



ESWATINI VOCATIONAL QUALIFICATIONS PACKAGE
FOR

FITTING

LEVEL 3



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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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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Mabandla	Nxumalo	ECOT
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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 3

Originator	DIVT		
Qualification Type:	Certificate	Descriptor:	Fitting
Specialisation:			
Level:	3	Minimum Credits:	80
Actual Credits	105		
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 at ENQF Level 4.

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 program 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 with minimum supervision and be able to supervise a Fitting Technician at level 2. Graduates will be able to relate their learning to scientific and technological principles and concepts.

Entry Requirements

Minimum requirements for entry:

- Fitting Level 2
- RPL

Associated Level Descriptors

Knowledge	• To demonstrate ability to understand and apply theoretical and technical knowledge of key concepts to perform tasks and solve problems within given parameters. • To have an understanding of solutions to a limited range of predictable problems.
Skills	• To apply a range of methods, tools and materials to complete routine activities.
Personal Attributes	• To complete tasks under moderate supervision in stable contexts. • To demonstrate ability to perform tasks in a team. • To demonstrate ability to adhere to organisational values.

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 an 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 mechanical fitting operations and practices and tasks under minimum supervision	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 unfamiliar problems and report work done and pending work to clients and immediate supervisors.	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 which, in their combination, make up the complete qualification.

Unit No.	Unit Titles	Level	Credit
MEF 301	Apply safety, health, and environmental rules and regulations	3	6
MEF 302	Explain and use organizational procedures	3	6
MEF 303	Maintain bearings in machines and equipment	3	8
MEF 304	Maintain direct and indirect drive	3	12
MEF 305	Maintain lubricating systems	3	4
MEF 306	Manage work time effectively	3	3
MEF 307	Maintain brakes and clutches	3	6
MEF 308	Maintain centrifugal pumps	3	14
MEF 309	Maintain positive displacement pumps	3	10
MEF 310	Maintain conveyor systems	3	6
MEF 311	Maintain filters and strainers	3	4
MEF 312	Maintain heat exchangers and pressure vessels	3	8
MEF 313	Maintain valves	3	8
MEF 314	Maintain compressors	3	10
Total Credits			105

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 105 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 and also compares with TVET Qualifications in South Africa (Qual ID 59669)
African Continent	N/A
Globally, including TQF	N/A

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 4
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

Apply safety, health, and environmental protection procedures

Title		Apply quality, safety, health, and environmental protection procedures			
Field		Engineering, Manufacturing and Construction			
Subfield		Mechanics and Metal Trades			
SZNQF Level	3	Unit ID	MEF 301	Credits	6

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 ENQF level 3 manufacturing and engineering qualifications.

Qualifying learners can apply relevant quality, safety, health, and environmental protection procedures in their place of work to maintain a safe and productive work area. They are able to explain quality, safety, health and environmental objectives, standards and regulations at the workplace, perform safety inspections, and identify and report on unsafe conditions.

Special Notes

1. Entry information/Prerequisite

MEF 205 Apply and maintain health and safety rules and regulations

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

- work safely and use safety equipment

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

3. Explain and discuss quality, safety, health and environmental objectives, standards and regulations at the workplace.

Unit Standard Range

The learner is required to apply quality, safety, health, and environmental protection procedures as described in the elements of this standard in his/her area of work.

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: Explain and discuss statutory rights, responsibilities and liability regarding safety

Range

- An understanding of statutory rights, responsibilities and liabilities regarding quality, safety, health and environmental objectives, standards and regulations is demonstrated.

Performance Criteria

- 1.1. An understanding of statutory rights, responsibilities and liability regarding safety.
- 1.2 Explanations are given in a clear manner using appropriate examples.
- 1.3 Statutory inspections are understood according to procedures and schedules and are documented as required
- 1.4 Conditions that present a threat to quality, safety, health and the environment are identified, reported and documented promptly
- 1.5 Appropriate corrective actions are promptly identified and appropriate parties consulted about these actions
- 1.6 Reports are regularly completed according to scheduling requirements in the required format

Element 2: Explain and discuss quality, safety, health and environmental objectives, standards, and regulations

Performance Criteria

- 2.1 An understanding of quality, safety, health and environmental objectives, standards, and regulations is demonstrated.
- 2.2 Explanations of quality, safety, health and environmental objectives, standards, and regulations are given in a clear manner using appropriate examples.
- 2.3 Unsafe acts and conditions are identified and appropriate corrective action is taken.
- 2.4 Reports on quality, safety, health, and environmental conditions in the work area are available.

Element 3: Perform quality, safety, health and environmental inspections in the work area

Performance Criteria

- 3.1 Demonstrate an understanding of the importance of quality, safety, health and environmental and regulations inspections.

3.2 Demonstrate an understanding of the different types of data collection during quality, safety, health and environmental inspections in the work area.

3.3 Unsafe acts and conditions are identified and appropriate corrective action is taken.

3.4 Reports on quality, safety, health, and environmental conditions in the work area are available.

Element 4: Take corrective action

Performance Criteria

4.1 Demonstrate an understanding based on an analysis of the hazard/risk.

4.2 Determine the corrective measure to be undertaken to eliminate/mitigate/control of the hazard/risk.

4.3 Unsafe acts and conditions are identified and appropriate corrective action is taken.

4.4 Reports on quality, safety, health, and environmental conditions in the work area are available.

Element 5: Report on safety conditions in the work area

Performance Criteria

5.1 Reports are regularly completed according to the workplace's scheduling requirements in a timely manner in the required format.

5.2 Explanations are given in a clear manner using appropriate examples.

5.3 Conditions that present a threat to quality, safety, health and the environment are identified, reported and documented continuously improvement.

5.4 Reports on quality, safety, health, and environmental conditions in the work area are readily accessible.

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)

Explain and use organizational procedures

Title		Explain and use organisational procedures			
Field		Manufacturing, Engineering and Construction			
Subfield		Mechanics and Metal Trades			
SZNQF Level	3	Unit ID	MEF 302	Credits	6

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 explain and use organisational procedures within and around the organisation. They are able to demonstrate an understanding of these procedures and apply them to various situations at work.

Special Notes

1. Entry information/Prerequisite

MEF 203 Explain the individual role within the business.

