Maldives National Skills Development Authority

National Competency Standard for Fiberglass Boat Building

Standard Code: CON09S14V1

Qualification Name: National Certificate III in Fiberglass Boat Building
Qualification Code: CON09SQ1L314

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).

CON09S14V1 is the first version of the NCS for Fiberglass Boat Building, and has been developed and endorsed in the year 2014. This standard includes one Qualification at Level 3 of Maldivian National Qualifications Framework.

Ms Sameera Ali	Ms Aminath Asra	Dr. Abdul Hannan Waheed
Director TVET Authority	Director MQA	Chief Executive Officer MQA

National Competency Standard for Fiberglass Boat Building has been endorsed by	
Ms Aminath Asra Director MQA	
Contact for Comments	
Technical and Vocational Education and Training Authority 1st Floor, Velaanaage, Male'|Maldives Telephone: 3341313, Fax: 3344079 Email: info@tvet.gov.mv	
Date of Endorsement	

Key for 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**

Endorsement Application for Qualification 01		
NATIONAL CERTIFICATE III IN FIBERGLASS BOAT BUILDING		
Qualification code: CON09SQ1L314	**Total Number of Credits :** 60	
Purpose of the qualification The holders of this qualification are expected to work as an Assistant to a Fiberglass Boat Builder and will be working under the supervision of a a Fiberglass Boat Builder .		
Regulations for the qualification	National Certificate III in a Fiberglass Boat Building will be awarded to those who are competent in units 1+2+3+4+5+6+7+8+9+10+11	
Schedule of Units		
Unit	**Unit Title**	**Code**
1.	Observe personal and work place hygiene practices	CON09S1U01V1
2.	Practice health, safety and security Practices	CON09S1U02V1
3.	Provide effective customer care	CON09S1U03V1
4.	Practice effective workplace communication	CON09S1U04V1
5.	Perform computer operations	CON09S1U05V1
6.	Plan and prepare estimate for metal fabrication	CON09S2U06V1
7.	Mark and cut material for metal fabrication	CON09S2U07V1
8.	Bend / roll / form material for metal fabrication	CON095S2U08V1
9.	Assemble fabricated metal components	CON09S2U09V1
10.	Finish fabricated metal work	CON09S2U10V1
11.	Prepare workplace for laminating	CON09S2U11V1
Accreditation requirements	The training provider should have the required training facility to provide the trainees the hands-on experience related to this qualification	
Recommended sequencing of units	As appearing under the section 06	

Units Details

Unit	Unit Title	Code	Level	No of credits
1.	Observe personal and work place hygiene practices	CON09S1U01V1	03	05
2.	Practice health, safety and security Practices	CON09S1U02V1	03	05
3.	Provide effective customer care	CON09S1U03V1	03	05
4.	Practice effective workplace communication	CON09S1U04V1	03	05
5.	Perform computer operations	CON09S1U05V1	03	05
6.	Plan and prepare estimate for metal fabrication	CON09S2U06V1	03	06
7.	Mark and cut material for metal fabrication	CON09S2U07V1	03	06
8.	Bend / roll / form material for metal fabrication	CON095S2U08V1	03	06
9.	Assemble fabricated metal components	CON09S2U09V1	03	06
10.	Finish fabricated metal work	CON09S2U10V1	03	06
11.	Prepare workplace for laminating	CON09S2U11V1	03	05

Packaging of National Qualifications:

National Certificate III in Fiberglass Boat Building will be awarded to those who are competent in units 1+2+3+4+5+6+7+8+9+10+11

Qualification Code: CON09SQ1L314

Competency Standard for

FIBERGLASS BOAT BUILDING

Unit No	Unit Title
1.	Observe personal and work place hygiene practices
2.	Practice health, safety and security Practices
3.	Provide effective customer care
4.	Practice effective workplace communication
5.	Perform computer operations
6.	Plan and prepare estimate for metal fabrication
7.	Mark and cut material for metal fabrication
8.	Bend / roll / form material for metal fabrication
9	Assemble fabricated metal components
10.	Finish fabricated metal work
11.	Prepare workplace for laminating

Description of a fiberglass laminator

A fibreglass laminator is a professional who laminates layers of fiberglass on molds to form boat decks and hulls, or other fibreglass bodies.

Description of fiberglass fabricator

Fiberglass fabricator is the one who makes the material. A fiberglass fabricator may either construct the material, or assemble various fiberglass products to produce a product.

