	Curriculum Document	
Curriculum Code	**Curriculum Title**	**Logo**
313908000	**Sugar Processing Controller**	

	Name	Email	Phone	Logo
Development Quality Partner	**AgriSETA**	**info@agriseta.co.za**	**012 301 5600**	

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SECTION 1: CURRICULUM SUMMARY

1. Occupational Information

1.1 Associated Occupation

313908: Sugar Processing Controller

1.2 Occupation or Specialisation Addressed by this Curriculum

313908000: Sugar Processing Controller

1.3 Alternative Titles used by Industry

- Sugar Process Controller
- Sugar Processing Superintendent
- Sugar Processing Foreman
- Sugar Refinery Foreman

2. Curriculum Information

2.1 Curriculum Structure

This qualification is made up of the following compulsory Knowledge and Practical Skill Modules:

Knowledge Modules:

- 313908000-KM-01, Introduction to sugar processing laboratory work, NQF Level 4, Credits 8
- 313908000-KM-02, The sugar manufacturing process, NQF Level 5, Credits 12
- 313908000-KM-03, Sugar processing factory control calculations, NQF Level 5, Credits 12
- 313908000-KM-04, Sugar juice extraction, NQF Level 4, Credits 4
- 313908000-KM-05, Sugar juice handling and clarification, NQF Level 4, Credits 4
- 313908000-KM-06, Evaporation, NQF Level 4, Credits 8
- 313908000-KM-07, Pan Boiling theory and technology, NQF Level 5, Credits 8
- 313908000-KM-08, Crystallisation, Centrifuging and Drying, NQF Level 4, Credits 4
- 313908000-KM-09, Water and effluent treatment, NQF Level 4, Credits 4
- 313908000-KM-10, Sugar refining, NQF Level 5, Credits 4
- 313908000-KM-11, Operations management, NQF Level 5, Credits 12
- 313908000-KM-12, Safety, Health, Environment, Risk and Quality Control, (SHERQ), NQF Level 5, Credits 8
- 313908000-KM-13, Mechanical maintenance, NQF Level 5, Credits 4

Total number of credits for Knowledge Modules: 92

Practical Skill Modules:

- 313908000-PM-01, Monitor and control sugar processing equipment, NQF Level 5, Credits 16
- 313908000-PM-02, Control sugar milling operations and resources, NQF Level 5, Credits 8
- 313908000-PM-03, Monitor and direct subordinate performance and conduct, NQF Level 5, Credits 8
- 313908000-PM-04, Enforce compliance to Safety, Health, Environmental protection and Quality standards, NQF Level 5, Credits 6
- 313908000-PM-05, Conduct and respond to in-line quality tests and reports, NQF Level 5, Credits 8
- 313908000-PM-06, Inspect and coordinate maintenance of equipment, NQF Level 5, Credits 8
- 313908000-PM-07, Compile and present production reports, NQF Level 4, Credits 4

Total number of credits for Practical Skill Modules: 58

This qualification also requires the following Work Experience Modules:

- 313908000-WM-01, Sugar processing equipment control procedures, NQF Level 5, Credits 28
- 313908000-WM-02, Sugar processing resource control procedures, NQF Level 5, Credits 16
- 313908000-WM-03, Safety, health, environmental protection and quality compliance procedures, NQF Level 5, Credits 16
- 313908000-WM-04, Mechanical equipment functionality and availability processes, NQF Level 4, Credits 16

Total number of credits for Work Experience Modules: 76

2.2 Entry Requirements

 A Senior Certificate issued by the Department of Education, or NCV (NQF 4) Operations Management, or ABET level 4 with Communication and Mathematical Literacy with 5 years work experience in a Sugar processing plant

3. Assessment Quality Partner Information

Name of body: AgriSETA

Address of body: AgriSETA House 529 Belvedere Road Arcadia 0083

Contact person name: QCTO Manager

Contact person work telephone number: 012 301 5600

4. Part Qualification Curriculum Structure

SECTION 2: OCCUPATIONAL PROFILE

1. Occupational Purpose

achieves production targets and quality standards by monitoring, controlling and responding to operational variables, processing equipment, resource and by ensuring the mechanical integrity of equipment.

2. Occupational Tasks

- Control sugar processing equipment to achieve planned sugar outputs that meet product specifications (NQF Level 5)
- Control sugar milling operations and resources to achieve efficiency standards (NQF Level 5)
- Monitor and enforce compliance with safety, health, environmental protection and quality (SHEQ) policies, practices and procedures in a sugar processing plant (NQF Level 5)
- Monitor and ensure the integrity of operational equipment and facilities for a sugar processing unit (NQF Level 5)

3. Occupational Task Details

3.1. Control sugar processing equipment to achieve planned sugar outputs that meet product specifications (NQF Level 5)

Unique Product or Service:

Controlled sugar processing operations

Occupational Responsibilities:

- Monitor and control sugar processing equipment
- Compile and present production reports

Occupational Contexts:

- Sugar processing equipment control procedures

3.2. Control sugar milling operations and resources to achieve efficiency standards (NQF Level 5)

Unique Product or Service:

Sugar processing resources controlled

Occupational Responsibilities:

- Control sugar milling operations and resources
- Monitor and direct subordinate performance and conduct

Occupational Contexts:

- Sugar processing production resource control procedures

3.3. Monitor and enforce compliance with safety, health, environmental protection and quality (SHEQ) policies, practices and procedures in a sugar processing plant (NQF Level 5)

Unique Product or Service:

Occupational and environmental risks controlled

Occupational Responsibilities:

- Enforce compliance to Safety, Health, Environmental protection and Quality standards
- Perform and respond to in-line quality tests and reports

Occupational Contexts:

- Safety, health, environmental protection and quality compliance procedures

3.4. Monitor and ensure the integrity of operational equipment and facilities for a sugar processing unit (NQF Level 5)

Unique Product or Service:

Functional equipment assured

Occupational Responsibilities:

- Inspect and coordinate maintenance of equipment

Occupational Contexts:

- Mechanical equipment functionality and availability assurance processes

SECTION 3: CURRICULUM COMPONENT SPECIFICATIONS

SECTION 3A: KNOWLEDGE MODULE SPECIFICATIONS

List of Knowledge Modules for which Specifications are included

- 313908000-KM-01, Introduction to sugar processing laboratory work, NQF Level 4, Credits 8
- 313908000-KM-02, The sugar manufacturing process, NQF Level 5, Credits 12
- 313908000-KM-03, Sugar processing factory control calculations, NQF Level 5, Credits 12
- 313908000-KM-04, Sugar juice extraction, NQF Level 4, Credits 4
- 313908000-KM-05, Sugar juice handling and clarification, NQF Level 4, Credits 4
- 313908000-KM-06, Evaporation, NQF Level 4, Credits 8
- 313908000-KM-07, Pan Boiling theory and technology, NQF Level 5, Credits 8
- 313908000-KM-08, Crystallisation, Centrifuging and Drying, NQF Level 4, Credits 4
- 313908000-KM-09, Water and effluent treatment, NQF Level 4, Credits 4
- 313908000-KM-10, Sugar refining, NQF Level 5, Credits 4
- 313908000-KM-11, Operations management, NQF Level 5, Credits 12
- 313908000-KM-12, Safety, Health, Environment, Risk and Quality Control, (SHERQ), NQF Level 5, Credits 8
- 313908000-KM-13, Mechanical maintenance, NQF Level 5, Credits 4

1. 313908000-KM-01, Introduction to sugar processing laboratory work, NQF Level 4, Credits 8

1.1 Purpose of the Knowledge Modules

The main focus of the learning in this knowledge module is to build an understanding of sugar processing science.

The learning will enable learners to demonstrate an understanding of:

- KM-01-KT01: Laboratory apparatus and equipment and their uses (10%)
- KM-01-KT02: Specific laboratory techniques (5%)
- KM-01-KT03: Arithmetical calculations (10%)
- KM-01-KT04: Draw and interpret graphs (10%)
- KM-01-KT05: Units of measurement (10%)
- KM-01-KT06: Use a balance (5%)
- KM-01-KT07: Use flasks, measuring cylinders and pipettes (5%)
- KM-01-KT08: Burettes and titration (5%)
- KM-01-KT09: Filtration techniques (10%)
- KM-01-KT10: Drying (10%)
- KM-01-KT11: Preparation of solutions and concentration calculations (10%)
- KM-01-KT12: Sampling (10%)

1.2 Guidelines for Topics

1.2.1. KM-01-KT01: Laboratory apparatus and equipment and their uses (10%)

Topic elements to be covered include:

- KT0101 Apparatus
- KT0102 Equipment

Internal Assessment Criteria and Weight

- IAC0101 Equipment and apparatus can be identified and their uses explained

(Weight 10%)

1.2.2. KM-01-KT02: Specific laboratory techniques (5%)

Topic elements to be covered include:

- KT0201 Sampling
- KT0202 Cleanliness

- KT0203 Chemicals
- KT0204 Gasses
- KT0205 Standard Methods
- KT0206 Liquid Levels
- KT0207 Temperature
- KT0208 Safety

Internal Assessment Criteria and Weight

- IAC0201 Laboratory techniques for specific analytical procedures can be explained

(Weight 5%)

1.2.3. KM-01-KT03: Arithmetical calculations (10%)

Topic elements to be covered include:

- KT0301 Terminology
- KT0302 Calculation rules
- KT0303 Fractions and decimals
- KT0304 Cubes and squares
- KT0305 Percentages and ratios

Internal Assessment Criteria and Weight

- IAC0301 Calculation are correctly performed

(Weight 10%)

1.2.4. KM-01-KT04: Draw and interpret graphs (10%)

Topic elements to be covered include:

- KT0401 Axis
- KT0402 Scale
- KT0403 Concentration Standard
- KT0404 Rules
- KT0405 Data

Internal Assessment Criteria and Weight

- IAC0401 Graphs are drawn accurately

(Weight 10%)

1.2.5. KM-01-KT05: Units of measurement (10%)

Topic elements to be covered include:

- KT0501 Measurement of Quantity
- KT0502 Derived Units
- KT0503 Length
- KT0504 Area
- KT0505 Volume

Internal Assessment Criteria and Weight

- IAC0501 An understanding of measurement units can be demonstrated

(Weight 10%)

1.2.6. KM-01-KT06: Use a balance (5%)

Topic elements to be covered include:

- KT0601 Mechanical Balances
- KT0602 Electronic Balances
- KT0603 Massing

Internal Assessment Criteria and Weight

- IAC0601 An understanding of the use of balances can be demonstrated

(Weight 5%)

1.2.7. KM-01-KT07: Use flasks, measuring cylinders and pipettes (5%)

Topic elements to be covered include:

- KT0701 Specific Flasks
- KT0702 Measuring Cylinders
- KT0703 Use a Pipette

Internal Assessment Criteria and Weight

- IAC0701 An understanding of the use of balances can be demonstrated

(Weight 5%)

1.2.8. KM-01-KT08: Burettes and titration (5%)

Topic elements to be covered include:

- KT0801 Purpose
- KT0802 Definition
- KT0803 Method

Internal Assessment Criteria and Weight

- IAC0801 An understanding of the use of balances can be demonstrated

(Weight 5%)

1.2.9. KM-01-KT09: Filtration techniques (10%)

Topic elements to be covered include:

- KT0901 Filter Paper
- KT0902 Clarification Agent
- KT0903 Gravity Filtration
- KT0904 Vacuum Filtration
- KT0905 Pressure Filtration

Internal Assessment Criteria and Weight

- IAC0901 An understanding of the use of filtration techniques can be demonstrated

(Weight 10%)

1.2.10. KM-01-KT10: Drying (10%)

Topic elements to be covered include:

- KT1001 Equipment
- KT1002 Method
- KT1003 Calculations

Internal Assessment Criteria and Weight

- IAC1001 The purpose of drying can be explained

(Weight 10%)

1.2.11. KM-01-KT11: Preparation of solutions and concentration calculations (10%)

Topic elements to be covered include:

- KT1101 Standard Solutions

- KT1102 Reagent Solutions
- KT1103 Preparation
- KT1104 Concentration & Dilution
- KT1105 Storage

Internal Assessment Criteria and Weight

- IAC1101 An understanding of the use of standard solutions can be demonstrated

(Weight 10%)

1.2.12. KM-01-KT12: Sampling (10%)

Topic elements to be covered include:

- KT1201 Composite sampling
- KT1202 Continuous
- KT1203 Catch
- KT1204 Containers
- KT1205 Procedures

Internal Assessment Criteria and Weight

- IAC1201 An understanding of the sampling techniques can be demonstrated
- IAC1202 The purpose of sampling and importance of accurate sampling can be explained

(Weight 10%)

1.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Human Resource Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations

1.4 Exemptions

- None recognised

2. 313908000-KM-02, The sugar manufacturing process, NQF Level 5, Credits 12

2.1 Purpose of the Knowledge Modules

The main focus of the learning in this knowledge module is to build an understanding of the sugar manufacturing process.