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: Discuss the purpose of organizational policies and procedures

Performance Criteria

- 1.1 An understanding of the purpose of organizational policies and procedures is demonstrated.
- 1.2 Explanations of organizational policies and procedures are given in a clear manner using appropriate examples from the learner's own experience.
- 1.3 Types of scenarios where such policies and procedures would be applied are discussed.

Element 2: Identify, select and apply organizational policies and procedures

Range

Organizational policies and procedures include safety, human resource, quality, and work procedures as well as procedures outside of the organization that may impact the individual at work, e.g. procedures in place within a trade union of which the learner may or may not be a member.

Performance Criteria

2.1 Appropriate organizational policies and procedures for various scenarios at work are identified, selected, and applied.

2.2 Demonstrate the ability to apply organizational policies and procedures interchangeably.

Element 3: Discuss the purpose of an organisation's vision, mission and values

Performance Criteria

3.1 An understanding of the purpose of an organisation's vision, mission, and values is demonstrated.

3.2 Explanations of organizational vision, mission, and values are given in a clear manner using appropriate examples from the learner's own experience.

3.3 Types of scenarios where such vision, mission, and values would be applied are discussed.

Element 4: Reflect on the role of organizational policies and procedures in the work life of the individual

Performance Criteria

4.1 The role of organizational policies and procedures in the work life of the individual within an organization is discussed and reflected upon.

4.2 The role of the individual in relation to organizational policies and procedures is discussed and reflected upon.

4.3 The role of the individual in communicating and documenting new and updated organizational policies and procedures is discussed and reflected upon.

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 bearings in machines and equipment

Title		Maintain bearings in machines and equipment			
Field		Manufacturing, Engineering, and Construction			
Subfield		Mechanics and Metal Trades			
SZNQF Level	3	Unit ID	MEF 303	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 (ENQF level 3) and related qualifications.

Qualifying learners can identify a range of bearings and their application in machinery and equipment and can check bearings, determine faults, assess requirements for repair, and remove and replace bearings.

Special Notes

1. Entry information/Prerequisite

Must have done fitting Level Two (2) qualification

MEF 305 Maintain Lubricating system

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

3. Identify problems and take corrective action

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 and prepare for bearing replacement.

Range

- Planning and preparation include obtaining documentation, interpreting engineering drawings, maintenance schedules, and procedures, and selecting appropriate tools and equipment.
- Bearings include anti-friction and plain types.
- Anti-friction bearings include ball (single and double thrust) and roller (needle, spherical, taper) types.
- Plain bearings include plain, wrapped, flanged, split, and thrust types in brass, bronze, white metal, phosphor bronze, aluminium, and synthetics.

Performance Criteria

1.1 Determine the type of bearing to be fitted and the limits of fit tolerances

1.2 Identify the tools required to execute the task.

Element 2: Prepare site and equipment for bearing replacement.

Range

- Site preparation includes ensuring the place is free of dust.
- Equipment preparation includes isolating equipment electrically, mechanically, and from other energy sources.

Performance Criteria

2.1 Site and equipment are prepared for bearing replacement

2.2 Bearing serviceability is determined in situ if in good condition replace the lubricant

Element 3: Remove and inspect bearings.

Range

- Inspection includes security, alignment, a sign of wear/deterioration, and leakage.
- Cleaning includes removal of oils and grease.
- Bearing removal/installation includes cold, and warm dismounting, heater, and mechanical means.
- Problems include incorrect internal clearance, excessive noise, alignment, vibration, undue movement, high temperatures, and lack of or excessive lubrication.

Performance Criteria

3.1 Bearing serviceability is determined

3.2 If the bearing's condition is unsatisfactory, remove the bearings.

3.3 Visual inspection of bearing journals and the bores.

3.4 Measure and record the dimensions of the journals and the bores.

Element 4: Install bearings to machines and equipment.

Range

Installation includes clearance, alignment, pre-loading and lubrication.

For white metal bearings installation includes scraping surfaces to obtain the required fit.

Performance Criteria

- 4.1 Equipment is prepared for bearing replacement.
- 4.2 Prepare bores and journals for installation.
- 4.3 Determine the correct installation method and proceed with the installation.
- 4.4 Bearing is lubricated with the correct type and amount of lubricant.

Element 5: Check bearings after installation.

Range

- Bearing loading includes axial, radial and combinations of these.
- In situ check includes inspection while the machine is static.
- Application includes loading: axial, radial and a combination of these.

Performance Criteria

- 5.1 Apply the necessary loading on the bearing.
- 5.2 Manually rotate equipment to check for free movement.

Element 6: Check installation for compliance with operational requirements.

Range

Operational requirements include using of bearing catalogue, radial internal clearance, load, speed, vibration, temperature, and appropriate lubrication.

Performance Criteria

- 6.1 Equipment is prepared for test running
- 6.2 Direction of rotation is ascertained.
- 6.3 Test run and monitor installation as per manufacturer's specification.
- 6.4 Record information on work done.
- 6.5 Monitor and report incidents and problems related to bearing replacement.

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 brakes and clutches

Title		Maintain brakes and clutches			
Field		Manufacturing, Engineering and Construction			
Subfield		Mechanics and Metal Trades			
SZNQF Level	3	Unit ID	MEF 307	Credits	6

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 a range of brakes and clutches and their application and inspect brakes and clutches, determine faults, assess requirements for repair, and remove, replace and set up brakes and clutches.

Special Notes

1. Entry information/Prerequisite

Must have done Fitting qualification Level Two (2)

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

3. The learner should be able to work autonomously with minimal supervision and according to worksite and manufacturer specifications and occupational safety, health and environmental legislation.

4. Work is generally, but not exclusively, carried out in a team environment.

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 brake and clutch maintenance.

Range

- Planning and preparation include obtaining documentation, interpreting engineering drawings, maintenance schedules and procedures, and selecting appropriate tools and equipment.
- Brakes include disc, thrustors and electromagnetic types.

- Clutches include centrifugal and multi-disc types.

Performance Criteria

- 1.1 Determine the scope of work based on the job card.
- 1.2 Gathering of tools and spares required.
- 1.3 Applicable health, safety, and environmental procedures are adhered to
- 1.4 Brake and clutch are installed.
- 1.5 Installation is checked for compliance.
- 1.6 Problems are identified and corrective action taken.

