



ESWATINI VOCATIONAL QUALIFICATIONS PACKAGE
FOR

FITTING

LEVEL 4



Prepared by the Directorate of Industrial and Vocational Training (DIVT)

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Registration documents can be downloaded at the link:

<https://www.divt.org.sz/qualifications>

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Contents

ACKNOWLEDGEMENT	3
THE QUALIFICATION	4
NATIONAL VOCATIONAL CERTIFICATE FITTING LEVEL 4	5
Rationale	5
Purpose.....	6
Entry Requirements	6
Associated Level Descriptors.....	6
Learning Outcomes Statements and Associated Assessment Criteria	6
Components of Qualifications.....	7
Rules of Combination	8
Integrated Assessment.....	8
International Comparability	8
Articulation Possibilities/Learning Pathways	9
Notes	9
Name of Registered Provider	9
UNIT STANDARDS.....	10
Align machines and equipment.....	11
Commission assembly or machine	14
Diagnose and repair faults on equipment and machinery during production	17
Inspect and conduct routine maintenance on an overhead crane.....	20
Lead a team, plan, allocate, and assess their work.....	24
Maintain Hydraulic systems	26
Maintain pneumatic systems	30
Maintain safety valves.....	33
Maintain turbines.....	36
Monitor the application of safety, health and environmental protection procedures	39
Overhaul centrifugal pumps.....	43
Overhaul compressors	46
Produce a business plan for a new venture	49
Refurbish machines	52

ACKNOWLEDGEMENT

The qualifications package was developed through consultations and combined efforts of individuals, organizations and collaborating partners. The qualification contains unit standards benchmarked from other countries in the SADC Region and internationally. The DIVT facilitated the whole process of developing this package.

The following individuals together with their organizations are acknowledged for their special inputs.

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Phumzile	Dlamini	Gwamile VOCTIM
Mabandla	Nxumalo	ECOT
Mukelo	Shabangu	ECOT
Mxolisi	Shongwe	Montigny
Mthobisi	Dlamini	RES
Mxolisi	Dlamini	RES
Shaka	Dlamini	USL
Lucky	Phakathi	DIVT
Mazambane	Dlamini	Taiwan Technical Mission

THE QUALIFICATION

NATIONAL VOCATIONAL CERTIFICATE FITTING LEVEL 4

Originator	DIVT		
Qualification Type:	Certificate	Descriptor:	Fitting
Specialisation:			
Level:	4	Minimum Credits:	120
Actual Credits	130		
Sub-Framework	TVET		
Field name	Engineering, Manufacturing and Construction	Field no:	07
Sub-field no:	Mechanics and metal trades	Sub-field no:	0715

Rationale

Describe the context of ETSDS

The Technical and Vocational System in Eswatini lacks occupational standards and harmonised curricula for training which has the input for the industry players. There is general dissatisfaction with the competencies produced by the system in terms of relevance with the labour market. There is currently no correlation between the required industry skills and the qualification the system produces.

Describe how the qualification will impact positively within the sketched context:

The qualification will provide the much-needed correlation between the required industry skills and the competencies produced by the system. The qualification will also harmonise curricula for training with the input of industry players.

Why do you need the qualification?

This qualification will enhance the status and productivity of the learner as well as contribute to improved quality, production rate and growth within the engineering sector. The range of typical learners at this level could include individuals preparing to qualify as a Fitting Artisan. Qualifying learners will obtain a National Vocational Certificate in Fitting which places the learner in a position to investigate requirements for advancement to qualified artisan status or progress to a National Certificate or Diploma at NQF Level 5.

Purpose

The purpose of the qualification is to develop learners who have the competencies required for performing Fitting tasks. It is awarded to people who have demonstrated the skills and knowledge of Fitting tasks within this broad industry.

Learners attracted to this qualification include those who are training in institutions to be Fitting Technicians at an Artisan level, learners who are in the apprenticeship training system and those who are in the non-formal sector who will acquire through trade testing.

Graduates will be able to ...

The qualification is developed to produce a Fitting Technician who can operate independently and be able to supervise the Fitting Artisan at levels 2 & 3. Graduates will be able to relate their learning to scientific and technological principles and concepts. They will also be able to maintain and support the various policies and procedures related to the safety, health, environment and quality systems that govern their workplace.

Entry Requirements

Minimum requirements for entry:

- Fitting Level 3
- RPL

Associated Level Descriptors

Knowledge	• To demonstrate advanced knowledge in understanding and application of theoretical and technical knowledge of key concepts to perform tasks and solve problems within given parameters. • To understand key concepts, terms, rules and established principles and theories in one or more fields or disciplines.
Skills	• To apply strategic approaches to tasks that arise in work and using expert sources of information. • To use technology to solve existing and emerging situations.
Personal Attributes	• To demonstrate accountability and responsibility in work/ learning situations. • To show proactivity and reliability in the performance of tasks.

Learning Outcomes Statements and Associated Assessment Criteria

This qualification will enable the learner to find employment as a skilled worker to perform Artisan duties in the Fitting field.

Learning Outcomes - After completion of this qualification learners will be able to:	Assessment Criteria
Demonstrate high level of understanding of the mechanical fitting and the practice including tools, materials, processes, equipment and machinery.	This is a theory assessment approach, it should carry at least 20% of the overall time for assessment. The theory is compulsory for the acquisition of the qualification but it is not a proof of competency. At this level it should be either written examination paper
Perform complex mechanical fitting operations, practices and tasks under without supervision. Should be able to supervise and be accountable for work done by others.	Practical assessment to be carried out in a hospitality environment (actual or simulation). The proof of competency should be between 60% or 70% to prove competency. This should be at least 70% of the overall assessment.
Ensure a safe working environment for self, mates and equipment.	An important aspect which should be embedded on the theory and should also be observed during practical tests
Evaluate and solve complex problems and report work done and pending work to clients.	To be assessed both in theory and practical through complex problem solving scenarios. This will be embedded on the theory and practice assessments

Components of Qualifications

The components of the qualification, in their combination, make up the complete qualification.

Unit No.	Unit Titles	Level	Credit
MEF 401	Commission assembly/ machine	4	8
MEF 402	Diagnose and repair faults on equipment and machinery during production/operation	4	8
MEF 403	Maintain hydraulic systems	4	8
MEF 404	Maintain pneumatic systems	4	8
MEF 405	Maintain gearboxes	4	10
MEF 406	Maintain safety valves	4	4
MEF 407	Monitor the application of safety, health, and environmental rules and regulations	4	4
MEF 408	Refurbish machines	4	12
MEF 409	Lead a team, plan, allocate, and assess their work	4	4
MEF 410	Overhaul centrifugal pumps	4	14

MEF 411	Align machinery and equipment	4	8
MEF 412	Overhaul compressors	4	14
MEF 413	Inspect and conduct routine maintenance on an overhead crane	4	8
MEF 414	Maintain turbines	4	14
MEF 415	Produce business plans for a new venture	4	6
Total Credits			130

Rules of Combination

Specific rules? The learner should be competent in all units in this qualification
Compulsory modules, units learning? All units are compulsory in these qualifications
Any subminimum credits to be achieved? The learner should acquire all 130 credits in these qualifications

Integrated Assessment

How will the assessment be done? This qualification will have compulsory theory and practice
How often will the assessment be done? • Trade testing • Institutional theory exams and practice • Formative assessment for apprenticeship training through log books and institutional evidence of theory training
Who will be responsible for the assessment? • DIVT • Vocational training institutions • There will be collective awarding of certificates for institutional learners

International Comparability

SADC	This qualification contains unit standards from the South African Qualifications Authority and aligns with the level descriptors in the SADC Qualifications Framework.
African Continent	N/A

Globally, including TQF	N/A
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Articulation Possibilities/Learning Pathways

A provision to learners, on successful completion of accredited prerequisites, to move between components of the delivery system.

Vertical	NVC Fitting Level 5
Horizontal	None
Diagonal	No match

Notes

Could be used by the office to let the public know the status of various issues. Here are 3 possibilities.

