



ESWATINI VOCATIONAL QUALIFICATIONS PACKAGE
FOR

FITTING

LEVEL 2



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>

Funded by the Taiwan Technical Mission in Eswatini



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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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Mthobisi	Dlamini	RES
Mxolisi	Dlamini	RES
Shaka	Dlamini	USL
Lucky	Phakathi	DIVT
Mazambane	Dlamini	Taiwan Technical Mission

THE QUALIFICATION

NATIONAL VOCATIONAL CERTIFICATE FITTING LEVEL 2

Originator	DIVT		
Qualification Type:	Certificate	Descriptor:	Mechanical Fitting
Specialisation:			
Level:	2	Minimum Credits:	40
Actual Credits	78		
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 qualifications 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 3.

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 maximum supervision. Graduates will be able to relate their learning to scientific and technological principles and concepts.

Entry Requirements

Minimum requirements for entry:

- SGCSE or equivalent
- RPL

Associated Level Descriptors

Knowledge	• To recall and apply basic practical and educational knowledge of a defined area of learning / work.
Skills	• To apply basic skills to execute tasks involving known routines and procedures under maximum supervision.
Personal Attributes	• To perform tasks in a well-defined and supervised environment. • To demonstrate limited autonomy in execution 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 outcome

What the qualification represents in terms of the application of knowledge, understanding, skills and attitudes; and the components of the qualification which, in their combination, make up the complete qualification.

Assessment criteria

Activities designed to evaluate the acquisition of learning outcomes. (The assessment criteria should be clearly articulated for all the learning outcomes listed. There could be more than one criterion in each learning outcome)

Learning Outcomes - After completion of this qualification learners will be able to:	Assessment Criteria
Understand the principles, foundations, applications, and theory of Mechanical Fitting.	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 can be either written or oral examination
Perform Mechanical Fitting practices under maximum supervision to demonstrate competence	Practical assessment to be carried out in a Mechanical Fitting workshop 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
Solve familiar problems and report work done and pending work to clients and immediate supervisors.	To be assessed both in theory and practical through minimal 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 Standard Title	Level	Credit
MEF 202	Assemble mechanical components	2	8
MEF 203	Explain the individual role within the business	2	4
MEF 204	Identify engineering materials, their characteristics and applications, and common metal tests used in engineering	2	4
MEF 205	Apply and Maintain Health and Safety Rules and Regulations	2	8
MEF 206	Maintain static seals in machines and/or equipment	2	4
MEF 207	Mark off basic regular engineering shapes	2	6
MEF 208	Read, interpret, and produce basic engineering drawings	2	6
MEF 209	Select, use, and care for engineering hand tools	2	8
MEF 210	Select, use, and care for engineering measuring equipment	2	4
MEF 211	Select, use, and care for engineering power tools	2	6
MEF 212	Describe and cut screw threads and install threaded pipe systems	2	4
MEF 213	Weld, braze, cut and heat metals using the oxy-acetylene process	2	8
MEW 209	Weld carbon steel work-pieces using the shielded metal arc welding process.	2	8
			78

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 78 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

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 3
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 and Maintain Health and Safety Rules and Regulations

Title	Apply and Maintain Health and Safety Rules and Regulations				
Field	Engineering, manufacturing and construction				
Subfield	Mechanics and metal trades				
SZNQF Level	2	Unit ID	MEF 205	Credits	8

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 keep their work area safe and productive when carrying out their work duties. They can demonstrate, an understanding of safety requirements, procedures and equipment

Unit Standard Range

The scope and level of this unit standard is determined by the ranges as indicated under the specific outcomes / Elements.

Special Notes

1. Entry information/Prerequisite

MEF 210 Select, use, and care for engineering measuring equipment
MEF 211 Select, use, and care for engineering power tools
2. This unit standard may be used as a core or elective within any vocationally based qualification.
3. Identify and respond to unsafe or potentially unsafe conditions, incidents or acts that may occur while working.

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: Discuss and explain the purpose of safety equipment and procedures in the workplace

Performance Criteria

- 1.1 An understanding of safety issues at work is demonstrated, in particular the permit-to-work system (PTW)
- 1.2 Demonstrate understanding of the different permits required to carry out different tasks e.g. working at heights, confined spaces, etc.
- 1.3 All work is undertaken in a safe manner according to established procedures.
- 1.4 The work area is in a neat and tidy condition.
- 1.5 Reports on safety issues are made as required.

Element 2: Identify and explain the purpose of demarcated areas, emergency stops, emergency exits, emergency assembly points and first aid stations

Performance Criteria

- 2.1 An understanding of demarcated areas is demonstrated.
- 2.2 An understanding of emergency stops on equipment is demonstrated.
- 2.3 An understanding of emergency exits from buildings is demonstrated.
- 2.4. An understanding of emergency assembly points is demonstrated.
- 2.5 An understanding of first aid stations is demonstrated.

Element 3: Use personal protective equipment

Performance Criteria

- 3.1 An understanding of safety issues and the correct use of appropriate PPE at work is demonstrated.
- 3.2 The selection of PPE based on the type of hazard, its functionality, comfort and / or ergonomics is demonstrated.
- 3.3 The limitation of PPE are understood.
- 3.4 The understanding of the need to maintain, store and dispose of PPE is demonstrated.
- 3.5 All work is undertaken in a safe manner according to established procedures.
- 3.6 The PPE should be kept clean and neat.
- 3.7 Reports on safety issues are made as required.

Element 4: Perform housekeeping duties in the work area

Range

Housekeeping includes general cleaning and lifting, pulling, wheeling, positioning, and storing of materials, objects, tools, and equipment.

Performance Criteria

- 4.1 An understanding of housekeeping and the requirement to maintain a high standard of cleanliness at work is demonstrated.
- 4.2 Hazards associated with poor housekeeping e.g. trip hazards, slip hazards, fire, etc. are discussed and understood.
- 4.3 An understanding of how housekeeping contributes to making the workplace safer and function better is discussed.
- 4.4 Work area is in a neat and tidy condition.
- 4.5 Waste material is always disposed according to procedures.
- 4.6 Reports on safety issues are made as required.

Element 5: Identify and respond to unsafe or potentially unsafe conditions, incidents or acts that may occur.

Performance Criteria

- 5.1 An understanding of the importance of reporting safety issues, including near-miss incidents, at work is demonstrated.
- 5.2 An ability examine, record and manage any event resulting in property damage or injury in the workplace is demonstrated.
- 5.3 An understanding of conducting risk analysis and control measures and its contribution to the company profits is demonstrated.
- 5.4 All work is undertaken in a safe manner according to established procedures.
- 5.5 Reports on safety issues are made as required.