Element 2: Prepare site and equipment for brake and clutch maintenance.

Range

- Site and equipment preparation includes isolating equipment electrically, mechanically and from energy sources.
- Preparation includes supporting the load when the brake or clutch is released / removed / worked adjusted / lowered or removed.

Performance Criteria

- 2.1 Site and equipment are prepared for brake and clutch maintenance.
- 2.2 Brake and clutch serviceability is determined in situ.
- 2.3 Release the load from the system.
- 2.4 Work is carried out in a safe manner and in accordance with schedules and manufacturer specifications.

Element 3: Inspect brakes and clutches in situ.

Range

- In situ check includes inspection while the machine is in operation and static.
- Checks include inspection for wear and fluid levels of hydraulic reservoirs (where applicable).
- Problems include overheating, excessive noise, brake torque too low, worn brake pads, slipping loads, and worn or damaged components.

Performance Criteria

- 3.1 Equipment is prepared for brake and clutch inspection.
- 3.2 Brake and clutch serviceability is determined in situ.
- 3.3 Release the load from the system.
- 3.4 Brake and clutch assemblies are inspected for conformance to manufacturer's specifications
- 3.5 Replacement brake and clutch components are identified from manufacturer markings and parts publ

Element 4: Remove, inspect and maintain brakes and clutches.

Range

- Inspection includes signs of wear and damage, leaks, and gaps.
- Problems include overheating, excessive noise, brake torque too low, worn brake pads, slipping loads, and worn or damaged components.
- Cleaning includes ultrasonic cleaning.

Performance Criteria

- 4.1 Equipment is prepared for brake and clutch maintenance.
- 4.2 Brake and clutch serviceability is determined in situ.
- 4.3 Brake and clutch are stripped and parts are identified
- 4.4 Parts are cleaned and inspected for non-conformances
- 4.5 Replacement brake and clutch components are identified from manufacturer markings and parts publ

Element 5: Install brakes and clutches to machines and equipment.

Range

- Installation includes assembly and setting up.
- Setting up includes clearance, alignment, and torque settings.

Performance Criteria

- 5.1 Equipment is prepared for brake and clutch installation.
- 5.2 Brake and clutch components are assembled
- 5.3 Brake and clutch assemblies are installed in accordance with manufacturer specifications

Element 6: Check installation for compliance with operational requirements.

Range

- Operational requirements include setting of clearances, max load for overhead cranes to determine brake torque, and a load test or test to prove safe operation.

Performance Criteria

- 6.1 Equipment is prepared for brake and clutch operation.
- 6.2 Locking devices, if any, are secured in accordance with machine requirements
- 6.3 Replacement parts and / or assemblies are functionally checked and / or tested
- 6.4 Non-conformances are identified and appropriate corrective action taken
- 6.5 Record information on work done.
- 6.6 Discuss and report incidents and problems related to brake and clutch maintenance.
- 6.7 Brake and clutch operational parameters are monitored and the system is operational and meets specifications

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 centrifugal pumps

Title		Maintain centrifugal pumps			
Field		Manufacturing, Engineering and Construction			
Subfield		Mechanics and Metal Trades			
SZNQF Level	3	Unit ID	MEF 308	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 centrifugal pumps and their applications.
- Plan and prepare for centrifugal pump maintenance.
- Remove, repair, replace, and set up centrifugal pumps.
- Maintain and care for tools and equipment.

Special Notes

1. Entry information/Prerequisite

MEF 303 Maintain bearings in machines and equipment.

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

3. All work is performed under supervision and according to worksite and manufacturer specifications and occupational safety, health and environmental legislation.

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 centrifugal pumps.

Range

This outcome covers the knowledge required to identify and explain:

- Basic fluid principles (suction, delivery, static, manometric heads) and principles of operation.

- Classifications and types of centrifugal pumps.
- Applications.
- Distinct features and characteristics of various types.
- Priming methods.
- Maintenance and repair (lateral end clearances, parts renewal, assembly procedures, calculations).
- Troubleshooting techniques (Reduced capacity or pressure, losses after starting, pump driver overloads and vibration).

Performance Criteria

- 1.1 The classifications and types of centrifugal pumps are identified and discussed.
- 1.2 The applications and the distinct features and characteristics of various types of centrifugal pumps are explained.
- 1.3 Discuss and explain incidents and problems related to pump operations.
- 1.4 Maintenance and repair procedures are discussed and explained in terms of worksite practice and manufacturers' specifications.
- 1.5 Troubleshooting certain conditions during start-up and operations are discussed and explained in terms of worksite practice and manufacturers' specifications.
- 1.6 The terminology used when explaining and discussing centrifugal pumps, is in keeping with manufacturer and worksite norms and standards.

Element 2: Plan and prepare for pump maintenance.

Range

Planning and preparation include reading and understanding task instructions, engineering drawings and manuals, maintenance scheduling, identification of the equipment to be maintained, 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 Pump is prepared for maintenance.

Element 3: Maintain pump.

Range

- Maintenance includes identifying non-conforming components, removal, repair and installation of components and parts.
- Problems include non-conforming components, leaks, wear and damage, and broken seals.

Performance Criteria

3.1 Pump is prepared for maintenance.

3.2 The pump is dismantled and individual components are cleaned and inspected for compliance with the manufacturer's specifications. Findings are recorded.

3.3 Components that are found to be out of specification are replaced/repared.

3.4 Assembly pump components as per the manufacturer's specification.

3.5 Maintained pump is checked for conformance with manufacturer specifications and safety standards.

3.6 Pump operational parameters are monitored and the system is operational and meets specifications.

Element 4: Pump installation and commissioning

Range

- Installation includes alignment and coupling with drive.
- Coupling includes direct and indirect drive.
- Commissioning includes performance testing.
- Monitor leaks, temperature, vibration, delivery pressure, etc.

Performance Criteria

4.1 Site and equipment are prepared for pump installation.

4.2 Pump fitted into position and suction and discharge piping is connected.

4.3 Alignment of the pump with the drive is carried out in accordance with manufacturer specifications. Confirm rotational direction.

