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OCCUPATIONAL SKILLS PROGRAMME

Occupational Role Profile

IN LINE WITH THE OQSF POLICY (2021) OCCUPATIONAL QUALIFICATION TYPE (NOMENCLATURE)

QUALIFICATION/PART-QUALIFICATION/SKILLS PROGRAMME	TYPE (NOMENCLATURE)	TITLE (DESCRIPTOR)	NQF LEVEL	CREDITS
Skills Programme	Skills Certificate	Turbine Fitter (Gas and Steam)	5	48
CURRICULUM CODE	900488-000-00-00			

PARTNER DETAILS	ORGANISATION NAME	WEBSITE ADDRESS	TELEPHONE NUMBER	LOGO
QUALITY PARTNER - DEVELOPMENT	Energy and Water Services Education and Training Authority (EWSETA)	Home - Energy & Water SETA (ewseta.org.za)	+27 11 274-4700	EW SETA
QUALITY PARTNER – ASSESSMENT	N/A	N/A	N/A	N/A

DESIGNATION	NAME AND SURNAME	SIGNATURE	DATE
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QUALITY PARTNER REPRESENTATIVE	Petronella Ngubeni		24 June 2024

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653303: Mechanical Fitter

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TYPE	TITLE	NQF LEVEL	CREDITS	CURRICULUM CODE
Occupational Qualification	Occupational Certificate: Mechanical Fitter	4	410	653303-000-00-00

OFO MAJOR GROUP

6 - SKILLED AGRICULTURAL, FORESTRY, FISHERY, CRAFT AND RELATED TRADES WORKERS

Skilled agricultural, forestry, fishery craft and related trades workers apply specific knowledge and skills to construct and maintain buildings, form metal, erect metal structures, set machine tools, or make, fit, maintain and repair machinery, equipment or tools, carry out printing work produce or process foodstuffs, textiles, or wooden, metal and other articles, including handicraft goods and grow and harvest field or tree and shrub crops, breed, tend or hunt animals, produce a variety of animal husbandry products, cultivate, conserve and exploit forests and breed or catch fish.

Tasks:

- Installing and erecting heavy metal structures, tackle and related equipment
- Growing fruit and other tree and shrub crops, garden vegetables and horticultural products
- Executing printing work; producing and processing foodstuffs and various articles made of wood, textiles, leather and related materials
- Cultivating, conserving and exploiting forests; breeding or catching fish; cultivating or gathering other forms of aquatic life
- Making precision instruments, jewellery, household and other precious-metal articles, pottery, glass and related products
- Supervision of other workers may be included
- Producing handicrafts
- Sowing, planting, spraying, fertilising and harvesting field crops
- Fitting, maintaining and repairing industrial machinery, including engines and vehicles, as well as electrical and electronic instruments and other equipment
- Breeding, raising, tending or hunting animals mainly to obtain meat, milk, hair, fur, skin, sericultural, apiarian or other products
- Storing, and basic processing of produce
- Setting for operators, or setting and operating various machine tools
- Constructing, maintaining and repairing buildings and other structures; casting, welding and shaping metal
- Making machinery, tools, equipment, and other metal articles

OFO SUB MAJOR GROUP

65 - Metal, Machinery and Related Trades Workers

Metal, machinery and related trades workers cast, weld, forge and, by other methods, form metal, erect, maintain and repair heavy metal structures, engage in machine-tool setting as well as in fitting, maintaining and repairing machinery, including engines, vehicles, or they produce tools and various non-precious-metal articles. The work is carried out by hand and by hand-powered and other tools which are used to reduce the amount of physical effort and time required for specific tasks, as well as to improve the quality of the products. The tasks call for an understanding of the work organisation, the materials and tools used, and the nature and purpose of the final product.

Tasks:

- Installing, erecting, maintaining and repairing heavy metal structures, tackle and related equipment
- Fitting, installing, maintaining and repairing industrial machinery, including engines and vehicles and similar mechanical equipment
- Setting for operators or setting and operating various machine tools
- Making moulds and cores for casting metal
- Forging and forming steel and other non-precious metals to make and repair machinery, tools, equipment and other articles
- Supervision of other workers may be included
- Casting, welding and shaping metal

OFO MINOR GROUP

653 - Machinery Mechanics and Repairers

Machinery mechanics and repairers fit, install, maintain and repair engines, vehicles, agricultural or industrial machinery and similar mechanical equipment..