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)

Assemble Mechanical Components

Title	Assemble mechanical components				
Field	Engineering, manufacturing and construction				
Subfield	Mechanics and metal trades				
SZNQF Level	2	Unit ID	MEF202	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 at ENQF Level 2 and related qualifications.

Qualifying learners can:

- Identify, discuss, and demonstrate mechanical assembly methods and techniques.
- Plan and prepare to perform a mechanical assembly.
- Assemble mechanical components.
- Care and store tools and equipment.

They are therefore able to verify task requirements and necessary assembly equipment, assemble components in the correct sequence and according to specification, and ensure the finished assembly complies with assembly specifications and is stored or moved as instructed.

Special Notes

1. Entry information/Prerequisite

MEF 204	Identify engineering materials, their characteristics and applications, and common metal tests used in engineering
MEF 207	Mark off basic regular engineering shapes
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

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

3. Regulations and legislation relevant to this unit standard include the following

- Labour Act 2005

- Workmen's Compensation Act No.7 of 1983
- Occupational Health and Safety (OHS) Act 2001
- Environmental Management Act of 2002

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: Identify, discuss and demonstrate mechanical assembly methods and techniques.

Performance Criteria

- 1.1 The fundamental technologies, concepts, and principles of mechanical assembly are explained.
- 1.2 Basic and specialised mechanical assembly tools and equipment are identified and their application is discussed.
- 1.3 The applications, functions, distinct features and characteristics of various fasteners are explained and demonstrated.
- 1.4 Mechanical assembly techniques are discussed and their application is demonstrated in terms of a drawing or work instruction.
- 1.5 Hazards and safety risks related to mechanical assembly procedures are discussed and explained in terms of legislation, regulatory requirements and safety standards.
- 1.6 Assembly procedures are discussed and explained in terms of worksite practice and manufacturers' specifications.
- 1.7 The terminology used when explaining and discussing mechanical assembly, is in keeping with the manufacturers' and worksite practices.

Element 2: Plan and prepare to perform a mechanical assembly.

Range

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

Performance Criteria

- 2.1 The planning and preparation for isolation, disassembly, maintenance, repair, and assembly of the machine and/or sub-assembly is explained, in accordance with work instructions.
- 2.2 Site and equipment are prepared for the mechanical assembly process.
- 2.3 Tools, 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.
- 2.4 Where required, handling space is cleared, potential obstructions are removed and personnel are notified, prior to the maintenance, repair and/or removal task.
- 2.5 Pre-operational checks are carried out on removal and securing equipment, in accordance with work instructions.
- 2.6 The mechanical assembly/s are inspected and assessed for its work requirements in terms of strip-down procedures, removal, clean, inspect, and assembly.

Element 3: Assemble mechanical components.

Range

- Maintenance includes removal, disassembly evaluation, reassembly, and re-installation of machines or sub-assemblies (combinations of assembled components and parts).
- Correct use of tools, equipment, and fasteners are important factors for competency.
- The applicable procedure is appropriate for the task and conforms with work-site practice and manufacturer's specifications.
- Quality checks after completion (where applicable checking gauges and measuring instruments may be implemented).
- Evaluation/inspection of components after disassembly.

Performance Criteria

- 3.1 Mechanical assembly is performed and complies with task instructions.
- 3.2 Faulty components 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 assembly is tested (where possible) for functionality in terms of operational requirements and in accordance with quality assurance procedures.

3.5 The operation, running condition or exactness of assembly is confirmed, recorded and reported after the assembly process, according to work-site practice, drawing information and/or manufacturer's specifications.

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

Element 4: Maintain and care for tools and equipment.

Range

Tools and equipment include absorbent material, hand tools and cleaning equipment, mechanical assembly fluid, lifting equipment and tackle.

Performance Criteria

4.1 The proper care and storage procedure for tools and equipment is explained in accordance with work site practice.

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

4.3 Tools and equipment are stored in accordance with manufacturer's specification and requirements.

4.4 Defective tools and equipment are reported and corrective action taken, according to accepted worksite practice.

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)

Describe and cut screw threads and install screwed or threaded systems

Title		Describe and cut screw threads and install screwed or threaded systems			
Field		Engineering, manufacturing and construction			
Subfield		Mechanics and metal trades			
SZNQF Level	2	Unit ID	MEF 212	Credits	4

Purpose

This unit standard will be useful to people who are required to know screw threads, cut screw threads manually and by means of a thread cutting machine in order to assembly mechanical components and install threaded pipe systems.

People credited with this unit standard are able to:

- Discuss screw threads types, threaded pipe fittings and the thread cutting process.
- Explain the application of manual thread cutting as well as the thread cutting machine and prepare to cut screw threads.
- Cut screw threads manually and by means of a thread cutting machine.
- Assemble and install mechanical components using using different screwed or threaded fasteners and to install threaded pipe and pipe fittings.
- Care and store equipment.

Special Notes

1. Entry information/Prerequisite

MEF 207 Mark off basic regular engineering shapes
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

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

3. Regulations and legislation relevant to this unit standard include the following

- Competition Act 2007
- Labour Act 2005

- Workmen's Compensation Act No.7 of 1983
- Occupational Health and Safety (OHS) Act 2001

And all subsequent amendments

4. Screwed or threaded fasteners include bolts, nuts, washers, while locking elements include spring washers, pins, grub screws, etc.
5. Screwed or threaded pipe-fittings are identified (elbows, tees, couplings, plugs, swages, nipples and unions)
6. Application includes the function and operation of screwed or threaded components.
7. Application includes identification of components and description of the range of functions and its operation.
8. Tools and equipment include taps, dies, drills, pipe reamer and cutting attachments, threading die-sets, thread pitch gauges, thread tape and hand tools.

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: Discuss fasteners and the different types of threads and thread components, including thread locking devices.

Range:

- Fasteners include bolts, nuts, washers, etc.
- Types of threads include metric and imperial, right and left hand, internal and external, single start and multi-start thread, as well as their geometric shape e.g. square, vee, etc.
- Locking devices includes any device used to stop any screwed fitting from slackening off due to vibrations e.g. lock nuts, washers, pins, locking plates, etc.
- Fastener material properties selection is appropriate for the application e.g. mild steel, high tensile, stainless steel, etc.
- Modes of failures include breaking of bolt shank in shear on tension, stripping of threads, etc.