The learning will enable learners to demonstrate an understanding of:

- KM-02-KT01: The sugar manufacturing process (55%)
- KM-02-KT02: Rework and recycling (15%)
- KM-02-KT03: Sugar and By-Products Analysis (30%)

2.2 Guidelines for Topics

2.2.1. KM-02-KT01: The sugar manufacturing process (55%)

Topic elements to be covered include:

- KT0101 Process flow diagram
- KT0102 Instrumentation and process flow (DSC, SCADA)

Internal Assessment Criteria and Weight

- IAC0101 The process steps of cane to crystal can be identified on a flow diagram and explained
- IAC0102 An understanding of control systems used to control specific production areas can be demonstrated
- IAC0103 An understanding of the relationship between instrument and product flow and quality can be demonstrated

(Weight 55%)

2.2.2. KM-02-KT02: Rework and recycling (15%)

Topic elements to be covered include:

- KT0201 Effects and potential losses from over flows and leaks
- KT0202 Effects and potential losses from carry-overs
- KT0203 Effects and potential losses from recirculation of processed product
- KT0204 Effects and potential losses from rework of substandard products

Internal Assessment Criteria and Weight

- IAC0201 The effects of rework and recycling of specific production flows and targets can be explained

(Weight 15%)

2.2.3. KM-02-KT03: Sugar and By-Products Analysis (30%)

Topic elements to be covered include:

- KT0301 Sucrose Molecule
- KT0302 Chemical Reactions
- KT0303 Constituents of Sugarcane
- KT0304 Brix
- KT0305 Apparent Sucrose (pol)
- KT0306 Moisture
- KT0307 pH
- KT0308 Ash
- KT0309 Phosphate
- KT0310 Colour & Turbidity
- KT0311 Starch
- KT0312 Grain Size
- KT0313 Reducing Sugars
- KT0314 Sugar Trace

Internal Assessment Criteria and Weight

- IAC0301 An understanding of mechanical and chemical breakdown of sucrose can be demonstrated in terms of factory efficiencies
- IAC0302 Calculations are accurately performed

(Weight 30%)

2.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Human Resource Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations

2.4 Exemptions

- None recognised

3. 313908000-KM-03, Sugar processing factory control calculations, NQF Level 5, Credits 12

3.1 Purpose of the Knowledge Modules

The main focus of the learning in this knowledge module is to build an understanding of for the learner to gain fundamental understanding of analytical procedures and calculations to control a sugar processing factory.

The learning will enable learners to demonstrate an understanding of:

- KM-03-KT01: Introduction to factory control concepts (40%)
- KM-03-KT02: Materials Balance (25%)
- KM-03-KT03: Stock Taking (10%)
- KM-03-KT04: Calculations (25%)

3.2 Guidelines for Topics

3.2.1. KM-03-KT01: Introduction to factory control concepts (40%)

Topic elements to be covered include:

- KT0101 Averaging
- KT0102 Factory Figures
- KT0103 Cane Payment
- KT0104 Calculations

Internal Assessment Criteria and Weight

- IAC0101 Understanding the meaning of factory performance indicators can be demonstrated

(Weight 40%)

3.2.2. KM-03-KT02: Materials Balance (25%)

Topic elements to be covered include:

- KT0201 Data Source
- KT0202 Calculations

Internal Assessment Criteria and Weight

- IAC0201 Source of material to be balancedcan be explained
- IAC0202 Calculations are correctly performed

(Weight 25%)

3.2.3. KM-03-KT03: Stock Taking (10%)

Topic elements to be covered include:

- KT0301 Purpose
- KT0302 Data collection
- KT0303 Sampling

Internal Assessment Criteria and Weight

- IAC0301 Knowledge of accurate stocking as a component of materials balance can be demonstrated

(Weight 10%)

3.2.4. KM-03-KT04: Calculations (25%)

Topic elements to be covered include:

- KT0401 Factory Performance Calculations
- KT0402 Products in Process
- KT0403 Calculations

Internal Assessment Criteria and Weight

- IAC0401 Knowledge of formulas and accurate application can be demonstrated

(Weight 25%)

3.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Human Resource Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations

3.4 Exemptions

4. 313908000-KM-04, Sugar juice extraction, NQF Level 4, Credits 4

4.1 Purpose of the Knowledge Modules

The main focus of the learning in this knowledge module is to build an understanding of for the learner to gain fundamental understanding of front end juice extraction processes.

The learning will enable learners to demonstrate an understanding of:

- KM-04-KT01: Raw product handling and processing (80%)
- KM-04-KT02: Raw product handling and processing problem solving (20%)

4.2 Guidelines for Topics

4.2.1. KM-04-KT01: Raw product handling and processing (80%)

Topic elements to be covered include:

- KT0101 Definitions & Composition
- KT0102 Cane receiving, handling and conveying
- KT0103 Cane preparation
- KT0104 Milling
- KT0105 Diffusion
- KT0106 Juice Screening
- KT0107 Juice Massing
- KT0108 Bagasse Handling

Internal Assessment Criteria and Weight

- IAC0101 An understanding of process steps and use of equipment related to raw product handling can be demonstrated
- IAC0102 An understanding of process steps and use of equipment related to raw product handling can be demonstrated

(Weight 80%)

4.2.2. KM-04-KT02: Raw product handling and processing problem solving (20%)

Topic elements to be covered include:

- KT0201 Cane receiving, handling and conveying problems and corrective measures
- KT0202 Cane preparationproblems and corrective measures
- KT0203 Millingproblems and corrective measures
- KT0204 Diffusionproblems and corrective measures

- KT0205 Juice screeningproblems and corrective measures
- KT0206 Juice massingproblems and corrective measures
- KT0207 Bagasse handlingproblems and corrective measures

Internal Assessment Criteria and Weight

- IAC0201 An understanding of trouble shooting and standard responses related to raw product handling and processing can be demonstrated

(Weight 20%)

4.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Learning resources approved by the QCTO
- Assessment documentation, instruments and standards approved by the QCTO

Human Resource Requirements:

- Facilitators with subject matter expertise
- A learner facilitator ratio of no more than 1:15
- Assessors with recognised assessment practice training and subject matter expertise
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Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations

4.4 Exemptions

- None recognised

5. 313908000-KM-05, Sugar juice handling and clarification, NQF Level 4, Credits 4

5.1 Purpose of the Knowledge Modules

The main focus of the learning in this knowledge module is to build an understanding of for the learner to gain fundamental understanding of the theory and science of juice handling and clarification.

The learning will enable learners to demonstrate an understanding of:

- KM-05-KT01: Juice Heating (40%)
- KM-05-KT02: Clarification (40%)
- KM-05-KT03: Problem solving (20%)

5.2 Guidelines for Topics

5.2.1. KM-05-KT01: Juice Heating (40%)

Topic elements to be covered include:

- KT0101 Properties of Mixed Juice
- KT0102 Purpose of Heating
- KT0103 Heat Exchange
- KT0104 Equipment

Internal Assessment Criteria and Weight

- IAC0101 An understanding of process steps and use of equipment related to juice heating can be demonstrated
- IAC0102 Key control points related to juice heating can be listed and controls explained

(Weight 40%)

5.2.2. KM-05-KT02: Clarification (40%)

Topic elements to be covered include:

- KT0201 Purpose
- KT0202 Principles
- KT0203 Liming
- KT0204 Operation of Clarifiers
- KT0205 Filtration
- KT0206 Mud recycling

Internal Assessment Criteria and Weight

- IAC0201 An understanding of process steps and use of equipment related to clarification can be demonstrated
- IAC0202 Key control points related to clarification can be listed and controls explained

(Weight 40%)

5.2.3. KM-05-KT03: Problem solving (20%)

Topic elements to be covered include:

- KT0301 Heat exchange problems and corrective measures
- KT0302 Limingproblems and corrective measures
- KT0303 Clarificationproblems and corrective measures
- KT0304 Filtrationproblems and corrective measures
- KT0305 Mud recyclingproblems and corrective measures

Internal Assessment Criteria and Weight

- IAC0301 An understanding of trouble shooting and standard responses related to juice handling and clarification can be demonstrated

(Weight 20%)

5.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Human Resource Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations

5.4 Exemptions

- None recognised

6. 313908000-KM-06, Evaporation, NQF Level 4, Credits 8

6.1 Purpose of the Knowledge Modules

The main focus of the learning in this knowledge module is to build an understanding of for the learner to gain fundamental understanding of the theory and science of evaporation.

The learning will enable learners to demonstrate an understanding of:

- KM-06-KT01: Evaporation principles (35%)
- KM-06-KT02: Evaporator design/type (15%)
- KM-06-KT03: Pressure and vacuum (35%)
- KM-06-KT04: Evaporation problem solving (15%)

6.2 Guidelines for Topics

6.2.1. KM-06-KT01: Evaporation principles (35%)

Topic elements to be covered include:

- KT0101 Calculations
- KT0102 Pressure and Boiling Point
- KT0103 Single and multiple effects
- KT0104 Chemical changes during evaporation

Internal Assessment Criteria and Weight

- IAC0101 An understanding of process steps and use of equipment related to evaporation can be demonstrated
- IAC0102 Key control points related to evaporation can be listed and controls explained
- IAC0103 An understanding of evaporation related calculations and formula can be demonstrated

(Weight 35%)

6.2.2. KM-06-KT02: Evaporator design/type (15%)

Topic elements to be covered include:

- KT0201 Principles of operation
- KT0202 Heat transmission
- KT0203 Scale and cleaning
- KT0204 Control systems and principles

Internal Assessment Criteria and Weight

- IAC0201 Examples of evaporator equipment can be identified

(Weight 15%)

6.2.3. KM-06-KT03: Pressure and vacuum (35%)

Topic elements to be covered include:

- KT0301 Objectives
- KT0302 Vacuum Pumps
- KT0303 Cooling Systems

Internal Assessment Criteria and Weight

- IAC0301 The purpose of vacuum and pressure in evaporation process can be explained

(Weight 35%)

6.2.4. KM-06-KT04: Evaporation problem solving (15%)

Topic elements to be covered include:

- KT0401 Evaporation problems and corrective measures
- KT0402 Vacuum pump related problems and corrective measures
- KT0403 Cooling system related problems and corrective measures

Internal Assessment Criteria and Weight

- IAC0401 An understanding of trouble shooting and standard responses related to evaporation can be demonstrated

(Weight 15%)

6.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Human Resource Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations

6.4 Exemptions

- None recognised

7. 313908000-KM-07, Pan Boiling theory and technology, NQF Level 5, Credits 8

7.1 Purpose of the Knowledge Modules

The main focus of the learning in this knowledge module is to build an understanding of for the learner to gain fundamental understanding of the theory and science of pan boiling.