Tasks:

Fitting, installing, maintaining and repairing engines, vehicles, agricultural or industrial machinery and similar mechanical equipment

OFO UNIT GROUP

6533 - Agricultural and Industrial Machinery Mechanics and Repairers

Agricultural and industrial machinery mechanics and repairers fit, install, examine, service and repair engines, agricultural and industrial machinery and mechanical equipment, except motor vehicle, aircraft and electric motors.

Tasks:

Fitting, installing, examining, servicing and repairing engines, machinery and mechanical equipment

Examining parts for defects such as breakage and excessive wear

Operating newly repaired machinery and equipment to verify the adequacy of repairs

Inspecting and testing new machinery and mechanical equipment for conformity with standards and specifications

Disassembling machinery and equipment to remove parts and make repairs

Oiling and greasing stationary engines and machinery

Recording repairs and maintenance performed

OFO OCCUPATION

653303 - Mechanical Fitter

Fits installs, examines, services and repairs engines, machinery and mechanical equipment.

1.1.3 Alternative titles used by industry:

South African Industry Titles:

- Turbine Technician
- Power Plant Technician
- Mechanical Maintenance Technician
- Rotating Equipment Technician
- Industrial Turbine Mechanic
- Plant Maintenance Technician
- Turbine Fitter
- Mechanical Artisan
- Maintenance Fitter
- Field Service Technician

Global Industry Titles:

- Turbine Maintenance Technician
- Gas Turbine Technician
- Steam Turbine Technician
- Mechanical Technician
- Turbine Mechanic
- Field Service Engineer
- Rotating Equipment Engineer
- Power Generation Technician
- Industrial Maintenance Technician
- Turbine Service Technician
- Maintenance Engineer
- Power Plant Mechanic

1.2 Curriculum Information:

1.2.1 Articulation for Qualifications and Part- Qualifications

(a) Horizontal Articulation: This qualification articulates horizontally within the OQSF and between other sub-framework(s) as follows:

Within OQSF -

N/A

Between sub-frameworks -

N/A

(b) Vertical Articulation: This qualification articulates vertically within the OQSF as follows:

N/A

(c) Diagonal Articulation: This qualification articulates diagonally across NQF levels and across Sub-Frameworks:

N/A

(d) Validation of Entry Requirements into articulation possibilities provided:

NB: If the entry requirements make articulation possible, answer YES.

N/A

1.2.2 Articulation for Skills Programmes

(a) Work Opportunities:

The skills of a Gas and Steam Turbine Fitter are highly specialised and can be applied in a variety of roles across different industries. Here are some specific jobs where these skills can be utilised:

- **Power Plant Maintenance Technician**
  - Responsible for the maintenance and repair of power generation equipment, including turbines, within a power plant.
- **Rotating Equipment Technician**
  - Focuses on the maintenance and repair of rotating equipment, such as compressors, pumps, and turbines, used in various industries.
- **Field Service Technician**
  - Travels to different sites to perform maintenance, repairs, and installations of gas and steam turbines and related equipment.
- **Mechanical Maintenance Technician**
  - Works in industrial settings to maintain and repair mechanical systems, including turbines.
- **Industrial Turbine Mechanic**
  - Specializes in the maintenance and repair of turbines used in industrial applications, such as manufacturing plants and refineries.
- **Plant Maintenance Technician**
  - Ensures the smooth operation of all mechanical equipment, including turbines, in a manufacturing or processing plant.