Performance Criteria

- 1.1 Tools and equipment used and work-related hazards are identified and dealt with in order to protect people and equipment – and understanding of consequences of failure to adhere to the above is also demonstrated.
- 1.2 The application of different screwed fastenings (where components must be assembled and dismantled regularly) are described.
- 1.3 Different types of threads and their applications are explained.
- 1.4 Different types of locking devices are defined and juxtaposed against one another.

1.5 The different materials and modes of failures of screwed fasteners are described.

Element 2: Prepare to cut screw thread manually and by use of machine tools

Range:

- Cutting screw threads manually involves the use of taps and dies, pipe threader.
- Use of machine tools involves the use motorized thread-cutting machine, center lathe, etc.
- Thread repair using hand tools and by thread chasing on the centre lathe.

Performance Criteria

- 2.1 Planning and preparation for thread cutting is explained in accordance with the work instruction and type of thread to be cut.
- 2.2 The tools and equipment required for the task are prepared, including the determination of correct tap drill sizes and screw pitch gauges are explained.
- 2.3 Handling of taps and dies during the thread-cutting process is discussed, as well as the finishing processes post thread-cutting.
- 2.4 Basic steps for screw cutting using machine tools are discussed, including the need to grind the screw cutting tool to the correct profile, setting the correct pitch (using the lathe gear train) and the operation of the machine to cut the screw thread.

Element 3: Discuss threaded pipe fittings and the thread cutting process.

Performance Criteria

- 3.1 Screwed or threaded fittings are described and explained according to manufacturers' specifications and design.
- 3.2 The applications and the distinct features and characteristics of various types of pipe systems and/or components are explained.
- 3.3 Discuss and explain incidents and problems related to the installation of the threaded pipe system.
- 3.4 Installation procedures are discussed and explained in terms of worksite practice and manufacturers' specifications.
- 3.5 Troubleshooting certain conditions during start-up and operations are discussed and explained in terms of worksite practice and manufacturers' specifications.

3.6 The application and function of a thread-cutting machine is explained according to the manufacturer's specifications and design.

3.7 The safe use of the thread-cutting machine is explained in terms of legislative and work-site requirements.

3.8 The terminology used when explaining and discussing screwed/threaded pipe fittings and the use of a thread-cutting machine, is in keeping with manufacturers' specifications and worksite practice.

Element 4: Explain the application of the thread-cutting machine and prepare to cut screw threads.

Performance Criteria

4.1 Planning and preparation for the thread cutting process is explained, in accordance with work instructions.

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

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

4.4 The workplace is examined in accordance with specified requirements.

4.5 Hazardous and sub-standard conditions are dealt with in accordance with specified requirements.

4.6 The thread-cutting machine is prepared in accordance with specified requirements.

4.7 The consequences for health, safety and production, of not preparing to cut screw threads by means of a thread-cutting machine in line with specified requirements and current legislation are explained.

Element 5: Cut screw threads by means of a thread-cutting machine.

Performance Criteria

5.1 The screw cutting procedure is explained according to task instructions and working pipe drawings.

5.2 Risks associated with cutting threads by means of thread cutting machines are explained.

5.3 The thread cutting process is in line with specified requirements for sequence and tolerances and is consistent with accepted best practice.

5.4 Personal protective equipment is used so that the safety of persons and equipment is ensured.

5.5 Work related hazards are dealt with in accordance with specified requirements.

5.6 Interaction with fellow workers is positive and promotes effective teamwork.

5.7 The tools and equipment are used in accordance with manufacturers' design and task instructions.

5.8 The consequences for health, safety and production of not cutting threads by means of a thread cutting machine in line with specified requirements and current legislation are explained.

Element 6: Install screwed or threaded pipes and pipe fittings.

Range

- Installation includes identifying non-conforming components, removal, repair and installation of components and parts, and confirming pressure retention at specific and predetermined pressures.
- Problems include non-conforming components.

Performance Criteria

6.1 Screwed or threaded pipes and pipe fittings are installed according to operational requirements.

6.2 The screwed or threaded pipes and pipe fittings are tested for conformance within operational requirements and according to the manufacturer's specifications.

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

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

6.5 Screwed or threaded pipes and pipe fittings condition is recorded and reported.

Element 7: Care and store tools and equipment.

Performance Criteria

7.1. The selected tools, material and equipment are cleaned and stored in accordance with specified requirements.

7.2 The workplace is cleaned and free from hazards in accordance with specified requirements and good housekeeping practices.

7.3 A report on work performed is compiled and complies with specified requirements for format, content, accuracy, and distribution.

7.4 The report is submitted within the agreed time.

7.5 The consequences for health, safety and production of not completing the thread cutting process in line with specified requirements and current legislation are 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)

Explain the individual's role within the business

Title	Explain the individual's role within the business				
Field	Engineering, manufacturing and construction				
Subfield	Mechanics and metal trades				
SZNQF Level	2	Unit ID	MEF 203	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 explain their role within a business and their rights, contributions and responsibilities. They are able to demonstrate an understanding of how a business functions, organisational structures, organisational culture and procedures and concepts.

Special Notes

1. Entry information/Prerequisite

None

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

3. Indicators:

3.1 Explanations are given in a clear manner using appropriate examples from learner's own experience.

3.2 Understanding confirmed.

3.3 Respond to 'what if' and 'why' questions covering:

- Purpose of understanding an individual's role within business
- Employee rights
- Organisational structures, culture, procedures and concepts
- How a business functions

4. Identify and explain the structures, cultural procedures, and concepts within a particular organization.

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: Discuss the rights of an employee within the workplace

Range

Rights include rights concerning language, safety, and culture.

Performance Criteria

- 1.1 An understanding of the rights of an employee within the workplace is demonstrated.
- 1.2 Organisational structures, culture, procedures and concepts are explained
- 1.3 An understanding of how a business functions is demonstrated
- 1.4 The individual's role within the organisation is discussed and reflected upon

Element 2: Identify and explain the structures, cultural procedures, and concepts within an organization

Range

- Organizational structures include overall, departmental, workgroup, and human resource structures.
- Procedures and concepts include conditions of employment, disciplinary, grievance, employee representation.

Performance Criteria

- 2.1 An understanding of the rights of an employee within the workplace are demonstrated
- 2.2 Organisational structures, culture, procedures and concepts are explained
- 2.3 An understanding of how a business functions is demonstrated
- 2.4 The individual's role within the organisation is discussed and reflected upon

Element 3: Discuss how business functions

Range:

Business functioning includes aspects such as customers, deadlines, markets, quality, profit, and environment.