The learning will enable learners to demonstrate an understanding of:

- KM-07-KT01: Theory of crystallisation (15%)
- KM-07-KT02: Equipment design and operation (5%)
- KM-07-KT03: Graining a pan and growing a massecuite (30%)
- KM-07-KT04: Pan cycle (10%)
- KM-07-KT05: Pan control and automation (5%)
- KM-07-KT06: Problems experienced during pan boiling (15%)
- KM-07-KT07: Three massecuite boiling system (5%)
- KM-07-KT08: Mixture calculation (5%)
- KM-07-KT09: Continuous pan boiling (5%)
- KM-07-KT10: Control formulae (5%)

7.2 Guidelines for Topics

7.2.1. KM-07-KT01: Theory of crystallisation (15%)

Topic elements to be covered include:

- KT0101 Solutions
- KT0102 Purity and saturation
- KT0103 Crystal growth rate
- KT0104 Crystal formation
- KT0105 Effect of impurities
- KT0106 Boiling point elevation
- KT0107 Measurement of super saturation

Internal Assessment Criteria and Weight

- IAC0101 Incoming product specification for all stages can be listed
- IAC0102 Theory of crystal formation and growth can be explained
- IAC0103 External influence that impact on crystal formation and growth can be listed and explained
- IAC0104 Define and explain saturation point

- IAC0105 Massecuite flows and pan discharge concepts can be explained
- IAC0106 Sampling and testing practices can be explained

(Weight 15%)

7.2.2. KM-07-KT02: Equipment design and operation (5%)

Topic elements to be covered include:

- KT0201 Batch pans
- KT0202 Operation and ancillary equipment
- KT0203 Pan instrumentation
- KT0204 Feed systems
- KT0205 Strike receiver
- KT0206 Seed receiver
- KT0207 Valves
- KT0208 Starting a batch pan

Internal Assessment Criteria and Weight

- IAC0201 Process flow and instrumentation used can be described
- IAC0202 An understanding of process steps and use of equipment related to juice heating can be demonstrated

(Weight 5%)

7.2.3. KM-07-KT03: Graining a pan and growing a massecuite (30%)

Topic elements to be covered include:

- KT0301 Grain formation
- KT0302 Slurry
- KT0303 Graining a pan
- KT0304 Control of super saturation
- KT0305 Automatic vacuum control
- KT0306 Boiling a massecuite
- KT0307 Brix of pan feed
- KT0308 Hydrostatic head
- KT0309 Striking a pan

- KT0310 Dealing with highly viscous massecuite

Internal Assessment Criteria and Weight

- IAC0301 Pan boiling process flow and steps can be described
- IAC0302 Quality specification for process stages can be listed
- IAC0303 Potential problem areas can be listed and actions to avoid these explained
- IAC0304 Critical Control Points can be listed

(Weight 30%)

7.2.4. KM-07-KT04: Pan cycle (10%)

Topic elements to be covered include:

- KT0401 The pan boiling cycle
- KT0402 Quality specification
- KT0403 Typical problem areas and standard remedial action

Internal Assessment Criteria and Weight

- IAC0401 Pan boiling cycle can be described
- IAC0402 Quality specification for stages can be listed
- IAC0403 Potential problem areas can be listed and actions to avoid these explained
- IAC0404 Critical Control Points can be listed

(Weight 10%)

7.2.5. KM-07-KT05: Pan control and automation (5%)

Topic elements to be covered include:

- KT0501 Importance of pan control
- KT0502 Using conductivity
- KT0503 Using computer control

Internal Assessment Criteria and Weight

- IAC0501 Instrumentation used in pan boiling can be listed and application explained
- IAC0502 An understanding of data readings from instruments can be demonstrated

(Weight 5%)

7.2.6. KM-07-KT06: Problems experienced during pan boiling (15%)

Topic elements to be covered include:

- KT0601 False grain
- KT0602 Aconitic acid
- KT0603 Water dilution
- KT0604 Loss of vacuum
- KT0605 Pan not boiling fast enough
- KT0606 Purity of pan feed
- KT0607 Low brix feed
- KT0608 High viscosity massecuite

Internal Assessment Criteria and Weight

- IAC0601 An understanding of trouble shooting and standard responses related to pan boiling can be demonstrated

(Weight 15%)

7.2.7. KM-07-KT07: Three massecuite boiling system (5%)

Topic elements to be covered include:

- KT0701 Introduction to massecuite boiling
- KT0702 Thethree massecuite boiling system
- KT0703 Pan flow data
- KT0704 Crystal size
- KT0705 Types of crystal
- KT0706 Viscosity
- KT0707 Massecuite brix at strike

Internal Assessment Criteria and Weight

- IAC0701 An understanding of process steps and use of equipment related to massecuite boiling can be demonstrated
- IAC0702 An understanding of the impact on factory performance can be demonstrated

(Weight 5%)

7.2.8. KM-07-KT08: Mixture calculation (5%)

Topic elements to be covered include:

- KT0801 Introduction

- KT0802 Using formulae
- KT0803 Using the Cobenz diagram

Internal Assessment Criteria and Weight

- IAC0801 Formula, calculations and data interpretation is performed correctly
- IAC0802 Balancing product streams to achieve final product specification can be explained

(Weight 5%)

7.2.9. KM-07-KT09: Continuous pan boiling (5%)

Topic elements to be covered include:

- KT0901 Basic operation
- KT0902 Pan control

Internal Assessment Criteria and Weight

- IAC0901 An understanding of process steps and use of equipment related to massecuite boiling can be demonstrated
- IAC0902 An understanding of the impact on factory performance can be demonstrated

(Weight 5%)

7.2.10. KM-07-KT10: Control formulae (5%)

Topic elements to be covered include:

- KT1001 Crystal content of massecuite
- KT1002 Exhaustion
- KT1003 SJM formula

Internal Assessment Criteria and Weight

- IAC1001 Formula selection and use, calculations and data interpretation is performed correctly

(Weight 5%)

7.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Human Resource Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations

7.4 Exemptions

- None recognised

8. 313908000-KM-08, Crystallisation, Centrifuging and Drying, NQF Level 4, Credits 4

8.1 Purpose of the Knowledge Modules

The main focus of the learning in this knowledge module is to build an understanding of the theory and science of sugar crystallisation, centrifuging and drying.

The learning will enable learners to demonstrate an understanding of:

- KM-08-KT01: Theory of cooling crystallisation (20%)
- KM-08-KT02: Crystalliser type and layout (10%)
- KM-08-KT03: Massecuite reheating (10%)
- KM-08-KT04: Theory of centrifuging (15%)
- KM-08-KT05: Exhaustion (5%)
- KM-08-KT06: Theory of sugar drying (10%)
- KM-08-KT07: Sugar driers (5%)
- KM-08-KT08: Sugar conditioning (5%)
- KM-08-KT09: Raw sugar quality (5%)
- KM-08-KT10: Problems experienced during crystallisation and separation (15%)

8.2 Guidelines for Topics

8.2.1. KM-08-KT01: Theory of cooling crystallisation (20%)

Topic elements to be covered include:

- KT0101 Rate of cooling
- KT0102 High and low purity crystallisation
- KT0103 Crystal size and content
- KT0104 Viscosity
- KT0105 Massecuite data

Internal Assessment Criteria and Weight

- IAC0101 An understanding of crystal growth during the cooling cycle can be demonstrated
- IAC0102 The relationship between crystal growth and final product quality can be explained

(Weight 20%)

8.2.2. KM-08-KT02: Crystalliser type and layout (10%)

Topic elements to be covered include:

- KT0201 Heat transfer
- KT0202 Speed of rotation
- KT0203 Drives
- KT0204 Cooling element corrosion

Internal Assessment Criteria and Weight

- IAC0201 Types of equipment can be identified and purpose of equipment components explained

(Weight 10%)

8.2.3. KM-08-KT03: Massecuite reheating (10%)

Topic elements to be covered include:

- KT0301 Application (when and why)

Internal Assessment Criteria and Weight

- IAC0301 The effect of crystallisation can be assessed

(Weight 10%)

8.2.4. KM-08-KT04: Theory of centrifuging (15%)

Topic elements to be covered include:

- KT0401 Batch centrifugal operation
- KT0402 Continuous centrifugal operation

Internal Assessment Criteria and Weight

- IAC0401 Principles of centrifuging can be explained
- IAC0402 An understanding of the impact of centrifuging process on quality - cause and effect - can be demonstrated

(Weight 15%)

8.2.5. KM-08-KT05: Exhaustion (5%)

Topic elements to be covered include:

- KT0501 Theory and calculations
- KT0502 Target purity

Internal Assessment Criteria and Weight

- IAC0501 An understanding of the impact of exhaustion on factory performance can be demonstrated

- IAC0502 Formula selection and use, calculations and data interpretation is performed correctly

(Weight 5%)

8.2.6. KM-08-KT06: Theory of sugar drying (10%)

Topic elements to be covered include:

- KT0601 Raw and refined sugars
- KT0602 Washed sugars
- KT0603 Micro organisms
- KT0604 Chemical treatment
- KT0605 Moisture control during storage
- KT0606 Deterioration in bulk storage

Internal Assessment Criteria and Weight

- IAC0601 An understanding of the sugar drying process can be demonstrated
- IAC0602 Critical Control Points can be listed and explained
- IAC0603 The impact on sugar quality and handling can be explained

(Weight 10%)

8.2.7. KM-08-KT07: Sugar driers (5%)

Topic elements to be covered include:

- KT0701 Calculations
- KT0702 Types of driers

Internal Assessment Criteria and Weight

- IAC0701 The impact on sugar quality and handling can be explained
- IAC0702 Formula selection and use, calculations and data interpretation is performed correctly

(Weight 5%)

8.2.8. KM-08-KT08: Sugar conditioning (5%)

Topic elements to be covered include:

- KT0801 Why sugar cakes
- KT0802 Conditioning and data
- KT0803 Factors influencing conditioning

Internal Assessment Criteria and Weight

- IAC0801 An understanding of the sugar conditioning process can be demonstrated
- IAC0802 The theory of conditioning can be explained

(Weight 5%)

8.2.9. KM-08-KT09: Raw sugar quality (5%)

Topic elements to be covered include:

- KT0901 Standards, parameters and levels

Internal Assessment Criteria and Weight

- IAC0901 Knowledge of values required and the impact of deviations can be demonstrated
- IAC0902 Potential re-work parameters and consequences can be explained

(Weight 5%)

8.2.10. KM-08-KT10: Problems experienced during crystallisation and separation (15%)

Topic elements to be covered include:

- KT1001 Process problems and standard responses
- KT1002 Data and trends

Internal Assessment Criteria and Weight

- IAC1001 Demonstrate problem solving techniques and data interpretation

(Weight 15%)

8.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Human Resource Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations

8.4 Exemptions

- None recognised

9. 313908000-KM-09, Water and effluent treatment, NQF Level 4, Credits 4

9.1 Purpose of the Knowledge Modules

The main focus of the learning in this knowledge module is to build an understanding of factory services.

