



Maldives National Skills Development Authority



National Competency Standard for Bar Bending

Standard Code: CON03S09V1

Qualification Name: National Certificate III in Bar Bending
Qualification Code: CON03SQ1L309

PREFACE

Technical and Vocational Education and Training (TVET) Authority was established with the vision to develop a TVET system in the Maldives that is demand driven, accessible, beneficiary financed and quality assured, to meet the needs of society for stability and economic growth, the needs of Enterprise for a skilled and reliable workforce, the need of young people for decent jobs and the needs of workers for continuous mastery of new technology.

TVET system in the Maldives flourished with the Employment Skills Training Project (ESTP) funded by ADB with the objective of increasing the number of Maldivians, actively participating in the labor force, employed and self-employed. The Project supported expansion of demand driven employment-oriented skills training in priority occupations and to improve the capacity to develop and deliver Competency Based Skill Training (CBST). The project supported delivery of CBST programs to satisfy employer demand-driven needs. The National Competency Standards (NCS) provide the base for this training. Currently CBST is offered for five key sectors in the Maldives: Tourism, Fisheries and Agriculture, Transport, Construction and the Social sectors. These sectors are included as priority sectors that play a vital role in the continued economic growth of the country.

The NCS are developed in consultation with Employment Sector Councils representing employers. They are designed using a consensus format endorsed by the Maldives Qualifications Authority (MQA) to maintain uniformity of approach and the consistency of content amongst occupations. This single format also simplifies benchmarking the NCS against relevant regional and international standards. NCS specify the standards of performance of a competent worker and the various contexts in which the work may take place. NCS also describes the knowledge, skills and attitudes required in a particular occupation. They provide explicit advice to assessors and employers regarding the knowledge, skills and attitudes to be demonstrated by the candidates seeking formal recognition for the competency acquired following training or through work experience. By sharing this information, all participants in the training process have the same understanding of the training required and the standard to be reached for certification. Certification also becomes portable and can be recognized by other employers and in other countries with similar standards. NCS are the foundation for the implementation of the TVET system in Maldives. They ensure that all skills, regardless of where or how they were developed can be assessed and recognized. They also form the foundation for certifying skills in the Maldives National Qualification Framework (MNQF).

Technical Panel members		
Name	Designation	Company
Mr. Mohamed Ali Janaah	CEO	Alyson Service
Mr. Mohamed Hashim	principal	MIVET
Mr. Adnan Haleem	Managing Director	Alihavaasa Construction & Carpentry
Mr. Alau Ali	Director	Alia Construction
Mr. Saudhulla Hilmeem	Managing Director	Swift Engineering
Mr. Abdulla Mohamed	Managing Director	Amin Construction
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TVET	-	MHRYS
Employment Sector Councils		
Name	Designation	Company
Mr. Abdulla Mohamed	Managing Director	Amin Construction
Mr. Suhail Ahmed	Project Coodinator	Hulhumale' Development Cooperation Ltd
Mr. Mohamed Ali	Deputy Director	Min. of Construction & Public Infrastructure
Mr. Mohamed Ali Janaah	CEO	Alyson Service
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Mr. Ahmed Shiyam	Operation Manager	Rainbow Construction Pvt

		Ltd
Mr. Mohamed Aswan	Operation Executive	AIMA Construction
National Competency Standard has been Endorsed by		
<div> <div></div> <div> Chariman, Construction Sector Council vice Chairman, Construction Sector Council </div> </div>		
Contact for Comments		
Technical Vocational Education and Training Section Ministry of Human Resources, Youth and Sports Haveeree Hingun, Male' / Maldives Telephone: 3347411, Fax: 3347493 Email: PIU@employment.gov.mv		
Date of Endorsement:		Date of revision

KEY FOR CODING

Coding Competency Standards and Related Materials

DESCRIPTION	REPRESENTED BY
Industry Sector as per ESC (Three letters)	Construction Sector (CON) Fisheries and Agriculture Sector (FNA) Transport sector (TRN) Tourism Sector (TOU) Social Sector (SOC) Foundation (FOU)
Competency Standard	S
Occupation with in a industry Sector	Two digits 01-99
Unit	U
Common Competency	1
Core Competency	2
Optional/ Elective Competency	3
Assessment Resources Materials	A
Learning Resources Materials	L
Curricula	C
Qualification	Q1, Q2 etc
MNQF level of Qualification	L1, L2 etc
Version Number	V1, V2 etc
Year of endorsement of standard, qualification	By two digits Example- 07

1. Endorsement Application for Qualification 01		
2. NATIONAL CERTIFICATE III IN BAR BENDING		
3. Qualification code: CON03SQ1L209		Total Number of Credits: 45
4. Purpose of the qualification <p>The holders of this qualification will be competent to work in the Construction Sector as a bar bender. The level II qualification presented here will facilitate preparing students to the entry workplace tasks and the competency units are mapped in such a way to fulfil the knowledge and skills requirements of the "Bar Bender" occupation within the local construction Industry.</p>		
5. Regulations for the qualification		National Certificate II in the occupation of Bar Bender will be awarded to those who are competent in units 1+2+3+4+5+6+7+8
6. Schedule of Units		
Unit Title	Unit Title	Code
1	Work safely in the workplace	TRN01S1U01V1
2	Handle and maintenance of workplace tools and equipment's	TRN01S1U03V1
3	Perform effective workplace communication	TRN01S1U05V1
4	Select Material Required for Re - Enforcement	CON03S2U01VI
5	Cut Steel Bars to Measurements	CON03S2U02VI
6	Bend Steel Bars to Required Shapes & Measurements	CON03S2U03VI
7	Produce Pre-Fabricated Re-Enforcement Cages	CON03S2U04VI
8	Lay Re-Enforcement In-situ	CON03S2U05VI
7. Accreditation requirements	The training provider should have a workshop or similar training facility to provide the trainees the hands-on experience related to this qualification	
8. Recommended sequencing of units	As appearing under the section 06	

