



Curriculum Document				
Curriculum Code	Curriculum Title			
651202-000-00-SP01	Coded Shielded Metal Arc Fillet Welder			
Industry Body Partner	Name	E-mail	Phone	Logo
	South African Institute for Elders			

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SECTION 1: CURRICULUM SUMMARY

1. Occupational Information

1.1 Associated Occupation

651202: Welder.

1.2 Skill Addressed by this Curriculum

Code Certified Shielded Metal Arc Fillet Welder.

1.3 Related Occupational Qualification Curriculum

651202000: Welder.

Curriculum Information

1.1 Curriculum Structure

The total credit value for this Skills Programme: 40 Credits

This Skills Programme is at NQF Level 2

This Skills Programme is made up of the following compulsory Knowledge and Application Skills Modules:

Knowledge Modules:

- 651202-000-00-SP01-KM-01 Introduction to the welding trade, NQF level 2, Cr 2.
- 651202-000-00-SP01-KM-02 Occupational safety, health and environmental protection, NQF level 2, Cr 4.
- 651202-000-00-SP01-KM-03 Welding schematics, calculations, welds and welded joints, NQF level 2 Cr 2.
- 6651202-000-00-SP01-KM-04 Weld imperfections, NQF level 2, Cr 2.
- 651202-000-00-SP01-KM-08 Fusion welding, NQF level 3, Cr 1.
- 651202-000-00-SP01-KM-09 Arc welding, NQF level 3, Cr 1.

Total number of credits for Knowledge Modules: 12.

Application Skills Modules:

- 651202000-00-SP01-PM-03 Perform fillet welds using shielded metal arc welded processes NQF level 3, Cr 12.
- 651202-000-00-SP01-WM-02-01 Produce a range of fillet welds using Shielded Metal Arc Welding processes with carbon steel and stainless steel materials in the flat, horizontal, vertical and overhead (FHVO) positions, NQF level 4, Cr 16.

Total number of credits for Application Skills Modules: 28.

1.2 Learning Assumed to be in Place

NQF Level 1.

1.3 Quality Assurance

QCTO will facilitate the assessment and quality assurance

1.4 Possible Learning Pathway

The Welding qualification comprises three (3) part qualifications and nine (9) skills programmes. Having completed skills programme in FW001_Shielded Metal Arc Welding (SMAW) and individual may progress to learning in the any of the desired welding skills programmes as listed below

1. Fillet Welder

1. FW001_Shielded Metal Arc Welding (SMAW)
2. FW002_Gas Tungsten Arc Welding (GTAW)
3. FW003_Gas Metal Arc Welding [MIG & MAG], Including Flux Cored Arc Welding (FCAW)

2. Plate/Butt Welder

1. PBW001_Shielded Metal Arc Welding (SMAW)
2. PBW002_Gas Metal Arc Welding [MIG & MAG], Including Flux Cored Arc Welding (FCAW)
3. PBW003_Gas Tungsten Arc Welding GTAW)

3. Pipe Welder

1. PW001_Shielded Metal Arc Welding (SMAW)
2. PW002_Gas Metal Arc Welding [MIG & MAG], Including Flux Cored Arc Welding (FCAW)
3. PW003_Gas Tungsten Arc Welding (GTAW)

SAQA ID: 91400; Occupational Certificate: Welder; NQF Level 4; Credits 372.

SECTION 2: SKILLS PROGRAMME PROFILE

1. Skills Programme Purpose

The purpose of this skills programme is to prepare a learner to operate as a Shielded Metal Arc Fillet Welder. A Shielded Metal Arc Fillet Welder produces a range of fillet welds using Shielded Metal Arc Welding processes with carbon steel and stainless steel materials in the flat, horizontal, vertical and overhead (FHVO) positions. This individual will be able to weld any kind of fillet welds within various kinds of production environments and will be in a position to weld gates, burglar bars and various types of fillet welds required in a factory or a production environment.