Performance Criteria

- 2.1 An understanding of the rights of an employee within the workplace are demonstrated
- 2.2 Organisational structures, culture, procedures, and concepts are explained
- 2.3 An understanding of how a business functions is demonstrated
- 2.4 The individual's role within the organisation is discussed and reflected upon

Element 4: Reflect on the individual's role within the organization

Performance Criteria

- 4.1 An understanding of the rights of an employee within the workplace are demonstrated.
- 4.2 Organisational structures, culture, procedures and concepts are explained.
- 4.3 An understanding of how a business functions are demonstrated.
- 4.4 The individual's role within the organisation 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)

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

Title		Identify engineering materials, their characteristics and applications, and common metal tests used in engineering			
Field		Manufacturing, Engineering and Construction			
Subfield		Mechanics and metal trades			
SZNQF Level	2	Unit ID	MEF 204	Credits	4

Purpose

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

The learning outcomes in this unit standard also contribute to the exit level outcomes required for various NQF level 2 engineering qualifications.

Qualifying learners can identify the types, properties and common applications of ferrous and non-ferrous metals and demonstrate an understanding of common testing and treatment procedures.

Unit Standard Range

In this unit standard, the learner is required to identify, distinguish, list, describe and explain the basic concepts as outlined under the specific outcomes / Elements. The learner is not required to go into great detail

Special Notes

1. Entry information/Prerequisite

None

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

3. Indicators:

Descriptions and explanations are clear and accurate and demonstrate the learner's understanding of concepts and content.

4. Explain the common applications and methods of processing and manufacturing using engineering materials

- Relate common applications to characteristics of engineering materials
- Relate methods of processing and manufacturing to engineering materials

5. Identify the common metal tests and the processes and equipment used.
6. Identify the different kinds of heat treatment processes used
7. Explain the changes in metal properties caused by heating
8. Regulations and legislation relevant to this unit standard include the following
 - Labour Act 2005
 - Workmen's Compensation Act No.7 of 1983
 - Occupational Health and Safety (OHS) Act 2001
 - And 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 the Eswatini Higher Education Council

Elements and Performance Criteria

Element 1: Identify materials used in common engineering applications.

Range

- Materials used in engineering include metals, alloys and non-metals.
- Distinctions between ferrous and non-ferrous metals and alloys must be explained in terms of colour codes, strength, density, corrosion resistance, electrical conductivity and magnetic properties.

Performance Criteria

- 1.1 Types of engineering materials identified and differentiated from one another.
- 1.2 Physical properties of engineering materials described and explained.
- 1.3 Common applications and methods of processing and manufacturing of engineering materials described and explained.
- 1.4 Common metal tests used in engineering described and explained.
- 1.5 Heat treatment processes described and explained.
- 1.6 Changes in metal properties caused by heating described and explained.
- 1.7 Effects external factors have on engineering materials described and explained.

Element 2: Demonstrate understanding of the physical properties of engineering materials used in common engineering applications.

Range

Physical properties include yield stress, proof stress, ultimate tensile stress, % elongation, impact strength, toughness, fatigue strength, wear resistance, heat resistance, hardness and bend.

Performance Criteria

- 2.1 Types of engineering materials identified and differentiated from one another.
- 2.2 Physical properties of engineering materials described and explained.
- 2.3 Common applications and methods of processing and manufacturing of engineering materials described and explained.
- 2.4 Common metal tests used in engineering described and explained.
- 2.5 Heat treatment processes described and explained.
- 2.6 Changes in metal properties caused by heating described and explained.
- 2.7 Effects external factors have on engineering materials described and explained

Element 3: Explain common applications and methods of processing and manufacturing using engineering materials.

Range

- Applications would relate to the machinability, castability, weldability, forgeability and corrosion resistance.
- Methods of processing engineering materials include machining, casting, rolling, forging, extrusion, drawing and spinning.
- Methods of manufacturing include hot working, cold working and thermal processes.

Performance Criteria

- 3.1 Types of engineering materials identified and differentiated from one another.
- 3.2 Physical properties of engineering materials described and explained.
- 3.3 Common applications and methods of processing and manufacturing of engineering materials described and explained.
- 3.4 Common metal tests used in engineering described and explained.
- 3.5 Heat treatment processes described and explained.
- 3.6 Changes in metal properties caused by heating described and explained.

3.7 Effects external factors have on engineering materials described and explained

Element 4: Demonstrate an understanding of the common metal tests used in engineering.

Range

Common metal tests must include tensile, hardness, shear, impact, spark, and bend tests

Performance Criteria

- 4.1 Types of engineering materials identified and differentiated from one another.
- 4.2 Physical properties of engineering materials described and explained.
- 4.3 Common applications and methods of processing and manufacturing of engineering materials described and explained.
- 4.4 Common metal tests used in engineering described and explained.
- 4.5 Heat treatment processes described and explained.
- 4.6 Changes in metal properties caused by heating described and explained.
- 4.7 Effects external factors have on engineering materials described and explained.

Element 5: Demonstrate an understanding of heat treatment processes

Range

- Heat treatment processes must include homogenizing, annealing, normalizing, stress relieving, hardening, tempering, and case hardening.
- Changes in metal properties include a variety of changes in state, e.g. strength, hardness, ductility, magnetism, dimensions, and colour.

Performance Criteria

- 5.1 Types of engineering materials identified and differentiated from one another
- 5.2 Physical properties of engineering materials described and explained.
- 5.3 Common applications and methods of processing and manufacturing of engineering materials described and explained.
- 5.4 Common metal tests used in engineering described and explained
- 5.5 Heat treatment processes described and explained.

5.6 Changes in metal properties caused by heating described and explained.

5.7 Effects external factors have on engineering materials described and explained.

Element 6: Explain the effects external factors have on engineering materials.

Range

Environmental effects include oxidation, acid attack, galvanic action, heat

Performance Criteria

6.1 Types of engineering materials identified and differentiated from one another

6.2 Physical properties of engineering materials described and explained

6.3 Common applications and methods of processing and manufacturing of engineering materials described and explained.

6.4 Common metal tests used in engineering described and explained

6.5 Heat treatment processes described and explained.

6.6 Changes in metal properties caused by heating described and explained

6.7. Effects external factors have on engineering materials described and 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)

Maintain static seals in machines and equipment

Title	Maintain static seals in machines and / or equipment				
Field	Manufacturing, Engineering and Construction				
Subfield	Mechanics and Metal Trades				
SZNQF Level	2	Unit ID	MEF 206	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 (NQF level 2) and related qualifications.

Qualifying learners can identify types of static seals, select for specific use, and replace, and test static seals used in machines and equipment.

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

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 maintenance in the engineering area. The credits allocated to this unit standard assume that a learner has already learned to use engineering hand tools, power tools and measuring equipment and maintain a safe and productive work area.

