



Occupational Profile: *Welder & Fabricator*

A competent Welder & Fabricator should be able to demonstrate the following skills and competences:

1. Read and apply data from graphic designs and manuals in English and Maltese
2. Read units of measure in the metric system and the English system
3. Distinguish and define metals
4. Know and explain the main processes for joining metals
5. Adapt a joining process for the right job
6. Define and choose the right filler material for joining purposes
7. Be able to read graphic designs provided for a project
8. Measure and mark out as appropriate on the job
9. Be proficient in practicing the Manual metal arc welding process
10. Be proficient in the use and practice of Oxy-Acetylene equipment and application
11. Make appropriate calculations to establish quantities of materials required for a project
12. Lift and move loads safely
13. Use scaffold platform and ladders in a safe manner

The candidate applying to be trade tested for the Certificate of Competence should be in possession of the majority of the following knowledge, competencies & skills:

Measuring both in the metric and the English units

Relating volumes to liquid measures

Identifying common metals and their alloys, iron, steel, copper, bronze, aluminium, aluminium bronze

Knowledge of the physical and mechanical properties of the materials mentioned above

Knowledge of micro structures

The use of manual metal arc welding power sources.

Generators, rectifiers, current and voltage control, inverters, effect of polarity, open circuit voltage for AC and DC equipment, voltage and current meters.

The identification and assembly of MMA equipment, cables, switch isolators, electrodes, head screens, chipping hammers and brushes.

The awareness and use of the Manual Metal Arc process, arc voltage, current settings, methods of striking an arc, breaking and restarting, Melting parent and filler metal, fusion and solidification, control of liquid metal and slug.

The awareness and use of transformers and inverters.

Perform welding joints such as lap, square butt, single and double V butts, single and double U butts, single and double bevel butts, and open corner outside.

Experience and control of distortion, presetting, welding sequence, backing strips, restraints, jigs and chills, pre and post heating, residual stresses.

Describe methods of inspection and testing of welds,

Destructive: Nick break test, bend test, macro etching.

Non-destructive: Visual, dye penetrant, magnetic particle,

Ultrasonic examination, radiographic examination.

Identify weld defects and possible causes, undercut, cracking, overlap, lack of penetration, lack of fusion, slag inclusions, porosity, excessive spatter, and poor weld appearance.

Awareness of potential safety hazards, and precautions to be taken, personal protective equipment, electric hazards, confined spaces, ventilation, containers of flammable or caustic or toxic substances.

Identification of weld features, parent metal, weld pool, fusion zone, heat-affected zone, root, toe, actual throat, effective throat, leg length, concave profile, convex profile, mitre profile.

Knowledge of principles of cutting action and state applications of the methods of cutting by shearing:

Guillotine, plate shears, rotary shears, bevelled cutting wheels, punches, dies, snips and related safety precautions.

Knowledge of the advantages and limitations of cutting by shear:

Fastest cutting method, restricted to metal thickness, prone to edge deformation, prone to cracking along the cutting line.

The knowledge of principles of cutting action of chip forming machines and state applications: Hacksaw, circular saw, band saw.

Knowledge of the reasons for machining the ends of work such as beams and stanchions.

Knowledge of the principles of forming actions of sheet-metal equipment such as:
Folders, edging, flanging, wiring, beading, swaging, universal forming and related safety precautions.
Identify and describe the use of bending rolls:
Pinch or pyramid rollers.
Uses are presetting, allowances for spring back, conical and helical rolling, and related safety precautions.
Knowledge of the factors to be considered when forming and state their effects:
Spring back, pinching, material grain direction, bend radius, material thickness and width of die opening.
Calculation of the allowances for metal thickness applied to rolling and bending sheet-metal and plate.
Calculate material allowance for sheet-metal safe edges:
Single edge, double edge, and wired.
Identify methods of stiffening sheet metal and plate.
Program sequence for ease of construction, be economic and save time.
Mark out and form pipe-work, structural sections, directly or from templates.
Identify structural steel forms of supply:
Angle bar, tee bar, universal beam, rectangular hollow sections, circular hollow sections.
Explain the terms: Back mark, cross centres, edge distance, and pitch of holes either in line or on a circle.
Describe methods of setting out cambers in such members as girders and roof trusses, giving reasons for producing such cambers in steel work.
Identify materials used for templates such as:
Paper, cardboard, plastic, wood, sheet metal plate.
Describe methods of producing a level bench using:
Spirit level, straight edge, steel wire, water level and laser level.
Describe the sequence of assembly and methods of setting up, to avoid twist and buckling by using stays and other means of maintaining shape.
List safety requirements in relation to lifting and handling equipment:
Static mobile and overhead cranes, shear legs, pulley systems, slings, jacks, crow bars, winches, shifting skates and mobile ramps.
State the precautions to be observed when using scaffold platforms less than two meters high and in the use, transport and storage of ladders.
Read measurements and marks from graphic designs
Transfer design markings onto sheet and plate
Bend and roll sheet metal
Cut and perforate sheet metal
Join sheet metal in various processes
Use and care of personal protective equipment.
Use measuring and marking out equipment.