Programmes recorded against this registered qualification
N/A
Accredited Providers
N/A
Registered, re-registered, de-registered?
N/A

Name of Registered Provider

Information on all providers accredited to offer this qualification must be indicated here. In the final database this information must be updatable.

Name:	DIVT
Address:	P. O. Box 1218 Mbabane

UNIT STANDARDS

Align machines and equipment

Title		Align machines and equipment			
Field		Manufacturing, Engineering and Construction			
Subfield		Mechanics and Metal Trades			
SZNQF Level	4	Unit ID	MEF 411	Credits	8

Purpose

The learning outcomes in this unit standard also contribute to the exit level outcomes required for the National Certificate in Engineering Fitting (ENQF level 4) and related qualifications.

Qualifying learners can align machines and equipment to ensure close tolerance alignment of equipment. They will understand the importance of close tolerance alignment requirements and how it is achieved. This will include setting up of the alignment equipment, calibration and performing alignment activities on machines and equipment.

Special Notes

1. Entry information/Prerequisite

MEF 402 Diagnose and repair faults on equipment and machinery during production/operation.

MEF 407 Monitor the application of safety, health, and environmental rules and regulations.

2. This unit standard may be used as a core or elective within any vocationally based qualification.

3. The credits allocated to this unit standard assume that a learner has already learned to maintain direct drives.

4. The examples are – axial, parallel and angular shaft; couplings; gear-trains; belts;pulleys; chain drives; slideways.

Quality Assurance Requirements

This unit standard and others within this subfield may be awarded by institutions that comply with the accreditation, national assessment, and moderation requirements set by the Eswatini Higher Education Council

Elements and Performance Criteria

Element 1: Plan and prepare for machine and equipment alignment.

Range

- Plan and prepare includes reading and interpreting task instruction and engineering drawings
- Preparing includes determining the methodology to be used based on the application.
- Making system safe includes isolation and applying protective equipment
- Isolation includes electrical and mechanical
- Work safely with due care for self, fellow workers, equipment, materials and the environment.

Performance Criteria

1.1 Appropriate machines and equipment are identified for alignment.

1.2 The system is ensured to be safe before starting the intended task.

Element 2: Prepare site and equipment for machine and equipment alignment.

Range

Preparation includes setting up, ensuring calibration, and testing alignment equipment

Performance Criteria

2.1 System is made safe before starting an intended task

2.2 Site and equipment are prepared for alignment

2.3 Provisions for working in a hazardous location are implemented to regulatory and worksite procedures

Element 3: Align machines and equipment.

Range

Alignment includes levelling, axial, horizontal, and vertical alignment

Performance Criteria

3.1 Clean and inspect machined surfaces for base and equipment/ machinery to ensure no debris and high spots.

3.2 Reasons for misalignment are determined and rectified e.g. softfoot, pipe strain, thermal growth, faulty installation, distortion, wear, shaft and coupling concentricity/ runout, etc.

3.3 Measure and record initial alignment

3.4 Alignment activities are carried out in a safe manner in accordance with schedules and manufacturer specifications.

3.5 Record final alignment figures.

Element 4: Apply quality checks on completed work.

Range

Quality checks include inspection of aligned machines and equipment and calculation of alignment accuracy.

Performance Criteria

4.1 Machines and equipment gaps, axial and radial alignment is within manufacturer-specified tolerance

4.2 Completion of alignment is confirmed and verified

Element 5: Conduct post-alignment activities.

Range

- Post-alignment activities include cleaning up, processing documentation, and reporting alignment activities to responsible persons.
- Documentation includes registers and schedules.

Performance Criteria

5.1 Machinery records are completed in accordance with workplace procedures

5.2 Discuss and explain incidents and problems related to machine and equipment alignment.

5.3 Alignment report is accurate, clear, and timeously processed

5.4 The work environment is clean, tidy, and safe

5.5 Care for and store alignment tools and equipment.

Registration Data

Date first registered	2025
Anticipated review	2030
Standard setting body (SSB)	Directorate of Industrial and Vocational Training (DIVT)
Body responsible for review	Directorate of Industrial and Vocational Training (DIVT)

Commission assembly or machine

Title		Commission assembly/ machine			
Field		Manufacturing, Engineering and Construction			
Subfield		Mechanics and Metal Trades			
SZNQF Level	4	Unit ID	MEF 401	Credits	8

Purpose

Learners in the field of engineering require the skills, values and knowledge reflected in this unit standard.

The learning outcomes in this unit standard also contribute to the exit level outcomes required for the National Certificate in Engineering Fitting (EQF level 4) and related qualifications.

Qualifying learners are able to, over a wide range of contexts and / or enterprises, confirm the installation of machines/assemblies, and commission and test the installation to operational specifications.

Special Notes

1. Entry information/Prerequisite

Must have done Fitting qualification Level Three (3).

2. This unit standard may be used as a core or elective within any vocationally based qualification.

3. The credits allocated to this unit standard assume that a learners has already learned to:

- Maintain gearboxes, compressors, bearings, pumps, heat exchangers and pressure vessels, direct and indirect drives, seals, brakes and clutches, pipes systems, lubricating systems and fluid power and pneumatic systems

4. The learner should be able to work autonomously.

Quality Assurance Requirements

This unit standard and others within this subfield may be awarded by institutions that comply with the accreditation, national assessment, and moderation requirements set by the Eswatini Higher Education Council

Elements and Performance Criteria

Element 1: Plan and prepare for commissioning.

Range

- Planning and preparation include acquiring job cards and determining the sequence of commissioning events.
- Prepare appropriate personal protective equipment.

Performance Criteria

- 1.1 Obtain operational parameters.
- 1.2 Identify all safety devices of the machine/assembly and ensure that are in place and functional.
- 1.3 Gather all required resources that will be needed.

Element 2: Commission machine/assembly.

Range

- Commissioning includes setting up machine/assembly for first-time use
- Complementary inputs include power, air, fluid, lighting and ventilation
- Complementary commissioning equipment includes specialized measuring equipment, PLC programs, flow meters, and operating software

Performance Criteria

- 2.1 The machine is energized and gradually loaded.
- 2.2 Machine performance is monitored against operational parameters and recorded.
- 2.3 Diagnosed faults are corrected.
- 2.4 Machine performance meets production, quality, and operational requirements.
- 2.5 Reports and records reflect fault diagnosis and corrective action taken, completed commissioning, events, and conditions.
- 2.6 The commissioning site is restored to a safe and serviceable condition.

Element 3: Complete commissioning activity.

Performance Criteria

- 3.1 Reports and records reflect fault diagnosis and corrective action taken, completed commissioning, events, and conditions.
- 3.2 Make recommendations on improvement of future installations.
- 3.3 Discuss and explain incidents and problems related to performing commissioning.

Registration Data

Date first registered	2025
Anticipated review	2030
Standard setting body (SSB)	Directorate of Industrial and Vocational Training (DIVT)
Body responsible for review	Directorate of Industrial and Vocational Training (DIVT)

Diagnose and repair faults on equipment and machinery during production

Title		Diagnose and repair faults on equipment and machinery during production/operation			
Field		Manufacturing, Engineering and Construction			
Subfield		Mechanics and Metal Trades			
SZNQF Level	4	Unit ID	MEF 402	Credits	8

Purpose

The skills, values, and knowledge reflected in this unit standard are required by people in the field of engineering machining.

The learning outcomes in this unit standard also contribute to the exit level outcomes required for the National Certificate in Mechanical Engineering (Fitting) (EQF level 4) and related qualifications.

Qualifying learners can monitor the condition of equipment and machinery in operation, diagnose faults, perform minor repairs online, and identify major repair requirements. Qualifying learners are required to work autonomously with minimal supervision.

Special Notes

1. Entry information/Prerequisite

MEF 407 Monitor the application of safety, health, and environmental rules and regulations.