Unit Standard Range

The ranges as indicated under the specific outcomes determine the scope and level of this unit standard.

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

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

Seal types are accurately identified and seal assembly inspected according to manufacturer specifications

- a) Appropriate tools and correct replacement method is determined relevant to seal assembly.
- b) Seal assemblies are correctly removed from machine / equipment and component parts inspected for conformance with manufacturer specifications.
- c) Appropriate seals and replacement parts required are selected and obtained.
- d) Seal and seal assemblies are prepared for installation in accordance with manufacturer requirements.
- e) Equipment is prepared and inspected for installation.
- f) Seals and seal assemblies are correctly fitted to machines and / or equipment.
- g) Seal assemblies are tested for conformance with specifications.
- h) Appropriate lubrication is applied where necessary to manufacturer specifications.
- i) Work is carried out in a safe manner in accordance with schedules and manufacturer specifications.
- j) Replacement process cycle time meets workplace requirements,
- k) A clean and tidy work environment is maintained.
- l) No delays are caused as a result of poor planning for replacing seals and identifying problems.
- m) Seal replacement report is accurate and clear.
- n) Applicable OSH and environmental procedures are adhered to.

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 seal replacement.

Performance Criteria

- 1.1 Site, tools, and equipment are prepared for installation.
- 1.2 Appropriate static seal is selected.

Element 2: Prepare site and equipment for seal replacement.

Range

- Preparation includes making system safe.
- Making system safe includes isolation and applying protective equipment.
- Isolation includes electrical and mechanical energy.

Performance Criteria

- 2.1 Site, tools, and equipment are prepared and safe for installation.
- 2.2 The correct PPE for the task is available.

Element 3: Maintain static seals.

Range

- Seal types include gaskets, "O" rings, sealing compounds, sheet, metallic and spiral wound, oil seals.
- Replacement parts include making of "O" ring seals.
- Problems include leaks, burning of seals, non-compatibility, leaks, thickness and size of seal

Performance Criteria

- 3.1 Site, tools, and equipment are prepared for installation.
- 3.2 The correct PPE for the task is worn.
- 3.3 Static seal is maintained.

Element 4: Check equipment for compliance with operational requirements.

Range

Operational requirements include current static seal used, current tightening of static seal, correct compatibility with different fluids and pressure capacity, suitable seal type for the application.

Performance Criteria

- 4.1 Site, tools, and equipment are prepared for installation.
- 4.2 Static seal is maintained.
- 4.3 Installation is checked for compliance.
- 4.4 Commission the equipment and check for compliance with operational requirements.

Element 5: Record information on work done.

Performance Criteria

- 5.1. Site, tools, and equipment were prepared for installation.
- 5.2 Static seal was maintained.
- 5.3 Installation was checked for compliance.
- 5.4 Equipment was commissioned and checked for compliance.

Element 6: Discuss and explain incidents and problems related to replacing static seals.

Performance Criteria

- 6.1 Site, tools, and equipment are prepared for installation.
- 6.2 Static seal is maintained.
- 6.3 Installation is checked for compliance.

Element 7: Work safely with care for self, fellow workers, machines, equipment, materials and environment.

Performance Criteria

- 7.1 Site, tools, PPE, and equipment are prepared for installation.
- 7.2 Static seal is maintained.
- 7.3 Installation is checked for compliance.

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)

Mark off basic regular engineering shapes

Title	Mark off basic regular engineering shapes				
Field	Manufacturing, Engineering and Construction				
Subfield	Mechanics and Metal Trades				
SZNQF Level	2	Unit ID	MEF 207	Credits	6

Purpose

Marking off various basic engineering shapes including the use of templates.

Special Notes

1. Entry information/Prerequisite

MEF 208 Read, interpret, and produce basic engineering drawings

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

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

Unit Standard Range

- The learner works under direct supervision
- The range of marking-off applications includes gaskets, seals, flanges, flat shapes

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 materials and equipment for marking off.

Range

- Materials include aluminium, copper, plastics, metals, paper
- Marking off equipment includes pencils, chalk, scribe, centre punches, dividers

Performance Criteria

- 1.3 Materials for marking off are prepared to meet the requirements of the job.
- 1.4 Materials are marked off.
- 1.5 Marking off equipment and templates are cared for and stored.

Element 2: Mark off materials using templates.

Performance Criteria

- 2.1 Materials for marking off are prepared to meet the requirements of the job.
- 2.2 Materials are marked off.
- 2.3 Marking off equipment and templates are cared for and stored.

Element 3: Apply quality checks on completed work.

Performance Criteria

- 3.1 Marked-off materials are checked against job requirements.
- 3.2 Marked-off materials are cared for and stored.

Element 4: Care for and store marking off equipment.

Range

Caring for marking off equipment includes sharpening of pencils, scribes and dividers, cleaning, refilling

Performance Criteria

- 4.1 Marking off equipment is cared for and stored.

Element 5: Work safely with due care for self, fellow workers, equipment, and materials.

Performance Criteria

- 5.1 Safety practices are adhered to.
- 5.2 Marking off equipment and templates are cared for and stored.

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)

Read, interpret, and produce basic engineering drawings

Title	Read, interpret, and produce basic engineering drawings				
Field	Manufacturing, Engineering and Construction				
Subfield	Mechanics and Metal Trades				
SZNQF Level	2	Unit ID	MEF 208	Credits	6

Purpose

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

The learning outcomes in this unit standard also contribute to the exit level outcomes required for various NQF level 2 engineering qualifications.

Qualifying learners can read and interpret basic engineering drawings to be able to select components to be manufactured or assembled and produce freehand sketches and basic drawings using isometric, oblique and orthographic projection, including hidden detail and single plane sectional views. Drawings are limited to single components. These components may include components of pumps, gearboxes, hydraulic cylinders, support frames and holding devices. All drawings produced must meet required recognised international drawing standards.

Special Notes

1. Entry information/Prerequisite

None

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

3. The scope and level of this unit standard is determined by the ranges as indicated under the specific outcomes.

4. All work is performed under supervision.

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: Discuss and explain basic engineering drawing concepts and material lists

Performance Criteria

- 1.1 Component identified and interpreted as per job requirements
- 1.2 Engineering drawing concepts and material lists are explained

Element 2: Interpret basic engineering drawings

Range

Engineering drawings interpreted are limited to first- and third-angle orthographic projection, isometric and oblique, and hidden detail and single-plane sectional views.