Competency Standard Development Process

The competencies were determined based on the analysis of the tasks expected to be performed by the Fiberglass professional in the Maldives. The task analysis was based on the existing documents prepared among the experts in the industry and on the advice of the experts in the field of Fiberglass training in Maldives. Competency standards used for similar type of training in other countries were also examined

Unit 01

UNIT TITLE	Observe personal and work place hygiene practices				
DESCRIPTOR	This unit covers the knowledge, skills and attitudes required to observe workplace hygiene procedures and maintaining of personal presentation and grooming standard. This unit deals with necessary skills and knowledge required for maintaining the hygiene of workers and the hygienic practices that should be applied while on the job.				
CODE	CON09S1U01V1	Level	3	Credit	5

ELEMENTS OF COMPETENCIES	**PERFORMANCE CRITERIA**
1. Observe grooming, hygiene and personal presentation standards	1.1. Grooming, hygiene and personal presentation practices maintained at high standards in line with industry norms and procedures 1.2. Adequate level of personal cleanliness observed throughout the work 1.3. Effects of poor personal hygiene understood and avoided in all practices
2. Follow hygiene procedures	2.1. Hygiene procedures followed in line with procedures and legal requirements 2.2. Hygiene standards maintained in line with procedures
3. Identify and avoid hygiene risks	3.1. Hygiene risks understood and avoided in line with general standards and guidelines

Range statement

Procedures included

- Grooming and personal presentation
- Personal and work place hygiene

Tools, equipment and materials required may include:

Nil

Assessment guide

Form of assessment

- Assessment for the unit needs to be holistic and observed during assessment of other units of competency which forms the qualification.
- Any written or oral examinations may include questions related to hygiene, illness and personal grooming standard.

Assessment context

Assessment may be done in workplace or a simulated work environment.

Critical aspects

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:

- Maintaining adequate level of all aspects of personal hygiene and cleanliness
- Following cleaning procedures for effective cleaning of work areas
- Immediately reporting any symptoms of illness
- Undertaking routine medical checkups
- This unit may be assessed in conjunction with all and units which form part of the normal job role

Assessment conditions

- Theoretical assessment of this unit must be carried our in an examination room where proper examination rules are followed.
- Assessment of hygienic work practices must be constantly evaluated.

Underpinning knowledge and skills

Underpinning knowledge	Underpinning skills
• General knowledge of common terminologies used in hygiene including personal hygiene • Knowledge on general symptoms of different types of diseases • Detailed knowledge and importance of illness and injury reporting procedures	• Ability to follow procedures and instructions • Competent to work according to relevant hygiene regulations and procedures • Competent to work to meet requirements for personnel hygiene and hygienic practices • Communication skills • Interpersonal skills

Unit 02

UNIT TITLE	Practice health, safety and security Practices				
DESCRIPTOR	This unit describes the importance of health and safety in the working environment. It identifies the key safety hazards within the work area and recognizes the correct manner in which to safely carry out the tasks of the job, for the benefit of the trainee, colleagues and customers.				
CODE	CON09S1U02V1	**Level**	3	**Credit**	5

ELEMENTS OF COMPETENCIES	**PERFORMANCE CRITERIA**
1. Follow workplace health, safety and security procedures	1.1. Health, safety and security procedures followed in line with operational policies and procedures and laws and regulations 1.2. Illnesses reported through proper channels of communication, using relevant forms and formats, in line with enterprise procedures 1.3. Safety and security breaches reported through proper channels of communication, in line with existing procedures
2. Deal with emergency situations	2.1. Emergency situations recognized and appropriate procedures followed in line with existing procedures 2.2. Assistance sought and cooperation given in emergency situations in line with existing procedures 2.3. Emergency incidences reported in line with existing procedures
3. Identify and prevent hygiene risks	3.1. Hygiene risks identified, prevented and avoided in line with existing procedures 3.2. Hygiene risks reported to appropriate persons and corrective action taken in line with enterprise procedures

Range Statement

Procedures included:

- Guidelines for safe handling of equipment of utensils
- Emergency procedures
- Fire safety procedures
- Security and safety guidelines
- Cleaning and decontamination procedures
- Waste handling procedures
- Cleaning chemicals handling guidelines
- Accident and incidence reporting procedures
- Basic first aid procedures

Tools, equipment and materials required may include:

- Relevant procedure manuals

Assessment guide

Forms of assessment

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

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.
- Safely handling and storage of dangerous and/or hazardous goods and substances.
- Applying safe manual handling practices.
- Safely and effectively operating equipment and utilising materials over the full range of functions and processes for work undertaken on worksite.
- This unit may be assessed in conjunction with all and units which form part of the normal job role.

Assessment conditions

Assessment must reflects and events processes that occur over a period of time

Resources required for assessment

The following should be made available:

- A workplace or simulated workplace
- Situations requiring safe working practices

- Instructions on safe working practice
- Hazardous chemicals and/or dangerous goods information
- Common food services equipment with their usage guideline

Underpinning knowledge and skills

Underpinning knowledge	Underpinning skills
• General knowledge on safe practices • Communication procedures • Relevant workplace procedures and guidelines	• Undertake safe manual handling jobs • Competent to follow safety regulations • Competent to work safely with workplace equipments, materials and colleagues

Unit 03

UNIT TITLE	Provide effective customer care				
DESCRIPTOR	This unit addresses the importance of caring for customers in the hospitality industry. It shows how customer care relates to quality service and the best methods of anticipating and meeting customer's need.				
CODE	CON09S1U03V1	**Level**	3	**Credit**	5