Skills Programme Tasks

- Fillet weld using the Shielded Metal Arc Welding process on carbon steel and stainless steel materials in the flat, horizontal, vertical and overhead (FHVO) position

2. Skills Programme Task Details

2.2 Fillet weld metal pieces using Shielded Metal Arc Welding processes with carbon steel and stainless-steel materials in the flat, horizontal, vertical and overhead (FHVO) position

Unique Product or Service:

- Produce fillets welds in the flat, horizontal, vertical and overhead (FHVO) position

Skills Programme Responsibilities:

- Produce single pass fillet weld using the Shielded Metal Arc Welding process with carbon steel and stainless steel materials in the flat position
- Perform a multi pass fillet weld using the Shielded Metal Arc Welding process with carbon steel and stainless steel materials in the flat position

SECTION 3: CURRICULUM COMPONENT SPECIFICATIONS

SECTION 3A: KNOWLEDGE MODULE SPECIFICATIONS

List of Knowledge Modules for which Specifications are included

- 651202000-KM-01: Introduction to the welding trade, NQF Level 2 (2 credits)
- 651202000-KM-02: Occupational Safety, Health and Environmental Protection, NQF Level 2 (4 credits)
- 651202000-KM-03: Welding schematics, calculations, welds and welded joints, NQF Level 2 (2 credits)
- 651202000-KM-04: Weld imperfections, NQF Level 2 (2 credits)
- 651202000-KM-08: Fusion welding, NQF Level 3 (1 credits)
- 651202000-KM-09: Arc welding, NQF Level 3 (1 credit)

Total number of credits for Knowledge Modules: 12.

651202000-KM-01: Introduction to the welding trade, NQF Level 2 (2 credits)

1.1 Purpose of the Knowledge Module

The main focus of the learning in this knowledge module is to introduce the learner to the welding trade, employment opportunities, career opportunities and requirements to qualify as a Welder.

The learning will enable learners to demonstrate an understanding of:

- KM-01-KT01: Occupational profiles of welders (30%)
- KM-01-KT02: Specialised welding related positions (10%)
- KM-01-KT03: The welding apprentices and the trade test (50%)
- KM-01-KT04: The work environment of a welder (10%)

1.2 Guidelines for Topics

1.2.1 KM-01-KT01: Occupational profiles of welders

Topic elements to be covered include:

- KT0101 The occupational profile and employment opportunities for the qualified Fillet welder
- KT0102 The occupational profile and employment opportunities for the qualified Plate welder
- KT0103 The occupational profile and employment opportunities for the qualified Pipe welder
- KT0104 The occupational profile and employment opportunities for coded welders

Internal Assessment Criteria

- Describe and explain the occupational environment and roles of a welder
- Explain the legal restrictions for welding apprentices

1.2.2 KM-01-KT02: Specialised welding related positions

Topic elements to be covered include:

- KT0201 The International Welding Practitioner
- KT0202 The Occupational Trainer: Welding
- KT0203 The International Welding Specialist
- KT0204 The Welding Inspector
- KT0205 The Welding Technologist and Engineer

Internal Assessment Criteria

- Describe and explain the occupational environment and roles of a welder accurately
- Explain the legal restrictions for welding apprentices

1.2.3 KM-01-KT03: The welding apprentices and the trade test

Topic elements to be covered include:

- KT0301 Legal restrictions for welding apprentices
- KT0302 The welding trade test and eligibility requirements

Internal Assessment Criteria

- Describe and explain the occupational environment and roles of a welder accurately
- Explain the legal restrictions for welding apprentices

1.2.4 KM-01-KT04: The work environment of a welder

Topic elements to be covered include:

- KT0401 Career opportunities in different sectors of the economy
- KT0402 Work ethics
- KT0402 Collective agreements that applies to the welding trade

Internal Assessment Criteria

- Describe and explain the occupational environment and roles of a welder accurately
- Explain the legal restrictions for welding apprentices

Provider Programme Accreditation Criteria

Physical Requirements:

- Training/facilitation resources.
- Assessment tools/instruments for assessment.
- Plumbing learning material.

Human Resource Requirements:

- Recommended facilitator/learner ratio 1 to 24.

Legal Requirements:

- None.

Exemptions

None.