UNITS DETAILS

no	Unit Title	Code	Level	No of credits
1	Work safely in the workplace	TRN01S1U01V1	3	4
2	Handle and maintenance of workplace tools and equipment's	TRN01S1U03V1	3	6
3	Perform effective workplace communication	TRN01S1U05V1	3	7
4	Select Material Required for Re - Enforcement	CON03S2U01V1	3	4
5	Cut Steel Bars to Measurements	CON03S2U02V1	3	3
6	Bend Steel Bars to Required Shapes & Measurements	CON03S2U03V1	3	7
7	Produce Pre-Fabricated Re-Enforcement Cages	CON03S2U04V1	3	6
8	Lay Re-Enforcement In-situ	CON03S2U05V1	3	8

Packaging of National Qualifications:

National certificate III in Bar Bender will be awarded to those who are competent in No
1+2+3+4+5+6+7+8

Qualification Code: CON03SQ1L209

DESCRIPTION OF AN BAR BENDER

Bar bender will be working front line of the construction industry. Bar benders who are competent in this standard will be equipped for cutting and bending reinforcing bars according the information in the drawing. They will be working under the supervision of site supervisor.

COMPETENCY STANDARD DEVELOPMENT PROCESS

The competencies were determined based on the analysis of the tasks expected to be performed by the bar bender in the Maldives. The task analysis was based on the existing job descriptions used in both private and public sector. Competency standards used for similar type of training in other countries were also examined.

COMPETENCY STANDARDS FOR

BAR BENDER

Unit No	Unit Title
1.	Work safely in the workplace
2.	Handle and maintenance of workplace tools and equipment's
3.	Perform effective workplace communication
4.	Select Material Required for Reinforcement
5.	Cut Steel Bars to Measurements
6.	Bend Steel Bars to Required Shapes & Measurements
7.	Produce Pre-Fabricated Reinforcement Cages
8.	Lay Re-Enforcement In-situ

UNIT 1

UNIT TITLE	Work safely in the workplace				
DESCRIPTOR	This unit incorporates safety guidelines and encompasses competencies necessary to apply basic safety and emergency procedures to maintain a safe workplace for staff, customers and others.				
CODE	TRN01S1U01V1	LEVEL	1	CREDIT	4

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Apply basic safety procedures	<ul style="list-style-type: none">1.1. procedures to achieve a safe working environment followed and maintained in line with existing regulations and requirements and according to worksite policy1.2. all unsafe situations recognized and reported according to worksite policy1.3. all breakdowns in relation to machinery and equipment reported to supervisor or nominated persons1.4. fire and safety hazards identified and precautions are taken or reported according to worksite policy and procedures1.5. dangerous goods and substances identified, handled and stored according to worksite policy and procedures1.6. worksite policy regarding manual handling practice followed
2. Apply necessary emergency procedures	<ul style="list-style-type: none">2.1. worksite policies and procedures regarding illness or accidents identified and applied2.2. safety alarms identified2.3. qualified persons are contacted in the event of accident or sickness of customers or staff and accident details documented according to worksite accident/ injury procedures2.4. worksite evacuation procedures identified and applied

RANGE STATEMENT

Unsafe situations may include but are not limited to sharp cutting tools and instruments, the electricity/ water combination, toxic substances, damaged packing material or containers, broken or damaged equipment, flammable materials and fire hazards, lifting practices, spillages, waste and debris especially on floors, ladders, trolleys and glue guns/burns

Emergency procedures may include responding to sickness, accidents and fire, or store/shop evacuation involving staff or customers.

Tools, equipment and material used in this unit may include

Safety manuals, fire extinguishers and dangerous goods used in the workplaces.

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be holistic and must include real or simulated workplace activities.

Evidence of performance may be provided by customers, team leaders/members or other persons, subject to agreed authentication arrangements.

Assessment context

Assessment of this unit must be completed on the job or in a simulated work environment which reflects a range of safe working practices.

Critical aspects (for assessment)

It is essential that competence is fully observed and there is ability to transfer competence to changing circumstances and to respond to unusual situations in the critical aspects of:

- Communicating effectively with others involved in or affected by the work.
- Identifying and assessing hazardous situations and rectifying, or reporting to the relevant persons.
- Operating fire-fighting appliances.

- Safely handling and storage of dangerous and/or hazardous goods and substances.
- Applying safe manual handling practices.
- Safely and effectively operating equipment and utilizing materials over the full range of functions and processes for work undertaken on worksite.
- Following worksite evacuation procedures.

This unit may be assessed in conjunction with all and units which form part of the normal job role.

Assessment conditions

It is preferable that assessment reflects a process rather than an event and occurs over a period of time to cover varying circumstances.

Special notes for assessment

Evidence of performance may be provided by customers, team leaders/members or other persons, subject to agreed authentication arrangements.