ELEMENTS OF COMPETENCIES	**PERFORMANCE CRITERIA**
1. Greet customers and colleagues	1.1. Customers and colleagues greeted according to standard procedures and social norms 1.2. Sensitivity to cultural and social differences demonstrated
2. Identify and attend to customer needs	2.1. Customer needs identified, assessed and prioritized effectively.Customers informed correctly. 2.2. Personal limitations identified and assistance from proper sources sought when required
3. Deliver service to customers	3.1. Quality services provided to customers in line with enterprise procedures 3.2. Personal limitations identified and assistance from proper sources sought when required
4. Handle inquiries	4.1. Customer queries handled promptly and properly 4.2. Personal limitations identified and assistance from proper sources sought when required
5. Handle complaints	5.1. Responsibility for handling complaints taken within limit of responsibility 5.2. Personal limitations identified and assistance from proper sources sought when required 5.3. Operational procedures to handling irate or difficult customers followed correctly 5.4. Details of complaints and comments from customers properly recorded

Range statement

Procedures included:

- Greeting procedure
- Complaint and comment handling procedure
- Incidence reporting procedures
- General knowledge of property
- Standard operating procedures for service deliveries

Tools, equipment and materials required may include:

- Relevant procedure manuals

Form of assessment

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

Assessment context

Assessment of this unit must be completed on the job or in a simulated work environment which reflects a range of 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. This unit may be assessed in conjunction with all units which form part of the normal job role.

Assessment conditions

Assessment must reflect both events and processes over a period of time.

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
- Simulated work place scenarios

Underpinning knowledge and skills

Underpinning Knowledge	Underpinning Skills
• General knowledge of the implications on efficiency, morale and customer relations • General knowledge of ways of caring for customers	• Undertake effective customer related communications • Competent in providing customer care

Unit 04

UNIT TITLE	Practice effective workplace communication				
DESCRIPTOR	This unit addresses the need for effective communication in the Tour Guiding Profession. It describes the ethics of communication and shows the importance of selecting the best method of communication during various situations. It also identifies the barriers to communication and explains how to overcome them. The unit also describes how to use the telephone; the procedures for answering, transferring and holding calls, making outgoing calls and taking messages. In addition it also highlights the need for cleaning telephone equipment.				
CODE	CON09S1U04V1	**Level**	3	**Credit**	5

ELEMENTS OF COMPETENCIES	**PERFORMANCE CRITERIA**
1. Communicate with customers and colleagues	1.1. Proper channels and methods of communication used 1.2. Workplace interactions with customers and colleagues appropriately made 1.3. Appropriate non-verbal communication used 1.4. Appropriate lines of communication followed
2. Participate in workplace meetings and discussions	2.1. Meetings and discussions attended on time 2.2. Procedures to expressing opinions and following instructions clearly followed 2.3. Questions asked and responded to effectively 2.4. Meeting and discussion outcomes interpreted and implemented correctly
3. Handle relevant work related documentation	3.1. Conditions of employment understood correctly 3.2. Relevant information accessed from appropriate sources 3.3. Relevant data on workplace forms and other documents filled correctly 3.4. Instructions and guidelines understood and followed properly 3.5. Reporting requirements completed properly
4. Handle telephone	4.1. Procedures for taking messages and making outgoing calls followed correctly 4.2. Incoming calls answered correctly 4.3. Calls put on hold and transferred properly 4.4. Outgoing calls made efficiently 4.5. Communication in both English and Dhivehi

	demonstrated correctly

Range statement

Procedures included:

- Organizational hierarchy and reporting order
- Communications procedures
- Telephone handling procedures

Aspects evaluated:

- Non-verbal communication
- Interpersonal skills
- General attitude to customers, colleagues and work
- Conformity to policies and procedures

Tools, equipment and material used in this unit may include

- Telephone
- Note pads
- Pens
- Forms and formats related to inter-personal communication

Assessment guide

Forms of assessment

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

Assessment context

Assessment of this unit must be completed on the job or in a simulated work environment which reflects a range of opportunities for communication.

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. 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
- Materials and equipment

Underpinning knowledge and skills

Underpinning Knowledge	Underpinning Skills
• General knowledge of English and Divehi grammar • General knowledge of common telephone equipment • General knowledge on effective communication	• Undertake effective customer relation communications • Competent in communicating basic with customers • Fluency in English and Dhivehi language usage

Unit 05

UNIT TITLE	Perform Computer Operations				
DESCRIPTOR	This unit covers the knowledge, skills and attitudes and values needed to perform computer operations that include inputting, accessing, producing and transferring data using the appropriate hardware and software.				
CODE	CON09S1U05V1	**Level**	3	**Credit**	5

ELEMENTS OF COMPETENCIES	**PERFORMANCE CRITERIA**
1. Input data into computer	1.1. Data entered into the computer using appropriate program/application in accordance with company procedures 1.2. Accuracy of information checked and information saved in accordance with standard operating procedures 1.3. Input data stored in storage media according to requirements
2. Access information using computer	2.1. Correct program/application selected based on job requirement 2.2. Program/application containing the information required accessed according to company procedures 2.3. Desktop icons correctly selected, opened and closed for navigation purposes
3. Produce/output data using computer system	3.1. Entered/stored data processed using appropriate software commands 3.2. Data printed out as required using computer hardware/peripheral devices in accordance with standard operating procedures 3.3. Files and data transferred between compatible systems using computer software, hardware/ peripheral devices in accordance with standard operating procedures

Range Statement

This unit covers computer hardware to include personal computers used independently or within networks, related peripherals, such as printers, scanners, keyboard and mouse, and storage media such as disk drives and other forms of storage. Software used must include but not limited to word processing, spreadsheets, database and billing software packages and Internet browsing software.