The learning will enable learners to demonstrate an understanding of:

- KM-09-KT01: Potable water technology (1%)
- KM-09-KT02: Cooling water technology (1%)
- KM-09-KT03: Boiler water technology (1%)
- KM-09-KT04: Waste water / effluent technology (1%)

9.2 Guidelines for Topics

9.2.1. KM-09-KT01: Potable water technology (1%)

Topic elements to be covered include:

- KT0101 Technology and measurements
- KT0102 Treatment
- KT0103 Problem solving

Internal Assessment Criteria and Weight

- IAC0101 Water quality requirements can be explained

(Weight 1%)

9.2.2. KM-09-KT02: Cooling water technology (1%)

Topic elements to be covered include:

- KT0201 Technology and measurements
- KT0202 Treatment
- KT0203 Problem solving

Internal Assessment Criteria and Weight

- IAC0201 An understanding of heat exchange principles and technology can be demonstrated
- IAC0202 Application principles can be explained

(Weight 1%)

9.2.3. KM-09-KT03: Boiler water technology (1%)

Topic elements to be covered include:

- KT0301 Technology and measurements
- KT0302 Treatment
- KT0303 Problem solving

Internal Assessment Criteria and Weight

- IAC0301 An understanding of boiler water treatment and trace elements can be demonstrated
- IAC0302 Water quality concepts and contaminants can be explained

(Weight 1%)

9.2.4. KM-09-KT04: Waste water / effluent technology (1%)

Topic elements to be covered include:

- KT0401 Technology and measurements
- KT0402 Treatment
- KT0403 Problem solving

Internal Assessment Criteria and Weight

- IAC0401 An understanding of wastewater treatment concepts and trace elements can be demonstrated
- IAC0402 Water quality concepts and contaminants can be explained

(Weight 1%)

9.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Human Resource Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations

9.4 Exemptions

- None recognised

10. 313908000-KM-10, Sugar refining, NQF Level 5, Credits 4

10.1 Purpose of the Knowledge Modules

The main focus of the learning in this knowledge module is to build an understanding of the theory and science of sugar refining.

The learning will enable learners to demonstrate an understanding of:

- KM-10-KT01: Principles of colour removal (30%)
- KM-10-KT02: Sugar refining technology (30%)
- KM-10-KT03: Refinery balance and calculations (25%)
- KM-10-KT04: Problems experienced during sugar refining (15%)

10.2 Guidelines for Topics

10.2.1. KM-10-KT01: Principles of colour removal (30%)

Topic elements to be covered include:

- KT0101 Raw sugar quality
- KT0102 Melting
- KT0103 Colour removal
- KT0104 Filtration
- KT0105 Evaporation
- KT0106 Sugar boiling
- KT0107 Drying and conditioning

Internal Assessment Criteria and Weight

- IAC0101 An understanding of the sugar refining process can be demonstrated
- IAC0102 Critical Control Points can be listed and explained

(Weight 30%)

10.2.2. KM-10-KT02: Sugar refining technology (30%)

Topic elements to be covered include:

- KT0201 Filtration
- KT0202 Evaporation
- KT0203 Sugar boiling
- KT0204 Drying and conditioning

Internal Assessment Criteria and Weight

- IAC0201 An understanding of the refining process and associated equipment can be demonstrated

(Weight 30%)

10.2.3. KM-10-KT03: Refinery balance and calculations (25%)

Topic elements to be covered include:

- KT0301 Sucrose solubility
- KT0302 Raw Sugar Pol
- KT0303 Moisture
- KT0304 Brix
- KT0305 Purity

Internal Assessment Criteria and Weight

- IAC0301 Formula selection and use selection and use, calculations and data interpretation is performed correctly

(Weight 25%)

10.2.4. KM-10-KT04: Problems experienced during sugar refining (15%)

Topic elements to be covered include:

- KT0401 Refining problems and standard responses

Internal Assessment Criteria and Weight

- IAC0401 An understanding of trouble shooting and standard responses related to sugar refining can be demonstrated

(Weight 15%)

10.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Human Resource Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations

10.4 Exemptions

- None recognised

11. 313908000-KM-11, Operations management, NQF Level 5, Credits 12

11.1 Purpose of the Knowledge Modules

The main focus of the learning in this knowledge module is to build an understanding of operations management terms, concepts, established principles and theories.

The learning will enable learners to demonstrate an understanding of:

- KM-11-KT01: General operational management concepts (25%)
- KM-11-KT02: Employment relations management (25%)
- KM-11-KT03: Financial management concepts (25%)
- KM-11-KT04: Personnel management concepts (25%)

11.2 Guidelines for Topics

11.2.1. KM-11-KT01: General operational management concepts (25%)

Topic elements to be covered include:

- KT0101 The role of an operational manager
- KT0102 Management theory
- KT0103 Planning and scheduling
- KT0104 Organising
- KT0105 Leading and leadership theories and concepts
- KT0106 Controlling
- KT0107 Production reporting
- KT0108 Decision making and problem solving methods
- KT0109 Continuous improvement models
- KT0110 Delegation principles
- KT0111 Document control and administration
- KT0112 Challenges for Operational Managers

Internal Assessment Criteria and Weight

- IAC0101 Operational management can be explained in terms of the role and function of the Operational Manager in a production environment

(Weight 25%)

11.2.2. KM-11-KT02: Employment relations management (25%)

Topic elements to be covered include:

- KT0201 The employment relationship
- KT0202 Key provisions of the legislative framework governing employment
- KT0203 Managing workplace discipline (codes, procedures, fairness, CCMA, principles established through cases and awards)
- KT0204 Managing workplace conflict and grievances (sources, resolution styles, grievance procedures)
- KT0205 Managing capacity related problems (types, procedural requirements, principles established through cases and awards)
- KT0206 Organised labour

Internal Assessment Criteria and Weight

- IAC0201 The concept of fairness as applied in industrial relations can be explained
- IAC0202 An understanding of the use of procedures and codes to manage industrial relations can be demonstrated
- IAC0203 Principles of conflict resolution can be explained

(Weight 25%)

11.2.3. KM-11-KT03: Financial management concepts (25%)

Topic elements to be covered include:

- KT0301 Budgets, budgeting concepts and budget control
- KT0302 Cost estimates and calculations (labour, raw material, energy, milling cost, processing)
- KT0303 Cost management (waste, re-work, recall)
- KT0304 Financial source documents

Internal Assessment Criteria and Weight

- IAC0301 An understanding of production costs under the control of the operational manager can be demonstrated
- IAC0302 The budgeting process and the use of budgets for cost control purposes can be defined and explained

(Weight 25%)

11.2.4. KM-11-KT04: Personnel management concepts (25%)

Topic elements to be covered include:

- KT0401 Basic conditions of employment and contracts
- KT0402 Job analysis and descriptions

- KT0403 Performance management
- KT0404 Training management
- KT0405 Mentoring and coaching
- KT0406 Recruitment and selection

Internal Assessment Criteria and Weight

- IAC0401 An understanding of personnel management concepts under the control of the operational manager can be demonstrated

(Weight 25%)

11.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Human Resource Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations

11.4 Exemptions

- None recognised

12. 313908000-KM-12, Safety, Health, Environment, Risk and Quality Control, (SHERQ), NQF Level 5, Credits 8

12.1 Purpose of the Knowledge Modules

The main focus of the learning in this knowledge module is to build an understanding of the safety, health, environment and quality assurance (SHEQ) terms, concepts and established principles applied to first level operational managers.

The learning will enable learners to demonstrate an understanding of:

- KM-12-KT01: Quality management (20%)
- KM-12-KT02: Occupational safety, health and environmental protection management concepts (25%)
- KM-12-KT03: Controlling quality (20%)
- KM-12-KT04: Environmental protection and pollution concepts (10%)
- KM-12-KT05: Contamination control (10%)
- KM-12-KT06: Risk control and safety practices (15%)

12.2 Guidelines for Topics

12.2.1. KM-12-KT01: Quality management (20%)

Topic elements to be covered include:

- KT0101 Quality management systems (HACCP, ISO)
- KT0102 Quality administration and reporting
- KT0103 Quality audit procedures

Internal Assessment Criteria and Weight

- IAC0101 Quality management systems can be defined and explained in terms of the purpose of the system, administrative and reporting requirements
- IAC0102 The auditing procedures and importance of maintaining quality certification status can be explained

(Weight 20%)

12.2.2. KM-12-KT02: Occupational safety, health and environmental protection management concepts (25%)

Topic elements to be covered include:

- KT0201 Introduction to the legislative framework that regulates workplace safety, health and environmental protection including appointments, compliance audits, repercussion and personal liability

- KT0202 General overview of statutory provisions of the Act including reporting of IOD, incident investigation and reporting, statutory registers
- KT0203 Incident investigation and reporting procedures
- KT0204 Risk management concepts and practices

Internal Assessment Criteria and Weight

- IAC0201 Responsibilities and delegated authorities of different appointments and management officials can be explained
- IAC0202 Statutory provisions that regulates the sugar milling industry can be listed and their impact explained
- IAC0203 The concept

(Weight 25%)

12.2.3. KM-12-KT03: Controlling quality (20%)

Topic elements to be covered include:

- KT0301 Quality Control vs Quality Assurance
- KT0302 Key process stages or factors that could affect quality (Critical Control Points)
- KT0303 Quality indicators at critical stages
- KT0304 Causes of quality problems and remedial actions

Internal Assessment Criteria and Weight

- IAC0301 The control of quality can be described in terms of critical stages in the process, quality indicators, causes of typical quality problems and remedial actions

(Weight 20%)

12.2.4. KM-12-KT04: Environmental protection and pollution concepts (10%)

Topic elements to be covered include:

- KT0401 Environmental pollution concepts
- KT0402 Sources of and impact of contaminants on the natural environment specific to the sugar milling industry
- KT0403 General rules related to waste control and management
- KT0404 The impact of environmental pollution on natural resources, communities and the economy
- KT0405 Global warming and green production principles

Internal Assessment Criteria and Weight

- IAC0401 Measures to minimise the impact of a sugar mill on the environment can be explained

(Weight 10%)

12.2.5. KM-12-KT05: Contamination control (10%)

Topic elements to be covered include:

- KT0501 Pest control principles and practices
- KT0502 Product contamination and deterioration cause by equipment or facilities
- KT0503 Preventative actions for microbial and mycotoxin contamination

Internal Assessment Criteria and Weight

- IAC0501 Contamination control concepts can be explained from a food safety and product quality perspective

(Weight 10%)

12.2.6. KM-12-KT06: Risk control and safety practices (15%)

Topic elements to be covered include:

- KT0601 Risk control concepts
- KT0602 Equipment and mechanical system safety
- KT0603 Basic electrical safety
- KT0604 Emergency response
- KT0605 Dust explosion and spontaneous combustion risks
- KT0606 Fire risks and preventative measures
- KT0607 Access and movement control

Internal Assessment Criteria and Weight

- IAC0601 Risk control and safety practices common to the sugar milling industry can be explained and motivated

(Weight 15%)

12.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Human Resource Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations

12.4 Exemptions

- None recognised

13. 313908000-KM-13, Mechanical maintenance, NQF Level 5, Credits 4

13.1 Purpose of the Knowledge Modules

The main focus of the learning in this knowledge module is to build an understanding of mechanical maintenance principles and concepts that relates to a sugar mill.