Resources required for assessment

The following should be made available:

- A workplace or simulated workplace
- Situations requiring safe working practices
- Worksite or equivalent instructions on safe working practice
- Hazardous chemicals and/or dangerous goods information
- Materials, tooling and equipment
- Fire-fighting appliances and fire test facilities

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
<ul style="list-style-type: none"> • General knowledge of the implications on efficiency, morale and customer relations • General knowledge of common automotive terminologies 	<ul style="list-style-type: none"> • Undertake effective customer relation communications • Competent in communicating basic automotive terminologies • Competent to work according to

<ul style="list-style-type: none"> • Working knowledge of workplace safety regulations/requirements, equipment, material and personal safety requirements. • Working knowledge of safe manual handling theories and practices • Working knowledge of the selection and application of fire-fighting appliances • Working knowledge of dangerous goods and hazardous chemicals handling processes • Detailed knowledge of worksite reporting procedures 	<p>safety regulations</p> <ul style="list-style-type: none"> • Competent to work safely with workplace equipments, materials and colleagues • Undertake safe manual handling jobs • Skill to select and apply appropriate fire fighting appliances • Ability to safely handle dangerous good and hazardous chemicals • Competent to undertake appropriate worksite reporting procedures
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UNIT 2

UNIT TITLE	Handle and maintenance of workplace tools and equipments				
DESCRIPTOR	This unit covers the competence required to select, safely use and maintain workplace tooling and equipment. The unit includes identification and confirmation of work requirement, preparation for work, selection, use, servicing, maintenance and storage of tooling and equipment and completion of work finalisation processes, including clean-up and documentation.				
CODE	TRN01S1U03V1	LEVEL	2	CREDIT	6

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Select correct tooling and equipment for workplace applications	1.1. Tooling and equipment selected to meet job requirements 1.2. Suitable tooling and equipment selected for use within the workplace environment 1.3. Tooling and equipment selected according to enterprise procedures/policies
2. Use of tooling and equipment	2.1. Tooling and equipment used in a safe manner to prevent injury to self and others 2.2. Tooling and equipment used in a manner that does not cause damage to other workplace equipment 2.3. Observations noted during the use of tooling/ equipment
3. Service and maintain workplace tooling and equipment	3.1. Tooling and equipment regularly checked against manufacturer/component supplier recommendations to ensure safe operating condition 3.2. Damaged/worn tooling and equipment tagged and removed from the workplace for repair or replacement and reported in accordance with enterprise requirements 3.3. Tooling/equipment are serviced, adjusted and/or maintained per

	<p>manufacturer/component supplier</p> <p>schedule to ensure safe and correct operation, within the scope of responsibility</p> <p>3.4. Servicing and maintenance operations carried out according to industry regulations/guidelines, enterprise procedures/policies</p>
4. Store and secure tooling and equipment	<p>4.1. Tooling and equipment cleaned, checked and stored</p> <p>4.2. Tooling and equipment securely stored</p> <p>4.3. Documents completed according to enterprise policies and procedures</p>

RANGE STATEMENT

Tooling and equipment may include computer hardware/ software, calculators, general office equipment, hand and power tooling, specialist tooling for removal/adjustment, storage racks, protective covers, measuring devices, plastics repair equipment, sealing equipment, adhesive equipment, heating equipment, templates, welding equipment, including oxy, arc, MIG and TIG, vehicle cleaning equipment, service workshop manuals, product manuals, hydraulic breaker tooling, line oilers, filters and gauges, alternator and starting motor bench testers, paint mixers, key cutters, multimeters, load testers, brake and drum lathes, fuel injector cleaners, ignition module test instruments

Maintenance methods may include routine maintenance to tooling and equipment as per schedules, labelling faulty tooling and equipment, minor repairs to tooling and equipment, and the chocking, jacking and supporting of machines on level and incline planes

Specific requirements may include hydraulic jacks, air bags and overhead cranes for lifting heavy machines

Tools, equipment and materials used in this unit may include

- All the available workshop tools and equipments
- A fully operational workshop with all equipments and tools

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be a holistic one and must include real or simulated workplace activities.

Assessment context

Application of competence is to be assessed in the workplace or simulated worksite and needs to occur using standard and authorized work practices, safety requirements and environmental constraints.

Critical aspects (for assessment)

It is essential that competence in this unit signifies ability to transfer competence to changing circumstances and to respond to unusual circumstances in the critical aspects of:

- Selection and safe use of hand tooling
- Selection and safe use of workplace equipment
- Basic maintenance of tooling and equipment within the scope of operator responsibility
- Selection and safe use of personal protective equipment

Assessment conditions

It is preferable that assessment reflects a process rather than an event and occurs over a period of time to cover varying quality circumstances. Evidence of performance may be provided by customers, team leaders/members or other persons subject to agreed authentication arrangements

Special notes for assessment

Competence in this unit may be assessed in conjunction with other functional units which together form part of the holistic work role

Resources required for assessment

The following resources should be made available:

- Workplace location or simulated workplace
- Material relevant to the use and maintenance of workplace tooling and equipment

- Equipment, hand and power tooling appropriate to the use and maintenance of workplace tooling and equipment
- Activities covering mandatory task requirements
- Specifications and work instructions

UNDERPINNING KNOWLEDGE AND SKILLS

Analyst groups might be advised to include Key Competencies and Levels in this section

Underpinning Knowledge	Underpinning Skills
<ul style="list-style-type: none"> • Safety regulations/requirements, equipment, material and personal safety requirements • Tool and equipment selection procedures • Basic maintenance procedures for tooling and equipment • Tool and equipment safety and operating procedures • Types, characteristics, uses and limitations of hand tooling • Types, characteristics, uses and limitations of power tooling • Types, characteristics, uses and limitations of workplace equipment 	<ul style="list-style-type: none"> • Demonstrate understanding of workplace safety • Identify appropriate tools and equipments • Undertake maintenance of tools and equipments used in the workplace • Operate tools and equipments safely

UNIT 3

UNIT TITLE	Perform effective workplace communication				
DESCRIPTOR	This unit covers the competence to communicate in the workplace by oral, written and electronic means.				
CODE	TRN01S1U05V1	LEVEL	2	CREDIT	7