Tools, equipment and materials required may include:

- Storage device
- Different software and hardware
- Personal computers system
- Laptop computer
- Printers
- Scanner
- Keyboard
- Mouse
- Disk drive /CDs, DVDs, compressed storage device

Assessment guide

Forms of assessment

The assessor may select two of the following assessment methods to objectively assess the candidate:

- Observation
- Questioning
- Practical demonstration

Assessment context

Assessment may be conducted out of the workplace preferably in a computer classroom

Critical aspects (for assessment)

Assessment must show that the candidate:

- Selected and used hardware components correctly and according to the task requirement
- Identified and explain the functions of both hardware and software used, their general features and capabilities
- Produced accurate and complete data in accordance with the requirements
- Used appropriate devices and procedures to transfer files/data accurately

Assessment conditions

Assessment may be conducted out of the work environment and may include assignments and projects.

Special notes for assessment

During the assessment the trainees shall:

- Carry out all the tasks according to the industry and organizational policies and procedures
- Meet the performance criteria of all competence
- Demonstrate accepted level of performance determined by the assessors

Resources required for assessment

Computer hardware with peripherals and appropriate software

Underpinning knowledge and skills

Underpinning knowledge	Underpinning skills
• Basic ergonomics of keyboard and computer use • Main types of computers and basic features of different operating systems • Main parts of a computer • Storage devices and basic categories of memory • Relevant software • General security and computer Viruses	• Reading skills required to interpret work instruction • Communication skills • Keyboard skills

Unit 06

UNIT TITLE	**Plan and prepare estimate for metal fabrication**				
DESCRIPTOR	This unit covers the knowledge, skills and attitudes and values needed to plan and prepare estimate for metal fabrication that include gathering of information, calculating the cost after estimating the required labour, materials and time, along with documentation and verification of details				
CODE	CON09S2U06V1	Level	3	Credit	6

ELEMENTS OF COMPETENCIES	**PERFORMANCE CRITERIA**
1. Gather information.	1.1. Details of customer requirements are obtained through discussion with customer or from information supplied. 1.2. Plans and specifications are accessed and site is inspected. 1.3. Details of products and services to be provided are sourced. 1.4. Delivery point and methods of transportation are determined where necessary. 1.5. Details are recorded according to workplace procedures.
2. Estimate materials, labour and time.	2.1. Work, including preparatory tasks, is planned and sequenced. 2.2. Types and quantities of materials required for product work are estimated. 2.3. Labour requirements to perform work are estimated. 2.4. Time requirements to perform work are estimated. 2.5. Sustainability principles and concepts are observed when preparing for and undertaking work process
3. Calculate costs.	3.1. Total materials, labour and overhead costs are calculated according to workplace procedures using appropriate equipment. 3.2. Total work cost is calculated, including overheads and mark-up percentages.

	3.3. Final cost for work is calculated.
4. Document and verify details.	4.1. Details of costs and charges are documented according to workplace procedures. 4.2. Costs, calculations and other details are verified according to workplace procedures. 4.3. Customer quotation and tender are prepared. 4.4. Details are documented for future reference according to workplace procedures and using relevant information .

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

Factors for estimating and costing must include:

- labour
- Materials
- Overheads

Sustainability principles and concepts:

Cover the social, economic and environmental use of resources to meet current and future needs, may include:

- Use of materials and resources to meet the current needs of society while preserving the environment for the future
- Efficient use and recycling of material
- Disposing of waste material to ensure minimal environmental impact
- Energy efficiency
- Water efficiency

Information may include:

- Charts and hand drawings
- Instructions issued by authorisedorganisational or external personnel
- Job drawings
- Manufacturer specifications and instructions
- Material safety data sheets (MSDS)
- Memos
- organisation work specifications and requirements

- Regulatory and legislative requirements, particularly those pertaining to:
    - codes of practice
    - contracts
    - building codes
    - WHS and environmental requirements
- safe work procedures relating to estimating and costing work
- signage
- verbal, written and graphical instructions
- work bulletins
- work schedules, plans and specifications.

Tools, equipment and material used in this unit may include:

Equipment may include:

- Calculators
- Computers running appropriate software to estimate and calculate necessary details
- Measuring equipment appropriate to work
- Stationery

Assessment guide

Forms of assessment

The assessor may use the following assessment methods to objectively assess the candidate:

- Observation
- Questioning
- Practical demonstration

Assessment context

Assessment of this unit must be completed on the job or in a simulated work environment which reflects a range of opportunities for planning and preparing estimates for metal fabrication.