2. This unit standard may be used as a core or elective within any vocationally based qualification.

3. The credits allocated to this unit standard assume that a learner has already learned to:

- Maintain gearboxes, compressors, bearings, pumps, heat exchangers and pressure vessels, direct and indirect drives, seals, brakes and clutches, pipes systems, lubricating systems and fluid power and pneumatic systems

4. The learner should be able to work autonomously.

Quality Assurance Requirements

This unit standard and others within this subfield may be awarded by institutions that comply with the accreditation, national assessment, and moderation requirements set by the Eswatini Higher Education Council

Elements and Performance Criteria

Element 1: Monitor the performance of equipment and machinery during operation.

Range

- Get the necessary documents for monitoring performance.
- Liaise with production personnel.
- Identify potential or recurrent faults and determine corrective action required
- Diagnose root causes of faults

Performance Criteria

- 1.1 Explain and discuss potential operational and maintenance problems in the plant.
- 1.2 Re-occurring equipment and machinery faults and their root causes identified.
- 1.3 Documentation on major repair requirements completed.
- 1.4 Major repair requirements reported.
- 1.5 Potential production and maintenance problems are explained and discussed.

Element 2: Perform minor repairs on line.

Range

Minor repairs include adjustments, lubrication, changeovers of equipment

Performance Criteria

- 2.1 Inform production personnel and obtain a safe work permit.
- 2.2 Minor repairs online performed.
- 2.3 Major repair requirements reported.
- 2.4 Potential production and maintenance problems are explained and discussed.

Element 3: Determine major equipment and machinery components to be repaired.

Range

- A complete report detailing repairs to be done
- Gather all required spares and tools
- Remove equipment and machinery components for major repair

Performance Criteria

- 3.1 Re-occurring equipment and machinery faults and their root causes identified and reported.
- 3.2 Major repair requirements reported.
- 3.3 Documentation on major repair requirements completed.

Element 4: Perform major repairs.

Range

Major repairs include replacement of worn-out components / equipment.

Performance Criteria

- 4.1 Inform production personnel and obtain a safe work permit.
- 4.2 Documentation on major repair requirements completed.
- 4.3 Equipment and machinery components requiring major repair are dismantled and dispatched to the workshop.
- 4.4 Major repairs performed as per manufacturer specifications.
- 4.5 Assembly of the equipment and machinery, performed tests at the workshop, and dispatched to the site.
- 4.6 Install, commission, and hand over for production/operation.

Registration Data

Date first registered	2025
Anticipated review	2030
Standard setting body (SSB)	Directorate of Industrial and Vocational Training (DIVT)
Body responsible for review	Directorate of Industrial and Vocational Training (DIVT)

Inspect and conduct routine maintenance on an overhead crane

Title		Inspect and conduct routine maintenance on an overhead crane			
Field		Manufacturing, Engineering and Construction			
Subfield		Mechanics and Metal Trades			
SZNQF Level	4	Unit ID	MEF 413	Credits	8

Purpose

This unit standard will be useful to people who are required to inspect and conduct routine maintenance on an overhead crane.

People credited with this unit standard are able to:

- Explain the factors critical to inspecting and maintaining an overhead crane.
- Prepare to inspect and maintain the overhead crane.
- Inspect and maintain the overhead crane.
- Complete the inspection and maintenance process and prepare for operation and/or production.

Special Notes

1. Entry information/Prerequisite

MEF 402 Diagnose and repair faults on equipment and machinery during production/operation.

MEF 407 Monitor the application of safety, health, and environmental rules and regulations.

2. This unit standard may be used as a core or elective within any vocationally based qualification.

3. The credit calculation is based on the assumption that learners are already competent in terms of the following outcomes or areas of learning when starting to learn towards this unit standard:

- Handle material safely.
- Use relevant hand tools.
- Use relevant measuring equipment.
- Read and interpret an engineering drawing.
- Know the dangers related to electrocution.
- Know the treatment for electric shock.
- Know lifting communication system.

Quality Assurance Requirements

This unit standard and others within this subfield may be awarded by institutions that comply with the accreditation, national assessment, and moderation requirements set by the Eswatini Higher Education Council

Elements and Performance Criteria

Element 1: Identify and discuss the applications of overhead cranes.

Range

This outcome covers the knowledge required to identify and explain:

- Basic overhead crane components

Must include:

- Bogie/gantry.
- Traverse runway.
- Power collector/trailing cables.
- Drive motor and gearbox.
- Control unit.
- Hook spread.
- Hoist.
- Limit control.
- Brakes
- Load limit
- Principles of operation including limitations of overhead cranes (safe working load, sign language communication)
- Classifications and types of overhead cranes (gantry, bridge, tower, etc.).
- Applications (loading/unloading materials, moving materials
- Troubleshooting techniques
- Routine inspections, maintenance, and repair of overhead cranes.
- Statutory requirements for overhead cranes

Performance Criteria

1.1 Basic overhead crane components are explained.

1.2 The principles of overhead crane operation are discussed.

1.3 The different applications of overhead cranes are explained.

1.4 The troubleshooting techniques of the various crane components are discussed.

1.5 Routine inspections, maintenance, and repair methodologies are explained.

1.6 Statutory/legal and certification requirements for overhead cranes by approved inspection authority are discussed.

Element 2: Explain the factors critical to inspecting and maintaining an overhead crane.

Performance Criteria

2.1 The explanation of the reasons for inspecting an overhead crane is in accordance with specified requirements.

2.2 The explanation of the importance of inspecting an overhead crane shows a clear understanding of the direct consequences to self and the business.

Must include:

- Injury to persons.
- Damage to equipment.
- Loss of production time through breakdowns.
- Increased costs.
- Legal consequences.

2.3 The explanation lists the possible critical workplace hazards (unsafe conditions) that may be encountered while inspecting an overhead crane in a particular context. The explanation also describes the risks associated with and the factors contributing to each workplace hazard.

2.4 The explanation lists the possible critical work-related hazards (unsafe acts) that may be encountered while inspecting an overhead crane in a particular context. The explanation also describes the risks associated with and the factors contributing to each work-related hazard.

2.5 The importance of using genuine replacement components during overhead crane maintenance is explained.

Element 3: Plan and prepare to inspect and maintain the overhead crane.

Range

Planning and preparation include reading and understanding task instructions, engineering drawings and inspection requirements, identification of the equipment to be inspected, obtaining inspection schedules and manufacturer specifications for specific equipment to be inspected.

Performance Criteria

3.1 The required personal protective equipment is selected, examined and used in a way that is consistent with its purpose, design and specified requirements.

3.2 Tools, spares and equipment are selected, examined and transported in accordance with specified requirements.

3.3 The site is examined in accordance with specified requirement. Hazards are dealt with in accordance with specified requirements.

3.4 The crane is locked-out and made safe in accordance with specified requirements.

3.5 The consequences to health, safety and production due to inadequate planning and preparation in line with specified requirements are explained.

Must include:

- Permit-to-work.
- Personal protective equipment.
- Tools, material and equipment.
- Workplace examination.
- Workplace hazards.

Element 4: Inspect and maintain the overhead crane.

Performance Criteria

- 4.1 Permit-to-work is obtained in accordance with specified requirements.
- 4.2 The required personal protective equipment is used in a way that is consistent with its purpose, design and specified requirements. Personal protective equipment is used to ensure the safety of persons and equipment.
- 4.3 The crane is inspected and/or maintained in accordance with specified requirements.
- 4.4 Major defects identified during inspection rendering the crane unsatisfactory for further use are explained.
- 4.5 The tools and equipment are used in accordance with manufacturers' design and without injury to self and others.

Element 5: Complete the inspection and maintenance process and prepare for operation and/or production.

Performance Criteria

- 5.1 The workplace is cleaned and free from hazards in accordance with specified requirements and good housekeeping practices.
- 5.2 The lock-out device and notices are removed in accordance with specified requirements.
- 5.3 Power is restored and the overhead crane is tested for correct operation.
- 5.4 A report on the work performed is compiled and complies with specified requirements for format, content, accuracy, and distribution. The report is submitted within the agreed time.