Performance Criteria

- 2.1 Component identified and interpreted as per job requirements
- 2.2 Engineering drawings produced comply with job requirements
- 2.3 Engineering drawing concepts and material lists are explained
- 2.4 Engineering symbols and abbreviations interpreted

Element 3: Produce drawing

Range

- Engineering drawings produced are limited to first and third angle orthographic projection, isometric and oblique.
- Engineering drawings produced must meet required recognised international drawing standards.

Performance Criteria

- 3.1 Component identified and interpreted as per job requirements
- 3.2 Engineering drawings produced comply with job requirements

3.3 Engineering drawing concepts and material lists are 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)

Select, use and care for engineering power tools

Title		Select, use and care for engineering power tools			
Field		Manufacturing, Engineering and Construction			
Subfield		Mechanics and Metal Trades			
SZNQF Level	2	Unit ID	MEF 211	Credits	6

Purpose

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

The learning outcomes in this unit standard also contribute to the exit level outcomes required for various NQF level 2 engineering qualifications.

Qualifying learners can select, safely use and maintain a range of engineering power tools. The power sources include electrical, pneumatic and hydraulics.

Special Notes

1. Entry information/Prerequisite

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

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

2. This unit standard may be used as a core or elective within any vocationally based qualification.
3. The scope and level of this unit standard are determined by the ranges as indicated under the specific outcomes.
4. All work is performed under supervision.
5. Select appropriate power tool attachments for the required application
6. Work safely with due care for self, fellow workers, machines, equipment, materials and the environment.

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: Select and use engineering power tools

Range

Engineering power tools include but are not limited to drills (including pedestal drilling machines), grinders (including pedestal grinders), sanders, brushes, buffs, wrenches (including impact type), jacks, nibblers, saws (including power and band saws).

Performance Criteria

- 1.1 Power tools used as recommended by the manufacturer to meet job/ task requirements.
- 1.2 Unsafe/ faulty power tools identified and corrective action taken.
- 1.3 Power tools cleaned, serviced, maintained, and stored.

Element 2: Care for and maintain engineering power tools

Range

Power tool maintenance includes replacing wearing parts and lubrication.

Performance Criteria

- 2.1 Power tools used as recommended by the manufacturer to meet job/ task requirements.
- 2.2 Unsafe/ faulty power tools identified and corrective action taken.
- 2.3 Power tools are cleaned, serviced, maintained, and stored.
- 2.4 The maintenance of engineering power tools is carried out in accordance with the applicable requirements and workplace procedures.

Element 3: Check on power supply connections to equipment

Range

Power sources include electricity, compressed air, and hydraulic power.

Performance Criteria

3.1 Power tools to be connected to the power source as recommended by the manufacturer to meet job/ task requirements.

3.2 Unsafe/ faulty power tools connection identified and corrective action taken.

Element 4: Recognise and report problems, changes, and/or malfunctions while working

Performance Criteria

4.1 Power tools used as recommended by the manufacturer to meet job/ task requirements.

4.2 Unsafe/ faulty power tools identified and corrective action taken

Element 5: Work safely with due care for self, fellow workers, machines, equipment, materials and environment

Range

- Safe working practices include the use of appropriate personal protective equipment.
- Safety hazards include bad connections, damaged air hoses and hydraulic hoses, damaged electrical cables, cracked discs, and worn or damaged blades.

Performance Criteria

5.1 Unsafe/ faulty power tools identified and corrective action taken.

5.2 Power tools are cleaned, serviced, maintained, and stored.

5.3 Power tools to be connected to the power source as recommended by the manufacturer to meet job/ task requirements.

5.4 The workplace must be clean, tidy, and clear from flammable materials.

5.5 Control of oil spillage and understanding of waste disposal.

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)

Select, use, and care for engineering hand tools

Title	Select, use, and care for engineering hand tools				
Field	Manufacturing, Engineering and Construction				
Subfield	Mechanics and Metal Trades				
SZNQF Level	2	Unit ID	MEF 209	Credits	8

Purpose

People in the field of Fitting require the skills, values, and knowledge reflected in this unit standard. Qualifying learners can select, safely use, and care for a range of engineering hand tools used for checking, forming, cutting, marking, and fastening tools and tooling aids.

Special Notes

1. Entry information/Prerequisite

None

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

3. The ranges as indicated under the specific outcomes determine the scope and level of this unit standard.

4. All work is performed under constant supervision and according to workplace and workshop manual 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: Select and use Engineering hand tools.

Range

Engineering hand tools include but are not limited to hand files, spanners, socket sets, specialized sockets, impact sockets, torque wrenches, Allen keys, screwdrivers, pliers, clamps, tin snips, hacksaws, chisels, metal shears, hammers, pullers, mallets, bench stakes, scrapers, hole punches, anvils and riveters, and sanding blocks.

Performance Criteria

- 1.1 All the engineering hand tools are identified and their uses are explained.
- 1.2 Explanations given are clear and appropriate examples are given.
- 1.3 Appropriate literature is referred to when explanations are given.
- 1.4 The ability to apply the various engineering hand tools in their different applications is demonstrated.

Element 2: Care for and maintain engineering hand tools.

Range

Hand tool maintenance includes cleaning, sharpening, de-burring, resetting/calibration, de-rusting, oiling, replacing, and storage.

Performance Criteria

- 2.1 The maintenance of engineering hand tools is carried out in accordance with the applicable requirements and workplace procedures.
- 2.2 The understanding of the maintenance process is confirmed by responding accurately to task-related questions.
- 2.3 Recognise and report problems, changes, and/or malfunctions while working with engineering hand tools.

Element 3: Work safely with due care for self, fellow workers, equipment, materials and the environment.

Range

Safe working practices include the use of appropriate personal protective equipment.

Performance Criteria

- 3.1 Safe working practices are explained and demonstrated.
- 3.2 An understanding of SHEQ procedures is demonstrated.

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)

Select, use, and care for engineering measuring equipment

Title		Select, use, and care for engineering measuring equipment			
Field		Manufacturing, Engineering and Construction			
Subfield		Mechanics and Metal Trades			
SZNQF Level	2	Unit ID	MEF 210	Credits	4

Purpose

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

The learning outcomes in this unit standard also contribute to the exit level outcomes required for various NQF level 2 engineering qualifications.

Qualifying learners can identify units of measure commonly accepted within the engineering industry, know the correct symbols, and select, safely use, and maintain a range of engineering measuring equipment.

Special Notes

1. Entry information/Prerequisite

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

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

2. This unit standard may be used as a core or elective within any vocationally based qualification.
3. The scope and level of this unit standard is determined by the ranges as indicated under the specific outcomes.
4. All work is performed under supervision.