4.4 Couple the drive and restore all safety devices.

4.5 Charge/prime the system with the relevant fluid and bleed air off in readiness for testing

4.6 Test run pump and monitor system performance.

4.7 Record information on work done.

4.8 Discuss and report incidents and problems related to pump 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)

Maintain Compressors

Title		Maintain compressors			
Field		Manufacturing, Engineering and Technology			
Subfield		Mechanics and Metal Trades			
SZNQF Level	3	Unit ID	MEF 314	Credits	10

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 Mechanical Engineering Fitting (ENQF Level 4) and related qualifications.

Qualifying learners are able to:

- Identify and discuss compressors and their applications.
- Plan and prepare for compressor maintenance.
- Maintain, repair, remove, replace and set up compressors.
- Maintain and care for tools and equipment.

Special Notes

1. Entry information/Prerequisite

MEF 303 Maintain bearings in machines and equipment.

MEF 304 Maintain direct and indirect drive.

MEF 305 Maintain lubricating systems.

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

3. This unit standard has been designed as part of a progression. It is one of a series of unit standards for machine and equipment maintenance in the engineering area.

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

4. Compressors include but are not limited to the following categories:

- Reciprocating compressors.
- Rotary screw.
- Rotary vane.
- Centrifugal 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: Identify and discuss the applications of compressors.

Range

This outcome covers the knowledge required to identify and explain:

- Basic compressed air principles and principles of operation.
- Classifications and types of compressors.
- Applications.
- Distinct features and characteristics of various types.
- Maintenance and repair (parts renewal, assembly procedures, etc).
- Troubleshooting techniques (Reduced capacity or pressure; water in the system, motor overload, and vibration).

Performance Criteria

1.1 The classifications and types of compressors are identified and discussed.

1.2 The applications and the distinct features and characteristics of various types of compressors are explained.

1.3 Discuss and explain incidents and problems related to compressor maintenance.

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

1.5 Trouble shooting certain conditions during start-up and operations are discussed and explained in terms of worksite practice and manufacturers' specifications.

1.6 The terminology used when explaining and discussing compressors and compressor components, is in keeping with manufacturer and worksite norms and standards.

Element2 : Plan and prepare for compressor maintenance.

Range

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

- 2.1 The compressor/s are inspected and assessed for its work requirements in terms of maintenance, repair, and/or removal.
- 2.2 The planning and preparation for the maintenance, repair, and/or removal of the compressor/s is explained, in accordance with manufacturers' specifications and work instructions.
- 2.3 Site and equipment are prepared for compressor 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 practices.
- 2.5 Where required, handling space is cleared, potential obstructions are removed and personnel are notified, prior to 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.

Element3: Maintain a compressor.

Range

- Maintenance includes identifying non-conforming components, removal, repair and installation of components and parts and confirming pressure release at predetermined pressure.
- Problems include but are not limited to reduced maximum pressure, leaks, wear and damage, air-filtration, crankcase lubrication, drive maintenance, inlet and outlet valve efficiency, electrical faults, cooling/overheating, etc.
- Operational requirements include the meeting of required pressure criteria (functionality, flow-rate, pressure regulation, etc.).
- Checks include pressure-gauging, pressure regulation, condensate prevention, air-filtration, crank-case oil-levels, efficiency of delivery, cooling, methods.
- Checks for conformance in terms of regulatory and legislative requirements.

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 and manufacturer specifications.
- 3.3 The system is tested for functionality in terms of operational requirements and in accordance with quality assurance procedures.
- 3.4 The system operation and running condition are confirmed, according to work-site practice and/or manufacturer's specifications.
- 3.5 The work area is restored to a safe and serviceable condition.

Element 4: Compile a Job Report

Performance Criteria

- 4.1 Information on work done is recorded, and reported after the maintenance and repair process is complete.
- 4.2 Discuss and report incidents and problems related to compressor maintenance and 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)

Maintain conveyor systems

Title		Maintain conveyor systems			
Field		Manufacturing, Engineering and Construction			
Subfield		Mechanics and Metal Trades			
SZNQF Level	3	Unit ID	MEF 310	Credits	6

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

Special Notes

1. Entry information/Prerequisite

MEF 303 Maintain bearings in machines and equipment.

MEF 305 Maintain lubricating systems.

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, indirect drives, bearings and brakes and clutches.

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

5. For the purpose of assessment, conveyor systems include but are not limited to the following categories:

- Belt conveyors.
- Screw conveyors.
- Roller-type conveyors.
- Slat conveyors.
- Apron conveyors.
- Wire-mesh conveyors.
- Chain conveyors.
- Bucket conveyors

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 conveyor systems.

Range

This outcome covers the knowledge required in order to identify and explain:

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

Performance Criteria

1.1 The classifications and types of conveyor systems are identified and discussed.

1.2 The applications and the distinct features and characteristics of various types of conveyor systems are explained.

1.3 The terminology used when explaining and discussing conveyor systems and individual components, is in keeping with manufacturer and worksite norms and standards.

1.4 Discuss and explain incidents and problems related to conveyor system maintenance.

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

Element 2: Plan and prepare for conveyor system maintenance.

Range

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

Performance Criteria

- 2.1 The conveyor system/s are inspected and assessed for its work requirements in terms of maintenance, and repairs.
- 2.2 The scope of the work is determined for maintenance requirements.
- 2.3 The planning and preparation for the maintenance, and repairs of the conveyor system/s is explained, in accordance with work instructions.
- 2.4 Maintenance tools, spares, equipment, and resources are correct for the task.
- 2.5 Where required, handling space is cleared, potential obstructions are removed and personnel are notified, prior to the maintenance, and repairs.

Element 3: Maintain conveyor system.

Range

- Maintenance includes understanding the importance of proper isolation and locking out procedures.
- Maintenance includes identifying non-conforming components, removal, repair, and installation of components and parts, and confirming functionality.
- Problems include spillages, tracking, drive malfunction, non-conforming components, wear, and damage etc.
- Troubleshooting techniques (Loss of efficiency, losses after starting; driver overload; undue machine vibration; bearing replacement; re-alignment and maintenance of conveyors).