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Write routine texts	<ul style="list-style-type: none">1.1. Routine texts of one or more sentences composed in accordance with workplace requirements1.2. Routine forms completed in accordance with workplace requirements1.3. Spelling, punctuation and grammar rules followed1.4. Texts self-checked for accuracy and presented for progress checks by relevant persons
2. Read routine documents	<ul style="list-style-type: none">2.1. Purpose of the text understood and described2.2. Main points or ideas presented described2.3. New technical words comprehended2.4. The meaning of key words and phrases explained
3. Contribute to workplace communications	<ul style="list-style-type: none">3.1. Information accessed to ensure effective communication when sending or receiving information3.2. Assistance provided to colleagues in the workplace , to foster common understanding3.3. Requests for information from colleagues met3.4. Documents kept and maintained in accordance with workplace/enterprise procedures and Government legislation
4. Apply basic computer skills	<ul style="list-style-type: none">4.1. Computer turned on according to manufacturer/ component supplier specifications or workplace procedures4.2. Software loaded or selected from menu

	<p>4.3. File identified and selected or new file produced</p> <p>4.4. Information entered, edited or deleted using an input device and within workplace designated speed and accuracy requirements</p> <p>4.5. Document saved regularly to avoid loss of information</p> <p>4.6. Document proof read and amended for accuracy</p> <p>4.7. Document produced in required style and format</p> <p>4.8. Document printed</p> <p>4.9. Files saved and closed and program closed or exited according to manufacturer/component supplier specifications or workplace procedures</p> <p>4.10. Computer turned off according to manufacturer/ component supplier specifications or workplace procedures</p> <p>4.11. Workplace guidelines relating to screen-based equipment and computer workstations observed</p>
5. Operate workplace telephone systems	<p>5.1. Telephone system functions used according to enterprise policy</p> <p>5.2. Outgoing calls completed in accordance with manufacturer instructions and enterprise policy and procedures</p> <p>5.3. Incoming calls answered promptly and in accordance with enterprise policy and procedures</p> <p>5.4. Calls transferred or placed on hold</p> <p>5.5. Caller kept informed of delays and action being taken</p> <p>5.6. Caller details and purpose of call obtained and documented</p> <p>5.7. Messages documented and calls promptly</p>

	returned if required
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RANGE STATEMENT

- Enterprise may vary in size, type and location, the range of work activities conducted, hours of operation and the number and type of staff
- Staff may work in teams or groups of varying size and structure
- Communication may include face-to-face, telephone, written or electronic means
- Staff must be aware of industry codes.

Tools, equipment and materials used in this unit may include

- Computers and Telephones
- Enterprise policies and procedures relating to workplace forms and documents, computer, telephone use and system operating procedures and necessary industry codes if available.

ASSESSMENT GUIDE

Forms of assessment

Assessment for the unit needs to be a holistic one and must include real or simulated workplace activities.

Assessment context

Elements of competence contain both knowledge and practical components. Knowledge components may be assessed off the job. Practical components should be assessed on the job or in a simulated work environment

Evidence is best gathered using the products, processes and procedures of the workplace as the means by which the candidate achieves industry competencies

Critical aspects (for assessment)

It is essential that competence is fully observed and there is ability to transfer competence to changing circumstances and to respond to unusual situations in the critical aspects of:

- Writing short routine texts using correct spelling, punctuation and grammar
- Reading, interpreting and applying routine texts in the workplace

- Interpreting and conveying workplace information
- Maintaining workplace communications, including documents
- Applying keyboard skills to prepare and/or edit simple documents using a computer
- Applying enterprise requirements for document style and format
- Applying enterprise requirements for electronic storage and retrieval of documents
- Applying enterprise procedures for incoming and outgoing telephone calls

Assessment conditions

It is preferable that assessment reflects a process rather than an event and occurs over a period of time to cover the varying circumstances. Evidence of performance may be provided by customers, team leaders/members or other appropriate persons, subject to agreed authentication arrangements

Special notes for assessment

- Enterprise may vary in size, type and location, the range of work activities conducted, hours of operation and the number and type of staff
- Staff may work in teams or groups of varying size and structure
- Communication may include face-to-face, telephone, written or electronic means

Resources required for assessment

- A workplace or simulated workplace
- documentation, such as enterprise or sample policies and procedures manuals related to workplace document style, format and layout, workplace communication procedures, workplace documents, telephone protocols and operating procedures, computer system operating procedures
- Enterprise or sample stationery, documents and forms
- Access to enterprise or similar computer hardware and software
- Access to enterprise or similar telephone system

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
<ul style="list-style-type: none"> • General knowledge of enterprise forms, documents and stationery • Operational knowledge of enterprise policies and procedures in regard to: <ul style="list-style-type: none"> ➤ workplace document style, format and layout ➤ workplace communication procedures ➤ workplace documents ➤ telephone protocols and operating procedures ➤ computer system operating procedures 	<ul style="list-style-type: none"> • Appropriate skills in handling enterprise forms, documents and stationery • Skills in handling the following: <ul style="list-style-type: none"> ➤ workplace document style, format and layout ➤ workplace communication procedures ➤ workplace documents ➤ telephone protocols and operating procedures

UNIT 4

UNIT TITLE	Select Material Required for Reinforcement				
DESCRIPTOR	This unit covers the competencies required to select material for reinforcement work as per given design and to ensure safe working at all times in the use of relevant tools & material.				
CODE	CON03S2U01VI	Level	2	Credit	4

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Read and interpret drawings	1.1. Information gathered in terms of reinforcement work by interpreting drawing including plans, elevation, location, abbreviating and measurements
2. Prepare Bar Bending schedule/s	2.1. Bar Bending schedule prepared using "standard" or "code" format 2.2. Bar Bending schedule prepared to comply with the given design 2.3. Schedule prepared incorporating all necessary details
3. Prepare cutting list	3.1. Cutting lengths calculated considering all bars mentioned in the schedule and using correct formula according to the type, size and shape of the bar 3.2. Required number of bars of each bar mark calculated to meet the full requirement 3.3. Cutting list compiled using above information and to comply with bar bending schedule
4. Select steel bar/other materials	4.1. Requirement of each type and size of bar calculated minimizing wastage 4.2. Bars of different types and sizes identified in compliance with the cutting list 4.3. Steel bars selected are free from grease, dust, corrosion and deformation 4.4. Bars collected and transported without endangering self, others and properties

RANGE STATEMENT

Competencies in this unit may be performed either at worksite or at a bar bending workshop. Scope of work is limited to small scale construction such as two storeyed commercial/domestic buildings and pre-cast components.