Registration Data

Date first registered	2025
Anticipated review	2030
Standard setting body (SSB)	Directorate of Industrial and Vocational Training (DIVT)
Body responsible for review	Directorate of Industrial and Vocational Training (DIVT)

Lead a team, plan, allocate, and assess their work

Title		Lead a team, plan, allocate, and assess their work			
Field		Manufacturing, Engineering, and Construction			
Subfield		Mechanics and Metal Trades			
SZNQF Level	4	Unit ID	MEF409	Credits	4

Purpose

Lead the team, plan and allocate work, and assess team members within context.

Special Notes

1. Entry information/Prerequisite

Must have done Fitting Level Three (3).

2. This unit standard may be used as a core or elective within any vocationally based qualification.

3. An understanding of teamwork and knowledge of the role and functions of a team leader

4. Unit Range: Coordination of a team of up to six (6) members (members could be of different trades).

Quality Assurance Requirements

This unit standard and others within this subfield may be awarded by institutions which comply with the accreditation, national assessment and moderation requirements set by the Eswatini Higher Education Council

Elements and Performance Criteria

Element 1: Plan the work activities of a team.

Performance Criteria

1.1 Instructions are received, incorporated with planned activities, and agreed with relevant parties after consultation.

1.2 Setting objectives and determining the course of action.

1.3 The selection of team members based on the abilities of individuals as per current and anticipated work requirements.

1.4 All team members are engaged, prepared, and assisted for the task as per current and anticipated work requirements.

Element 2: Allocate work to team members.

Performance Criteria

- 2.1 The tasks that need to be executed are listed.
- 2.2 The tasks that need to be executed are prioritized and an estimated time for completion is indicated.
- 2.3 A work allocation schedule is compiled and communicated to team members.
- 2.4 The tasks that need to be executed are explained to the team and relevant guidance is given.

Element 3: Assess and report on team member performance and issues within the team.

Performance Criteria

- 3.1 Selection methods to assess team member performance are identified and reported.
- 3.2 Selection methods to assess issues within the team are identified, explained, and reported.
- 3.3 Regular feedback is given to the team individually and collectively and their roles in the successful growth of a company are explained.
- 3.4 Report on the team's performance to determine team building and development plans to set objectives for the team are listed and explained.
- 3.5 Discuss and document all related activities that have been undertaken.

Registration Data

Date first registered	2025
Anticipated review	2030
Standard setting body (SSB)	Directorate of Industrial and Vocational Training (DIVT)
Body responsible for review	Directorate of Industrial and Vocational Training (DIVT)

Maintain Hydraulic systems

Title		Maintain hydraulic systems			
Field		Manufacturing, Engineering and Construction			
Subfield		Mechanics and Metal Trades			
SZNQF Level	4	Unit ID	MEF 403	Credits	8

Purpose

The learning outcomes in this unit standard also contribute to the exit level outcomes required for the National Certificate in Engineering Fitting (ENQF Level 4) and related qualifications. This includes the ability to perform routine maintenance on a hydraulic system in order to ensure operational integrity. Learners will also understand the importance of maintenance in hydraulic machine operations and how it is achieved. This will include a basic knowledge of filtration, fluid conditioning techniques, and the use of hand tools to maintain fluid power systems.

Qualifying learners are able to:

- Identify and discuss the range of hydraulic systems and their applications.
- Plan and prepare for hydraulic systems maintenance.
- Maintain, repair, remove, replace, and set up hydraulic systems.
- Maintain and care for tools and equipment.

Special Notes

1. Entry information/Prerequisite

MEF 407 Monitor the application of safety, health, and environmental rules and regulations.

2. This unit standard may be used as a core or elective within any vocationally based qualification.

3. The credits allocated to this unit standard assume that a learner has already learned to maintain pipe systems, static seals, and sling loads safely.

Quality Assurance Requirements

This unit standard and others within this subfield may be awarded by institutions that comply with the accreditation, national assessment, and moderation requirements set by the Eswatini Higher Education Council.

Elements and Performance Criteria

Element 1: Identify and discuss the principles and applications of hydraulics.

Range

Hydraulic systems include but are not limited to:

- Power pack (Drive unit) and related components.
- Directional control valves.
- Linear and rotary actuators.
- Various actuation methods (Electric, mechanical, pilot-actuation).
- Flow control and measurement.
- Pressure regulating devices.
- Pipe and hose connections and fittings.

Performance Criteria

1.1 The fundamental concepts and principles of hydraulics are explained.

1.2 The classifications and types of hydraulic components are identified and discussed.

1.3 The applications, functions, distinct features, characteristics and symbols of various hydraulic components are explained and demonstrated.

1.4 Basic hydraulic circuits are developed and their operation is demonstrated in terms of a drawing or work instruction.

1.5 Incidents and problems related to hydraulic system maintenance and faults with components are discussed and explained.

1.6 Maintenance procedures are discussed and explained in terms of worksite practice and manufacturers' specifications.

1.7 The terminology used when explaining and discussing hydraulics, is in keeping with manufacturer and worksite norms and standards.

Element 2: Plan and prepare for hydraulic system maintenance.

Range

Planning and preparation include reading and understanding task instructions engineering drawings and maintenance scheduling, identification of the equipment to be maintained, and obtaining maintenance schedules and manufacturer specifications for specific equipment to be maintained.

Performance Criteria

2.1 The hydraulic system/s is inspected and assessed for its work requirements in terms of maintenance, repair, and/or removal.

2.2 The planning and preparation for maintenance repair and/or removal of the hydraulic system/s is explained, in accordance with work instructions.

2.3 Site and equipment are prepared for hydraulic system maintenance.

2.4 Maintenance equipment and resources are correct for the task, available on site by the agreed time, and checked for serviceability in accordance with regulatory and worksite practice

2.5 Where required, handling space is cleared, potential obstructions are removed and personnel are notified, before the maintenance, repair, and/or removal task.

2.6 Pre-operational checks are carried out on removal and securing equipment, in accordance with work instructions.

Element 3: Maintain the hydraulic system.

Range

- Maintenance includes identifying non-conforming components, removal, repair and installation of components and parts and confirming pressure release at predetermined pressure.
- Problems include non-pressure release, non-conforming components, leaks, wear and damage, and broken seals.
- Operational requirements include correct pressure relief at a predetermined pressure and meeting flow control criteria (functionality, flow rate, directional control, pressure regulation, etc.).

Checking for compliance may include functionality testing.

Performance Criteria

3.1 All work is performed safely with due care for self, fellow workers, machines, equipment, materials, and environment.

3.2 Faults are identified and corrective action is taken according to standard operating procedures.

3.3 The hydraulic system is maintained and repaired in compliance with operational requirements/manufacture specifications.

3.4 The system is tested for functionality in terms of operational requirements and in accordance with quality assurance procedures.

3.5 The system operation and running condition are confirmed, recorded, and reported after the maintenance and repair process, according to work-site practice and/or manufacturer's specifications.

3.6 The work area is restored to a safe and serviceable condition.

Registration Data

Date first registered	2025
Anticipated review	2030
Standard setting body (SSB)	Directorate of Industrial and Vocational Training (DIVT)
Body responsible for review	Directorate of Industrial and Vocational Training (DIVT)

Maintain pneumatic systems

Title		Maintain pneumatic systems			
Field		Manufacturing, Engineering and Construction			
Subfield		Mechanics and Metal Trades			
SZNQF Level	4	Unit ID	MEF 404	Credits	8

Purpose

The learning outcomes in this unit standard also contribute to the exit level outcomes required for the National Certificate in Engineering Fitting (ENQF Level 4) and related qualifications. This includes the ability to perform routine maintenance on a pneumatic system in order to ensure operational integrity. Learners will also understand the importance of maintenance in pneumatic machine operations and how it is achieved. This will include a basic knowledge of filtration, fluid conditioning techniques, and the use of hand tools to maintain fluid power systems.

Qualifying learners are able to:

- Identify and discuss the range of pneumatic systems and their applications.
- Plan and prepare for pneumatic systems maintenance.
- Maintain, repair, remove, replace, and set up pneumatic systems.
- Maintain and care for tools and equipment.