Performance Criteria

- 3.1 Site and equipment are prepared for conveyor system maintenance.
- 3.2 The different components of the conveyor system are maintained in compliance with operational requirements.
- 3.3 All safety devices are restored and comply with the required standards.
- 3.4 The work area is restored to a safe and serviceable condition.
- 3.5 Post-maintenance checks are carried out on the completion of tasks per work instructions

Element 4: Conveyor Commissioning and monitoring

Range

- Commissioning includes to check direction, system alignment and performance of individual components of the system.
- Monitor load, leaks, spillages, tracking, temperature, vibration, etc.

Performance Criteria

- 4.1 Pre-operational checks are carried out on the conveyor system, in accordance with work instructions
- 4.2 Site and equipment are prepared for commissioning.

4.3 The conveyor system is tested for conformance with operational requirements and according to the manufacturer's specifications.

4.4 The conveyor system is loaded and monitored for conformance with operational requirements and according to the manufacturer's specifications.

4.5 Conveyor system performance is recorded and reported.

4.6 Discuss and report incidents and problems related to conveyor 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)

Maintain Direct and Indirect drives

Title		Maintain Direct and Indirect drives			
Field		Manufacturing, Engineering, and Construction			
Subfield		Mechanics and Metal Trades			
SZNQF Level	3	Unit ID	MEF 305	Credits	12

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 (ENQF level 3) and related qualifications.

Qualifying learners can perform routine maintenance on both Direct and Indirect drives to ensure operational integrity. This will include monitoring, repairing, and alignment of these drives. They will understand the importance of maintaining the drives and how this is achieved.

Special Notes

1. Entry information/Prerequisite

MEF 202 Assemble mechanical components

MEF 204 Identify engineering materials, their characteristics and applications, and common metal tests used in engineering

MEF 205 Keep the work area safe and productive

MEF 208 Read, interpret, and produce basic engineering drawings

MEF 209 Select, use, and care for engineering hand tools

MEF 210 Select, use, and care for engineering measuring equipment

MEF 211 Select, use, and care for engineering power tools

MEF 212 Cut screw threads and install threaded pipe systems

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

3. All work is performed under supervision and according to worksite and manufacturer specifications and occupational safety, health, and environmental legislation.

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 and prepare for Direct and Indirect drive maintenance.

Range

- Plan and prepare including reading and interpreting engineering drawings, manuals and task instructions.

Performance Criteria

1.1 System is made safe before starting an intended task

1.2 Site and equipment are prepared for maintenance

Element 2: Prepare site and equipment for Direct and Indirect drive maintenance.

Range

- Preparing includes ensuring the system is safe.
- Making the system safe includes isolation and applying protective equipment.
- Isolation includes electrical, instrumentation and mechanical, etc.

Performance Criteria

2.1 System is made safe before starting an intended task

2.2 Site and equipment are prepared for maintenance

Element 3: Maintain Direct and Indirect drive.

Range

- Working principles of direct and indirect drive components are accurately explained
- Direct drives include ridged and flexible coupling drives
- Indirect drives include belt and chain drives.
- Maintenance includes identifying, inspection, dismantling and assembling direct and indirect drive components e.g. couplings, couplings pins and elements, bushes, pulleys, sprockets, belts, chains and tensioners
- Problems include lack of tension resulting in whipping of belt or chain, drive shafts misalignment, worn pulleys or sprockets, worn belts or chains, worn or damaged pins and other defective components.

Performance Criteria

3.1 System is made safe before starting an intended task

3.2 Equipment is prepared for maintenance

3.3 Drive components requiring service are identified and removed without damage to the rest of the drive system

3.4 Identification of the proper replacement components is done.

3.5 Drive components are correctly assembled in accordance with specifications.

Element 4: Align Direct and Indirect drives.

Range

- Drive alignment methods include straight-edge, dial test indicator and laser.
- Drive alignment tools include taper and feeler gauges, straight edge and parallel bars, precision levels, laser beam, and tensioners.
- Use of shims to acquire correct alignment specifications.

Performance Criteria

4.1 Equipment is prepared for alignment.

4.2 The appropriate method of alignment to use is determined.

4.2 Drive alignment activities are carried out to specifications

4.4 The importance of determining the existence of soft foot on motor and correction methods are discussed.

4.5 Symptoms and effects of misalignment on drive and its components are discussed.

Element 5: Apply quality checks and commissioning on completed work.

Range

- Quality checks on the indirect drive include tension setting/adjustment.
- Quality checks also include inspection for correct levels of lubricant and coolants (checking for leaks).
- Commissioning includes fitting of safety guards, test running drive, and rotational direction check.
- Vibration levels and temperature readings are within equipment specifications.

Performance Criteria

5.1 The system is made safe before starting intended task

5.2 Equipment is prepared for test running

5.3 Drive commissioning activities are carried out and the drive is operational and meets specifications

Element 6: Conduct post-maintenance activities.

Range

- Post maintenance activities include cleaning up, processing documentation and reporting maintenance activities to responsible persons.
- Documentation includes inspection registers and maintenance schedules.
- Discuss and explain incidents and problems related to indirect drive maintenance.

Performance Criteria

6.1 Inspection is carried out in a safe manner and in accordance with schedules and manufacturer specifications

6.2 Drive operational parameters are monitored and the drive is operational and meets specifications

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 filters and strainers

Title		Maintain filters and strainers			
Field		Manufacturing, Engineering and Construction			
Subfield		Mechanics and Metal Trades			
SZNQF Level	3	Unit ID	MEF 311	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 at ENQF Level 3 and related qualifications.

Qualifying learners are able to:

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

Competency in this unit standard can be achieved within the, Marine, Power Generation, Metal and Steel Production, Processing Industries, Aeronautics, Environmental and other applications.

Special Notes

1. Entry information/Prerequisite

Must have done Fitting Level Two (2).

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

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

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 filters and strainers.

Range

This outcome covers the knowledge required in order to:

- Identify classifications and types of filters and strainers.

- Applications.
- Distinct features and characteristics of various types.
- Maintenance procedures.

Performance Criteria

- 1.1 The classifications and types of filters and strainers are identified and discussed.
- 1.2 The applications and the distinct features and characteristics of various types of filters and strainers are explained.
- 1.3 Discuss and explain incidents and problems related to the maintenance of filters and strainers.
- 1.4 Maintenance procedures are discussed and explained in terms of worksite practice and manufacturers' specifications.
- 1.5 The terminology used when explaining and discussing filters and strainers, is in keeping with manufacturer and worksite norms and standards.