The following tools, equipment necessary for this unit:

- Tape (30m)
- Steel measuring tape (3m)
- Chalk
- Wire brush
- Claw hammer
- Safety Hand Gloves
- Helmet
- Boots
- Calculator

The materials used in this unit may include:

- Mild steel bars
- Tor steel Bars
- Ribbed steel Bars
- Mild steel rolls

Work should comply with relevant health, safety and other environmental regulations

ASSESSMENT GUIDE

Forms of assessment

Continuous assessment is suitable for this unit.

Assessment context

This unit may be assessed on the job; the competencies covered by this unit would be demonstrated by an individual working alone. The assessment environment should not disadvantage the candidate.

Critical aspects

Assessment must confirm sufficient knowledge in reading and interpreting drawings.

Assessment must confirm ability to select right amount of correct steel bars.

This unit may be assessed in conjunction with other related units

Assessment condition

The candidate shall have access to;

- All tools, equipment, material and documentations required as outlined in this unit.

The candidate shall be permitted to refer to the following documents:

- Relevant work place procedures
- Relevant, codes, standards & reference material
- The candidate shall be required to;
- Orally, or by other methods of communication, answer questions asked by the assessor.
- Identify superiors who can be approached for the collection of competency evidence where appropriate.
- Present evidence of credit for an off-job training related to this unit.

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria and that he/she possesses the required underpinning knowledge.

Special notes

During assessment the individual shall: -

- Demonstrate safe work practices at all times;
- Communicate information about processes, events or tasks being undertaken to ensure a safe and efficient working environment;
- Take responsibility for the quality of his/her own work.
- Plan tasks and review task requirements as appropriate;
- Relate to all stakeholders according to accepted company conventions
- Perform all tasks in accordance with standard operating procedures;
- Perform all tasks to specification;

Tasks involved will be completed within reasonable time frames relating to typical workplace activities.

Resources required for assessment include;

These include material, tools, and documents listed within this unit.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
<ul style="list-style-type: none">• Basic engineering drawing and technical sketches• Abbreviations, notations,• Bar codes and abbreviations, symbols used in reinforcement drawings• Bar Bending schedules - "standard" & "code" types• Cutting lists• Simple mathematical calculation• Metric and imperial linear measuring• Cutting formula• Types and sizes of steel bars• Safety practices in handling steel bars• Treatment of corrosion in steel• Stacking and storing steel bars	<ul style="list-style-type: none">• Ability to use and interpret drawings• Prepare bar bending schedules and cutting lists• Ability to use calculator• Ability to identify bars in terms of type and size• Ability to remove corrosion• Ability to transport stack and store steel bars

UNIT 5

UNIT TITLE	Cut Steel Bars to Measurements				
DESCRIPTOR	This unit covers the competencies required to cut and stack steel bars required for reinforcement work and to ensure safe working at all times in the use of relevant tools, machines and material.				
CODE	CON03S2U02VI	Level	2	Credit	3

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Measure and mark the bar	1.1. Bar selected to comply with the Bar Bending schedule in terms of bar number, type and size 1.2. Length measured holding the tape along the bar 1.3. Measurement read keeping the line of sight perpendicular to the bar 1.4. Point marked right round the bar using a sharply pointed chalk and within a tolerance of $\pm 3\text{mm}$
2. Select cutting tools/equipment	2.1. Cutting tools selected considering the need to use bar cropper to cut bars of 6mm, Guillotine to cut bars up to 16mm and bar cutter to cut bars above 16mm
3. Cut steel bars	3.1. Bar held horizontally keeping the mark exactly under the cutting edge 3.2. Cutting Machine operated observing safety procedures 3.3. Cut completed, producing an even surface, perpendicular to the axis of the bar and within a tolerance of $\pm 5\text{mm}$
4. Number, bundle and stack bars	4.1. Bars bundled tying at two places tightly and keeping the bars of same bar number together 4.2. Label made inserting number of bars, bar number and length of the bar 4.3. Label hung to the bundles securely 4.4. Bundles of bars stacked so that they are easily retrievable, label visible and safety precautions

	are adhered
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RANGE STATEMENT

Competencies in this unit may be performed either at the work site or at a bar bending workshop. It involves the use of tools and equipment required for cutting steel bars of different types and sizes.

The following tools, equipment necessary for this unit:

- Tape (30m)
- Steel tape (3m)
- Chalk
- Bar cropper
- Bar cutter
- Guillotine
- Bar Benders nips
- Safety gear

The materials used in this unit may include:

- Mild steel bars
- Tor steel Bars
- Ribbed steel Bars
- Mild steel rolls
- Binding wire
- Card Board

Work should comply with relevant health, safety and environmental regulations.

ASSESSMENT GUIDE

Forms of assessment

Holistic assessment is suitable for this unit.

Assessment context

This unit may be assessed on the job; the competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.

Critical aspects

Assessment must confirm sufficient knowledge of the importance of accuracy of measurements of cut bars.

Assessment must confirm ability to select and use appropriate cutting tools/equipment adhering to safety practices. Candidate will be allowed of obtain the assistance of another person to hold the bar while it is being cut, if required.