2 651202000-KM-02: Occupational Safety, Health and Environmental Protection, NQF Level 2 (4 credits)

2.1 Purpose of the Knowledge Module

The main focus of the learning in this knowledge module is to introduce the learner to general and welding specific safe work practices in an industrial environment

The learning will enable learners to demonstrate an understanding of:

- KM-02-KT01: General health, safety and environmental protection concepts (30%)
- KM-02-KT01: Welding specific health, safety and environmental protection concepts (70%)

2.2 Guidelines for Topics

2.2.1 KM-02-KT01: General health, safety and environmental protection concepts

Topic elements to be covered include:

- KT0201 General overview of occupational health and safety legislation
- KT0202 General workshop safety rules and practices
- KT0203 Environmental protection and pollution
- KT0204 Hazard identification and risk assessment principles
- KT0205 Safety signs and colour coding
- KT0206 Personal protective equipment
- KT0207 Fundamentals of securing worksites
- KT0208 Environmental protection and pollution concepts

Internal Assessment Criteria

- Describe and explain general safe work practices
- Explain legal occupational health, safety and environmental protection concepts at a basic level
- Identify and interpret safety signs and describe the associated risk and safe conduct
- Respond to questions that demonstrates understanding of the inter relationship between workplace safety and a productive work environment
- Explain the general hazards in an industrial environment

2.2.2 KM-02-KT02: Welding specific health, safety and environmental protection concepts

- KT0201 Welding specific safety risks such as the working environment; fumes, heavy and hot material, electrical cables, working at heights for example gantries and fixed staging; poor ground conditions; extremes of heat and cold; wind and rain effects
- KT0202 Protection of other workers from welding hazards,
- KT0203 Welding in confined spaces such as build-up of pollutants; risk of explosion; displacement of oxygen by gases like argon, nitrogen
- KT0204 Properties, handling and storage of compressed gases
- KT0205 Earthing arrangements of welding machines

- KT0206 Extinguishing substances and fire fighting

Internal Assessment Criteria

- Explain the general hazards in a welding fabrication shop
- Explain the need for ventilation, risks of explosion and handling of compressed gases
- Explain basic safety precautions to be taken before and during welding (PPE, shielding, equipment, materials)

Provider Accreditation Requirements for the Knowledge Module

Physical Requirements:

- Training/facilitation resources.
- Assessment tools/instruments for assessment.
- Plumbing learning material.

Human Resource Requirements:

- Recommended facilitator/learner ratio 1 to 24.

Legal Requirements:

- None.

Exemptions

None.

3 651202000-KM-03: Welding schematics, calculations, welds and welded joints, NQF Level 2 (2 credits)

3.1 Purpose of the Knowledge Module

The main focus of the learning in this knowledge module is to introduce the learner to concepts related to welding schematics, calculations, welds and welded joints.

The learning will enable learners to demonstrate an understanding of:

- KM-03-KT01: Welding schematics and calculations (30%)
- KM-03-KT02: Welds and welded joints (70%)

3.2 Guidelines for Topics

3.2.1 KM-03-KT01: Welding schematics and calculations

Topic elements to be covered include:

- KT0101 Description and schematics of typical welds
- KT0102 Welding calculations and measuring gauges

Internal Assessment Criteria

- Identify throat thickness, leg length, penetration, and number of runs from a sketch
- Identify single and multi-run welds, excess weld metal, weld profile from a sketch

3.2.2 KM-03-KT02: Welds and welded joints

Topic elements to be covered include:

- KT0201 Types of joints including butt, "T", lap, flare and corner
- KT0202 Types of welds including butt (full and partial penetration) and fillet
- KT0203 Suitable methods of joint preparation for different metals (plate and pipes)
- KT0204 Characteristics of fillet welds including leg length, throat thickness, penetration, number of runs, weld profile
- KT0205 Characteristics of butt welds including types of joint preparation, single and multi-run welds, excess weld metal, weld profile, penetration, permanent and temporary backing
- KT0206 Examples of welded joints in typical constructions using plates, structures, tanks and pressure vessels
- KT0207 Butt welds in pipes including in-line and at an angle
- KT0208 Branch connections (set-on, set-in and set-through)
- KT0209 Fillet welds (plate to plate, branch connections and tube to plate)