- **Turbine Commissioning Engineer**
    - Involved in the commissioning and startup of new turbine installations, ensuring they are correctly installed and functioning properly.
- **Power Generation Technician**
    - Maintains and repairs equipment used in the generation of electrical power, including gas and steam turbines.
- **Maintenance Fitter**
    - Performs routine maintenance and repairs on various mechanical systems, including turbines, in an industrial setting.
- **Energy Sector Technician**
    - Works within the energy sector, focusing on the maintenance and repair of equipment used in power generation and distribution.
- **Marine Engineer**
    - Applies turbine repair skills to marine propulsion systems, which often include gas turbines.
- **Aerospace Technician**
    - Utilizes knowledge of gas turbines for the maintenance and repair of aircraft engines.
- **Process Plant Technician**
    - Works in chemical or petrochemical plants, maintaining and repairing turbines used in the process of manufacturing chemicals or refining oil.
- **Hydroelectric Plant Technician**
    - Maintains and repairs turbines used in hydroelectric power plants.
- **Wind Turbine Technician**
    - While more specific to wind energy, the mechanical and technical skills can be transferable to maintaining and repairing wind turbines.

(b) Learning Opportunities:

Further learning courses that can build on the skills acquired in the Turbine Fitter Skills Programme can enhance a learner's expertise and open up additional career opportunities. Here are some specific courses:

Technical and Engineering Courses:

- **Advanced Turbine Technology**
    - In-depth courses on advanced turbine designs, materials, and technology advancements.
- **Mechanical Engineering (Diploma or Degree)**
    - Comprehensive programs covering a broad range of mechanical systems, including turbines.

- **Power Plant Engineering**
    - Focuses on the operation, maintenance, and management of power plants.
- **Rotating Equipment Engineering**
    - Specialized training on the maintenance and repair of rotating machinery.
- **Instrumentation and Control Engineering**
    - Courses on the control systems and instrumentation used in power generation and industrial settings.
- **Thermodynamics and Heat Transfer**
    - Advanced courses on the principles governing energy conversion and heat transfer in turbines.
- **Certifications and Professional Development:**
- **Certified Maintenance and Reliability Professional (CMRP)**
    - A certification focusing on maintenance and reliability best practices.
- **Gas Turbine Engineering Certificate (ASME)**
    - Specialized certificate programs offered by the American Society of Mechanical Engineers (ASME).
- **Steam Turbine Training Programs**
    - Industry-specific training programs focusing on steam turbine operation and maintenance.
- **HVAC and Refrigeration Engineering**
    - Courses on heating, ventilation, air conditioning, and refrigeration systems, which often use turbine technology.
- **Renewable Energy and Sustainable Practices:**
- **Wind Turbine Technology**
    - Training on the installation, maintenance, and repair of wind turbines.
- **Renewable Energy Engineering**
    - Programs focusing on various forms of renewable energy, including wind, solar, and hydroelectric power.
- **Energy Efficiency and Sustainability**
    - Courses on improving energy efficiency and implementing sustainable practices in industrial settings.
- **Safety and Compliance:**
- **Occupational Health and Safety (OHS)**

- Training on maintaining a safe working environment in industrial and power plant settings.

- **Environmental Compliance and Management**
  - Courses on ensuring compliance with environmental regulations and managing environmental impact.
- **Project Management and Leadership:**
- **Project Management Professional (PMP)**
  - Certification focusing on project management skills applicable to engineering projects.
- **Leadership and Management in Engineering**
  - Courses on developing leadership and management skills for engineering professionals.
- **Practical and Hands-On Training:**
- **Apprenticeship Programs**
  - Advanced apprenticeship programs focusing on specific aspects of turbine maintenance and repair.
- **On-the-Job Training Programs**
  - Practical training programs offered by employers or industry organizations.

These courses and programs can help a learner advance their knowledge and skills, leading to greater expertise and more advanced career opportunities in the field of turbine technology and related industries.

1.3 List of Qualification(s)/Part- Qualification(s)/Skills Programme(s) Related to this Curriculum

TYPE	TITLE	NQF LEVEL	CREDITS	CURRICULUM CODE
Occupational Qualification	Occupational Certificate: Mechanical Fitter	4	410	653303-000-00-00

SECTION 2: OCCUPATIONAL SKILLS PROGRAMME PROFILE

2.1 Purpose:

A Steam and Gas Turbine Fitter utilises their base knowledge and capabilities as a Mechanical Fitter to carry out specialised mechanical maintenance and repair activities on Gas and Steam turbine components including generators and associated auxiliaries.