Assessment condition

The candidate shall be provided with all tools, equipment, material and documentation required as outlined within this unit.

The candidate shall be permitted to refer to the following documents:

- Relevant work place procedures
- Relevant manuals

Candidate will be allowed to obtain assistance of another person to hold the bar while it is being cut, if required.

The candidate shall be required to:

- Orally, or by other methods of communication, answer questions asked by the assessor.
- Identify superiors who can be approached for the collection of competency evidence where appropriate.
- Present evidence of credit for an off-job training related to this unit.

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria and that he/she possesses the required underpinning knowledge.

Special notes

During assessment the individual shall: -

- Demonstrate safe work practices at all times;

- Communicate information about processes, events or tasks being undertaken to ensure a safe and efficient working environment;
- Take responsibility for the quality of his/her own work;
- Plan tasks and review task requirements as appropriate;
- Relate to all stakeholders according to accepted company conventions
- Perform all tasks in accordance with standard operating procedures;
- Perform all tasks to specification;

Tasks involved shall be completed within reasonable time frames relating to typical workplace activities.

Resources required for assessment include;

These include material, tools, equipment and machines listed within this unit.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
<ul style="list-style-type: none"> • Metric and imperial linear measurement system • Bar cutting tools and machines • Labelling methods used in bar bending trade • Methods of bundling and stacking steel bars • Safety procedures applicable to bar cutting and stacking bundles, and bar bending workshop arrangements 	<ul style="list-style-type: none"> • Ability to take measurements and mark position • Ability to operate bar cutting tools/machines • Ability to prepare and hang the labels • Ability to bundle and stack steel bars • Ability to follow safety procedures related to bar cutting • Ability to arrange bar bending workshop • Ability to maintain safe and tidy environment within the workshop

UNIT 6

UNIT TITLE	Bend Steel Bars to Required Shapes & Measurements				
DESCRIPTOR	This unit covers the competencies required to bend steel bars for the reinforcement work according to bending schedules and ensures safe working at all times in the use of relevant tools, equipment, machinery, implements and material.				
CODE	CON03S2U03VI	Level	2	Credit	7

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Retrieve bundles of steel bars	1.1. Bar bundles retrieved from stack by identifying the relevant label 1.2. Label checked against the bar bending schedule 1.3. Bar number, type and size of the bar, measurement of the bar and number of bars in the bundle checked against the bar bending schedule
2. Select bending tools/ equipment	2.1. Appropriate bending equipment identified in terms of availability and suitability and in terms of the nature and scope of the work 2.2. Accessories/parts of equipment or implements checked against the manuals or the availability of necessary parts/ implements as the case maybe
3. Arrange facilities for bar bending	3.1. Bending table erected rigidly, having a minimum width of 300mm, the table top at chest height of the bar bender and sufficient room around to facilitate bending operations 3.2. Hand bender or bending gauge fixed to the table rigidly 3.3. Nail/steel pins driven to the table rigidly and to tally with the required measurements, for manual bending 3.4. Formers selected with 4 times the diameter in the case of mild steel and 6 times the diameter in the case of tor steel or according to given instructions

	3.5. Formers and rollers fitted to the machine at appropriate places
4. Bend Bars	<p>4.1. Bar taken from the bundle without dispersing other bars</p> <p>4.2. Creep of the machine/implement checked ensuring one diameter of the bar to be bent</p> <p>4.3. Bending point marked ensuring required measurement considering the creep and using a sharply pointed chalk, right round the bar with a thin line</p> <p>4.4. Bar positioned appropriately in accordance with the requirement of the type of bending apparatus used</p> <p>4.5. Bar bent producing a smooth curvature, staying in one plane and the external angle complying with the specified angle</p> <p>4.6. Closed stirrups bent are having the two overlapping ends in the same vertical plane</p> <p>4.7. Measurements of bent bars checked against the bar bending schedule and to be within the standard tolerances which are mentioned in the range statement of this unit</p> <p>4.8. All bending operations performed without endangering self, others and properties and using appropriate safety ware</p>
5. Number, bundle and stack bent bars	<p>5.1. Bent bars bundled tying at two places tightly and keeping the bars of same bar number together</p> <p>5.2. Labels made inserting the number of bars and the bar number</p> <p>5.3. Labels hung to the bundles surely</p> <p>5.4. Bundles of bent bars stacked ensuring that they are easily metrieable, the lable in verible and the safry vrecantri are adhered to</p>

RANGE STATEMENT

Competencies in this unit may be performed either at the work site or at a bar bending workshop. It involves the use of machines, tools and implements required for bending bars of different types and sizes.

Bending tolerances referred to in the criteria mentioned at 4.7 above are:

Measurement up to 1000mm - \pm 5mm

Measurement: 1000mm - 3000mm - + 5mm - 10mm

Measurement above 3000mm - + 5mm - 25mm

The following tools, equipment necessary for this unit:

- Tape (30m)
- Steel tape (3m)
- Chalk
- Bending Gauge
- Hand benders with accessories
- Power benders with accessories
- Claw hammer
- End cutting nips
- Self assembled Bar bench
- Piece of galvanized pipe of appropriate length
- Dog wrench

The material used in this unit may include:

- Mild steel bars
- Tor steel Bars
- Ribbed steel Bars
- Mild steel rolls
- Binding wire
- Wire nails/steel pins
- Tags

Work should comply with relevant health and safety regulations.

ASSESSMENT GUIDE

Forms of assessment

Continuous assessment is suitable for this unit.

Assessment context

This unit may be assessed on the job; the competencies covered by this unit would be demonstrated by an individual working alone or as a member of a team. The assessment environment should not disadvantage the candidate.