The learning will enable learners to demonstrate an understanding of:

- KM-13-KT01: Mechanical maintenance principles and concepts (70%)
- KM-13-KT02: Principles of preventative maintenance (30%)

13.2 Guidelines for Topics

13.2.1. KM-13-KT01: Mechanical maintenance principles and concepts (70%)

Topic elements to be covered include:

- KT0101 Methods for monitoring and controlling mechanical equipment based on operating parameters
- KT0102 Maintenance requirements for pumps
- KT0103 Maintenance requirements for motors
- KT0104 Maintenance requirements for heating equipment
- KT0105 Maintenance requirements for cooling equipment

Internal Assessment Criteria and Weight

- IAC0101 The maintenance requirements for mechanical components can be explained

(Weight 70%)

13.2.2. KM-13-KT02: Principles of preventative maintenance (30%)

Topic elements to be covered include:

- KT0201 Scheduling and planning preventative maintenance
- KT0202 Principle of preventative maintenance
- KT0203 Reasons for preventative maintenance

Internal Assessment Criteria and Weight

- IAC0201 The roles and responsibilities of the sugar processing controller in preventative maintenance can be explained and motivated

(Weight 30%)

13.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Human Resource Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations

13.4 Exemptions

- None recognised

SECTION 3B: PRACTICAL SKILL MODULE SPECIFICATIONS

List of Practical Skill Module Specifications

- 313908000-PM-01, Monitor and control sugar processing equipment, NQF Level 5, Credits 16
- 313908000-PM-02, Control sugar milling operations and resources, NQF Level 5, Credits 8
- 313908000-PM-03, Monitor and direct subordinate performance and conduct, NQF Level 5, Credits 8
- 313908000-PM-04, Enforce compliance to Safety, Health, Environmental protection and Quality standards, NQF Level 5, Credits 6
- 313908000-PM-05, Conduct and respond to in-line quality tests and reports, NQF Level 5, Credits 8
- 313908000-PM-06, Inspect and coordinate maintenance of equipment, NQF Level 5, Credits 8
- 313908000-PM-07, Compile and present production reports, NQF Level 4, Credits 4

1. 313908000-PM-01, Monitor and control sugar processing equipment, NQF Level 5, Credits 16

1.1 Purpose of the Practical Skill Modules

The focus of the learning in this module is on providing the learner an opportunity to gain the practical skills related to monitoring and controlling sugar processing equipment and process in a controlled learning environment.

The learner will be required to:

- PM-01-PS01: Monitor and control can yard operations
- PM-01-PS02: Monitor and control cane milling and juice extraction operations
- PM-01-PS07: Control and adjust material flow for a sugar milling production unit or line
- PM-01-PS08: Setup, monitor and adjust sugar processing equipment settings
- PM-01-PS09: Monitor demand, supply and efficient utilisation of services and utilities
- PM-01-PS03: Monitor and control sugar juice clarification and filtration operations
- PM-01-PS04: Monitor and control evaporation operations
- PM-01-PS05: Monitor and control pan boiling operations
- PM-01-PS06: Monitor and control centrifugal operations

1.2 Guidelines for Practical Skills

1.2.1. PM-01-PS01: Monitor and control can yard operations

Scope of Practical Skill

Given operational control parameters, plans and schedules, orders for a production unit and a controlled learning environment, the learner must be able to:

- PA0101 Develop or adjust a daily production plan based on production targets
- PA0102 Determine the resources required to ensure that the production plan and targets are met
- PA0103 Plan the utilisation of storage space to meet production schedules
- PA0104 Set and communicate production targets
- PA0105 Plan production line usage for optimal plant output
- PA0106 Monitor the achievement of production targets and initiate corrective measures

Applied Knowledge

- AK0101 Production capacity of the production line
- AK0102 Storage capacity
- AK0103 Production planning

Internal Assessment Criteria

- IAC0101 Operational schedules of the unit or line are aligned to the production plan
- IAC0102 Targets are clearly formulated and measurable
- IAC0103 Measures to address deviations from planned targets can be explained

1.2.2. PM-01-PS02: Monitor and control cane milling and juice extraction operations

Scope of Practical Skill

Given a controlled learning environment, a sugar mill production line or unit, and production schedules, the learner must be able to:

- PA0201 Coordinate start-up equipment in a production line
- PA0202 Coordinate shut-down of equipment in a production line
- PA0203 Control and coordinate operational processes (e.g. purging, cleaning, lock out, emergency stop) for a production line
- PA0204 Oversee equipment change-over procedures
- PA0205 Conduct shift handover procedures

Applied Knowledge

- AK0201 Workplace safety and operational requirements
- AK0202 Start-up and shut-down sequence
- AK0203 Standard procedures for various production line operating processes

Internal Assessment Criteria

- IAC0201 Production line start up and shut downs are coordinated within safety and operational requirements
- IAC0202 Specific processes are performed in terms of standard operating procedures

1.2.3. PM-01-PS07: Control and adjust material flow for a sugar milling production unit or line

Scope of Practical Skill

Applied Knowledge

Internal Assessment Criteria

1.2.4. PM-01-PS08: Setup, monitor and adjust sugar processing equipment settings

Scope of Practical Skill

Applied Knowledge

Internal Assessment Criteria

1.2.5. PM-01-PS09: Monitor demand, supply and efficient utilisation of services and utilities

Scope of Practical Skill

Applied Knowledge

Internal Assessment Criteria

1.2.6. PM-01-PS03: Monitor and control sugar juice clarification and filtration operations

Scope of Practical Skill

Given a controlled learning environment, a sugar mill production line and production schedules, the learner must be able to:

- PA0301 Achieve consistent flow and availability of material over various operational stages
- PA0302 Recognise and respond to deviations observed at various stages of an operation
- PA0303 Optimise equipment operation in terms of material availability and flow
- PA0304 Solve operational problems

Applied Knowledge

- AK0301 Equipment settings
- AK0302 Operating standards
- AK0303 Optimisation practices
- AK0304 Common deviations and standard responses
- AK0305 Problem-solving techniques

Internal Assessment Criteria

- IAC0301 Material flow requirements and quality standards are met
- IAC0302 Problem areas that falls outside of the delegated responsibility of the Feed Miller can be explained
- IAC0303 Potential problem areas can be recognised and remedial actions explained

1.2.7. PM-01-PS04: Monitor and control evaporation operations

Scope of Practical Skill

Given a controlled learning environment, a sugar mill production line or unit, production schedules and operational specifications, the learner must be able to:

- PA0401 Set up the production line equipment to production specifications

- PA0402 Read, analyse and respond to instrumentation readings to conduct process control
- PA0403 Adjust equipment settings to maintain equipment operation within required specifications
- PA0404 Make/initiate process adjustments to meet production targets and product specifications
- PA0405 Monitor key set/control points and initiate appropriate response to maintain quality control protocols
- PA0406 Evaluate implications of changes and cause and affect relations within a process when making adjustments
- PA0407 Recognise early warning signs of emerging deviations
- PA0408 Recognise the point at which things, that fall outside of normal procedures, go badly wrong and respond appropriately

Applied Knowledge

- AK0401 Equipment operation
- AK0402 Operating parameters
- AK0403 Product quality specifications and deviations
- AK0404 Corrective actions
- AK0405 Warning signs

Internal Assessment Criteria

- IAC0401 Operating standards of equipment are set and maintained within defined parameters
- IAC0402 Early warning signs of potential problems and remedial actions can be explained
- IAC0403 Problem areas that falls outside of the delegated responsibility of the Feed Miller can be explained

1.2.8. PM-01-PS05: Monitor and control pan boiling operations

Scope of Practical Skill

Given a controlled learning environment, a sugar mill production line and production schedules, the learner must be able to:

- PA0501 Draft a procedure for the inspection and monitoring of utlilities and services
- PA0502 Recognise sign of energy waste or inefficient utilisation
- PA0503 Recognise signs of steam, air and water shortages and initiate corrective measures
- PA0504 Conduct emergency shut down and start-up procedures

Applied Knowledge

- AK0501 Levels/volumes of utility or services required to maintain normal operations
- AK0502 Reporting procedures

- AK0503 Precautionary/emergency measures or production shut-down procedures

Internal Assessment Criteria

- IAC0501 Energy efficiency levels are maintained within set standards and parameters
- IAC0502 Emerging supply shortages are recognised and corrective measures initiated to address the situation

1.2.9. PM-01-PS06: Monitor and control centrifugal operations

Scope of Practical Skill

Applied Knowledge

Internal Assessment Criteria

1.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Access to a sugar processing line
- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Human Resource Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers
- Facilitators with expert knowledge in the scope of the module

Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations
- Personal protective equipment

1.4 Exemptions

- None recognised

2. 313908000-PM-02, Control sugar milling operations and resources, NQF Level 5, Credits 8

2.1 Purpose of the Practical Skill Modules

The focus of the learning in this module is on providing the learner an opportunity to practical skills required to execute planning and monitoring activities to control sugar milling operations and resource to ensure the achievement of plant efficiency targets

The learner will be required to:

- PM-02-PS01: Plan and schedule sugar milling operations to meet production targets
- PM-02-PS02: Monitor and control stock levels of raw materials used in sugar processing
- PM-02-PS03: Direct subordinate performance and conduct

2.2 Guidelines for Practical Skills

2.2.1. PM-02-PS01: Plan and schedule sugar milling operations to meet production targets

Scope of Practical Skill

Given production targets, the learner must be able to:

- PA0101 List the materials and estimated volumes required for a production shift
- PA0102 Determine the resources required to ensure that the production plan and targets are met
- PA0103 Plan labour needs and a shift roster
- PA0104 Schedule finished product storage according to available storage

Applied Knowledge

- AK0101 Production scheduling
- AK0102 Raw material volumes for specific products
- AK0103 Shift schedules
- AK0104 Communication

Internal Assessment Criteria

- IAC0101 Production scheduling meet production targets
- IAC0102 The impact of not meeting scheduled targets can be explained

2.2.2. PM-02-PS02: Monitor and control stock levels of raw materials used in sugar processing

Scope of Practical Skill

Given records of stock on hand, stock usage data and production schedules, the learner must be able to:

- PA0201 Compile estimates of stocks required in the production of different products
- PA0202 Reconcile production needs with stocks on hand

- PA0203 Determine minimum reordering levels for stock items
- PA0204 Determine stock loss levels (waste) based on historical data provided
- PA0205 Complete stock control reports

Applied Knowledge

- AK0201 Operational stock requirements for specific products
- AK0202 Stock control
- AK0203 Standard corrective actions

Internal Assessment Criteria

- IAC0201 Stock level estimates, waste and re-ordering volumes are correctly determined
- IAC0202 Stock control records are accurately completed

2.2.3. PM-02-PS03: Direct subordinate performance and conduct

Scope of Practical Skill

- PA0301 Set performance targets and direct personnel performance
- PA0302 Maintain shop floor discipline
- PA0303 Resolve a workplace grievance
- PA0304 Resolve shop floor conflict

Applied Knowledge

- AK0301 Performance management and performance targets
- AK0302 Disciplinary codes and procedures
- AK0303 Grievance procedures
- AK0304 Workplace conflict resolution

Internal Assessment Criteria

- IAC0301 Performance agreements are reached and measurable targets agreed upon
- IAC0302 Performance levels and monitored and corrected where required
- IAC0303 Disciplinary procedures and standard practices can be explained and applied
- IAC0304 Grievance procedures and standard practices can be explained and applied
- IAC0305 Conflict resolution practices can be explained and applied

2.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Access to a sugar processing line
- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Human Resource Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers
- Facilitators with expert knowledge in the scope of the module

Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations
- Personal protective equipment

2.4 Exemptions

- None recognised

3. 313908000-PM-03, Monitor and direct subordinate performance and conduct, NQF Level 5, Credits 8

3.1 Purpose of the Practical Skill Modules

The focus of the learning in this module is on providing the learner an opportunity to practical skills required to execute planning and monitoring activities to control sugar milling operations and resource to ensure the achievement of plant efficiency targets

The learner will be required to:

3.2 Guidelines for Practical Skills

3.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Human Resource Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers
- Facilitators with expert knowledge in the scope of the module

Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations

3.4 Exemptions

- None recognised

4. 313908000-PM-04, Enforce compliance to Safety, Health, Environmental protection and Quality standards, NQF Level 5, Credits 6

4.1 Purpose of the Practical Skill Modules

The focus of the learning in this module is on providing the learner an opportunity to to monitor and execute control over Safety, Health, Environmental and Quality (SHEQ) Procedures in a controlled learning environment.