Upon completion of the training the Fitter will be able to:

- Utilise specialised tools to disassemble gas and steam turbines.
- Inspect gas and steam turbines and identify the need for maintenance and refurbication of components.

- Conduct manual refurbishment of gas and steam turbine components.
- Reassemble, test and commission maintained/repaired gas and steam turbines.
- Document and report on repair and maintenance conducted on gas and steam turbines.

Qualified and competent learners will demonstrate the following key attributes:

- **Detail Orientated**

  Turbine Fitters deal with complex machinery and precise components. Small errors can lead to significant operational issues, safety hazards, or costly downtime.

- **Technical Problem Solver**

  Turbine Fitters often encounter unexpected issues that require quick and effective solutions to maintain productivity and ensure safety.

- **Operationally adaptable and flexible**

  The work environment for Turbine Fitters can be dynamic, with changing conditions, new technologies, and varying project requirements.

- **Compliant with health and safety standards**

  Working with turbines involves significant safety risks, and a strong commitment to safety ensures the well-being of the fitter and their colleagues.

- **Effective Team Player**

  Turbine Fitters typically work as part of a larger team and must coordinate with other technicians, engineers, and supervisors to complete tasks efficiently and safely.

2.2 Tasks:

TASK	LINKS TO ELO
TASK 01: Utilise specialised tools to disassemble gas and steam turbines.	ELO 01: Apply essential methods, procedures and techniques to utilise specialised tools and equipment for the disassembly of steam and gas turbines.
TASK 02: Inspect gas and steam turbines and identify the need for maintenance and refurbication of components.	ELO 02: Apply fundamental knowledge and understanding of the components and workings of steam and gas turbines and use own knowledge to inspect the turbines and identify the need for maintenance and refurbication of turbine components.
TASK 03: Conduct manual refurbishment of gas and steam turbine components.	ELO 03: Apply essential methods, procedures and precision machining, grinding, or welding techniques to repair and restore gas and steam turbine parts to their original specifications.

TASK 04: Reassemble, test and commission maintained/repaired gas and steam turbines.	ELO 04: Apply own knowledge to solve turbine operational problems and adjust common solutions to ensure the effective reassembly, testing and commissioning of repaired/refurbished gas and steam turbines.
TASK 05: Document and report on repair and maintenance conducted on gas and steam turbines.	ELO 05: Gather evaluate and interpret technical information to document and report on repair and maintenance conducted on gas and steam turbines.

2.3 Occupational Task Details:

2.3.1 Task 1

Utilise specialised tools to disassemble gas and steam turbines.

(a) Unique Product or Service:

Safe and efficient disassembly of the turbine without damage to any parts and interfaces

(b) Responsibilities:

- Read and interpret technical requirements and required scope of maintenance/repair work.
- Facilitate the safe lifting and movement of turbine components.
- Correctly and safely use specialised tools according to manufacturer guidelines.
- Accurately identify and remove turbine components without causing damage.
- Maintain a clean and organised work area to prevent tool loss and contamination.
- Check, measure and Record the condition and arrangement of disassembled parts for accurate reassembly.
- Follows all safety protocols and procedures to prevent accidents and equipment damage.

(c) Contexts:

In the context of utilising specialised tools to disassemble gas and steam turbines, the physical work environment is typically an industrial setting, such as a power plant or maintenance facility, where noise levels can be high, and safety protocols are strictly enforced. The turbine fitter must make critical decisions regarding the correct use and handling of specialised tools, ensuring both safety and efficiency. Teamwork is essential, as disassembly often requires coordination with other fitters, engineers, and safety personnel to safely and effectively dismantle complex machinery.

2.3.2 Task 2

Inspect gas and steam turbines and identify the need for maintenance and refurbication of components.

(a) Unique Product or Service:

A comprehensive and accurate assessment of the disassembled turbine that determines the turbine's component condition and specifies required maintenance and /or refurbishing requirements.

