. Detect problems in day-to-day tasks.</p>	
<p>PS10. Discuss possible solutions to address problems and liaise with the supervisor.</p>	
<p>PS11. Make decisions in emergency situations in the absence of the supervisor (as per the authority matrix defined by the organisation).</p>	

UNIT 2 [This unit is about performing the winding engine operations for activities that need to be carried out during a shift].

Unit No.	02
Unit Title	Perform winding engine operations
Description	This unit is about performing winding engine operation for activities that need to be carried out during a shift.
Scope	This unit covers the following: <ul style="list-style-type: none"> Perform operations for winding (hoisting of workers/ materials/ equipment), in line with the signal code and safety precautions.
Performance Criteria (PC) w.r.t. the Scope	
Element	Performance Criteria (PC)
Perform operations for winding to hoist workers/ materials/ equipment, in line with the signal code and safety precautions	To be competent, the individual must be able to: <ul style="list-style-type: none"> PC1. Operate the winding engine only upon being acquainted with the signal code or clearly understanding the transmission of signals for lowering or raising of workers/ material/ equipment. PC2. Ensure the functioning of continuous type alarm bell provided for slow banking zone. PC3. Check that the automatic contrivance is in working order with respect to slow banking, over speeding and over winding. PC4. Avoid jerking to the cage when starting, running and stopping the engine. PC5. Lower and raise persons at a speed fixed by the manager for man riding or at a speed approved by the Mines Safety Department. PC6. Follow all the norms and directives with regard to the operation of the winding engine. PC7. Ensure that the station is not left unattended for any reason, it should either be locked or handed over to another operator. PC8. Record observations in a report at end of the shift. PC9. Ensure housekeeping of the winding engine room and that it is properly maintained and any oil or grease should be removed immediately to avoid slippage, falling and fire. PC10. Check and ensure that the available fire extinguishing equipment is in proper working order.
Knowledge and Understanding (K)	
A. Organisational Context (Knowledge of the company/ organisation and its processes)	The individual on the job must demonstrate knowledge and understanding of: <ul style="list-style-type: none"> OK1. Types of documentation used in the organisation e.g. daily maintenance checklist, daily log book and their importance. OK2. Risk and impact of not following defined procedures/work instructions. OK3. Rules and regulations of the mine as per SOP. OK4. Risk and impact of not following company's SOP. OK5. Escalation matrix for reporting identified problems. OK6. The duties and responsibilities associated with his/her job role as defined by the employer. OK7. Cost of delays to the company. OK8. Direct/indirect cost of accidents to the company.

	OK9. Locally prepared emergency response/disaster management plan.
B. Technical Knowledge	<p>The individual on the job must demonstrate knowledge and understanding of:</p> <p>TK1. Basic operation of winder for which they are appointed for (e.g. steam winder, compressed air winder and electrical winders).</p> <p>TK2. Safety and hazards related to different types of winding mechanisms.</p> <p>TK3. Be conversant with the precautionary measures for different hazards for each type of winding mechanism.</p> <p>TK4. Be fully conversant with the control systems/devices and associated safety measures/devices of respective type of winding system.</p> <p>TK5. Function of different types of levers and brake/clutch mechanisms.</p> <p>TK6. Signal code as specified in relevant statutes, organisational processes and guidelines.</p> <p>TK7. Technical specifications of winding engine e.g. size, power type, power capacity, depth of shaft, total rope length.</p> <p>TK8. Safety features of the winding engine.</p>
C. Regulatory context (Knowledge of Mines Safety Department Rules and Regulations)	<p>The individual on the job must demonstrate knowledge and understanding of:</p> <p>RK1. Different types of mines and details of the mine he/she is working in.</p> <p>RK2. Mine organisation, time keeping, need for discipline and punctuality.</p> <p>RK3. Haulages, shafts and tunnels in underground mines, dressing of the roof, stable and unstable strata as well as ventilation and so on.</p> <p>RK4. Standing orders in force at the mine and safety in the vicinity of machinery.</p> <p>RK5. Duties of workmen/helpers.</p> <p>RK6. Provision of wages, working hours and accident compensation as per Mines and Minerals Act and Workers' Compensation Act.</p> <p>RK7. Mining safety procedures.</p> <p>RK8. Impact of violating safety procedures.</p>
Skills (S)	
A. Core Skills/ Generic Skills	Writing Skills
	<p>The individual on the job must be able to:</p> <p>CS1. Note down observations (if any) related to operations of the winding engine.</p> <p>CS2. Fill out administrative forms.</p>
	Reading Skills
	<p>The individual on the job must be able to:</p> <p>CS3. Read and comprehend operator's manual.</p> <p>CS4. Read and analyse the available data about the site.</p> <p>CS5. Read and comprehend banners/ signage.</p>