Critical aspects

Assessment must confirm sufficient knowledge of the importance of the accuracy of bent bars. Assessment must confirm the ability to bend all types and sizes of bars adopting all bending techniques and using tools, machinery and implements mentioned in this unit excepting the power bar bender. (Power bar benders are used only in a limited number of places)

Assessment conditions

The candidate shall be provided with all tools, equipment, material and documentation required as outlined within this unit.

The candidate shall be permitted to refer to the following documents:

- Relevant work place procedures
- Relevant manuals, standards & reference material

The candidate will be required to:

- Orally, or by other methods of communication, answer questions asked by the assessor.
- Identify superiors who can be approached for the collection of competency evidence where appropriate.
- Present evidence of credit for an off-job training related to this unit.

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria and that he/she possesses the required underpinning knowledge.

Special notes

During assessment the individual shall: -

- Demonstrate safe work practices at all times;
- Communicate information about processes, events or tasks being undertaken to ensure a safe and efficient working environment;
- Take responsibility for the quality of his/her own work;
- Plan tasks and review task requirements as appropriate;
- Relate to all stakeholders according to accepted company conventions
- Perform all tasks in accordance with standard operating procedures;
- Perform all tasks to specification;
- Use accepted bar bending techniques, practices, and processes in line with workplace procedures.

Tasks involved will be completed within reasonable time frames relating to typical workplace activities.

Resources required for assessment include;

These include material, tools, equipment, and implements listed within this unit.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
<ul style="list-style-type: none">• About labels/tags• Bar bending schedules and cutting lists• Bending equipment and bending techniques• Features of bar bending table• Metric and imperial linear measuring system• Creep• Stacking methods• Bar bending tolerances	<ul style="list-style-type: none">• Ability to interpret labels/tags, bar bending schedules and cutting lists• Ability to manipulate bending tools, machines and implements• Ability to measure and mark• Ability to stack steel bars• Ability to practice relevant safety procedures related to bar bending• Ability to organize bar bending workshop

<ul style="list-style-type: none"> • Expected quality standards of bent bars • Safety aspects related to bar bending • Bar bending workshop arrangement 	
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UNIT 7

UNIT TITLE	Produce Pre-Fabricated Reinforcement Cages				
DESCRIPTOR	This unit covers the competencies required to produce prefabricated reinforcement cages and to ensure safe working at all times in the use relevant of tools, and implements.				
CODE	CON03S2U04VI	Level	2	Credit	6

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Decide sequence of fabricating bent components	<p>1.1. Sequence of inserting bent components decided by studying drawings to accommodate each component without disruption</p> <p>1.2. Number of stands required decided in terms of the length of the cage and the weight of the bent components</p>
2. Fabricate cage	<p>2.1. Stands placed maintaining alignment</p> <p>2.2. Bottom main bars placed, in total and in the correct direction</p> <p>2.3. "Centers" (intervals) marked on all bars to within the tolerance of + 3mm and using sharply pointed chalk</p> <p>2.4. Stirrups inserted in total and keeping stirrup joints staggered</p> <p>2.5. Stirrups tied to bottom main bars on marked centres using appropriate type of knots in terms of the position</p> <p>2.6. Stirrups tied using knots with three loops and are hand tight and extra binding wire beyond third loop nipped off</p> <p>2.7. Top main bars placed in total in the correct direction after marking centres (intervals) as specified</p> <p>2.8. Top main bars tied to stirrups at correct positions using appropriate types of knots</p>

	2.9. Any other bars specified in the design inserted and tied in accordance with the measurement given in the diagram
3. Stack prefabricated re-inforcement cage	<p>3.1. Measurements checked ensuring that those are within a tolerance of + 3mm,cage ends are vertical, stirrups are perpendicular to the axis of the cage and bars are not deflected</p> <p>3.2. Rigidity of the cage checked ensuring that no more than three knots are loose</p> <p>3.3. Cages labelled with a tag indicating the relevant project name and the drawing number</p> <p>3.4. Cage stacked ensuring easy retrieval and without causing displacement of component</p>

RANGE STATEMENT

Competencies in this unit may take place in a bar bending workshop or at a work site.

The following tools, equipment necessary for this unit:

- Tape (30m)
- Steel tape (3m)
- Claw hammer
- Bar bender pincer
- Chalk
- Centre Plumb
- Spirit level
- Stand

The materials used in this unit may include:

- Bent steel components
- Binding wire
- Layout string

Work should comply with relevant health, safety and other environmental regulations.

ASSESSMENT GUIDE

Forms of assessment

Continuous assessment is suitable for this unit.

Assessment context

This unit shall be assessed on the job or off the job; the competencies covered by this unit would be demonstrated by an individual working alone or as a member of a team. The assessment environment should not disadvantage the candidate.

Critical aspects

Assessment must confirm the ability to fix steel bars rigidly using correct type of knots at appropriate places.

Assessment conditions

The candidate shall have access to:

- All tools, equipment, material and documentations required as outlined in this unit.

The candidate shall be permitted to refer to the following documents:

- Relevant work place procedures
- Relevant bar bending schedules & reference material

The candidate shall be required to:

- Orally, or by other methods of communication, answer questions asked by the assessor.
- Identify superiors who can be approached for the collection of competency evidence where appropriate.
- Present evidence of credit for an off-job training related to this unit.

Assessors must be satisfied that the candidates can competently and consistently perform all elements of the unit as specified by the criteria and that he/she possesses the required underpinning knowledge.

Special notes

During assessment the individual will: -

- Demonstrate safe work practices at all times;

- Communicate information about processes, events or tasks being undertaken to ensure a safe and efficient working environment;
- Take responsibility for the quality of her/his own work;
- Plan tasks and review task requirements as appropriate;
- Relate to all stakeholders according to accepted company conventions
- Perform all tasks in accordance with standard operating procedures;
- Perform all tasks to specification;
- Use accepted practices and processes in line with workplace procedures.