Underpinning knowledge and skills

Underpinning knowledge	Underpinning skills
• estimating and calculating processes • impact of time on wages and other costs • job safety analysis (JSA) and safe work method statements (SWMS) • process for estimating and costing work • processes for accessing information and for calculating material requirements • relevant statutory requirements related to estimating and costing work • SI system of measurements • relevant Australian standards applicable to the work to be undertaken • tendering and contracting processes • workplace and equipment safety requirements • Evidence Guide	communication skills to: • enable clear and direct communication, using questioning to identify and confirm requirements, share information, listen and understand • identify customer requirements • use language and concepts appropriate to cultural differences • use and interpret non-verbal communication literacy skills to: • complete workplace documentation • prepare quotes and tenders • record details, including costs and charges numeracy skills to: • estimate materials and labour required for provision of services or products • determine costs for the provision of a quotation or tender in the plumbing and services industry • apply calculations

Unit 07

UNIT TITLE	**Mark and cut material for metal fabrication**				
DESCRIPTOR	This unit covers the knowledge, skills and attitudes and values needed to carry out marking and cutting of the materials required for metal fabrication.A person who demonstrates competency in this unit must be able to mark off/out structural fabrications and shapes.				
CODE	CON09S2U07V1	Level	3	Credit	6

ELEMENTS OF COMPETENCIES	**PERFORMANCE CRITERIA**
1. Transfer dimensions from a detail drawing to work or surface	1.1. Specifications and work requirements are determined and understood using correct and appropriate calculations 1.2. Marking out is carried out to specifications or standard operating procedures using appropriate tools and equipment 1.3. Datum points are established
2. Make templates/patterns as required	2.1. Appropriate template/pattern material is chosen when required 2.2. Required templates are produced to specifications 2.3. Correct storage procedures are followed including labeling and identification to standard operating procedures
3. Develop patterns and/or transfer measurements to structures	3.1. Most appropriate development and/or measurement sequence is chosen and applied 3.2. Allowances for fabrication and assembly are correctly determined and transferred 3.3. Measurement transfer/layout of components is checked to ensure accuracy/set out
4. Interpret relevant codes, standards and symbols	4.1. Relevant standards/codes and symbols are interpreted 4.2. Requirements of standards/codes are interpreted and applied to materials and processes
5. Estimate quantities of materials from detail	5.1. Materials are correctly identified 5.2. Quantities are estimated from drawing

drawings	5.3. Material wastage is minimised

Range Statement

Storage procedures may include:

- labelling
- identification (e.g. template lofts)

Allowances may include:

- thickness
- bend
- pitch
- angle
- circumference
- perimeter

Tools, equipment and material

Tools, equipment and material used in this unit may include:

- Marking out tools as required
- Template material may include:
  - steel plate
  - Perspex
  - timber
  - cardboard
  - paper

Assessment guide

Forms of assessment

The assessor may use the following assessment methods to objectively assess the candidate:

- Observation
- Questioning
- Practical demonstration

Evidence can be gathered through a variety of ways including*;*

- Direct observation
- Supervisor's reports
- Project work
- Samples
- Questioning

Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency.

Assessment context

This unit has been developed to support training in and recognition of trade level competency in marking off/out structural fabrications and shapes as applied to a sheet metal or metal fabrication environment. Assessment should emphasise a workplace context and procedures found in the candidate's workplace.

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.

Underpinning knowledge and skills

Underpinning knowledge	Underpinning skills
• procedures for marking off/out and pattern development • tools and equipment to be used in the preparation of the marking off/out • datum points • materials that can be used for the preparation of templates and their application • manufacturing allowances that have to be considered when developing patterns • template labelling and identification procedures • storage requirements of templates • appropriate methods of development/marking off/out of a range of given objects • appropriate fabrication and assembly allowances • effects of material type and thickness on fabrication and assembly allowances • sources of data on fabrication and assembly allowances • relevant standards and codes and the meaning of symbols used • requirements of the codes/standards applicable to the work to be done • materials from which the component/assembly is to be manufactured • benefits of minimising material wastage • applicable industry standards, national/Australian Standards, NOHSC guides, state/territory regulatory codes of practice/standards	• reading, interpreting and following information on written job instructions, specifications, standard operating procedures, charts, lists, drawings and other applicable reference documents • undertaking numerical operations, geometry and calculations/formulae within the scope of this unit • planning and sequencing operations • using techniques and equipment required for marking off/out and developing patterns • checking for conformance to specifications • establishing and marking datum points • developing patterns according to specification • determining fabrication and assembly allowances and transferring to the pattern • where applicable, applying the requirements of the codes/standards during the geometric development/marking off/out process • determining material and component quantities from drawings and job specifications • minimising material wastage

• safe work practices and procedures • relevant hazards and control measures related to the competency	

Unit 08

UNIT TITLE	**Bend / roll / form material for metal fabrication**				
DESCRIPTOR	This unit of competency includes the knowledge, skills, attitudes and values needed for applying fabrication, forming and shaping of a wide variety of shapes and products undertaken in fabrication, using a variety of forming and shaping techniques. The fabrication, forming and shaping is done to specifications interpreted from technical drawings and job specifications using a variety of tools and equipment.				
CODE	CON09S2U08V1	Level	3	Credit	6