Special Notes

1. Entry information/Prerequisite

Must have done Fitting Level Three (3).

2. This unit standard may be used as a core or elective within any vocationally based qualification.

3. The credits allocated to this unit standard assume that a learner has already learned to maintain pipe systems, static seals, and sling loads safely.

Quality Assurance Requirements

This unit standard and others within this subfield may be awarded by institutions that comply with the accreditation, national assessment, and moderation requirements set by the Eswatini Higher Education Council.

Elements and Performance Criteria

Element 1: Identify and discuss the principles and applications of pneumatics.

Range

Pneumatic systems include but are not limited to:

- Compressor.
- Directional control valves.
- Cylinders
- Various actuation methods (Electric, electronic, mechanical, pilot-actuation).
- Flow control and measurement.
- Pressure-regulating devices.
- Pipe and hose connections and fittings.
- Air receiver vessel.
- Air service unit.

Performance Criteria

1.1 The fundamental concepts and principles of pneumatics are explained.

1.2 The classifications and types of pneumatic components are identified and discussed.

1.3 The applications, functions, distinct features, characteristics and symbols of various pneumatic components are explained and demonstrated.

1.4 Basic pneumatic circuits are developed and their operation is demonstrated in terms of a drawing or work instruction.

1.5 Incidents and problems related to pneumatic system maintenance and faults with components are discussed and explained.

1.6 Maintenance procedures are discussed and explained in terms of worksite practice and manufacturers' specifications.

1.7 The terminology used when explaining and discussing pneumatics, is in keeping with manufacturer and worksite norms and standards.

Element 2: Plan and prepare for pneumatic system maintenance.

Range

- Planning and preparation include reading and understanding task instructions engineering drawings and maintenance scheduling, identification of the equipment to be maintained, and obtaining maintenance schedules and manufacturer specifications for specific equipment to be maintained.
- Making system safe includes isolation, depressurization and using protective equipment.

Performance Criteria

2.1 The pneumatic system/s is inspected and assessed for its work requirements in terms of maintenance, repair, and/or removal.

2.2 The planning and preparation for maintenance repair and/or removal of the pneumatic system/s is explained, in accordance with work instructions.

2.3 Site and equipment are prepared for pneumatic system maintenance.

2.4 Maintenance equipment and resources are correct for the task, available on site by the agreed time, and checked for serviceability in accordance with regulatory and worksite practice

2.5 Where required, handling space is cleared, potential obstructions are removed and personnel are notified, before the maintenance, repair, and/or removal task.

2.6 Pre-operational checks are carried out on removal and securing equipment, in accordance with work instructions.

Element 3: Maintain the pneumatic system.

Range

- Maintenance includes identifying non-conforming components, removal, repair and installation of components and parts and confirming pressure release at predetermined pressure.
- Problems include non-pressure release, non-conforming components, leaks, wear and damage, and broken seals.
- Operational requirements include correct pressure relief at a predetermined pressure and meeting flow control criteria (functionality, flow rate, directional control, pressure regulation, etc.).
- Checking for compliance may include functionality testing.
- Pneumatic system components include supply manifolds, air preparation equipment, pressure regulators, flow control valves, directional control valves, actuators, and gauges.
- Problems include severe leaks, strange noises, and reversed connections.

Performance Criteria

3.1 All work is performed safely with due care for self, fellow workers, machines, equipment, materials, and environment.

3.2 Faults are identified and corrective action is taken according to standard operating procedures.

3.3 The pneumatic system is maintained and repaired in compliance with operational requirements/manufacturer specifications.

3.4 The system is tested for functionality in terms of operational requirements and in accordance with quality assurance procedures.

3.5 The system operation and running condition are confirmed, recorded, and reported after the maintenance and repair process, according to work-site practice and/or manufacturer's specifications.

3.6 The work area is restored to a safe and serviceable condition.

Registration Data

Date first registered	2025
Anticipated review	2030
Standard setting body (SSB)	Directorate of Industrial and Vocational Training (DIVT)
Body responsible for review	Directorate of Industrial and Vocational Training (DIVT)

Maintain safety valves

Title		Maintain safety valves			
Field		Manufacturing, Engineering and Technology			
Subfield		Fitting			
SZNQF Level	3	Unit ID	MEF 406	Credits	4

Purpose

The learning outcomes in this unit standard also contribute to the exit level outcomes required for the National Certificate in Mechanical Engineering Fitting (ENQF level 4) and related qualifications.

Qualifying learners are able to, over a wide range of contexts and / or enterprises, identify a range of safety valves and their application and are able to inspect safety valves, determine faults, assess requirements for repair, and remove, replace and seat parts and components.

Special Notes

1. Entry information/Prerequisite

Must have done fitting Level Three (3).

2. This unit standard may be used as a core or elective within any vocationally based qualification.

3. The credits allocated to this unit standard assume that a learner has already learned to maintain pipe systems, static seals, and sling loads safely.

Quality Assurance Requirements

This unit standard and others within this subfield may be awarded by institutions that comply with the accreditation, national assessment, and moderation requirements set by the Eswatini Higher Education Council

Elements and Performance Criteria

Element 1: Plan and prepare for safety valve maintenance.

Range

- Safety valves include thermal, pressure, and flow relief valves.
- Planning and preparation include reading and understanding task instructions engineering drawings and breakdown scheduling, identification of the equipment to be maintained,

obtaining maintenance schedules and manufacturer specifications for specific equipment to be maintained.

Performance Criteria

- 1.1 Obtain relevant documents for safety valve maintenance.
- 1.2 Prepare site and equipment for safety valve maintenance.
- 1.3 The tools and spares are prepared for safety valve maintenance.
- 1.4 Safety valve condition is recorded and reported.

Element 2: Inspect and assess safety valve maintenance requirements

Range

Inspection includes visual and condition/ performance-based monitoring.

Performance Criteria

- 2.1 Site and equipment are prepared for safety valve inspection.
- 2.2 Safety valve condition is inspected and/or monitored to identify changes that could indicate a developing fault.
- 2.3 Problems are identified and corrective action is taken.
- 2.4 Safety valve is checked for compliance with operational requirements.
- 2.5 Safety valve condition is recorded and reported.

Element 4: Maintain safety valve.

Range

- Maintenance includes identifying non-conforming components, removal, repair, and installation of components and parts, and confirming pressure release at the predetermined pressure.
- Problems include non-pressure release, non-conforming components, leaks, wear and damage, and broken seals and springs.

Performance Criteria

- 4.1 Site and equipment are prepared for safety valve maintenance.
- 4.2 The safety valve is maintained in compliance with operational requirements.
- 4.3 Safety valve condition is recorded and reported.
- 4.4 The work area is restored to a safe and serviceable condition.

Element 5: Check the safety valve for compliance with operational requirements.

Range

- Operational requirements include correct pressure release at a predetermined pressure and directional flow control.
- Checking for compliance may include re-pressurising and commissioning.

Performance Criteria

5.1 The safety valve is pressure tested and set to the correct relieve pressure.

5.2 Safety valve condition is recorded and reported.

5.3 Record information on work done.

5.4 Discuss and explain incidents and problems related to safety valve maintenance.

Registration Data

Date first registered	2025
Anticipated review	2030
Standard setting body (SSB)	Directorate of Industrial and Vocational Training (DIVT)
Body responsible for review	Directorate of Industrial and Vocational Training (DIVT)

Maintain turbines

Title		Maintain turbines			
Field		Manufacturing, Engineering and Construction			
Subfield		Mechanics and Metal Trades			
SZNQF Level	4	Unit ID	MEF 414	Credits	14

Purpose

The learning outcomes in this unit standard also contribute to the exit level outcomes required for the National Certificate in Mechanical Engineering Fitting (ENQF Level 3) and related qualifications.

Qualifying learners are able to:

- Identify and discuss a range of turbines and their applications.
- Identify critical components of turbines e.g. rotor, governors, oil pumps, control valves, emergency stop valves, thrust surge pads, white metal bearings etc.
- Plan and prepare for turbine maintenance.
- Remove, repair replace, and set up turbines.
- Perform static and dynamic protection tests.
- Commission and monitor turbine operational parameters e.g. temperatures, pressures, vibration, speed, etc.