Element 2: Plan and prepare for filter and/or strainer maintenance. .

Range

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

Performance Criteria

- 2.1 The planning and preparation for maintenance repair and/or removal of the filter and/or strainer/s is explained, in accordance with work instructions.
- 2.2 The filter and/or strainer/s are inspected and assessed for their operational requirements.
- 2.3 Determine the scope of work as per the schedule.

Element 3: Maintain filter and/or strainer.

Range

- Maintenance includes identifying non-conforming components, removal, repair and installation of components and parts and confirming filtration and straining effectiveness.
- Problems include non-conforming components, wear and damage, and broken seals.

Performance Criteria

- 3.1 Isolation and lock-out are carried out according to the required standards.
- 3.2 Defects are identified and corrective action is taken according to standard maintenance procedures.
- 3.3 The filter and/or strainer is maintained and repaired in compliance with maintenance requirements.

3.4 The filters and strainers are tested for functionality in terms of operational requirements and in accordance with quality assurance procedures.

3.6 Work area is restored to a safe and serviceable condition.

Element 4: Commissioning and monitoring of filter and / or strainer

Range

- The filter and/or strainer operational condition is confirmed, recorded and reported after the maintenance and repair process, according to work-site practice and/or manufacturer's specifications.

Performance Criteria

4.1 Maintained filters and strainer are checked for conformance with manufacturer specifications.

4.2 Filter and/or strainer operational parameters are monitored and the system is operational and meets specifications.

4.3 Commissioning and monitoring of filter and/or strainer, ensure records are completed and processed.

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 heat exchangers and pressure vessels

Title		Maintain heat exchangers and pressure vessels			
Field		Manufacturing, Engineering and Construction			
Subfield		Mechanics and Metal Trades			
SZNQF Level	3	Unit ID	MEF 312	Credits	8

Purpose

Learners in the field of mechanical installation and engineering maintenance, 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 related qualifications.

Qualifying learners are able to:

- Identify and discuss the range of heat exchangers, pressure vessels and their applications.
- Plan and prepare for heat exchanger maintenance.
- Maintain, repair, remove, replace, set up and conduct a pressure test on heat exchangers and pressure vessels.
- Maintain and care for tools and equipment.

It also reflects the understanding of:

- Pipe components and pipe systems.
- The operation of the plant or engineering system where applicable.
- The effect of heat loss (and heat gained) on the operation of system.

This unit standard would be assessed in the context of:

- A plant or engineering system within the workplace or a structured training environment.
- Any process controlled environment.
- Fluid flow systems related to utilities other than domestic systems.

Special Notes

1. Entry information/Prerequisite

Must have done Fitting Level Two(2).

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:

- Use hand tools.
- Assemble mechanical components.
- Maintain static seals.
- And where required, sling loads safely.

4. Identification includes:

- The identification of the main components included in the design and manufacture of heat exchangers and pressure vessels.
- Operation and functions.
- Classification and 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: Identify and discuss the applications of heat exchangers and pressure vessels.

Range

1. This outcome covers the knowledge required in order to:
 - Identify classifications and types of heat exchangers and pressure vessels.
 - Applications.
 - Distinct features and characteristics of various types.
 - Maintenance procedures (including cleaning procedures).
2. Procedures include removal, replacement, routine servicing, cleaning, de-scaling, strip and assembly, and fault finding.

Performance Criteria

- 1.1 The classifications and types of heat exchangers and pressure vessels are identified and discussed.
- 1.2 The applications and the distinct features and characteristics of various types of heat exchangers and pressure vessels are explained.
- 1.3 Maintenance procedures are discussed and explained in terms of worksite practice and manufacturers' specifications.
- 1.4 The terminology used when explaining and discussing heat exchangers and pressure vessels, is in keeping with manufacturer and worksite norms and standards.

Element 2: Plan and prepare for heat exchanger maintenance.

Range

- Planning and preparation include obtaining documentation and selecting appropriate tools and safety equipment, identification of the equipment to be maintained, cleaned, and pressure tested, obtaining maintenance schedules and manufacturer specifications for specific equipment to be maintained, cleaned, and pressure tested (specific pressure applicable to pressure vessel), interpreting engineering drawings.

- Resources include personnel requirements, tools, equipment, vehicle/s for transport and mechanical handling, cleaning materials, applicable documentation and personal protective equipment.

Performance Criteria

2.1 The heat exchanger/s are inspected and assessed for work requirements in terms of maintenance, repair, removal, and/or pressure testing and inspection.

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

2.3 Site and equipment are prepared for heat exchanger 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 practices.

2.5 Where required, handling space is cleared, potential obstructions are removed and personnel are notified, prior to 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: Plan and prepare for pressure vessel maintenance.

Range

- Planning and preparation include obtaining documentation and selecting appropriate tools and safety equipment, identification of the equipment to be maintained, cleaned, and pressure tested, certified by approved inspection authority (AIA) obtaining maintenance schedules and manufacturer specifications for specific equipment to be maintained, cleaned, and pressure tested (specific pressure applicable to pressure vessel), interpreting engineering drawings.
- Resources include personnel requirements, tools, equipment, vehicle/s for transport and mechanical handling, cleaning materials, applicable documentation, and personal protective equipment.

Performance Criteria

3.1 Site and equipment are prepared for pressure vessel maintenance.

3.2 The pressure vessel/specific component is inspected and assessed for work requirements in terms of maintenance, repair, removal, and/or pressure testing and inspection.

3.3 The planning and preparation for the maintenance repair and/or removal of the pressure vessel is explained, in accordance with work instructions.

3.4 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 practices.

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

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

Element 4: Maintain heat exchanger/s.

Range

- Problems include fouling, non-conforming components, leaks, wear, corrosion, excessive heat/cold, pipe/tube blockage, damage to pipes/tubes, and broken seals.
- Heat exchangers and pressure vessels include floating head, U-tube, fixed tube, and plate exchanger types.
- Maintenance includes inspection and elimination of corrosion, fouling, damage, and wear, removal, repair, and fitment of heat exchanger components and assemblies.
- Consumables include sealing agents fasteners, and tube brushes.
- Operational requirements include correct pressure retention at a predetermined pressure and meeting flow control criteria (includes functionality, flow rate, pressure regulation, cooling or heating).
- Checking for compliance may include pressure testing and commissioning.