The learner will be required to:

- PM-04-PS01: Investigate and report incidents
- PM-04-PS02: Execute control over Safety, Health, Environment and Quality (SHEQ)control procedures
- PM-04-PS03: Maintain records and registers in compliance with Safety, Health, Environment and Quality (SHEQ) regulations
- PM-04-PS04: Perform Hazard Identification and Risk Analysis assessment (HIRA)

4.2 Guidelines for Practical Skills

4.2.1. PM-04-PS01: Investigate and report incidents

Scope of Practical Skill

Given case studies or scenarios on industrial incidents, the learner must be able to:

- PA0101 Conduct an incident/accident investigation in accordance with procedures and regulatory requirements
- PA0102 Establish an official record in accordance with regulatory requirements and submit a report
- PA0103 Formulate recommendations on preventive measures

Applied Knowledge

- AK0101 Investigation procedures
- AK0102 Reporting procedures
- AK0103 Process knowledge

Internal Assessment Criteria

- IAC0101 Investigation reports are accurately and comprehensively completed
- IAC0102 Recommendations on preventative measures are explained in terms of impact, preventative value and practicability

4.2.2. PM-04-PS02: Execute control over Safety, Health, Environment and Quality (SHEQ)control procedures

Scope of Practical Skill

Given a controlled learning environment, a sugar mill, the learner must be able to:

- PA0201 Develop a SHEQ inspection sheet and standard procedure
- PA0202 Conduct inspections to identify actual or potential unsafe work practices or conditions
- PA0203 Develop a standard procedure to maintain the lock down status of equipment in a production line
- PA0204 Direct a simulated emergency evacuation procedure
- PA0205 Develop a standard procedure to enforce restrictions and access to high risk areas
- PA0206 Develop a standard procedure and inspection sheet for recognise factors in stored products and raw material that would result in unsafe products
- PA0207 Develop a standard procedure and inspection sheet to inspect housekeeping and sanitation practices

Applied Knowledge

- AK0201 SHEQ procedures
- AK0202 HACCP

Internal Assessment Criteria

- IAC0201 Standard procudeures and inspections sheets addresses all the critical control areas and are practically implementable

4.2.3. PM-04-PS03: Maintain records and registers in compliance with Safety, Health, Environment and Quality (SHEQ) regulations

Scope of Practical Skill

Given different scenarios, examples of SHEQ records, the learner must be able to:

- PA0301 Maintain statutory Safety, Health and Environmental protection registers
- PA0302 Perform a SHEQ inspection and complete SHEQ forms
- PA0303 Evaluate SHEQ records and formulate corrective measures
- PA0304 Draft a SHEQ feedback report

Applied Knowledge

- AK0301 Statutory register requirements
- AK0302 SHEQ inspection procedures
- AK0303 Reporting and recording procedures

Internal Assessment Criteria

- IAC0301 Statutory registers are complete and accurate
- IAC0302 SHEQ reports and documents are complete and accurate

4.2.4. PM-04-PS04: Perform Hazard Identification and Risk Analysis assessment (HIRA)

Scope of Practical Skill

Given controlled learning environment in a operational sugar production unit, the learner must be able to:

- PA0401 Draft a HIRA assessment sheet
- PA0402 Conduct inspections to identify actual or potential unsafe work practices or conditions
- PA0403 Formulate corrective measures to address unsafe work practices

Applied Knowledge

- AK0401 Assessment procedures
- AK0402 Risks and corrective measures
- AK0403 Reporting and recording procedures
- AK0404 The process of continuous risk assessment
- AK0405 Documentation required
- AK0406 Hazards and risks likely to be encountered
- AK0407 Consequences for not conforming to legal and specified requirements

Internal Assessment Criteria

- IAC0401 The process of continuous risk assessment and document requirements is explained
- IAC0402 The physical and environmental conditions that poses risks are indetified and consequences for not conforming to legal and specified requirements is explained
- IAC0403 A systematic approach is followed to recognise risks
- IAC0404 Remedial action are formulated that are pracically implementable

4.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Access to a sugar processing line
- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Human Resource Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers
- Facilitators with expert knowledge in the scope of the module

Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations
- Personal protective equipment

4.4 Exemptions

- None recognised

5. 313908000-PM-05, Conduct and respond to in-line quality tests and reports, NQF Level 5, Credits 8

5.1 Purpose of the Practical Skill Modules

The focus of the learning in this module is on providing the learner an opportunity to monitor quality standards and to initiate the responses to correct these in a controlled learning environment.

The learner will be required to:

- PM-05-PS01: Use observations, instruments, gauges and in-process tests to execute quality checks at various stages of sugar processing
- PM-05-PS02: Read and respond to sugar quality reports

5.2 Guidelines for Practical Skills

5.2.1. PM-05-PS01: Use observations, instruments, gauges and in-process tests to execute quality checks at various stages of sugar processing

Scope of Practical Skill

Given in-process samples of material and required specifications, the learner must be able to:

- PA0101 Conduct in-line quality inspections and sample analysis at various sugar processing stages
- PA0102 Conduct sensory assessments on quality at various sugar processing stages
- PA0103 Direct and schedule sampling frequency in response to quality tests and observations
- PA0104 Collect and prepare control samples for quality verification purposes at various sugar processing stages
- PA0105 Validate the accuracy of application equipment, scales and flow meters

Applied Knowledge

- AK0101 Testing equipment, instruments and gauges
- AK0102 Validation procedures and tolerances
- AK0103 Product standards
- AK0104 Sampling procedures
- AK0105 Common deviations and standard responses

Internal Assessment Criteria

- IAC0101 Quality factors affecting production line operations are identified
- IAC0102 Samples are analysed in accordance with accepted practices
- IAC0103 Quality control actions and frequencies are adjusted in response to quality results
- IAC0104 The implications of incorrect product data and/or the unavailability of data on the quality of the final product can be explained

5.2.2. PM-05-PS02: Read and respond to sugar quality reports

Scope of Practical Skill

Given quality reports, the learner must be able to:

- PA0201 Read and interpret reports on sugar quality, formulate actions to address deviations
- PA0202 Solve quality problems and formulate actions to address areas or processes that are repeatedly causing quality problems
- PA0203 Identify variations or deviations in technical performance of equipment from production and quality reports and formulate corrective actions

Applied Knowledge

- AK0201 Product specifications
- AK0202 Process knowledge
- AK0203 Equipment specifications

Internal Assessment Criteria

- IAC0201 Corrective actions that has to be initiated in good time to maintain quality standards and minimise loss can be explained
- IAC0202 Quality standards are monitored and maintained at various stages of the feed milling line

5.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Access to a sugar processing line
- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Human Resource Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers
- Facilitators with expert knowledge in the scope of the module

Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations
- Personal protective equipment

5.4 Exemptions

- None recognised

6. 313908000-PM-06, Inspect and coordinate maintenance of equipment, NQF Level 5, Credits 8

6.1 Purpose of the Practical Skill Modules

The focus of the learning in this module is on providing the learner an opportunity to to gain skills in the first line maintenance of equipment used in a sugar mill production line

The learner will be required to:

- PM-06-PS01: Perform mechanical inspections on sugar processing equipment

6.2 Guidelines for Practical Skills

6.2.1. PM-06-PS01: Perform mechanical inspections on sugar processing equipment

Scope of Practical Skill

Given a controlled learning environment, a sugar mill production line or unit, the learner must be able to:

- PA0101 Inspect sugar processing equipment for soundness and compliance with safety, health, environmental and quality assurance requirements
- PA0102 Detect technical problems and prioritise repairs in terms of associated risk of specific failure, safety risks or product loss
- PA0103 Generate maintenance requests (not scheduled)
- PA0104 Monitor and control the execution of standard equipment care and lubrication procedures to ensure operational functionality
- PA0105 Evaluate completed maintenance work by inspections, spot checks and machine runs
- PA0106 Recognise and initiate corrective actions when equipment is not operating to specification
- PA0107 Measure and record production downtime per category/incident/equipment
- PA0108 Present daily downtime trends by means of a graphical display against baseline targets
- PA01

Applied Knowledge

- AK0101 Standard maintenance procedures and documentation
- AK0102 Indicators of mechanical problems on processing unit and equipment
- AK0103 Standard equipment settings and operating standards
- AK0104 Causes of mechanical problems
- AK0105 Safety risks and protective measures

Internal Assessment Criteria

- IAC0101 Inspection of equipment is performed and recorded in accordance with standard procedures Functioning of mechanical equipment, indicators of faults or variations from normal operation and/or imminent mechanical failure and fault finding principles can be explained

6.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Access to a sugar processing line
- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers
-

Human Resource Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers
- Facilitators with expert knowledge in the scope of the module

Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations
- Personal protective equipment

6.4 Exemptions

- None recognised

7. 313908000-PM-07, Compile and present production reports, NQF Level 4, Credits 4

7.1 Purpose of the Practical Skill Modules

The focus of the learning in this module is on providing the learner an opportunity to to gain skills in the first line maintenance of equipment used in a sugar mill production line

The learner will be required to:

- PM-07-PS01: Access, organise and process sugar production and quality data
- PM-07-PS02: Compile reports and present sugar production data

7.2 Guidelines for Practical Skills

7.2.1. PM-07-PS01: Access, organise and process sugar production and quality data

Scope of Practical Skill

Given a controlled learning environment and a range of production data and a personnal computer, the learner must be able to:

- PA0101 Consolidate information from more than one source
- PA0102 Analyse data and isolate/identify trends
- PA0103 Formulate findings and recommendations

Applied Knowledge

- AK0101 Basic statistical/trend analysis
- AK0102 Basic computer skills

Internal Assessment Criteria

- IAC0101 Data is annalysed accurately
- IAC0102 Findings and recommendations are accurate and implementable

7.2.2. PM-07-PS02: Compile reports and present sugar production data

Scope of Practical Skill

Given a production information, the learner must be able to:

- PA0201 Compile a production report
- PA0202 Compile a presentation
- PA0203 Present the report at a simulated meeting
- PA0204 Present daily production trends by means of a graphical display

Applied Knowledge

- AK0201 Production reports

- AK0202 Presentation skills

Internal Assessment Criteria

- IAC0201 The reports are well structured and key information is captured
- IAC0202 Presentations are well structured and presented
- IAC0203 Graphical displays are accurate and with trends clearly illustrated

7.3 Provider Programme Accreditation Criteria

Physical Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers

Human Resource Requirements:

- Meet requirements as set out by the QCTO appointed AQP for accreditation of skills development providers
- Facilitators with expert knowledge in the scope of the module

Legal Requirements:

- Compliance with occupational health, safety and environmental protection regulations

7.4 Exemptions

- None recognised

SECTION 3C: WORK EXPERIENCE MODULE SPECIFICATIONS

List of Work Experience Module Specifications

- 313908000-WM-01, Sugar processing equipment control procedures, NQF Level 5, Credits 28
- 313908000-WM-02, Sugar processing resource control procedures, NQF Level 5, Credits 16
- 313908000-WM-03, Safety, health, environmental protection and quality compliance procedures, NQF Level 5, Credits 16
- 313908000-WM-04, Mechanical equipment functionality and availability processes, NQF Level 4, Credits 16

1. 313908000-WM-01, Sugar processing equipment control procedures, NQF Level 5, Credits 28

1.1 Purpose of the Work Experience Modules

The focus of the work experience is on providing the learner an opportunity to:

Gain experience in attending to a sugar processing equipment and production control procedures.