Special Notes

1. Entry information/Prerequisite

MEF 402 Diagnose and repair faults on equipment and machinery during production/operation.

MEF 407 Monitor the application of safety, health, and environmental rules and regulations.

MEF 411 Align machinery and equipment.

2. This unit standard may be used as a core or elective within any vocationally based qualification.

Quality Assurance Requirements

This unit standard and others within this subfield may be awarded by institutions that comply with the accreditation, national assessment, and moderation requirements set by the Eswatini Higher Education Council

Elements and Performance Criteria

Element 1: Identify and discuss the applications of turbines.

Range

This outcome covers the knowledge required to identify and explain:

- Basic turbine principles of operation.
- Classifications and types of turbines.
- Applications.
- Distinct features and characteristics of various types.

Performance Criteria

- 1.1 The classifications and types of turbines are identified and discussed.
- 1.2 The applications and the distinct features and characteristics of various types of turbines are explained.
- 1.3 Discuss and explain incidents and problems related to turbine operations.
- 1.4 The terminology used when explaining and discussing turbines, is in keeping with manufacturer and worksite norms and standards.

Element 2: Plan and prepare for turbine maintenance.

Range

Planning and preparation include reading and understanding task instructions, engineering drawings and manuals, maintenance scheduling, identification of the equipment to be maintained, quality control program (QCP) and manufacturer specifications for equipment to be maintained.

Performance Criteria

- 2.1 Determine the scope of work.
- 2.2 Determine the tools and spares required for the task.
- 2.3 The turbine is prepared for maintenance.

Element 3: Maintain and repair turbine.

Range

- Maintenance includes performing monitoring and pre-shut inspections.
- Repair includes identifying non-conforming components, removal, repair, and installation of components and parts.
- Problems include leaks, vibration, tripping, unstable speed (hunting) wear and damage, and non-conforming components.

Performance Criteria

3.1 Turbine is prepared for maintenance (shut down, allowed to cool down, energy isolation, and lockout)

3.2 Defective components identified and repaired/ replaced in accordance with the manufacturer's specifications.

3.3 Pre-running tests are carried out on the turbine in conformance with manufacturer specifications and safety standards.

3.4 Turbine start-up parameters are monitored and meet the manufacturer's specifications.

3.5 Turbine operational parameters are monitored and the system is operational and meets the manufacturer's specifications.

Element 4: Turbines commissioning (with load)

Range

- Commissioning includes performance testing.
- Monitor leaks, temperatures, vibrations, pressures, speeds etc.

Performance Criteria

4.1 Site and equipment are prepared for turbine installation.

4.2 Mantined/ repaired turbine components fitted into position.

4.3 Test run turbines and monitor system performance.

4.4 Record information on work done.

4.5 Discuss and report incidents and problems related to turbine operation and maintenance.

Registration Data

Date first registered	2025
Anticipated review	2030
Standard setting body (SSB)	Directorate of Industrial and Vocational Training (DIVT)
Body responsible for review	Directorate of Industrial and Vocational Training (DIVT)

Monitor the application of safety, health and environmental protection procedures

Title		Monitor the application of safety, health and environmental protection procedures			
Field		Manufacturing, Engineering and Construction			
Subfield		Mechanics and Metal Trades			
SZNQF Level	4	Unit ID	MEF 407	Credits	4

Purpose

The skills, values and knowledge reflected in this unit standard are required by people in the field of manufacturing and engineering. The learning outcomes in this unit standard also contribute to the exit level outcomes required for various manufacturing and engineering qualifications. Qualifying learners can monitor the application of safety, health and environmental protection procedures to maintain the discipline of the safety, health and environmental protection system. They are able to monitor adherence, promote and maintain preventive measures, coach their work team and evaluate and suggest changes to the system.

Special Notes

1. Entry information/Prerequisite

Must have done Fitting Level Three (3).

2. This unit standard may be used as a core or elective within any vocationally based qualification.

3. The credits allocated to this unit standard assume that a learner has already learned to

- Apply safety, health, and environmental protection procedures

4. a) Safety indicators and emergency procedures are pointed out and demonstrated by the work team.

b) Equipment in the area of responsibility is operated safely according to equipment specifications and workplace procedures.

c) Hazardous materials are handled and disposed of by the work team according to workplace requirements

d) Personal protective equipment is worn as required by the work team

e) All monitoring data is accurately documented

f) Work team are up-to-date on legislative requirements and responsibilities as well as company safety, health, and environmental policies and procedures.

g) Reports are regularly compiled according to the workplace's scheduling requirements in a timely

manner according to agreed company procedures and forwarded to appropriate parties

Understanding confirmed

Quality Assurance Requirements

This unit standard and others within this subfield may be awarded by institutions that comply with the accreditation, national assessment, and moderation requirements set by the Eswatini Higher Education Council

Elements and Performance Criteria

Element 1: Monitor adherence to safe and environmentally friendly work practices by work team

Performance Criteria

- 1.1 Safe and environmentally friendly work practices are monitored.
- 1.2 Ensure preventive measures are in place in the work area.
- 1.3 Ensure continuous improvement in the health, safety, and environmental work practice.

Element 2: Coachwork team in their statutory rights and responsibilities in safety indicators

Range

Coachwork team in their statutory rights and responsibilities and safety indicators and emergency procedures.

Performance Criteria

- 2.1 Safety indicators and emergency procedures are pointed out and demonstrated by the work team.
 - 2.2 Equipment in the area of responsibility is operated safely according to equipment specifications and workplace procedures.
 - 2.3 Hazardous materials are handled and disposed of by the work team according to workplace requirements.
 - 2.4 Personal protective equipment is worn as required by the work team.
 - 2.5 All monitoring data is accurately documented.
 - 2.6 Work team are up-to-date on legislative requirements and responsibilities as well as company safety, health, and environmental policies and procedures.
 - 2.7 Reports are regularly compiled according to the workplace's scheduling requirements in a timely manner according to agreed company procedures and forwarded to appropriate parties
- Understanding confirmed

Element 3: Promote and maintain preventive measures in area of responsibility

Performance Criteria

- 3.1 Safety indicators and emergency procedures are pointed out and demonstrated by the work team.
- 3.2 Equipment in the area of responsibility is operated safely according to equipment specifications and workplace procedures.
- 3.3 Hazardous materials are handled and disposed of by the work team according to workplace requirements.
- 3.4 Personal protective equipment is worn as required by the work team.
- 3.5 The work team is up-to-date on legislative requirements and responsibilities as well as company safety, health, and environmental policies and procedures.

Element 4: Evaluate and suggest changes to the system

Performance Criteria

- 4.1 All monitoring data is accurately documented.
- 4.2 Reports are regularly compiled according to the workplace's scheduling requirements in a timely manner according to agreed company procedures and forwarded to appropriate parties.
- 4.3 Review and revise current procedures, policies, and work instructions.
- 4.4 Test and implement changes.
- 4.5 Communicate changes where necessary.
- 4.6 Train personnel on changes where applicable.

Element 5: Compile reports on safety, health, and environmental issues in areas of responsibility

Performance Criteria

- 5.1 Reports are regularly compiled according to the workplace's scheduling requirements in a timely manner according to agreed company procedures and forwarded to appropriate parties
- 5.2 Safety, health, and environmental reports for areas of responsibility are available.

Registration Data

Date first registered	2025
Anticipated review	2030
Standard setting body (SSB)	Directorate of Industrial and Vocational Training (DIVT)
Body responsible for review	Directorate of Industrial and Vocational Training (DIVT)

Overhaul centrifugal pumps

Title		Overhaul centrifugal pumps			
Field		Manufacturing, Engineering and Technology			
Subfield		Fitting			
SZNQF Level	4	Unit ID	MEF 410	Credits	14

Purpose

This unit standard will be useful to people who are required to overhaul centrifugal pumps. People credited with this unit standard are able to:

- Explain the factors critical to overhauling centrifugal pumps.
- Prepare to overhaul centrifugal pumps.
- Overhaul centrifugal pumps.
- test centrifugal pumps
- Prepare for operation and production.