	<p>Oral Communication (Listening and Speaking skills)</p>
	<p>The individual on the job must be able to: CS6. Communicate with supervisors and peers effectively, in an appropriate manner.</p>
<p>B. Professional Skills</p>	<p>Plan and Organise</p>
	<p>The individual on the job must be able to: PS1. Plan and organise the work orders and jobs received from the supervisor/ other teams. PS2. Organise all process/ equipment manuals so that sorting out/accessing information is easy.</p>
	<p>Judgment and Critical Thinking</p>
	<p>The individual on the job must be able to: PS3. Use common sense and make judgments in day-to-day activities. PS4. Use reasoning skills to identify and resolve basic problems. PS5. Use intuition to detect any potential problems which could arise.</p>
	<p>Desire to Learn and Take Initiatives</p>
	<p>The individual on the job must be able to: PS6. Follow instructions and work on areas of improvement identified. PS7. Complete the assigned tasks with minimum supervision. PS8. Complete the job defined/ assigned by the supervisor within the agreed timelines and quality norms.</p>
	<p>Problem Solving and Decision Making</p>
	<p>The individual on the job must be able to: PS9. Detect problems in day-to-day tasks. PS10. Discuss possible solutions to address problems, with the supervisor. PS11. Make decisions in emergency situations in the absence of the supervisor (as per the authority matrix defined by the organisation).</p>

UNIT 3 [This unit is about assisting in routine maintenance and troubleshooting tasks].

Unit No.	03
Unit Title	Assist in routine maintenance and troubleshooting tasks
Description	This unit is about providing assistance in routine maintenance and troubleshooting tasks.
Scope	This unit covers the following: <ul style="list-style-type: none"> Assist in routine maintenance in accordance with the manufacturer's recommendations and company procedures. Carrying out basic diagnostics and troubleshooting.
Performance Criteria (PC) w.r.t. the Scope	
Element	Performance Criteria (PC)
Assist in routine maintenance in accordance with the manufacturer's recommendation and company procedures	To be competent, the individual must be able to: <p>PC1. Conduct routine daily testing on winding engine as stipulated</p> <p>PC2. Pay particular attention to ropes and shaft systems.</p> <p>PC3. Assist in assembling and dismantling of the winding machine in accordance with manufacturer's instructions.</p> <p>PC4. Ensure that a shaft conveyance is not used for the raising or lowering of persons until it has made at least one complete trip up and down the working portion of the shaft following: <ul style="list-style-type: none"> Any repairs to the winding installation; Any replacement of rope, attachments, shaft conveyance or any other equipment; Any repairs to the shaft; Any stoppage in winding exceeding one hour duration; and The occurrence of any seismic event. </p>
Assist in carrying out basic diagnostics and troubleshooting	To be competent, the individual must be able to: <p>PC5. Ensure that no maintenance task on the engine is performed when it is still running or hot.</p> <p>PC6. Assess when the problem is beyond his/her competence and report the problem to suitably qualified and competent personnel.</p> <p>PC7. Complete timely and legibly defect sheets as provided by the company.</p>
Knowledge and Understanding (K)	
A. Organisational Context (Knowledge of the company/ organisation and its processes)	The individual on the job must demonstrate knowledge and understanding of: <p>OK1. Types of documentation used in the organisation e.g. daily maintenance checklist, daily log book and their importance.</p> <p>OK2. Risk and impact of not following defined procedures/work instructions.</p> <p>OK3. Rules and regulations of the mine as per standard operating procedure (SOP).</p> <p>OK4. Risk and impact of not following company's SOP.</p> <p>OK5. Escalation matrix for reporting identified problems.</p>
B. Technical Knowledge	The individual on the job must demonstrate knowledge and understanding of:

	<p>TK1. All equipment including the control levers and their operation (foot brake, operating levers, hoisting/un-hoisting and locking devices); pre-start working device and associated systems (automatic speed recorder, depth indicator, slow banking, over speeding); electrical control systems and other equipment necessary for operations.</p> <p>TK2. Technical specifications of winding engines e.g. size, power type, power capacity, depth of shaft, total rope length.</p> <p>TK3. Basic fault diagnostics and troubleshooting techniques.</p> <p>TK4. Gear and transfer gearbox system of winding engines.</p> <p>TK5. Basic understanding of power drive units; electrical and mechanical.</p>
<p>C. Regulatory context (Knowledge of Mines Safety Department Rules and Regulations)</p>	<p>The individual on the job must demonstrate knowledge and understanding of:</p> <p>RK1. Different types of mines and details of the mine he/she is working in.</p> <p>RK2. Mine organisation, time keeping, need for discipline and punctuality.</p> <p>RK3. Shafts, haulages and tunnels in underground mines, dressing of the roof, stable and unstable strata.</p> <p>RK4. Code of practice applicable in specific areas of the mine and the significance of barricades/fences.</p> <p>RK5. Standing orders in force at the mine and safety in the vicinity of machinery.</p> <p>RK6. Duties of workmen/helpers.</p> <p>RK7. Mining safety procedures.</p> <p>RK8. Impact of violating safety procedures.</p>
<p>Skills (S)</p>	
<p>A. Core Skills/ Generic Skills</p>	<p>Writing Skills</p>
	<p>The individual on the job must be able to:</p> <p>CS1. Note down observations (if any) related to operations of the winding engine in the daily log book.</p> <p>CS2. Fill out administrative forms.</p>
	<p>Reading Skills</p>
	<p>The individual on the job must be able to:</p> <p>CS3. Read and comprehend operator's manual.</p> <p>CS4. Ensure Review of Logbook instructions before commencement of shift.</p> <p>CS5. Read and comprehend banners/ signage.</p>
<p>B. Professional Skills</p>	<p>Plan and Organise</p>
	<p>The individual on the job must be able to:</p> <p>PS1. Plan and organise the work orders and jobs received from the supervisor/ other teams.</p>

	PS2. Organise all process/ equipment manuals so that sorting out/ accessing information is easy.
	Judgment and Critical Thinking
	The individual on the job must be able to: PS3. Use common sense and make judgments in day-to-day activities. PS4. Use reasoning skills to identify and resolve basic problems. PS5. Use intuition to detect any potential problems which could arise.
	Desire to Learn and Take Initiatives
	The individual on the job must be able to: PS6. Follow instructions and work on areas of improvement identified. PS7. Complete the assigned tasks with minimum supervision. PS8. Complete the job defined/ assigned by the supervisor within the agreed timelines and quality norms.
Problem Solving and Decision Making	
The individual on the job must be able to: PS9. Detect problems in day-to-day tasks. PS10. Discuss possible solutions to address problems, with the supervisor. PS11. Make decisions in emergency situations in the absence of the supervisor (as per the authority matrix defined by the organisation).	

UNIT 4 [This unit is about maintaining health and safety measures critical in mines].