Internal Assessment Criteria

- Explain different welds and joints (butt weld, fillet weld, T-joint, lap joint and corner joint)
- Identify throat thickness, leg length, penetration, and number of runs from a sketch
- Identify single and multi-run welds, excess weld metal, weld profile from a sketch

- Identify the following joint preparations and welds including fillet, square butt, V-, X-(double V), K-(double bevel), U- and J- preparations
- Identify tube-to-plate welds and branch connections from specifications
- Describe the different methods for joint preparation of plates and pipes

Provider Accreditation Requirements for the Knowledge Module

Physical Requirements:

- Training/facilitation resources.
- Assessment tools/instruments for assessment.
- Plumbing learning material.

Human Resource Requirements:

- Recommended facilitator/learner ratio 1 to 24.

Legal Requirements:

- None.

Exemptions

None.

4 651202000-KM-04: Weld imperfections, NQF Level 2 (2 credits)

4.1 Purpose of the Knowledge Module

The main focus of the learning in this knowledge module is to introduce the learner to concepts related to welding schematics, calculations, welds and welded joints.

The learning will enable learners to demonstrate an understanding of:

- KM-0-KT01: Weld imperfections (100%)

4.2 Guidelines for Topics

4.2.1 KM-03-KT04: Weld imperfections

Topic elements to be covered include:

- KT0401 Causes and remedies of imperfections on parent metal, welding process and joint preparation
- KT0402 Influence of weld imperfections on product performance
- KT0403 Influence of the weld geometry on the fatigue life of the product

Internal Assessment Criteria

- Describe the cause of gas pores, incomplete penetration, lack of fusion and cracks
- Describe the remedy for gas pores, incomplete penetration, lack of fusion and cracks
- List ways to eliminate fatigue

Provider Accreditation Requirements for the Knowledge Module

Physical Requirements:

- Training/facilitation resources.
- Assessment tools/instruments for assessment.
- Plumbing learning material.

Human Resource Requirements:

- Recommended facilitator/learner ratio 1 to 24.

Legal Requirements:

- None.

Exemptions

None.

5 651202000-KM-08: Fusion welding, NQF Level 3 (1 credits)

5.1 Purpose of the Knowledge Module

The main focus of the learning in this knowledge module is to introduce the learner to concepts related to fusion welding and related consumables.

The learning will enable learners to demonstrate an understanding of:

- KM-08-KT01: Overview of fusion welding processes and related consumables (100%)

5.2 Guidelines for Topics

KM-08-KT01: Overview of fusion welding processes and related consumables

Topic elements to be covered include:

- KT0101 The arc welding process
- KT0102 Submerged Arc Welding consumables and fluxes
- KT0103 Manual Metal Arc welding and consumables
- KT0104 Metal Inert Gas/Metal Active Gas/Flux Cored welding, consumables and gases
- KT0105 Tungsten Inert Gas welding, consumables and gases
- KT0106 The gas welding process, consumables and gases

Internal Assessment Criteria

- Describe welding processes and consumables
- Describe the major components of welding equipment and their function

Provider Accreditation Requirements

Physical Requirements:

- Training/facilitation resources.
- Assessment tools/instruments for assessment.
- Plumbing learning material.

Human Resource Requirements:

- Recommended facilitator/learner ratio 1 to 24.

Legal Requirements:

- None.

Exemptions

None.

6 651202000-KM-09: Arc welding, NQF Level 3 (1 credits)

6.1 Purpose of the Knowledge Module

The main focus of the learning in this knowledge module is to introduce the learner to concepts related to arc welding principles, hazards and safety.