Special Notes

1. Entry information/Prerequisite

MEF 402 Diagnose and repair faults on equipment and machinery during production/operation.

MEF 407 Monitor the application of safety, health, and environmental rules and regulations.

2. This unit standard may be used as a core or elective within any vocationally based qualification.

3. The credit calculation is based on the assumption that learners are already competent in terms of the following outcomes or areas of learning when starting to learn towards this unit standard:

- Lift and move loads.
- Use relevant hand tools.
- Maintain centrifugal pumps.

4. However for the purpose of assessment, centrifugal pumps include but are not limited to the following categories and may include:

- Single stage and multi-stage.
- Low and high pressure conditions.
- Horizontal, vertical suction.
- Radial flow types.
- Mixed flow types.
- Axial flow types.

Quality Assurance Requirements

This unit standard and others within this subfield may be awarded by institutions that comply with the accreditation, national assessment, and moderation requirements set by the Eswatini Higher Education Council

Elements and Performance Criteria

Element 1: Explain the factors critical to overhauling centrifugal pumps.

Range

Performance Criteria

1.1 The explanation of the principle of operation and function of centrifugal pumps is in accordance with specified requirements.

1.2 The explanation of the importance of overhauling centrifugal pumps shows a clear understanding of the direct consequences to self and the business.

Direct consequences must include:

- Injury to persons.
- Damage to equipment.
- Loss of production time through breakdowns.
- Increased costs.

1.3 The explanation lists the possible critical workplace hazards that may be encountered while overhauling centrifugal pumps in a particular context. The explanation also describes the risks associated with and the factors contributing to each workplace hazard.

1.4 The explanation lists the possible critical work related hazards that may be encountered while overhauling centrifugal pumps in a particular context. The explanation also describes the risks associated with and the factors contributing to each work related hazard.

Element 2: Prepare to overhaul a centrifugal pump.

Performance Criteria

2.1 Permission is obtained in accordance with specified requirements.

2.2 The pump to be overhauled is identified in accordance with specified requirements.

2.3 The required personal protective equipment is selected, examined and used in a way that is consistent with its purpose, design and specified requirements. Personal protective equipment is used so that the safety of persons and equipment is protected.

2.4 Tools, material and equipment required are selected, examined and transported in accordance with specified requirements.

2.5 The worksite is examined in accordance with specified requirements. Hazardous and sub-standard conditions are dealt with in accordance with specified requirements.

2.6 The pump is positioned and secured in accordance with standard best practices.

2.7 The consequences for health, safety and production of not preparing to overhaul centrifugal pumps in line with specified requirements, and current legislation are explained.

Consequences must include:

- Permission.
- Personal protective equipment.
- Tools, materials, and equipment.
- Worksite examination.
- Worksite hazards.
- Identification of the pump to be overhauled.
- Positioning and securing.

Element 3: Overhaul the centrifugal pump.

Performance Criteria

3.1 The required personal protective equipment is used in a way that is consistent with its purpose, design, and specified requirements. Personal protective equipment is used to ensure the safety of persons and equipment.

3.2 Work-related hazards are dealt with in accordance with specified requirements.

3.3 The pump is cleaned and dismantled in line with specified requirements for sequence and tolerances and is consistent with accepted best practices.

3.4 The components are inspected and faulty components are replaced in line with manufacturers' specifications and accepted best practices.

3.5 The pump is assembled in line with specified requirements for sequence and tolerances.

3.6 The pump is checked manually for compliance according to manufacturer specifications.

Element 4: Compile a Job Report

Performance Criteria

4.1 Information on work done is recorded, and reported after the overhauling and repair process is complete.

4.2 Discuss and report incidents and problems related to pump operation and overhaul.

Registration Data

Date first registered	2025
Anticipated review	2030
Standard setting body (SSB)	Directorate of Industrial and Vocational Training (DIVT)
Body responsible for review	Directorate of Industrial and Vocational Training (DIVT)

Overhaul compressors

Title		Overhaul compressors			
Field		Manufacturing, Engineering and Construction			
Subfield		Mechanics and Metal Trades			
SZNQF Level	4	Unit ID	MEF 412	Credits	14

Purpose

This unit standard will be useful to people who are required to overhaul compressors.

People credited with this unit standard are able to:

- Explain the factors critical to overhauling compressors.
- Prepare to overhaul compressors.
- Overhaul compressors.
- Test compressors and prepare for operation and/or production.

Special Notes

1. Entry information/Prerequisite

MEF 402 Diagnose and repair faults on equipment and machinery during production/operation.

MEF 407 Monitor the application of safety, health, and environmental rules and regulations.

2. This unit standard may be used as a core or elective within any vocationally based qualification.

3. The credit calculation is based on the assumption that learners are already competent in terms of the following outcomes or areas of learning when starting to learn towards this unit standard:

- Lift and move loads.

4. The following scope and context applies to the whole unit standard:

- Overhaul vane-type compressors.
- Overhaul piston-type compressors.

Quality Assurance Requirements

This unit standard and others within this subfield may be awarded by institutions that comply with the accreditation, national assessment, and moderation requirements set by the Eswatini Higher Education Council

Elements and Performance Criteria

Element 1: Explain the factors critical to overhauling compressors.

Performance Criteria

1.1 The explanation of the principle of operation and function of compressors is in accordance with specified requirements.

1.2 The explanation of the importance of overhauling compressors shows a clear understanding of the direct consequences to self and the business.

Direct consequences must include:

- Injury to persons.
- Damage to equipment.
- Loss of production time through breakdowns.
- Increased running costs.

1.3 The explanation lists the possible critical workplace hazards that may be encountered while overhauling compressors in a particular context. The explanation also describes the risks associated with and the factors contributing to each workplace hazard.

1.4 The explanation lists the possible critical work-related hazards that may be encountered while overhauling compressors in a particular context. The explanation also describes the risks associated with and the factors contributing to each work-related hazard.

Element 2 : Prepare to overhaul compressors.

Performance Criteria

2.1 Planning and preparation include reading and understanding task instructions, engineering drawings and inspection requirements, identification of the equipment to be inspected, obtaining inspection schedules and manufacturer specifications for specific equipment to be inspected.

2.2 The required personal protective equipment is selected, examined, and used in a way that is consistent with its purpose, design, and specified requirements.

2.3 Tools, materials and equipment required are selected, examined, and transported in accordance with specified requirements.

2.4 The site is examined in accordance with specified requirements. Hazardous and sub-standard conditions are dealt with in accordance with specified requirements.

Element 4: Overhaul compressors.

Performance Criteria

3.1 The required personal protective equipment is used in a way that is consistent with its purpose, design, and specified requirements.

3.2 The compressor is dismantled in line with specified requirements for sequence and tolerances and is consistent with accepted best practices.

3.3 The components are inspected and faulty components are replaced in line with manufacturers' specifications and accepted best practice.

3.4 The compressor is assembled in line with specified requirements for sequence and tolerances.

3.5 The compressor is checked manually for compliance according to manufacturer specifications.

Element 5: Compile a Job Report

Performance Criteria

5.1 Information on work done, and running hours is recorded after the overhauling and repair process is complete.

5.2 Discuss and report incidents and problems related to compressor operation and overhaul.

Registration Data

Date first registered	2025
Anticipated review	2030
Standard setting body (SSB)	Directorate of Industrial and Vocational Training (DIVT)
Body responsible for review	Directorate of Industrial and Vocational Training (DIVT)

Produce a business plan for a new venture

Title		Produce business plans for a new venture			
Domain		Physical Planning and Construction			
Subfield		Mechanics and Metal Trades			
SZNQF Level	4	Unit ID	MEF 415	Credits	6

Purpose

This unit standard specifies the competencies required to produce business plans for a new venture. It includes identifying, gathering and analysing the relevant information needed to compile a business plan; formulating an ethical framework for the operational plans of a new venture; establishing and prioritising business, financial and/or operational goals and objectives for a new venture and; designing and presenting the business financial and/or marketing plans. This unit standard is for Mechanical Fitting Level 4.