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 basic units of measure and symbols.

Range

Basic units of measure include length, mass, temperature, angle, pressure, and velocity.

Performance Criteria

- 1.1 Basic units of measure, symbols, and derived units of measure are explained and discussed.
- 1.2 Measuring equipment used as recommended by the manufacturer to meet job/task requirements.
- 1.3 Measurements are taken and recorded.
- 1.4 Unsafe/faulty measuring equipment identified and corrective action taken.
- 1.5 Measuring equipment cleaned, serviced, maintained, and stored.

Element 2: Select and use engineering measuring equipment.

Range

Measuring equipment includes verniers, callipers, tapes, rulers, combination set, spirit level, plumb bob, micrometers, dial gauges, feeler gauges, thermometers, scales, go/no go gauges, thread gauges, and pressure gauges.

Performance Criteria

- 2.1 Basic units of measure, symbols, and derived units of measure are explained and discussed.
- 2.2 Measuring equipment used as recommended by the manufacturer to meet job/task requirements.
- 2.3 Measurements are taken and recorded.
- 2.4 Unsafe/faulty measuring equipment identified and corrective action taken.
- 2.5 Measuring equipment cleaned, serviced, maintained, and stored.

Element 3: Care for and maintain measuring equipment.

Range

- Damaged or faulty measuring equipment includes deformities, breakages, stickiness, not zeroing, missing parts, and expired calibration.
- Maintenance of measuring equipment includes oiling, setting, and calibration.

Performance Criteria

- 3.1 Basic units of measure, symbols, and derived units of measure are explained and discussed.
- 3.2 Measuring equipment used as recommended by the manufacturer to meet job/task requirements.
- 3.3 Measurements are taken and recorded.
- 3.4 Unsafe/faulty measuring equipment identified and corrective action taken.
- 3.5 Measuring equipment cleaned, serviced, maintained, and stored.

Element 4: Recognise and report problems, changes, and/or malfunctions while working.

Performance Criteria

- 4.1 Unsafe/faulty measuring equipment identified and corrective action taken.
- 4.2 Recognise and report problems, changes, and/or malfunctions while working with engineering hand tools.

Element 5: Work safely with due care for self, fellow workers, equipment, and materials.

Performance Criteria

- 5.1. Safe working practices are explained and demonstrated.
- 5.2 An understanding of SHEQ procedures is demonstrated.

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)

Weld carbon steel work-pieces using the shielded metal arc welding process in all positions (1)

Title		Weld carbon steel work-pieces using the shielded metal arc welding process in all positions			
Field		Manufacturing, Engineering and Construction			
Subfield		Mechanics and Metal Trades			
SZNQF Level	2	Unit ID	MEW 209	Credits	8

Purpose

This unit standard specifies the competencies required to describe the shielded metal arc welding process, select, assemble, and conduct pre-operational checks, prepare work pieces, and further conduct inspection for welding defects. This unit standard is for Fitting Level 2.

Special Notes

1. Entry information/Prerequisite
 MEW 201: Apply and maintain safety rules and regulations
 MEW 202: Communicate in welding and fabrication environment
 MEW 203: Use basic welding definitions and symbols
 MEW 210: Draw and interpret simple plate, pipe and structural steel plate drawings
 MEW 211: Use and maintain hand and power tools in welding and fabrication operations
2. This unit standard is to be delivered and assessed in the context of the welding field 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 welding and fabrication is carried out.
4. Regulations and legislation relevant to this unit standard may include but not limited to the following:
 - Workers' Compensation Act No.7 of 1983
 - Occupational Health and Safety Act 2001 and all subsequent amendments
5. Welding equipment may include but not limited to constant voltage power

source, earthclamp, welding cable and welding consumables.

6. The material type to be used may be chosen from the range of carbon steels (plate only), applicable to the material groups 1, 2, 3 or 11 [according to ISO (TR) 15608] and the material thickness minimum is 3-6mm.
7. Tools, equipment, safety requirements in relation to job requirements.
8. The cause for welding defects may include but not limited to heat input, electrode manipulation, electrode size, joint preparation, welding technique, consumable handling.
9. The welding positions include flat/horizontal, vertical and overhead (fillet and groove welding).

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: Describe the shielded metal arc welding process

- 1.1 The importance of correct assembly of the shielded metal arc welding equipment, and the consequences of incorrect assembly, are explained with reference to the manufacturer requirements.
- 1.2 Basic and major components of the shielded metal arc welding equipment are identified and the explanation of function and purpose is correct in terms of manufacturer's requirements and standards.
- 1.3 Terms and definitions used are consistent with generally accepted welding terminology as recorded in international welding standards.
- 1.4 Safety precautions in accordance to the OHS Act is explained.

Element 2: Select, set up and conduct pre-operational checks of shielded metal arc welding equipment.

Performance Criteria

- 2.1 Verification of identification and selection of shielded metal arc welding equipment as specified on welding procedure specification.
- 2.2 Identification and rectification of hazards relating to welding process in accordance with standard work site practices.

- 2.3 Equipment is assembled and pre-operational checks are carried out in accordance with manufacturer's specifications.

Element 3: Prepare work pieces prior to welding

Performance Criteria

- 3.1 Work pieces prepared prior to welding as specified on drawing and worksite procedures.
- 3.2 Dimensions and alignment checked as specified on drawing.
- 3.3 Workpiece tack welded in position as per drawing specifications.
- 3.4 workpiece inspected prior to welding.

Element 4: Weld workpieces

Performance Criteria

- 4.1 Welding electrodes selected as specified on welding procedure specification.
- 4.2 Work piece welded in position as per job requirement.
- 4.3 Work piece cleaned after welding as per worksite practices.

Element 5: Inspect welded work piece for defects in compliance with drawing specifications

Performance Criteria

- 5.1 All residues slag and spatter removed as specified in cleaning procedure.
- 5.2 Welded work piece conforms to job specifications.
- 5.3 Inspection methods and procedures selected are conducive to specifications.
- 5.4 Documentation completed as reflected in worksite practices.

Element 6: Care for and store welding consumables and equipment.

Performance Criteria

- 6.1 Tools and equipment cared for as per manufacturer's specifications and stored as per worksite practices.
- 6.2 Tools and equipment stored to conform to worksite practices.
- 6.3 Welding consumables stored in accordance to manufacturer's specifications and worksite practices.

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)

Weld, braze, cut and heat metals using the oxy-acetylene process (2)

Title		Weld, braze, cut and heat metals using the oxy-acetylene process			
Field		Manufacturing, Engineering and Construction			
Subfield		Mechanics and Metal Trades			
SZNQF Level	2	Unit ID	MEF 213	Credits	8

Purpose

This unit standard specifies the competencies required to describe the oxy-acetylene process and prepare equipment and workpieces. This unit standard is for persons in Fitting Level 2.