ELEMENTS OF COMPETENCIES	**PERFORMANCE CRITERIA**
1. Select and set up forming/shaping equipment for a specific operation	1.1. Most appropriate tools and equipment are selected 1.2. Equipment is correctly set up and adjusted for operation to standard operating procedures 1.3. Allowances for shrinkage, thickness and inside/outside measurements are correctly made
2. Operate forming/shaping equipment	2.1. Machine is safely started up and shut down to standard operating procedures 2.2. Material and safety guards are correctly positioned. 2.3. Equipment is correctly operated and adjusted
3. Form and shape material	3.1. Material is leveled, straightened, rolled, pressed or bent to specifications/drawings using fabrication techniques 3.2. Correct hot or cold forming procedures are followed 3.3. Final form/shape is checked for compliance to specification and adjusted as necessary to standard operating procedures

Range Statement

Material may include ferrous, non-ferrous and non-metallic substances

Fabrication techniques may include measurements and calculations associated with allowances for shrinkage, thickness and inside/outside measurements

Final form/shape may include:

- pipework
- chamfers
- cylinders

- cones
- angles
- hoppers
- ductwork
- 'square to round'
- 'transitions'
- 'lobster backs'
- all forms of tubular shapes, including hand rails, reticulation pipework and mufflers

Tools, equipment and material

Tools, equipment and material used in this unit may include:

- presses
- shapers
- benders
- rollers
- drop hammers

Assessment guide

Forms of assessment

The assessor may use the following assessment methods to objectively assess the candidate:

- Observation
- Questioning
- Practical demonstration

Evidence can be gathered through a variety of ways including*;*

- Direct observation
- Supervisor's reports
- Project work
- Samples
- Questioning

Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency.

Assessment context

This unit has been developed to support training in and recognition of trade level competency in fabrication, forming and shaping as applied to a sheet metal or metal fabrication environment. Assessment should emphasise a workplace context and procedures found in the candidate's workplace.

Critical aspects (for assessment)

Critical aspects of assessment and evidence include:

- Examining drawings and specifications to determine correct equipment to be used and sequence of fabrication, forming and shaping processes
- Correctly identifying any specified tolerances
- Correctly calculating allowances for shrinkage, thickness and inside/outside measurements
- Setting up and safely operating equipment to ensure forming and shaping outcome is to specifications
- Ensuring equipment is shut down and made safe
- Carrying out hot and cold forming processes safely and to specifications including levelling, straightening, rolling, pressing or bending.

Underpinning knowledge and skills

Underpinning knowledge	Underpinning skills
• selecting tools and equipment • setting up and adjusting equipment • calculating allowances • taking measurements • starting up and shutting down the machine • positioning material • positioning safety guards • obtaining drawings and/or specifications • selecting the most appropriate forming/shaping process to achieve the required size and specification • forming/shaping material to size and specification • checking the final form/shape of the object for conformance with specifications • reworking the object to ensure conformance with specifications • reading, interpreting and following information on written job instructions, specifications, standard operating	• selecting tools and equipment • setting up and adjusting equipment • calculating allowances • taking measurements • starting up and shutting down the machine • positioning material • positioning safety guards • obtaining drawings and/or specifications • selecting the most appropriate forming/shaping process to achieve the required size and specification • forming/shaping material to size and specification • checking the final form/shape of the object for conformance with specifications • reworking the object to ensure conformance with specifications • reading, interpreting and following information on written job instructions, specifications, standard operating procedures, charts, lists, drawings and other applicable reference documents • planning and sequencing operations

procedures, charts, lists, drawings and other applicable reference documents • planning and sequencing operations • checking task-related information	• checking task-related information

Unit 09

UNIT TITLE	**Assemble fabricated metal components**				
DESCRIPTOR	This unit describes the assembly of general fabricated components in plate, pipe and section or sheet either on-site or in a typical fabrication workplace. Assembly is performed according to specifications or drawings. The unit covers trade level assembly techniques requiring the use of jigs, fixtures and tools.				
CODE	CON09S2U09V1	**Level**	3	**Credit**	6

ELEMENTS OF COMPETENCIES	**PERFORMANCE CRITERIA**
1. Identify assembly method and construct jigs if required	1.1. Method is identified and jigs are constructed from engineering drawings or according to workshop practice 1.2. Distortion prevention/control techniques are correctly applied
2. Ensure all components for assembly are available	2.1. All components are checked against drawings and material list
3. Select tools and fixtures for fabrication assembly	3.1. Most appropriate equipment is selected
4. Assemble fabricated components	4.1. Material and/or fabricated components are correctly positioned 4.2. Jigs, fixtures, tools and measuring equipment are correctly adjusted and applied 4.3. Datum line is correctly determined if necessary 4.4. Assembled components are checked for position including squareness, level and alignment to specification 4.5. Fixing/joining techniques are applied as necessary according to standard operating procedures 4.6. Assembly is checked for compliance with drawing 4.7. Codes/standards are interpreted and applied

Range Statement

Distortion prevention/control techniques may include:

- jigs
- fixtures
- heat
- clamps
- Components

Components may include general fabricated components in either plate, pipe and section or sheet

Alignment may include:

Typical structural alignment and leveling using planes and line straight edges, spirit levels, line levels and squares

Fixing/joining techniques may include:

- welding
- adhesives
- fasteners
- rivets

Tools, equipment and materials required may include:

Nil

Assessment guide

Forms of assessment

The assessor may use the following assessment methods to objectively assess the candidate:

- Observation
- Questioning
- Practical demonstration

Evidence can be gathered through a variety of ways including*;*

- Direct observation
- Supervisor's reports
- Project work
- Samples
- Questioning

Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency.