Performance Criteria

4.1 The heat exchanger is isolated and depressurized.

4.2 The heat exchanger is striped and inspected in compliance with operational requirements /manufacturer specifications.

4.3 The problems with the heat exchanger are rectified and assembled.

4.4 The heat exchanger is commissioned for conformance with operational requirements and according to the manufacturer's specifications.

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

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

4.7 Heat exchanger condition is recorded and reported.

Element 5: Maintain pressure vessel.

Range

- Pressure vessels include boiler, air receiver, accumulator, process vessels, etc.
- Problems include fouling, non-conforming components, leaks, wear, corrosion, excessive heat/cold, pipe/tube blockage, damage to pipes/tubes, and broken seals.
- Maintenance may be on the whole system or individual system components e.g. safety valves, isolation valves, etc.
- Maintenance includes inspection and elimination of corrosion, fouling, damage, and wear, removal, repair, and fitment of pressure vessel components and assemblies.
- Consumables include sealing agents fasteners, and tube brushes.
- Operational requirements include correct pressure retention at a predetermined pressure and meeting flow control criteria (includes functionality, flow rate, pressure regulation, cooling, or heating).
- Checking for compliance includes visual, pressure testing, ultrasonic testing (UT), none non-destructive testing (NDT), material particle inspection (MPI), and commissioning.

Performance Criteria

5.1 The pressure vessel is isolated and depressurized.

5.2 The pressure vessel is striped and inspected in compliance with operational/statutory requirements /manufacturer specifications.

5.3 The problems with the pressure vessel are rectified and assembled.

5.4 The pressure vessel is commissioned for conformance with operational requirements and according to the manufacturer's specifications.

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

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

5.7 Pressure vessel condition is recorded and reported.

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 lubricating systems

Title		Maintain lubricating systems			
Field		Manufacturing, Engineering and Construction			
Subfield		Mechanics and Metal Trades			
SZNQF Level	3	Unit ID	MEF 305	Credits	4

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 (ENQF level 3) and related qualifications.

Qualifying learners can identify various types of lubricating systems, ascertain the operations of each, and inspect, test, and repair lubricating systems.

Special Notes

1. Entry information/Prerequisite

Must have done Fitting qualification Level Two(2)

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

3. The learner should be able to work autonomously with minimal supervision and according to the worksite and manufacturer specifications and occupational safety, health, and environmental legislation.

4. Work is generally, but not exclusively, carried out in a team environment.

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 repairs to the lubricating system.

Range

Lubricating systems include open, closed, immersed, gravity, pressurized, and splash

Performance Criteria

- 1.1 Gathering of the required tools.
- 1.2 Gathering of the required documentation.
- 1.3 Gathering of the appropriate lubricants.
- 1.4 Gathering of the appropriate personal protective equipment (PPE).

Element 2: Prepare site and equipment.

Performance Criteria

- 2.1 Site and equipment are prepared for the maintenance process.
- 2.2 The operation of the lubrication system is assessed.
- 2.3 Proper system operation is confirmed.
- 2.4 System condition is recorded and reported.

Element 3: Inspect and assess lubricating system functioning.

Range

Lubricating system components include pumps, piping, valves, nozzles, filters, gauges, etc.

Performance Criteria

- 3.1 Site and equipment are assessed for the maintenance process.
- 3.2 The operation of the individual lubrication system components is assessed.
- 3.3 Proper system operation is confirmed.
- 3.4 System condition is recorded and reported.

Element 4: Rectify lubrication system faults.

Range

Identification of the proper replacement components.

Performance Criteria

- 4.1 Site and equipment are prepared for the maintenance process.
- 4.2 Repair / replace defective system components.
- 4.3 Proper system operation is confirmed.

4.4 System condition is recorded and reported.

Element 5: Check system operation for compliance with operational requirements.

Range

- Operational requirements include volume of lubricating agent.
- Characteristics include viscosity, additives, origin, flashpoint, usage, and operating range/temperature.
- Principles include characteristics, control of friction, and interaction of moving surfaces.
- Lubricant data includes supplier publications and data sheets.
- Check includes fluid level, condition, temperature, pressure, consumption and/or loss.

Performance Criteria

5.1. Site and equipment are prepared for the test run operation.

5.2 The operation of the lubrication system is assessed.

5.3 Proper system operation is confirmed.

5.4 System condition is recorded and reported.

Element 6: Record information on work done.

Performance Criteria

6.1 Site and equipment are prepared for the maintenance process.

6.2 The operation of the lubrication system is assessed.

6.3 Proper system operation is confirmed.

6.4 System condition is recorded and reported.

6.5 Monitor and report incidents and problems related to maintaining the lubrication system.

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 positive displacement pumps

Title		Maintain positive displacement pumps			
Field		Manufacturing, Engineering and Construction			
Subfield		Mechanics and Metal trades			
SZNQF Level	3	Unit ID	MEF 309	Credits	10

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 type of positive displacement pumps and their applications.
- Plan and prepare for positive displacement pump maintenance.
- Maintain, repair, remove, replace, and set up positive displacement pumps.
- Monitor pump and system performance.

Special Notes

1. Entry information/Prerequisite

MEF 303 Maintain bearings in machines and equipment.

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

3. All work is performed under supervision and according to worksite and manufacturer specifications and occupational safety, health and environmental legislation.

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 positive displacement pumps.

Range

This outcome covers the knowledge required to identify and explain:

- Basic fluid principles (suction, delivery, static, manometric heads) and principles of operation.
- Classifications and application of different types of positive displacement pumps.

- Distinct features and characteristics of various types.
- Priming methods.
- Maintenance and repair (lateral end clearances, parts renewal, assembly procedures, calculations).
- Troubleshooting techniques (Reduced capacity or pressure, losses after starting, pump driver overloads and vibration).