The learner will be required to:

- WM-01-WE01: Observe and assist an experienced Sugar Process Controller with the control of equipment
- WM-01-WE02: Control sugar processing equipment under close direction and supervision of an experienced Process Controller
- WM-01-WE03: Control sugar processing equipment under normal workplace reporting and supervision structures

1.2 Guidelines for Work Experiences

1.2.1. WM-01-WE01: Observe and assist an experienced Sugar Process Controller with the control of equipment

Scope of Work Experience

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

- WA0101 Assist with and observe the operation a sugar milling production line including starting up and shutting down production lines, setting of equipment, monitoring and adjusting material flow, minimise contamination risks, production department communication and reporting, process control (SCADA systems), shift handovers
- WA0102 Assist with and observe general interaction, reporting and communication with other departments such as purchasing, maintenance, marketing, quality control staff, operational managers, administration, human resources
- WA0103 Assist with and observe general quality control practices, procedures and reports such as attending quality review meetings, in-process quality control, evaluation of quality reports, addressing quality problems
- WA0104 Gain exposure in the functions of supporting sections by rotating between these sections for a period of a week such as raw material stores, final product dispatch area, quality analysis laboratory/section

Supporting Evidence

- SE0101 Report by mentor

1.2.2. WM-01-WE02: Control sugar processing equipment under close direction and supervision of an experienced Process Controller

Scope of Work Experience

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

- WA0201 Attend to the operation a sugar milling production line under direct supervision including starting up and shutting down production lines, setting of equipment, monitoring and adjusting material flow, minimise contamination risks, production department communication and reporting, process control (SCADA systems), shift handovers
- WA0202 Attend to general interaction, reporting and communication with other departments under direct supervision such as purchasing, maintenance, marketing, quality control staff, operational managers, administration, human resources
- WA0203 Attend to general quality control practices, procedures and reports under direct supervision such as attending quality review meetings, in-process quality control, evaluation of quality reports, addressing quality problems

Supporting Evidence

- SE0201 Report by mentor

1.2.3. WM-01-WE03: Control sugar processing equipment under normal workplace reporting and supervision structures

Scope of Work Experience

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

- WA0301 Attend to the operation a sugar milling production line including starting up and shutting down production lines, setting of equipment, monitoring and adjusting material flow, minimise contamination risks, production department communication and reporting, process control (SCADA systems), shift handovers
- WA0302 Attend to general interaction, reporting and communication with other departments such as purchasing, maintenance, marketing, quality control staff, operational managers, administration, human resources
- WA0303 Attend to general quality control practices, procedures and reports such as attending quality review meetings, in-process quality control, evaluation of quality reports, addressing quality problems
- WA0304 Attend to sugar milling operations during days or shifts when limited support is available

Supporting Evidence

- SE0301 Production records including quantity and quality
- SE0302 Completed standard documentation
- SE0303 Plant utilisation records
- SE0304 Quality analysis records
- SE0305 Key plant result and performance indicators

1.3 Contextualised Workplace Knowledge

1 Data reporting systems

2 Equipment operating parameters

3 Production targets and schedules of work

4 Standard operating procedures

5 Product specification

6 SHEQ policies and procedures

7 Material costs

8 Process control technology

9 Document flow and control

10 Workplace specific processes and technology

1.4 Criteria for Workplace Approval

Physical Requirements:

- A sugar mill or refinery

Human Resource Requirements:

- A person in supervisory or managerial role, with 3 years operational process control experience in a sugar mill or refinery for every 8 learners
- Trained as a workplace mentor

Legal Requirements:

- Workplace compliance with occupational health safety and environmental protection requirements

1.5 Additional Assignments to be Assessed Externally

None specified

2. 313908000-WM-02, Sugar processing resource control procedures, NQF Level 5, Credits 16

2.1 Purpose of the Work Experience Modules

The focus of the work experience is on providing the learner an opportunity to:

Gain experience in controlling various resources and personnel in a sugar milling operation.

The learner will be required to:

- WM-02-WE01: Observe and assist an experienced Process Controller with the control of production resources
- WM-02-WE02: Control production resources under close direction and supervision of an experienced Process Controller
- WM-02-WE03: Control production resources under normal workplace reporting and supervision structures

2.2 Guidelines for Work Experiences

2.2.1. WM-02-WE01: Observe and assist an experienced Process Controller with the control of production resources

Scope of Work Experience

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

- WA0101 Assist with and observe material control activities such as estimating production requirements, verifying available stock levels
- WA0102 Assist with and observe the execution of personnel control activities such as determining staff needs, planning shift work, allocating staff, maintaining discipline, monitoring performance
- WA0103 Assist with and observe general interaction, reporting and communication with other departments such as production personnel, personnel department officials, stores officers, purchasing officers
- WA0104 Assist with and observe the application of policies and procedures in the workplace on control of materials and personnel such as ordering procedures, storage procedures, stock movement, personnel policies and procedures, access control

Supporting Evidence

- SE0101 Report by mentor

2.2.2. WM-02-WE02: Control production resources under close direction and supervision of an experienced Process Controller

Scope of Work Experience

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

- WA0201 Attend to material control activities such as estimating production requirements, verifying available stock levels

- WA0202 Attend to the execution of execution of personnel control activities such as determining staff needs, planning shift work, allocating staff, maintaining discipline, monitoring performance
- WA0203 Attend to general interaction, reporting and communication with other departments under direct supervision such as production personnel, personnel department officials, stores officers, purchasing officers
- WA0204 Attend to the application of policies and procedures in the workplace on control of materials and personnel such as ordering procedures, storage procedures, stock movement, personnel policies and procedures, access control

Supporting Evidence

- SE0201 Report by mentor

2.2.3. WM-02-WE03: Control production resources under normal workplace reporting and supervision structures

Scope of Work Experience

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

- WA0301 Attend to material control activities such as estimating production requirements, verifying available stock levels
- WA0302 Attend to the execution of the execution of personnel control activities such as determining staff needs, planning shift work, allocating staff, maintain discipline, monitoring performance
- WA0303 Attend to general interaction, reporting and communication with other departments such as production personnel, personnel department officials, stores officers, purchasing officers
- WA0304 Attend to the application of policies and procedures in the workplace on on control of materials and personnel such as ordering procedures, storage procedures, stock movement, personnel policies and procedures, access control

Supporting Evidence

- SE0301 Completed standard personnel records
- SE0302 Completed standard production records

2.3 Contextualised Workplace Knowledge

1 Production targets and schedules of work

2 Standard operating procedures

3 Stock control policies and procedures

4 Personnel management policies, procedures and codes

2.4 Criteria for Workplace Approval

Physical Requirements:

- A sugar mill

Human Resource Requirements:

- A person with 3 years experience in a supervisory or managerial role on a sugar mill trained as a workplace mentor must be available for every 5 learners

Legal Requirements:

- Workplace compliance with occupational health safety and environmental protection requirements

2.5 Additional Assignments to be Assessed Externally

None specified

3. 313908000-WM-03, Safety, health, environmental protection and quality compliance procedures, NQF Level 5, Credits 16

3.1 Purpose of the Work Experience Modules

The focus of the work experience is on providing the learner an opportunity to:

Gain experience in monitoring and enforcing compliance with SHEQ requirement, policies and procedures of a feed milling operation.

The learner will be required to:

- WM-03-WE01: Observe and assist an experienced Process Controller with the control of quality and enforcing SHEQ and HIRA procedures
- WM-03-WE02: Control quality and enforce SHEQ and HIRA procedures under close direction and supervision of an experienced Process Controller
- WM-03-WE03: Control quality and enforce SHEQ and HIRA procedures under normal workplace reporting and supervision structures

3.2 Guidelines for Work Experiences

3.2.1. WM-03-WE01: Observe and assist an experienced Process Controller with the control of quality and enforcing SHEQ and HIRA procedures

Scope of Work Experience

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

- WA0101 Assist with and observe the execution of SHEQ monitoring and enforcement actions in the production environment such as use of PPE, legal compliance, quality systems compliance
- WA0102 Assist with and observe general interaction, reporting and communication with other departments on compliance with SHEQ standards such liaising with safety officers, quality control staff, safety committees

Supporting Evidence

- SE0101 Report by mentor

3.2.2. WM-03-WE02: Control quality and enforce SHEQ and HIRA procedures under close direction and supervision of an experienced Process Controller

Scope of Work Experience

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

- WA0201 Attend to the execution of SHEQ and HIRA monitoring and enforcement actions in the production environment under direct supervision such as use of PPE, legal compliance, quality systems compliance
- WA0202 Attend to general interaction, reporting and communication with other departments on compliance with SHEQ and HIRA standards under direct supervision such liaising with safety officers, quality control staff, safety committees

Supporting Evidence

- SE0201 Report by mentor

3.2.3. WM-03-WE03: Control quality and enforce SHEQ and HIRA procedures under normal workplace reporting and supervision structures

Scope of Work Experience

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

- WA0301 Attend to the execution of SHEQ and HIRA monitoring and enforcement actions in the production environment such as use of PPE, legal compliance, quality systems compliance
- WA0302 Attend to general interaction, reporting and communication with other departments on compliance with SHEQ and HIRA standards such liaising with safety officers, quality control staff, safety committees
- WA0303 Attend to the execution of SHEQ and HIRA monitoring and enforcement actions when limited support is available

Supporting Evidence

- SE0301 Standard SHEQ and HIRA documentation
- SE0302 Quality control records
- SE0303 Safety records and minutes

3.3 Contextualised Workplace Knowledge

1 SHEQ and HIRA policies and procedures

2 SHEQ and HIRA documents and reports

3 SHEQ and HIRA audit procedures

3.4 Criteria for Workplace Approval

Physical Requirements:

- A sugar mill

Human Resource Requirements:

- A person with 3 years experience in a supervisory or managerial role in sugar mill trained as a workplace mentor must be available for every 5 learners

Legal Requirements:

- Workplace compliance with occupational health safety and environmental protection requirements

3.5 Additional Assignments to be Assessed Externally

None specified

4. 313908000-WM-04, Mechanical equipment functionality and availability processes, NQF Level 4, Credits 16

4.1 Purpose of the Work Experience Modules

The focus of the work experience is on providing the learner an opportunity to:

Gain experience in attending to the general maintenance of a sugar milling production line.

The learner will be required to:

- WM-04-WE01: Observe and assist an experienced Process Controller with the control of equipment availability and mechanical functionality
- WM-04-WE02: Control equipment availability and mechanical functionality under close direction and supervision of an experienced Process Controller
- WM-04-WE03: Control equipment availability and mechanical functionality under normal workplace reporting and supervision structures

4.2 Guidelines for Work Experiences

4.2.1. WM-04-WE01: Observe and assist an experienced Process Controller with the control of equipment availability and mechanical functionality

Scope of Work Experience

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

- WA0101 Assist with and observe the implementation of scheduled maintenance of a sugar processing production line
- WA0102 Assist with and observe mechanical inspections and pre start-up maintenance of a sugar processing production line
- WA0103 Assist with and observe general interaction, reporting and communication on matters such as maintenance planning, liaising with external contractors, equipment suppliers
- WA0104 Assist with and observe repairs of a sugar processing production line in breakdown situations

Supporting Evidence

- SE0101 Report by mentor

4.2.2. WM-04-WE02: Control equipment availability and mechanical functionality under close direction and supervision of an experienced Process Controller

Scope of Work Experience

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

- WA0201 Attend to the implementation of scheduled maintenance of a sugar processing production line under direct supervision

- WA0202 Attend to mechanical inspections and pre start-up maintenance of a sugar processing production line under direct supervision
- WA0203 Attend to general interaction, reporting and communication on matters such as maintenance planning, liaising with external contractors, equipment suppliers under the guidance of a supervisor
- WA0204 Attend to repairs of repairs of a sugar processing production line in breakdown situations under direct supervision

Supporting Evidence

- SE0201 Report by mentor

4.2.3. WM-04-WE03: Control equipment availability and mechanical functionality under normal workplace reporting and supervision structures