Assessment context

This unit has been developed to support training in and recognition of trade level competency in assembly of fabricated components as applied to a sheet metal or metal fabrication environment. Assessment should emphasise a workplace context and procedures found in the candidate's workplace.

Critical aspects (for assessment)

Critical aspects of assessment and evidence include:

- Planning assembly tasks and sequences
- Determining and implementing appropriate distortion control techniques
- Assembling general fabricated components in plate, pipe, section or sheet to specifications, codes, occupational health and safety (OHS) regulations and standard operating procedures
- Demonstrating safe working practices at all times
- Ability to assemble components in a workshop and site environment

Underpinning knowledge and skills

Underpinning knowledge	Underpinning skills
• methods for assembly of fabricated components • jigs construction • effects of distortion of fabricated components • distortion prevention techniques • drawing and material list • characteristics of relevant tools and equipment squareness, level and alignment • function of datum lines • variety of fixing/joining techniques • defects associated with the assembly of fabricated components • methods of rectification of defects by rework or adjustment • requirements of relevant codes/standards	• constructing jigs where appropriate • applying distortion prevention/control techniques • positioning components in accordance with drawing/specifications • using jigs, fixtures, tools and equipment • correctly marking the datum line • checking the position of all assembled components visually and dimensionally • using appropriate fixing/joining techniques

Unit 10

UNIT TITLE	**Finish fabricated metal work**				
DESCRIPTOR	This unit covers the knowledge, skills and attitudes required for performing finishing operations on fabricated metal work and the resolving of routine problems to procedure.				
CODE	CON09S2U10V1	**Level**	3	**Credit**	6

ELEMENTS OF COMPETENCIES	**PERFORMANCE CRITERIA**
1. Check work requirements.	1.1. Identify work requirements from production plan or request. 1.2. Check product, materials and equipment meet requirements for job(s). 1.3. Recognise requirements which may not be in accordance with usual practice. 1.4. Ask questions of appropriate person to confirm non-standard job specifications. 1.5. Ensure housekeeping is to requirements. 1.6. Identify hazards associated with the job and take appropriate action.
2. Prepare equipment and materials.	2.1. Check tools, equipment, jigs, fixtures, measuring devices are to requirements. 2.2. Check that products, components and consumables are available. 2.3. Ensure safety equipment is available and fit for use. 2.4. Identify non-conformances and report as required.
3. Assemble and finish products to specification	3.1. Assemble and join components as required by specifications. 3.2. Prepare surfaces to procedures. 3.3. Make adjustments as required to meet specifications. 3.4. Check product is in specification and to required quality standard at every stage of the

	finishing operation. 3.5. Use relevant testing methods to ensure conformity with specifications. 3.6. Clean, adjust and lubricate equipment as required. 3.7. Perform emergency stops as required.
4. Respond to routine problems in accordance with procedures.	4.1. Recognise known faults that occur during the operation. 4.2. Identify and take action on causes of routine faults. 4.3. Log problems as required. 4.4. Identify non-routine process and quality problems and take appropriate action.

Range statement

Context

This competency unit includes the processes required to assemble and finish, including alignment to ensure appearance is as required and surface quality meets specifications. It includes the operation of all relevant additional equipment where that equipment is integral to the finishing process.

Procedures

All operations are performed in accordance with procedures.

Procedures include all relevant workplace procedures, work instructions, temporary instructions and relevant industry and government codes and standards.

Hazards

Typical hazards include:

- dusts/vapours
- hazardous substances
- moving equipment
- manual handling hazards.

Problems

Respond to routine problems means 'apply known solutions to a limited range of predictable problems'. Typical process and product problems may include:

- product or components warped
- surface defects

- equipment wear and breakage
- Overuse of tools, requiring rework.

Appropriate action for non-routine problems may be reporting to designated person orother action specified in the procedures.

Tools and equipment

This competency includes use of equipment and tools such as:

- hand finishing tools, scrapers, sandpaper, buffs and polishes
- power tools, including drills, grinders, sanders, polishers and routers
- cutting tools
- supporting fixtures and jigs
- relevant personal protective equipment
- glues, solvents, sealers
- Nuts and bolts, rivets, and other fasteners.

Assessment guide

Form of assessment

Competence in this unit may be assessed:

- by using appropriate finishing processes and equipment requiring demonstration of procedures.
- in a situation allowing for the generation of evidence of the ability to respond to problems
- by using a suitable simulation and/or a range of case studies/scenarios
- Through a combination of these techniques.

In all cases it is expected that practical assessment will be combined with targeted questioning to assess the underpinning knowledge and theoretical assessment will be combined with appropriate practical/simulation or similar assessment. Assessors need to be aware of any cultural issues that may affect responses to questions.