Performance Criteria

- 1.1 The classifications and types of positive displacement pumps are identified and discussed.
- 1.2 The applications and the distinct features and characteristics of various types of positive displacement pumps are explained.
- 1.3 Discuss and explain incidents and problems related to pump operations.
- 1.4 Maintenance and repair procedures are discussed and explained in terms of worksite practice and manufacturers' specifications.
- 1.5 Troubleshooting certain conditions during start-up and operations are discussed and explained in terms of worksite practice and manufacturers' specifications.
- 1.6 The terminology used when explaining and discussing positive displacement pumps, is in keeping with manufacturer and worksite norms and standards.

Element 2: Plan and prepare for pump maintenance.

Range

Planning and preparation include reading and understanding task instructions, engineering drawings and manuals, maintenance scheduling, identification of the equipment to be maintained, 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 Pump is prepared for maintenance.

Element 3: Maintain pump.

Range

- Maintenance includes identifying non-conforming components, removal, repair and installation of components and parts.
- Problems include non-conforming components, leaks, wear and damage, and broken seals.

Performance Criteria

3.1 Pump is prepared for maintenance.

3.2 The pump is dismantled and individual components are cleaned and inspected for compliance with the manufacturer's specifications. Findings are recorded.

3.3 Components that are found to be out of specification are replaced/repared.

3.4 Assembly pump components as per the manufacturer's specification.

3.5 Maintained pump is checked for conformance with manufacturer specifications and safety standards.

3.6 Pump operational parameters are monitored and the system is operational and meets specifications.

Element 4: Pump installation and commissioning

Range

- Installation includes alignment and coupling with the drive.
- Coupling includes direct and indirect drive.
- Commissioning includes performance testing.
- Monitor leaks, temperature, vibration, delivery pressure, etc.

Performance Criteria

4.1 Site and equipment are prepared for pump installation.

4.2 Pump fitted into position and suction and discharge piping is connected.

4.3 Alignment of the pump with the drive is carried out in accordance with manufacturer specifications. Confirm rotational direction.

4.4 Couple the drive and restore all safety devices.

4.5 Charge/prime the system with the relevant fluid and bleed air off in readiness for testing

4.6 Test run pump and monitor system performance.

4.7 Record information on work done.

4.8 Discuss and report incidents and problems related to pump 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)

Maintain Valves

Title		Maintain valve			
Field		Manufacturing, Engineering and Construction			
Subfield		Mechanics and Metal Trades			
ENQF Level	3	Unit ID	MEF 313	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 Mechanical Engineering Fitting (ENQF Level 3) and related qualifications.

Qualifying learners are able to:

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

Special Notes

1. Entry information/Prerequisite

Must have done Fitting qualifications level Two (2).

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

3. This unit standard would be assessed in the context of:

- A plant or engineering system within the workplace or a structured training environment.
- The maintenance of valves in any process-controlled environment.
- Fluid flow systems related to any other environment.

4. The credits allocated to this unit standard assume that a learner has already learned to use and select engineering hand tools, assemble mechanical components, and maintain static seals.

5. Valves include but are not limited to:

- Isolation valves
- Safety relief valve
- Directional control valves.
- Pressure control valves.
- Flow control valves (for example shut-off valves, rotary valves).

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

Performance Criteria

- 1.1 The classifications and types of valves are identified and discussed.
- 1.2 The applications and the distinct features and characteristics of various types of valves and valve components are explained.
- 1.3 Discuss and explain incidents and problems related to valve maintenance.
- 1.4 Maintenance procedures are discussed and explained in terms of worksite practice and manufacturers' specifications.
- 1.5 The terminology used when explaining and discussing valves, is in keeping with manufacturer and worksite norms and standards.

Element 2: Plan and prepare for valve maintenance.

Range

- 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.
- Resources include personnel requirements, tools, equipment, vehicle/s for transport and mechanical handling, support materials, applicable documentation, and personal protective equipment.

Performance Criteria

- 2.1 Site and equipment are prepared for valve maintenance.
- 2.2 The valve/s are inspected and assessed for their work requirements in terms of maintenance, repair, and/or removal.
- 2.3 The planning and preparation for maintenance, repair, and/or removal of the valve/s is explained, in accordance with work instructions and the function of the valve.
- 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 practices.
- 2.5 Where required, handling space is cleared, potential obstructions are removed and personnel are notified, prior to 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 valves.

Range

- Maintenance includes identifying non-conforming components, removal, repair (e.g. grinding and lapping), and installation of components and parts and confirming pressure release at a predetermined pressure.
- Problems include non-isolation, non-pressure release, non-conforming components, leaks, wear and damage, etc.
- Operational requirements include correct pressure release at a predetermined pressure and meeting flow control criteria (functionality, flow-rate, directional control, pressure regulation, etc.).
- Checks include the use of pressure-test methods.
- Checking for compliance may include re-pressurising and commissioning.

Performance Criteria

3.1 The system is drained and depressurized.

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

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

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

3.5 The valve operational condition is 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)

Manage work time effectively

Title		Manage work time effectively			
Field		Manufacturing, Engineering and Construction			
Subfield		Mechanics and Metal Trades			
SZNQF Level	3	Unit ID	MEF 306	Credits	3

Purpose

To create a general understanding of time management, and be able to prioritize activities in the environment. They will also be able to manage their work time effectively.

Special Notes

1. Entry information/Prerequisite

MEF 203 Explain the individual role within the business.

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

3. Time management on a day-to-day basis.

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: Demonstrate understanding of the concept "time management in a 24-hour day world"

Performance Criteria

- 1.1 The different concepts used in the external environment to measure time are listed.
- 1.2 The concept of time management is explained in the learner's own understanding.
- 1.3 The importance of time management in the work environment is discussed.

Element 2: Describe the difference between urgent and important and prioritize daily activities.

Performance Criteria

2.1 Typical daily activities in the workplace are listed and ranked according to urgency and importance.

2.2 The listed activities are used to plan a typical day in the industry.

Element 3: Estimate time spent on a task and draw up a general day, week and month planner to manage time.

Range

Estimate time spent on a task and draw up a general day, week, and month planner to manage time effectively.

Performance Criteria

3.1 Estimated time spent on each task is allocated to the different activities.

3.2 A general day, week, and month planner is drawn up.

3.3 Provision is made for unexpected incidents and crisis management.

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)