Unit No.	04
Unit Title	Maintain health and safety
Description	This unit is about maintaining health and safety measures critical in mines.
Scope	This unit covers the following: <ul style="list-style-type: none"> • Maintain health and safety measures critical in mines.
Performance Criteria (PC) w.r.t. the Scope	
Element	Performance Criteria (PC)
Maintain health and safety measures critical in mines	To be competent, the individual must be able to: <ul style="list-style-type: none"> PC1. Comply with occupational health and safety regulations adopted by the employer. PC2. Adhere to mining operation procedures with respect to hoisting of workers/ materials/ equipment and handling of accidents. PC3. Follow the correct safety steps in case of accidents or major failure. PC4. Comply with safety regulations and procedures in case of fire hazards. PC5. Operate various grades of fire extinguishers and activate fire brigade call-out system. PC6. Work responsibly and as safely and carefully as possible so as not to put the health and safety of self or others at risk, including members of the public. PC7. Perform storage and transportation of hazardous materials compliant with safety guidelines prescribed by Mines Safety Department. PC8. Identify characteristics of post-blast fumes and take necessary precautions. PC9. Wear safety gear such as hardhat, respiratory protection, eye protection, ear protection. PC10. Adhere to manufacturer's instructions for care and safe operation of the equipment. PC11. Work a maximum 10 hours per shift.
Knowledge and Understanding (K)	
A. Organisational Context (Knowledge of the company/ organisation and its processes)	The individual on the job must demonstrate knowledge and understanding of: <ul style="list-style-type: none"> OK1. Relevant standards and procedures followed in the company. OK2. Different types of safety requirement at the mine. OK3. Processes like procurement, store management, inventory management, quality management and key contact points for query resolution.
B. Technical Knowledge	The individual on the job must demonstrate knowledge and understanding of: <ul style="list-style-type: none"> TK1. Mines Safety Department Rules and Regulations. TK2. Winding plant Mine safety standards including noise levels and other pollutants.

	TK3. Safety attire and equipment such as safety shoes, tight fit clothing, safety belt, hand gloves, safety goggles, gas detector, safety lamp, self-contained breathing apparatus, gum boots, ear muffs, face mask.
C. Regulatory context (Knowledge of Mines Safety Department Rules and Regulations)	<p>The individual on the job must demonstrate knowledge and understanding of:</p> <p>RK1. First aid, hygiene and general House Keeping. RK2. Code of traffic in specific areas of the mine and significance of fences. RK3. Standing orders in force at the mine and safety in the vicinity of machinery. RK4. Fire safety regulations and where to take shelter. RK5. Mining safety procedures. RK6. Impact of violating safety procedures. RK7. Locally prepared emergency preparedness/disaster management plan. RK8. Sources of dust, noise and vibration and measures to minimise them. RK9. Hazardous material safety and security rules and regulations as prescribed by the Mines Safety Department. RK10. Code of practice for safe handling and transportation of dangerous material and heavy equipment.</p>
Skills (S)	
A. Core Skills/ Generic Skills	Reading Skills
	The individual on the job must be able to: CS1. Read and interpret symbols and measurements. CS2. Assess logged instructions on normal operation of winding plant. CS3. Understand and analyse the available data about the site.
	Writing Skills
	The individual on the job must be able to: CS4. Note down observations (if any). CS5. Fill in documentation or enter information in online systems under the guidance of the supervisor.
	Oral Communication (Listening and Speaking skills)
B. Professional Skills	The individual on the job must be able to: CS6. Discuss task lists, schedules and activities. CS7. Effectively communicate with superiors, colleagues and regulators. CS8. Listen attentively and comprehend the information given by various sources about the site.
	Plan and Organise
	The individual on the job must be able to: PS1. Plan and organise the work order and jobs. PS2. Organise all process manuals so that sorting out/accessing information is easy.

	Judgment and Critical Thinking
	The individual on the job must be able to: PS3. Use common sense and make judgments in day-to-day activities. PS4. Use reasoning skills to identify and resolve basic problems. PS5. Conduct Job Safety analysis to identify potential problems which could cause damage and personal injury.
	Desire to Learn and Take Initiatives
	The individual on the job must be able to: PS6. Follow instructions and work on areas of improvement identified. PS7. Complete the assigned tasks with minimum supervision. PS8. Complete the job within the agreed timelines and quality norms.
	Problem Solving and Decision Making
	The individual on the job must be able to: PS9. Identify problems which may affect normal winder operation. PS10. Discuss possible solutions to address problems, with the supervisor. PS11. Make decisions in emergency situations in the absence of the supervisor (as per the authority matrix defined by the organisation).