Mark out squares, circles, pipes, flanges.
Check diagonals for square ness, mark back marks and edge distances.
Bend sheets, bars and pipe.
Cut plate and pipe using power tools and Oxy-Acetylene torch
Roll a cylinder from sheets.
Develop patterns of conic frustum and square to round, cut to shape and form.
Produce a level bench to assemble components using bolting and welding.
Assemble Oxy-fuel gas cutting equipment and test for leaks.
Assemble and use arc welding equipment such as M.M.A, M.I.G., M.A.G.,T.I.G.,

Common tools Marking:

Rule
Scriber
Divider
Jenny calliper
Compass
Chalk line

Common tools for Measuring:

Tape measure
Bevel gauge
Vernier Callipers
Outside callipers
Inside callipers

Hand Cutting Tools:

Drill bit types
Files
Hacksaws
Cold chisels types
Punches types
Snips types
Cone cutters
Hole cutters

Soldering Tools:

Soldering iron

Brazing Tools:

Oxy-acetylene torches

Welding Tools:

M.M.A. welding transformer

M.I.G and M.A.G welding transformer

T.I.G welding transformer

Spot welding transformers

Power tools to be dexterous with.

Electric spot welders

Electric Drills

Electric Grinders

Electric Nibblers

Electric and hydraulic Press brake

Electric shears

Manual machines.

Hydraulic pipe bender

Box and pan folding machine

Guillotine

Pyramid roller

Pinch roller

Beading machine

Flat bar bender

Hand Tools

Hammers

Spanners

Screw drivers

Pliers and grips

Clamps

Trammels

Pop riveters types

Engineers and flat squares

ASSESSMENT CRITERIA

Welder & Fabricator

1. Introduction

The following is a detailed description of the assessment criteria to be adopted by the Trade Testing Board (TTB) to reach a final decision on the award of a Certificate of Competence.

2. Trade Test

The trade test is to be made up of the following four components:

1. The Written
2. The Practical
3. The Interview

The Board has agreed on the sequence of the test and the markings allocated to each specific component as indicated below:

Component	Mark	Pass Mark
Written	100	50%
Interview	100	50%
Practical	100	50%

Written Test Component (Multiple Choice questions)

The candidate will be assessed on the following:

The proper use and care of personal protective equipment.
The standard materials used in construction and fabrication.
Equipment used for marking out relating to fabrication, welding and pipe work.
Draw geometrical shapes.
Use templates.
Use jigs.
Cut metal plates and sections and shape using the appropriate tools.
Cut shape and bend tubes.
Use fixtures and joining methods related to fabrication.
Use the proper equipment to lift and move heavy objects safely.
Assemble and use scaffolding platforms and ladders according to national standards.
Cut metals using oxy-acetylene equipment and plasma equipment.
Prepare plate edges to be joined by welding.
Join metal using several processes.
Carry out the inspection and testing of welded joints.
Identify possible defects in welded joints.
Squareness
Areas and volumes
Distance measures in English and metric systems
Angles
Weights of metals and liquids
Pressures
Temperatures

Interview Component

During the interview the candidates will be assessed on the following:

Design and construction of common equipment:

Guillotine Press
brake Folding
machine Rollers
Welding transformer
Cutting torch
Gas cylinders
Plasma machine

Identify the correct use of:

Gasses
Fluxes
Welding electrodes
Filler rods
Flames
Extinguishers
Gas tubing
Gas fittings

Performing processes:

Technique of brazing
Technique of gas welding
Technique of testing gas leakages
Preparation of joint edges
Purposes of joint edges

Settings affecting electric arc welding:

Current
Voltage
Arc length
Speed of weld
Angle of electrode in relation to parent metal surface

Welding and joining processes:

Manual Metal Arc Welding
Metal Inert Gas Arc Welding
Metal Active Gas Arc Welding
Tungsten Inert Gas Arc Welding
Submerged Arc Welding

Practical Component

This Assessment Test component is considered as based on the practical experience gained by the Candidates at the place of work.

- 1) Read design drawing supplied to transfer to the job
- 2) Clean and prepare material supplied as per drawing
- 3) Mark out details from drawing onto material supplied
- 4) Choose and use proper PPE for the job
- 5) Choose proper tools for the job
- 6) Cut to size using Gas cutting equipment safely
- 7) Assemble as per drawing
- 8) Join by the specified welding process
- 9) Joint to be performed in the welding position stated for every exercise.