Scope of Work Experience

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

- WA0301 Attend to the implementation of scheduled maintenance of a sugar processing production line
- WA0302 Attend to mechanical inspections and pre start-up maintenance of a sugar processing production line
- WA0303 Attend to general interaction, reporting and communication on matters such as maintenance planning, liaising with external contractors, equipment suppliers
- WA0304 Attend to repairs of a sugar processing production line in breakdown situations
- WA0305 Attend to maintenance and repairs during days when limited support is available
- WA0306 Attend to maintenance and repairs during high production demand

Supporting Evidence

- SE0301 Production documentation
- SE0302 Down time report
- SE0303 Engineering documentation

4.3 Contextualised Workplace Knowledge

1 Maintenance schedules

2 Data capturing and reporting

3 Standard Operating Procedures

4 Process knowledge and plant flexibility

5 Delegated authorities

4.4 Criteria for Workplace Approval

Physical Requirements:

- A sugar mill

Human Resource Requirements:

- A person with 3 years experience in a supervisory or managerial role in a sugar mill trained as a workplace mentor must be available for every 5 learners

Legal Requirements:

- Workplace compliance with occupational health safety and environmental protection requirements

4.5 Additional Assignments to be Assessed Externally

None specified

SECTION 4: STATEMENT OF WORK EXPERIENCE

Curriculum Number:	313908000
Curriculum Title:	Sugar Processing Controller

Learner Details	
Name:	
ID Number:	

Employer Details	
Company Name:	
Address:	
Supervisor Name:	
Work Telephone:	
E-Mail:	

313908000-WM-01, Sugar processing equipment control procedures, NQF Level 5, Credits 28

WM-01-WE01	Observe and assist an experienced Sugar Process Controller with the control of equipment		
	Scope Work Experience	Date	Signature
WA0101	Assist with and observe the operation a sugar milling production line including starting up and shutting down production lines, setting of equipment, monitoring and adjusting material flow, minimise contamination risks, production department communication and reporting, process control (SCADA systems), shift handovers		
WA0102	Assist with and observe general interaction, reporting and communication with other departments such as purchasing, maintenance, marketing, quality control staff, operational managers, administration, human resources		
WA0103	Assist with and observe general quality control practices, procedures and reports such as attending quality review meetings, in-process quality control, evaluation of quality reports, addressing quality problems		
WA0104	Gain exposure in the functions of supporting sections by rotating between these sections for a period of a week such as raw material stores, final product dispatch area, quality analysis laboratory/section		
	Supporting Evidence	Date	Signature
SE0101	Report by mentor		
WM-01-WE02	Control sugar processing equipment under close direction and supervision of an experienced Process Controller		
	Scope Work Experience	Date	Signature
WA0201	Attend to the operation a sugar milling production line under direct supervision including starting up and shutting down production lines, setting of equipment, monitoring and adjusting material flow, minimise contamination risks, production department communication and reporting, process control (SCADA		

	systems), shift handovers		
WA0202	Attend to general interaction, reporting and communication with other departments under direct supervision such as purchasing, maintenance, marketing, quality control staff, operational managers, administration, human resources		
WA0203	Attend to general quality control practices, procedures and reports under direct supervision such as attending quality review meetings, in-process quality control, evaluation of quality reports, addressing quality problems		
	Supporting Evidence	Date	Signature
SE0201	Report by mentor		
WM-01-WE03	Control sugar processing equipment under normal workplace reporting and supervision structures		
	Scope Work Experience	Date	Signature
WA0301	Attend to the operation a sugar milling production line including starting up and shutting down production lines, setting of equipment, monitoring and adjusting material flow, minimise contamination risks, production department communication and reporting, process control (SCADA systems), shift handovers		
WA0302	Attend to general interaction, reporting and communication with other departments such as purchasing, maintenance, marketing, quality control staff, operational managers, administration, human resources		
WA0303	Attend to general quality control practices, procedures and reports such as attending quality review meetings, in-process quality control, evaluation of quality reports, addressing quality problems		
WA0304	Attend to sugar milling operations during days or shifts when limited support is available		
	Supporting Evidence	Date	Signature
SE0301	Production records including quantity and quality		

SE0302	Completed standard documentation		
SE0303	Plant utilisation records		
SE0304	Quality analysis records		
SE0305	Key plant result and performance indicators		

	Contextualised Workplace Knowledge	Date	Signature
1	Data reporting systems		
2	Equipment operating parameters		
3	Production targets and schedules of work		
4	Standard operating procedures		
5	Product specification		
6	SHEQ policies and procedures		
7	Material costs		
8	Process control technology		
9	Document flow and control		
10	Workplace specific processes and technology		

	Additional Assignments to be Assessed Externally	Date	Signature

313908000-WM-02, Sugar processing resource control procedures, NQF Level 5, Credits 16

WM-02-WE01	Observe and assist an experienced Process Controller with the control of production resources		
	Scope Work Experience	Date	Signature
WA0101	Assist with and observe material control activities such as estimating production requirements, verifying available stock levels		
WA0102	Assist with and observe the execution of personnel control activities such as determining staff needs, planning shift work, allocating staff, maintaining discipline, monitoring performance		
WA0103	Assist with and observe general interaction, reporting and communication with other departments such as production personnel, personnel department officials, stores officers, purchasing officers		
WA0104	Assist with and observe the application of policies and procedures in the workplace on control of materials and personnel such as ordering procedures, storage procedures, stock movement, personnel policies and procedures, access control		
	Supporting Evidence	Date	Signature
SE0101	Report by mentor		
WM-02-WE02	Control production resources under close direction and supervision of an experienced Process Controller		
	Scope Work Experience	Date	Signature
WA0201	Attend to material control activities such as estimating production requirements, verifying available stock levels		
WA0202	Attend to the execution of execution of personnel control activities such as determining staff needs, planning shift work, allocating staff, maintaining discipline, monitoring performance		
WA0203	Attend to general interaction, reporting and communication with other departments under direct		

	supervision such as production personnel, personnel department officials, stores officers, purchasing officers		
WA0204	Attend to the application of policies and procedures in the workplace on control of materials and personnel such as ordering procedures, storage procedures, stock movement, personnel policies and procedures, access control		
	Supporting Evidence	Date	Signature
SE0201	Report by mentor		
WM-02-WE03	Control production resources under normal workplace reporting and supervision structures		
	Scope Work Experience	Date	Signature
WA0301	Attend to material control activities such as estimating production requirements, verifying available stock levels		
WA0302	Attend to the execution of the execution of personnel control activities such as determining staff needs, planning shift work, allocating staff, maintain discipline, monitoring performance		
WA0303	Attend to general interaction, reporting and communication with other departments such as production personnel, personnel department officials, stores officers, purchasing officers		
WA0304	Attend to the application of policies and procedures in the workplace on on control of materials and personnel such as ordering procedures, storage procedures, stock movement, personnel policies and procedures, access control		
	Supporting Evidence	Date	Signature
SE0301	Completed standard personnel records		
SE0302	Completed standard production records		

	Contextualised Workplace Knowledge	Date	Signature
1	Production targets and schedules of work		
2	Standard operating procedures		
3	Stock control policies and procedures		
4	Personnel management policies, procedures and codes		

	Additional Assignments to be Assessed Externally	Date	Signature

313908000-WM-03, Safety, health, environmental protection and quality compliance procedures, NQF Level 5, Credits 16

WM-03-WE01	Observe and assist an experienced Process Controller with the control of quality and enforcing SHEQ and HIRA procedures		
	Scope Work Experience	Date	Signature
WA0101	Assist with and observe the execution of SHEQ monitoring and enforcement actions in the production environment such as use of PPE, legal compliance, quality systems compliance		
WA0102	Assist with and observe general interaction, reporting and communication with other departments on compliance with SHEQ standards such liaising with safety officers, quality control staff, safety committees		
	Supporting Evidence	Date	Signature
SE0101	Report by mentor		

WM-03-WE02	Control quality and enforce SHEQ and HIRA procedures under close direction and supervision of an experienced Process Controller		
	Scope Work Experience	Date	Signature
WA0201	Attend to the execution of SHEQ and HIRA monitoring and enforcement actions in the production environment under direct supervision such as use of PPE, legal compliance, quality systems compliance		
WA0202	Attend to general interaction, reporting and communication with other departments on compliance with SHEQ and HIRA standards under direct supervision such liaising with safety officers, quality control staff, safety committees		
	Supporting Evidence	Date	Signature
SE0201	Report by mentor		
WM-03-WE03	Control quality and enforce SHEQ and HIRA procedures under normal workplace reporting and supervision structures		
	Scope Work Experience	Date	Signature
WA0301	Attend to the execution of SHEQ and HIRA monitoring and enforcement actions in the production environment such as use of PPE, legal compliance, quality systems compliance		
WA0302	Attend to general interaction, reporting and communication with other departments on compliance with SHEQ and HIRA standards such liaising with safety officers, quality control staff, safety committees		
WA0303	Attend to the execution of SHEQ and HIRA monitoring and enforcement actions when limited support is available		
	Supporting Evidence	Date	Signature
SE0301	Standard SHEQ and HIRA documentation		
SE0302	Quality control records		

SE0303	Safety records and minutes		

	Contextualised Workplace Knowledge	Date	Signature
1	SHEQ and HIRA policies and procedures		
2	SHEQ and HIRA documents and reports		
3	SHEQ and HIRA audit procedures		

	Additional Assignments to be Assessed Externally	Date	Signature

313908000-WM-04, Mechanical equipment functionality and availability processes, NQF Level 4, Credits 16

WM-04-WE01	Observe and assist an experienced Process Controller with the control of equipment availability and mechanical functionality		
	Scope Work Experience	Date	Signature
WA0101	Assist with and observe the implementation of scheduled maintenance of a sugar processing production line		
WA0102	Assist with and observe mechanical inspections and pre start-up maintenance of a sugar processing production line		
WA0103	Assist with and observe general interaction, reporting and communication on matters such as maintenance planning, liaising with external contractors, equipment suppliers		

WA0104	Assist with and observe repairs of a sugar processing production line in breakdown situations		
	Supporting Evidence	Date	Signature
SE0101	Report by mentor		
WM-04-WE02	Control equipment availability and mechanical functionality under close direction and supervision of an experienced Process Controller		
	Scope Work Experience	Date	Signature
WA0201	Attend to the implementation of scheduled maintenance of a sugar processing production line under direct supervision		
WA0202	Attend to mechanical inspections and pre start-up maintenance of a sugar processing production line under direct supervision		
WA0203	Attend to general interaction, reporting and communication on matters such as maintenance planning, liaising with external contractors, equipment suppliers under the guidance of a supervisor		
WA0204	Attend to repairs of repairs of a sugar processing production line in breakdown situations under direct supervision		
	Supporting Evidence	Date	Signature
SE0201	Report by mentor		
WM-04-WE03	Control equipment availability and mechanical functionality under normal workplace reporting and supervision structures		
	Scope Work Experience	Date	Signature
WA0301	Attend to the implementation of scheduled maintenance of a sugar processing production line		
WA0302	Attend to mechanical inspections and pre start-up maintenance of a sugar processing production line		
WA0303	Attend to general interaction, reporting and communication on matters such as maintenance		

	planning, liaising with external contractors, equipment suppliers		
WA0304	Attend to repairs of a sugar processing production line in breakdown situations		
WA0305	Attend to maintenance and repairs during days when limited support is available		
WA0306	Attend to maintenance and repairs during high production demand		
	Supporting Evidence	Date	Signature
SE0301	Production documentation		
SE0302	Down time report		
SE0303	Engineering documentation		

	Contextualised Workplace Knowledge	Date	Signature
1	Maintenance schedules		
2	Data capturing and reporting		
3	Standard Operating Procedures		
4	Process knowledge and plant flexibility		
5	Delegated authorities		

	Additional Assignments to be Assessed Externally	Date	Signature