5. EQUIPMENT, TOOLS AND CONSUMABLE MATERIALS

These include, but not limited to: personal protective equipment, greases and oils, lifting equipment, locks and lockout systems, toolkits, cutting and joining equipment and consumables, first aid kit, stretcher, medical kit, safety warning and general information signs, climbing ladders, lamp/torch, safety tools and equipment such as fire extinguishers and barricades, copies of mine safety rules and regulations, company's safety policy/procedure, company's standard operating procedures, incident/accident reporting templates and so on.

6. DILEMMAS/CHALLENGES AND COMPLEXITIES FOR A JOB HOLDER

Dilemmas associated with the job of Winding Engine Operator include: working in dangerous areas and hazardous machinery/equipment, lifting/pulling/pushing relatively heavy materials, long working hours, exposure to mining biological hazards, pressure from supervisors and colleagues, pressure from government regulators, working in extreme weather such as hot and cold conditions, working in noisy, wet and dusty environments and so on.

6.1 Alternative Choices (Solutions) to Dilemmas and Complexities

Solutions to dilemmas include: wearing protective clothing and ensuring their availability and use by other employees, exercising regularly to maintain physical fitness, participating in workplace safety sensitisation and awareness meetings/training sessions, adhering to company's safety and standard operating procedures at all times, consulting extensively within and outside one's department/team on electrical/mechanical safety issues and so on.

7. WORKING CONDITIONS/ENVIRONMENT

Working conditions include: underground mines or on the surface, confined spaces, cold, hot and wet conditions, climbing heights, standing/sitting for long hours, lifting materials, working in day or night shifts, areas that are noisy and dusty, areas with limited lighting and ventilation and so on.

8. PARTIES INVOLVED/INTERACTING WITH THE JOB HOLDER OR TRAINEE

8.1 Internal/Within the Organisation

Supervisors, trainers, safety team, other colleagues and subordinates.

8.2 External/Outside the Organisation

Government regulators, trainers, contractors, suppliers of equipment/tools/consumables, fellow winding engine operators from other companies, labour unions/occupational health and safety associations, etc.

9. PHYSICAL DEMANDS ON THE BODY

- Physique to sustain strenuous conditions;
- Be able to walk and stand for long periods of time;
- Bend, stretch, twist, or reach out;
- Be able to lift relatively heavy materials, tools and equipment;
- Be able to use fingers, hands and feet with ease to complete the assigned task (dexterity).

ANNEX A

Criteria for Assessments based on this NOS

A.1 Guidelines for Assessment

A.1.1 Criteria for assessment for curricula and learning programmes based on this NOS will be created by curricula and programmes developers. Each Performance Criteria (PC) will be assigned marks proportional to its importance in the NOS. Curricula and programme developers will also lay down proportion of marks for theory and practical skills for each performance criteria, giving more weight to practical skills.

There shall be allocated the 'Total Mark', which will be the sum of all marks in each Unit, distributed across the number of PCs in that particular Unit. The 'out of' mark will be the mark allocated to each PC, which will be shared between theory and skills practical assessments.

A.1.2 Individual awarding/assessment bodies or institutions and other users of the NOS will create unique question papers for the theory part and evaluations for skill practical part for their respective candidates.

ANNEX B NOS Version Control

This Annex gives details necessary for the tracking of the NOS versions based on the number of revisions.

NOS Code	NOS.WEO.01		
ZQF Level	4	Version Number	01
Sector	Mining	Date of Approval	7 th May, 2021
Sub Sector	Underground and Opencast Mines	Date of Last Review	N/A
Occupation	Mining Operations	Date of Next Review	May, 2026