Assessment context

Assessment will occur using an industrial finishing operation and equipment and will be undertaken in a work-like environment.

Critical aspects

It is essential that competence is demonstrated in the knowledge and skills defined in this unit. These may include the ability to:

- apply the required skills and knowledge in finishing composite products
- Apply approved procedures.

Consistent performance should be demonstrated. For example, look to see that:

- finishing production standards are met consistently
- all safety procedures are followed.

Underpinning knowledge and skills

Underpinning knowledge	Underpinning skills
• potential effects of variations in raw materials and equipment operation in relation to quality of product • waste management and importance of reusing non-conforming products wherever possible • factors which may affect product quality or production output and appropriate remedies • surface finish measurement techniques • Characteristics and properties of materials used.	• production workflow sequences and materials demand • accurately monitoring equipment operation and product quality • correct selection and use of equipment, materials, processes and procedures • application of joining process • application of finishing processes including fairing • plan own work, including predicting consequences and identifying improvements • identify when the operator is able to rectify faults, when assistance is required and who is the appropriate source for assistance • Identify and describe own role and role of others involved directly in the process.

Unit 11

UNIT TITLE	**Prepare workplace for laminating**				
DESCRIPTOR	This unit covers the knowledge, skills and attitudes required for preparing the workplace for laminating				
CODE	CON09S2U11V1	**Level**	3	**Credit**	5

ELEMENTS OF COMPETENCIES	PERFORMANCE CRITERIA
1. Prepare for work	1.1. Work requirements from work instructions to ascertain: 1.1.1. material to be used 1.1.2. process required to complete work tasks 1.1.3. the type, thickness and colour of the interlayer 1.1.4. number of sheets to be laminated and holding area for completed items 1.1.5. the correct machine heat and pressure settings for the materials that are being used 1.2. Workplace health and safety requirements relevant to operating glass laminating equipment including personal protection needs, are observed throughout the work 1.3. Work sequence is planned in a logical order to suit the job 1.4. Tools, equipment and materials are selected and checked prior to use to ensure that they are appropriate for the work, of the required quality, serviceable and in a safe condition 1.5. Machines, cutting tools and jigs are identified and checked for safe and effective operation, including emergency stops, gauges, guards and controls 1.6. Procedures are identified for checking: 1.6.1. quality of materials and items produced

	1.6.2. working condition of equipment 1.6.3. quality requirements for each stage of the laminating process 1.7. Communication with others involved with the work is established and maintained to ensure efficient workflow coordination, personnel cooperation and safety throughout the application of this competency
2. Set up equipment	2.1. Machine settings and adjustments are made in accordance with job requirements and machine and tool manufacturer instructions 2.2. Trial runs are conducted to check machine operation, accuracy and quality of finished work 2.3. Necessary adjustments are made to machine settings
3. Conduct glass laminating operations	3.1. Glass to be laminated is prepared for the process in accordance with workplace procedures or industrypractice 3.2. Start-up and shutdown procedures for equipment used in the laminating process are completed in accordance with manufacturer instructions or workplace procedures 3.3. Glass flopping and washing procedures are conducted in accordance with manufacturer instructions or workplace procedures 3.4. Whiteroom procedures are conducted in accordance with manufacturer instructions or workplace procedures 3.5. Whiteroom hoist is operated in accordance with manufacturer instructions or workplace procedures 3.6. Pre-press oven and glass stacker are operated in accordance with manufacturer instructions or workplace procedures to recognised industry standards

	3.7. Air lifter is operated in accordance with manufacturer instructions or workplace procedures 3.8. Autoclave is loaded, operated and unloaded in accordance with manufacturer instructions or workplace procedures 3.9. Cutting table is operated to cut glass to required size (if applicable) in accordance with manufacturer instructions or workplace procedures 3.10. FMF is operated in accordance with manufacturer instructions or workplace procedures
4. Complete work and maintain equipment	4.1. Product is inspected for quality of work and items which do not meet quality requirements discarded or returned for reprocessing in accordance with workplace procedures 4.2. Completed work is placed in holding area in accordance with workplace procedures 4.3. Work area is cleaned and rubbish disposed of as appropriate 4.4. Equipment is cleaned and inspected for serviceability in accordance with workplace procedures 4.5. Unserviceable equipment is tagged and faults identified in accordance with workplace procedures 4.6. Equipment and tooling is maintained in accordance with workplace procedures 4.7. Workplace documentation is completed in

Range statement

Tools and equipment

This competency includes use of equipment and tools such as:

Assessment guide

Form of assessment

Competence in this unit may be assessed:

- by using appropriate finishing processes and equipment requiring demonstration of procedures.
- in a situation allowing for the generation of evidence of the ability to respond to problems
- by using a suitable simulation and/or a range of case studies/scenarios
- Through a combination of these techniques.

In all cases it is expected that practical assessment will be combined with targeted questioning to assess the underpinning knowledge and theoretical assessment will be combined with appropriate practical/simulation or similar assessment. Assessors need to be aware of any cultural issues that may affect responses to questions.

Assessment context

Assessment will occur using an industrial finishing operation and equipment and will be undertaken in a work-like environment.