Tasks involved will be completed within reasonable time frames relating to typical workplace activities.

Resources required for assessment:

These include, material, tools, documents listed within this unit.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
<ul style="list-style-type: none"> • Reading drawings and bar bending schedules • Abbreviations and notations used in bar bending trade • Metric and imperial linear measuring systems • Tags and labels • Steel bar types and sizes • Standard types of knots used in steel fixing • Safety procedure related to bar bending • Weight of steel bars 	<ul style="list-style-type: none"> • Ability to interpret drawings and bar bending schedules • Ability to identify types and sizes of bars • Ability to select bundles of bars • Ability to measure and mark • Ability to plumb and level • Ability to tie bars with knots • Ability to prepare and hang tags • Ability to stack fabricated steel cages • Ability to adhere to relevant safety procedures

UNIT 8

UNIT TITLE	Lay Reinforcement In-situ				
DESCRIPTOR	This unit covers the competencies required to lay reinforcement in-situ and to ensure safe working at all times in the use of relevant tools equipment and material.				
CODE	CON03S2U05VI	Level	2	Credit	8

ELEMENTS COMPETENCIES	OF	PERFORMANCE CRITERIA
1. Select bundles or bent bars		1.1. Bundles of bars retrieved in accordance with the bar bending schedule in terms of bar no., type & size of bar and the number of bars
2. Make stools and spacers		2.1. Stools and spacers made in accordance with required measurements and required number
3. Check the area for laying reinforcement		3.1. Laying area checked to ensure sufficient strength to bear weight, the measurements are correct according to drawing/s and is free from dust, mud and debries
4. Lay steel bars		4.1. "Centres" (intervals) for main steel bars marked on the base clearly visibly and within the tolerance of + 3mm to the given measurements 4.2. Main steel bars laid directly on the positions marked on the base, joints staggered and joints having specified lap length 4.3. Centres (Intervals) for secondary steel bars marked on the main steel bars visibly and within the tolerance or + 3mm to the given measurements 4.4. Secondary steel bars laid directly on the positions marked on the main steel bars, joints staggered and joints having specified lap length 4.5. Main and secondary steel bars tied using knots with three loops and are hand tight and any extra binding wire beyond third loop nipped off
5. Insert stools		5.1. Stools placed in accordance with the specification

		and at appropriate intervals and the legs of the stools tied to the bottom net at two places
6. Insert spacers	6.1.	Spacers placed in accordance with the requirement and at appropriate intervals and the arms of the spacer tied to the vertical net at two places
7. Joint extensions	7.1.	Lap length provided in accordance with the specifications for the extensions
8. Place and fix cover blocks	8.1.	Cover blocks fixed to the mat to comply with required dimension and at appropriate intervals

RANGE STATEMENT

Competencies in this unit may take place at a worksite only. It may involve working at ground level, below ground level or above ground level.

The following tools, equipment necessary for this unit:

- Steel tape (3m)
- Chalk/permanent marker pen
- Plumb Bob with makiy
- Spirit level
- Levelling tube
- Chisel
- Corner blocks
- Wire brush
- Stools
- Spacers
- Claw Hammer
- Bar Bender pincer

The materials used in this unit may include:

- Layout drawing
- Binding wire
- Steel bars prepared according to the bar bending schedules

Work should comply with relevant health, safety and other environmental regulations.

ASSESSMENT GUIDE

Forms of assessment

Continuous assessment is suitable for this unit.

Assessment context

This unit shall be assessed on the job. The competencies covered by this unit would be demonstrated by an individual working alone or as a member of a team. The assessment environment should not disadvantage the candidate.

Critical aspects

Lay and fix steel bars rigidly with correct type of knots at appropriate places and using stools, spacers and cover blocks.

Assessment condition

The candidate shall have access to:

- All tools, equipment, material and documentations required as outlined in this unit

The candidate shall be permitted to refer to the following documents:

- Relevant work place procedures
- Relevant schedules & reference material.

The candidate shall be required to:

- Orally, or by other methods of communication, answer questions put by the assessor.
- Identify superiors who can be approached for the collection of competency evidence where appropriate.
- Present evidence of credit for an off-job training related to this unit.

Assessors must be satisfied that the candidates can competently and consistently perform all elements of the unit as specified by the criteria and that he/she possesses the required underpinning knowledge.

Special notes

During assessment the individual will:

- Demonstrate safe work practices at all times;
- Communicate information about processes, events or tasks being undertaken to ensure a safe and efficient working environment;
- Take responsibility for the quality of her/his own work;
- Plan tasks and review task requirements as appropriate;

- Relate to all stakeholders according to accepted company conventions
- Perform all tasks in accordance with standard operating procedures;
- Perform all tasks to specification;
- Use accepted steel fixing techniques practices and processes in line with workplace procedures.

Tasks involved will be completed within reasonable time frames relating to typical workplace activities.

Resources required for assessment include;

These include material, tools, and documents listed within this unit.

UNDERPINNING KNOWLEDGE AND SKILLS

Underpinning Knowledge	Underpinning Skills
<ul style="list-style-type: none"> • Reading drawings and bar bending schedules • Abbreviations and notations used in bar bending trade • Metric and imperial linear measuring systems • Tags and labels • Steel bar types and sizes • Standard types of knots used in steel fixing • Safety procedure related to bar bending • Weight of steel bars • Stools, spacers and cover block • Lap lengths 	<ul style="list-style-type: none"> • Ability to interpret drawings and bar bending schedules • Ability to identify types and sizes of bars • Ability select bundles of bars • Ability to measure and mark • Ability to plumb and level • Ability to tie bars with knots • Ability to fix stools, spacers, cover blocks and provide lap lengths • Ability to adhere to relevant safety procedures