Special Notes

1. Entry information/Prerequisite

- MEF 204 Identify engineering materials, their characteristics and applications, and common metal tests used in engineering
- MEF 207 Mark off basic regular engineering shapes
- MEF 208 Read, interpret, and produce basic engineering drawings

2. This unit standard is to be delivered and assessed in the context of the fitting field 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 welding and fabrication is carried out.
4. Regulations and legislation relevant to this unit standard may include but not limited to the following:
 - Workers' Compensation Act No.7 of 1983
 - Occupational Health and Safety Act 2001 and all subsequent amendments
5. The material type to be used may be chosen from the range of carbon steels (plate only), applicable to the material groups 1, 2, 3 or 11 [according to ISO (TR) 15608] and the material thickness minimum is 1.6mm.
4. Tools, equipment, safety requirements in relation to job requirements.
5. The welding positions are flat and flat-rotated (fillet and groove welding).
6. Tools and equipment include but not limited to gas cylinders, mixers, nozzles, gas regulators, flashback arrestors, hoses, torches and tips, brazing alloys and fluxes etc.

7. Joint types – ferrous to ferrous metals, non-ferrous to non-ferrous metals, ferrous to non-ferrous metals.

8. Processes used in the heat treatment of metals:

- Annealing
- Hardening
- Normalizing
- Stress relieving
- Tempering
- Quenching
- Cooling
- Spheroidizing
- Forging

9. Methods used for hardened steel;

- Water hardening
- Oil hardening
- Air hardening
- Case hardening

10. Methods used to heat-treat metals;

- Flame
- Furnace/Oven
- Induction

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: Describe the oxy-acetylene brazing and welding process

Performance Criteria

1.1 Components of the oxy-acetylene brazing and welding equipment are identified and the explanation of function and purpose is correct in terms of manufacturer's requirements and standards.

1.2 The importance of correct assembly of the oxy-acetylene brazing and welding equipment is explained with reference to the manufacturer requirements.

1.3 The consequences of incorrect assembly are explained with reference to the manufacturer's requirements.

1.4 Brazing and welding equipment components are correctly identified and the consequences for not testing for leaks are explained.

1.5 Terms and definitions used are consistent with generally accepted brazing and welding terminology as recorded in international standards.

Element 2: Prepare equipment prior to brazing and welding

Performance Criteria

2.1 Identification and selection of oxy-acetylene welding and brazing equipment and accessories as specified in manufacturer's specifications.

2.2 Identification and rectification of hazards relating to welding and brazing process in accordance with the standard work site practices

2.3 Pre-operational checks are carried out in accordance with manufacturer's specifications.

2.4 Incidents involving individuals are reported immediately to the relevant persons.

Element 3: Prepare work pieces prior to brazing and welding

Performance Criteria

3.1 Workpieces are identified and prepared prior to brazing and welding as specified on drawing and worksite practices and procedures.

3.2 Dimensions and alignment checked as specified on drawing.

3.3 Consequences of incorrect start up and shut down procedures are explained.

3.4 Work piece tacked in position as per drawing specifications.

3.5 Inspect work piece prior to complete brazing and welding in accordance with drawing and work instructions.

Element 4: Braze or weld workpiece

Performance Criteria

4.1 Brazing or welding filler material selected as specified according to worksite practices.

4.2 Work piece brazed or welded in position.

4.3 Flame used is compatible to type of material to be brazed or welded.

4.4 Work piece cleaned after brazing or welding in accordance with cleaning process specifications.

4.5 Safety precautions adhered to during brazing or welding process.

Element 5: Inspect brazed or welded work piece

Performance Criteria

5.1 All residues after brazing or welding are removed as specified in cleaning procedure.

5.2 Brazed or welded work piece conforms to specifications as reflected on drawing.

Element 6: Describe the oxy-acetylene cutting process

Performance Criteria

6.1 The importance of correct setting of cutting pressures, and the consequences of incorrect settings, is explained.

6.2 Basic and major components of the oxy-acetylene cutting process and equipment are identified, and the explanation of function and purpose is correct in terms of cutting standards.

6.3 Consequences of incorrect start-up and shutdown procedures are explained.

6.4 Cutting characteristics of carbon steel are identified and the implications for un-safe conditions are described.

6.5 Terms and definitions used are consistent with generally accepted cutting terminology as recorded in cutting standards.

6.6 Safety precautions are explained in accordance to OHS Act (applicable to cutting process).

Element 7: Prepare for the oxy- acetylene cutting operation

Performance Criteria

7.1 The scope and precise nature of preparing for oxy- acetylene cutting is in accordance with manufacturer's documentation and work instructions.

7.2 Oxy- acetylene gas equipment is assembled and tested in accordance with manufacturer's instructions and company specific safety operating procedures.

7.3 Resources are correct for the task and checked for serviceability or status in accordance with worksite practices and cutting standards.

7.4 Pre-operational checks are carried out in accordance with manufacturer's operations manual and specifications.

7.5 Cutting of materials match work instruction sheet.

7.6 Safety precautions are adhered to in accordance to OHS Act

Element 8: Cut material

Performance Criteria

- 8.1 Cutting of material is carried out in accordance with work instruction sheet and drawing requirements.
- 8.2 Apply quality check on cut materials.
- 8.3 End product is inspected to conform to specifications as reflected on drawing or job requirement.
- 8.4 Safety precautions are applied and adhered to in accordance with OHS Act (applicable to the cutting process).
- 8.5 Care and storage of cutting equipment, tools, and materials

Element 9: Describe the heat-treatment processes

Performance criteria

- 9.1 Define terminology associated with heating or heat treatment.
- 9.2 Identify hazards and describe safe work practices pertaining to heat treatment.
- 9.3 Identify methods used to determine the carbon content of steel.
- 9.4 Describe the procedures used to determine properties of materials namely chemical, physical and mechanical.
- 9.5 Identify the processes used in the heat treatment of metals and describe their applications.
- 9.6 Identify methods used for hardened steel and describe the properties of steel produced by each.
- 9.7 Identify methods used to heat-treat metals and describe their associated procedures and equipment

Element 10: Complete cutting, heating, brazing or welding activities

Performance criteria

- 10.1 Tools, equipment, and materials are accounted for and returned to storage in accordance with workplace procedures.
- 10.2 Waste materials and left over parts are disposed of or processed in accordance with workplace procedures.

Registration Data

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