The learning will enable learners to demonstrate an understanding of:

- KM-09-KT01: Electricity and arc welding equipment (40%)
- KM-09-KT01: Arc welding concepts (30%)
- KM-09-KT02: Arc welding hazards and safety requirements (30%)

6.2 Guidelines for Topics

6.2.1 KM-09-KT01: Electricity and arc welding equipment

Topic elements to be covered include:

- KT0101 Basics of electricity including Ohms law and electrical circuits
- KT0102 Distribution of electricity and main supply
- KT0103 Welding equipment design for converting main supply and matching welding output required
- KT0104 Power sources such as transformers, rectifiers, invertors, engine driven power sources and duty cycles
- KT0105 Type of welding current and polarity
- KT0106 Open circuit and arc voltage

Internal Assessment Criteria

- Explain basic electrical terms and concepts
- Describe the conversion of main supply to matching welding output required
- Describe polarity and change of polarity

6.2.2 KM-09-KT02: Arc welding concepts

Topic elements to be covered include:

- KT0201 The arc as heat source
- KT0202 Basic terminology for welds including run, layer, cap, root, toe and penetration
- KT0203 Types of shielding gases and applications
- KT0204 Formation of the weld pool
- KT0205 Functions of flux and slag
- KT0206 Arc welding parameters

Internal Assessment Criteria

- Explain basic welding terms
- Explain the functions of slag and flux

- Explain a typical shielding gas for a welding process and state its application
- Name the essential parameters of arc welding

6.2.3 KM-09-KT03: Arc welding hazards and safety requirements

Topic elements to be covered include:

- KT0301 Electric shock
- KT0302 UV- and heat radiation
- KT0303 Eye hazards
- KT0304 Burns, fires, fire prevention and fire fighting
- KT0305 Welding fumes
- KT0306 Respiratory hazards
- KT0307 Personal protective equipment and clothing
- KT0308 Noise hazards
- KT0309 Safety practices related to arc welding

Internal Assessment Criteria

- Explain dangerous situations in relation to electricity
- Explain the health risks of welding fumes
- Name adequate means of personal protection
- Explain measures to be taken to prevent fire

Provider Accreditation Requirements

Physical Requirements:

- Training/facilitation resources.
- Assessment tools/instruments for assessment.
- Plumbing learning material.

Human Resource Requirements:

- Recommended facilitator/learner ratio 1 to 24.

Legal Requirements:

- None.

Exemptions

None.

SECTION 3B: APPLICATION SKILLS MODULE SPECIFICATIONS

Application Skills Modules:

- 651202000-PM-03: Perform fillet welds using the Shielded Metal Arc Welding process, NQF Level 3 (Credits 12)
- 651202000-WM-02_01: Produce a range of fillet welds using various welding processes in a workplace, NQF Level 4 (Credits 16)

Total number of credits for Knowledge Modules: 28

1. 651202000-PM-03: Perform fillet welds using the Shielded Metal Arc Welding process NQF Level 3 (12)

1.1 Purpose of the Practical Skill Module

The focus of the learning in this module is on providing the learner an opportunity to develop fillet-welding skills to the minimum requirements of internationally accepted welding standards (BS EN 5817, BS EN 287) in a controlled learning environment using the Shielded Metal Arc Welding process.

The learner will be required to:

- PM-03-PS01 Perform a single pass fillet weld using the Shielded Metal Arc Welding process
- PM-03-PS02 Perform a multi pass fillet weld using the Shielded Metal Arc Welding process

1.2 Guidelines for Practical Skills

PM-03-PS01: Perform a single pass fillet weld on plate using the Shielded Metal Arc Welding process

Scope of Practical Skill:

Given an approved Shielded Metal Arc Welding procedure, welding equipment, material and consumables the learner must be able to:

- PA0101 Perform a fillet weld in the flat position (1F) including fitting and tacking
- PA0102 Perform a fillet weld in the horizontal position (2F), including fitting and tacking
- PA0103 Perform a fillet weld in the vertical up position (3F), including fitting and tacking
- PA0104 Perform a fillet weld in the overhead position (4F), including fitting and tacking

Applied Knowledge

- AK0101 Material preparation for Shielded Metal Arc Welding
- AK0102 Fit up and tack welding techniques and practices
- AK0103 Welding techniques using Shielded Metal Arc Welding
- AK0104 Visual inspection procedures and quality indicators
- AK0105 Work piece cleaning and dressing practices
- AK0106 Practices related to quality, health, safety, and protection of the environment when using Shielded Metal Arc Welding