Special Notes

1. Entry Requirement/Pre-requisites
MEW200: Apply basic entrepreneurship skills
2. This unit standard is to be delivered and assessed in the context of the Mechanical Fitting and should be assessed in conjunction with other relevant technical unit standards selected from this domain.
3. Assessment may be conducted at a real workplace or simulated workplace, or an appropriately realistic environment in which mechanical fitting is carried out.
4. Legal registrations include PAYE, VAT, etc.
5. Legislation applicable to the sector in which the new venture is situated.
6. Non-statutory regulations include but not limited to applicable codes of ethics and conduct, values, cultural dimension to the business type and sector.
7. Regulations and legislation relevant to this unit standard may include but not limited to the following:
 - Occupational Health and Safety Act 2001
 - Workman's Compensation Act No.7 of 1983
 - SZNS SANS 10142-1
 - SZNS-SANS 10142-2and all subsequent amendments

Quality Assurance Requirements

This unit standard and others within this subfield may be awarded by institutions which comply with the accreditation, national assessment and moderation requirements set by Eswatini Higher Education Council (ESHEC).

Elements and Performance Criteria

Element 1: Identify, gather and analyse the relevant information needed to compile a plan for a new business venture

Performance Criteria

- 1.1 The purpose and importance of a business plan is discussed in terms of its contribution to a successful business.
- 1.2 The different elements of a successful business plan are listed and described with examples.
- 1.3 Information on the resources needed and procedures to be followed to achieve the plan is compiled.
- 1.4 The industry specific and legal requirements for own venture are identified and explained in terms of how they will affect the venture.

Element 2: Formulate an ethical framework for the operational plans of a venture

Performance Criteria

- 2.1 Legislation and relevant regulations relating to the type of venture are identified for use in drawing up a code of ethics for the business.
- 2.2 Non-statutory regulations applicable to the sector are identified for use in drawing up a code of ethics for the business.
- 2.3 Codes of conduct that are used by similar organizations in the sector are evaluated and elements identified for inclusion in an ethical framework for the business.
- 2.4 Social and ethnic considerations are identified for inclusion in the ethical framework of a new venture.
- 2.5 Personal values are identified for inclusion in an ethical framework for a new venture.
- 2.6 An ethical framework and codes of ethics and conduct are drawn up for the new venture.

Element 3: Establish and prioritise business, financial and/or operations goals and objectives for a new venture

Performance Criteria

- 3.1 Personal objectives are clearly articulated and aligned to the plans of own venture.
- 3.2 Business objectives are analysed and specific goals formulated to achieve objectives set for own business.
- 3.3 A vision statement of a new venture is compiled to represent goals and objectives set out for own venture.
- 3.4 Specific short- and long-term goals are formulated allowing flexibility for possible changing circumstances.
- 3.5 Possible contribution to community and regional growth objectives are identified and considered.

- 3.6 Cultural values and beliefs of prospective employees and expected consumers are incorporated into the plans of own venture.

Element 4: Design and present business, financial and/or marketing plans based on a budget for a new venture

Performance Criteria

- 4.1 The business of the venture is introduced and described based on research and analysis of competitors.
- 4.2 Structure and layout of the business plan is designed to be compatible with the nature of own venture.
- 4.3 Marketing and promotion of the own venture is concisely presented in the business plan.
- 4.4 Finance requirements for the business are stated in the business plan.
- 4.5 The projected income and expense items for own venture are tabulated in the business plan.
- 4.6 The costs, risks and proposed infrastructure of the operations plan is presented in the business plan of own venture.
- 4.7 Relevant documentation is compiled to support the business plan.
- 4.8 Business plan information is presented in relevant and clear format.
- 4.9 Procedures to present the business plan for own venture to a financier is explained.

Registration Data

Date first registered	2025
Anticipated review	2030
Standard setting body (SSB)	Directorate of Industrial and Vocational Training (DIVT)
Body responsible for review	Directorate of Industrial and Vocational Training (DIVT)

Refurbish machines

Title		Refurbish machines			
Field		Manufacturing, Engineering and Construction			
Subfield		Mechanics and Metal Trades			
SZNQF Level	4	Unit ID	MEF 408	Credits	12

Purpose

Qualifying learners are able to refurbish machines using equipment and technological aids to achieve close tolerances.

They are able to interpret refurbishment instructions, identify necessary equipment and procedures to be used, diagnose faulty components and overhaul and test them for functioning, making minor modifications where required, and ensure the refurbished machine complies with operational specifications.

Special Notes

1. Entry information/Prerequisite

MEF 402 Diagnose and repair faults on equipment and machinery during production/operation.

MEF 407 Monitor the application of safety, health, and environmental rules and regulations.

2. This unit standard may be used as a core or elective within any vocationally based qualification.

3. The credits allocated to this unit standard assume that a learner has already learned to:

- Maintain gearboxes, compressors, bearings, pumps, heat exchangers and pressure vessels, direct and indirect drives, seals, brakes and clutches, pipes systems, lubricating systems, and fluid power and pneumatic systems.

4. In this unit standard, refurbishment means stripping and inspecting equipment for any worn-out/ damaged parts and components that need to be repaired or replaced to restore the equipment to its state when originally manufactured.

Quality Assurance Requirements

This unit standard and others within this subfield may be awarded by institutions that comply with the accreditation, national assessment, and moderation requirements set by the Eswatini Higher Education Council

Elements and Performance Criteria

Element 1: Plan and prepare for refurbishment.

Range

- Planning and preparation include obtaining documentation, maintenance schedules and procedures, manufacturer's specifications, and selecting appropriate tools and equipment.

Performance Criteria

- 1.1 Obtain relevant documentation for refurbishment.
- 1.2 Visual inspect the equipment to have an idea of the work involved.
- 1.3 Gather necessary tools and resources to be used.
- 1.4 Appropriate personal protective equipment to be used.

Element 2: Prepare site and equipment.

Range

- Preparation includes ensuring the system is safe and collecting relevant work instructions, drawings, procedures, tools, and auxiliary equipment required for refurbishment.
- Ensuring the system is safe includes isolation and applying protective equipment.
- Isolation includes electrical, mechanical, and potential energy.

Performance Criteria

- 2.1 Clear and prepare the site for readiness for the task.
- 2.2 Ensure site and equipment are made safe prior to commencement of work.
- 2.3 Clean the equipment for the readiness for the task.

Element 3: Carry out fault diagnosis on machines.

Performance Criteria

Range

- Fault diagnosis may occur during scheduled maintenance or as a result of machine malfunctioning.
- Fault diagnosis may include stripping the machine /component.
- Fault diagnosis includes visual inspection and the use of a variety of test instruments to determine defects in the various systems that enable the machine to function and their interaction with one another.
- Machines may include turbines, bottling plants, printing presses, lathes, boring mills packaging machinery.

Performance Criteria

- 3.1 Strip, clean, and inspect individual components.
- 3.2 Diagnosis correctly identifies faults and recommendations for refurbishment are appropriate.
- 3.3 Assess the condition of components to determine reusability.

Element 4: Refurbish machines.

Range

Refurbishment includes stripping the machine, removing worn and/or damaged components and parts, repairing systems (where appropriate), and replacing components and parts.

Performance Criteria

4.1 Repair the reusable components up to the manufacturer's specifications.

4.2 Replace the damaged components as per the manufacturer's specifications.

4.3 The machine is assembled as per the manufacturer's specifications with all steps observed.

Element 5: Check refurbished machine for compliance with manufacturer specifications.

Range

Checking may include performing a test run to determine optimum functions and commissioning of the machine where applicable.

Performance Criteria

5.1 Carry out pre-commissioning checks.

5.2 Machinery/ equipment is commissioned.

5.3 Identify and report operation parameters to determine performance.

5.4 Record information on work done.

5.5 Discuss and explain incidents and problems related to refurbishment activity.

Registration Data

Date first registered	2025
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