(b) Responsibilities:

- Thoroughly examine each turbine component for signs of wear, damage, or corrosion.
- Use precision measurement tools to assess the condition and alignment of parts.
- Document and report all findings, highlighting areas needing maintenance or replacement.
- Interpret inspection results to determine the appropriate maintenance or refurbishment actions.

(c) Contexts:

When inspecting gas and steam turbines to identify the need for maintenance and refurbishment, the work environment involves both on-site inspections at operational power plants and in workshop settings. The turbine fitter must exercise a high level of decision-making, using diagnostic tools and visual inspections to determine the condition of components and the urgency of required maintenance. Team collaboration is crucial for accurate assessment, often involving discussions with engineers, supervisors, and other technicians to develop a comprehensive maintenance plan.

2.3.3 Task 3

Conduct manual refurbishment of gas and steam turbine components.

(a) Unique Product or Service:

Effective, safe and efficient restoration of the turbine to its optimal operational condition, ensuring enhanced performance, reliability, and longevity.

(b) Responsibilities:

- Disassemble and clean turbine components to remove contaminants and prepare them for refurbishment.
- Perform precision machining, grinding, or welding to repair or restore parts to their original specifications.
- Replace worn or damaged components with new or refurbished parts, ensuring proper fit and function.

(c) Contexts:

Conducting manual refurbishment of gas and steam turbine components typically takes place in a controlled workshop environment equipped with specialised machinery and tools. The turbine fitter needs to make precise decisions regarding the techniques and materials used for refurbishment, ensuring components meet specified tolerances and performance standards. This task requires a moderate level of teamwork, often working alongside welders, machinists, and quality control inspectors to restore components to their optimal condition.

2.3.4 Task 4

Reassemble, test and commission maintained/repaired gas and steam turbines.

(a) Unique Product or Service:

Seamless reintegration of the repaired/maintained turbine into service, ensuring its reliable and efficient operation according to specified performance standards.

(b) Responsibilities:

- Reassemble turbine components meticulously, ensuring correct alignment and secure fastening according to specifications.

- Conduct comprehensive functional tests to verify the performance and reliability of the reassembled turbine.
- Calibrate and adjust settings to achieve optimal operational efficiency and compliance with manufacturer standards.
- Identify and rectify any issues detected during testing to ensure the turbine operates correctly and safely.
- Document all reassembly and testing procedures, providing a detailed report for future reference and compliance purposes.
- Facilitate the recommissioning of the properly functioning turbine and its reintegration into the operational system.

(c) Contexts:

Reassembling, testing, and commissioning maintained or repaired gas and steam turbines occur both in workshops and at power plant sites. The physical environment can be demanding, requiring the turbine fitter to work in confined spaces or at heights. The decision-making process is critical, involving the accurate reassembly of components, alignment, and testing to ensure the turbine operates correctly. Extensive teamwork is needed, coordinating with other fitters, engineers, and testing specialists to ensure the turbine is safely and efficiently brought back into operation.

2.3.5 Task 5

Document and report on repair and maintenance conducted on gas and steam turbines.

(a) Unique Product or Service:

Detailed and accurate record that ensures traceability, informs future maintenance decisions, and verifies compliance with operational and safety standards.

(b) Responsibilities:

- Compile detailed documentation outlining all repair and maintenance tasks performed on gas and steam turbines.
- Check to ensure the accuracy and completeness of records, including parts replaced, procedures followed, and time taken.
- Provide clear and concise reports highlighting any issues encountered and actions taken during the repair process.
- Verify compliance with regulatory requirements and manufacturer specifications in all documentation.
- Archive records systematically for future reference, audits, and maintenance planning purposes.

(c) Contexts:

Documenting and reporting on repair and maintenance conducted on gas and steam turbines involves working in an office environment, where the turbine fitter compiles detailed records and reports on the work performed. This task requires careful decision-making to ensure all documentation is accurate, comprehensive, and compliant with industry standards and regulations. The extent of required teamwork is minimal compared to other tasks, but collaboration with supervisors and quality assurance personnel is necessary to verify the accuracy and completeness of the documentation.