Internal Assessment Criteria

- Meet the minimum requirements of current accepted international standards e.g. BS EN 5817, BS EN 287 standards
- Health, quality, safety and environmental protection practices are adhered to
- Welding equipment setup and settings/parameters are correct and can be explained for different applications
- Welding defects are recognised through visual inspection, causes and prevention is explained, and defects are rectified

PM-03-PS02: Perform a multi pass fillet weld using the Shielded Metal Arc Welding process

Scope of Practical Skill:

Given an approved Shielded Metal Arc Welding procedure, welding equipment, material and consumables the learner must be able to:

- PA0201 Perform a fillet weld in the flat position (1F), including fit up and tack
- PA0202 Perform a fillet weld in the horizontal position (2F), including fit up and tack
- PA0203 Perform a fillet weld in the vertical up position (3F), including fit up and tack
- PA0204 Perform a fillet weld in the overhead position (4F), including fit up and tack

Applied Knowledge

- AK0201 Material preparation for Shielded Metal Arc Welding
- AK0202 Fit up and tack welding techniques and practices
- AK0203 Welding techniques using Shielded Metal Arc Welding
- AK0204 Visual inspection procedures and quality indicators
- AK0205 Work piece cleaning, dressing and inter-pass cleaning practices
- AK0206 Practices related to quality, health, safety, and protection of the environment when using Shielded Metal Arc Welding
- AK0207 Root, filler and cap welding techniques

Internal Assessment Criteria

- Meet the minimum requirements of current accepted international standards e.g. BS EN 5817, BS EN 287 standards
- Health, quality, safety and environmental protection practices are adhered to
- Welding equipment setup and settings/parameters are correct and can be explained for different applications
- Welding defects are recognised through

Provider Accreditation Requirements for the Module

Physical Requirements:

Demonstrate access to:

- Shielded Metal Arc Welding procedure
- welding equipment
- material and consumables

Human Resource Requirements:

- Facilitator at a recommended learner ratio 1 to 12.
- Workshop assistant at a recommended /learner ratio 1 to 4.
- Facilitator/learner at a recommended ratio 1 to 12.
- Workshop assistant at a recommended learner ratio 1 to 4.

Legal Requirements:

- Compliant with OHS ACT requirements

Exemptions

None.

2. 651202000-WM-02: Produce a range of fillet welds using various welding processes NQF Level 4 (16)

2.1 Purpose of the Work Experience Module

The focus of the work experience is on providing the learner an opportunity to produce a range of fillet welds in accordance with welding procedure specifications to coded standards

The learner will be required to:

- WM-02-WE01 Fillet weld a range of materials

2.2 Guidelines for Work Experiences

WM-02-WE01: Fillet weld a range of materials

Scope of Work Experience

The person will be expected to engage in the following work activities:

- WA0101 Assist an experienced welder with fillet welding of ferrous or non-ferrous materials for a minimum period of two days
- WA0101 Fillet weld ferrous or non-ferrous materials under different welding pressure situation
- WA0102 Achieve the specific coded status or required standards

2 651202000-WM-05: Team work, communication and reporting NQF Level 3 (8)

2.1 Purpose of the Work Experience Module

The focus of the work experience is on providing the learner an opportunity to participate communication and reporting procedures as a member of a work team

The learner will be required to:

- WM-05-WE01 Work as a member of a team
- WM-04-WE02 Participate in structured planning and communication processes

2.2 Guidelines for Work Experiences

WM-05-WE01: Participate and work as a member of a team

Scope of Work Experience

The person will be expected to engage in the following work activities:

- WA0101 Participate and contribute to achieving production targets and quality standards as a team member
- WA0102 Contribute to maintaining of a safe and productive workshop environment
- WA0103 Contribute to minimising waste and controlling costs

Supporting Evidence

SE0101 Team or project report

SE0102 Safety reports

SE0103 Workshop consumable expenditure