QCF Unit and Assessment Specification

Unit title	General Fabrication and Welding Applications
Ofqual Unit code	T/600/6004
SQA Unit code	FT2W 60
SSC Ref	Unit 81

History of changes

Publication date: March 2012

Version: completed by SQA

Version number	Date	Description	Authorised by

QCF Unit specification

Title	General Fabrication and Welding Applications
Level	2
Credit value	12

Learning Outcomes **The learner will:**	**Assessment Criteria** **The learner can:**
1 Carry out general fabrication and welding applications.	1.1 Work safely at all times, complying with health and safety legislation, regulations and other relevant guidelines. 1.2 Carry out all of the following during the fabrication and welding activities: ♦ adhere to procedures or systems in place for risk assessment, COSHH, personal protective equipment and other relevant safety regulations ♦ ensure that all hand tools and equipment used are in a safe and serviceable condition (such as extension leads, powered hand tools and welding equipment cables, welding plant hoses, the striking faces of chisels and hammers, guillotines, shears and forming machines) ♦ check that all measuring equipment to be used is within calibration date ♦ return all tools and equipment to the correct location on completion of the fabrication activities. 1.3 Determine what has to be done and how they are going to do it. 1.4 Obtain the appropriate tools and equipment for the fabrication operations.

Learning Outcomes The learner will:	Assessment Criteria The learner can:
	1.5 Mark out the components for the required operations, using appropriate tools and techniques to include all of the following: ♦ preparing/determining suitable datums from which to mark out ♦ applying a marking medium to enhance clarity of the marking out (such as chalk, bluing or paint) ♦ using an appropriate method of marking out (such as direct marking using instruments, use of templates or tracing/transfer methods) ♦ using a range of marking-out equipment (such as rules/tapes, straight edge, squares, scribers, dividers or trammels, protractors, punch) ♦ marking out a range of features (such as datum/centre lines, square/rectangular profiles, circles/radial profiles, hole positions, cutting and bending detail). 1.6 Cut and shape the materials to the required specification, using appropriate tools and techniques. 1.7 Use two appropriate materials from the following: ♦ hot rolled mild steel ♦ cold rolled mild steel ♦ coated mild steel (such as tinned, galvanised) ♦ stainless steel ♦ aluminium ♦ brass ♦ copper ♦ lead ♦ titanium.

Learning Outcomes **The learner will:**	**Assessment Criteria** **The learner can:**
	1.8 Cut and form material to the marked-out shape, using six of the following hand tools: ♦ tin snips ♦ bench shears ♦ saws (such as hand, mechanical, band) ♦ hand power tools (such as drill, nibbling, saw) ♦ hammers/panel beating equipment ♦ stakes and formers ♦ trepanning ♦ files ♦ pneumatic tools ♦ free hand thermal cutting (such as gas or plasma). 1.9 Cut and form material to the marked-out shape, using all of the following machine tools: ♦ guillotine ♦ pillar or bench drill ♦ bending machine (hand or powered) Plus two more from the following: ♦ press ♦ punch/cropping machine ♦ nibbling machine ♦ rolling machine (hand or powered) ♦ trepanning machine ♦ wheeling machine ♦ jenny/wiring machine ♦ swaging machine.
2 Carry out further general fabrication and welding applications .	2.1 Perform cutting and forming operations to produce four of the following shapes: ♦ straight cuts ♦ cut-ins (straight and curved) ♦ notches ♦ external curved contours ♦ internal curved contours ♦ round holes ♦ square holes

Learning Outcomes The learner will:	Assessment Criteria The learner can:
	Plus four of the following: ♦ bends/upstands ♦ folds/safe edges ♦ tray/box sections ♦ wired edges ♦ swages ♦ curved panels ♦ cylindrical sections ♦ square-to-round trunking ♦ ribbed components. 2.2 Use the appropriate methods and techniques to assemble and secure the components in their correct positions. 2.3 Assemble fabricated components, using four of the following methods: ♦ temporary tack welding ♦ soldering or brazing ♦ resistance spot welding ♦ riveting (such as hollow or solid) ♦ adhesive bonding ♦ mechanically fastened (such as bolts, screws) ♦ self securing joints (such as knocked up, paned down, swaged, joggled). 2.4 Use manual welding and related equipment, to include one of the following welding processes: ♦ manual metal-arc ♦ MIG/MAG ♦ TIG ♦ manual gas welding. 2.5 Produce two of the following welded joints of at least 150mm long, with at least one stop and start included: ♦ fillet lap joints ♦ corner joints ♦ Tee fillet joints ♦ butt joints.

Learning Outcomes **The learner will:**	**Assessment Criteria** **The learner can:**
	2.6 Produce fabricated components and assemblies which meet all of the following: ♦ all dimensions are within +/-
3 Know how to carry out general fabrication and welding applications.	3.1 Describe the Health and Safety requirements, and safe working practices and procedures required for the fabrication and welding activities undertaken. 3.2 Describe the personal protective clothing and equipment to be worn when carrying out the fabrication and welding activities (such as leather gloves, eye protection, ear protection), and the importance of keeping the work area safe and tidy. 3.3 Describe the hazards associated with carrying out fabrication and welding activities (such as handling sheet materials; using dangerous or badly maintained tools and equipment; operating guillotines and bending machines; using hand and bench shears; the electric arc; fumes and gases; spatter; hot slag and metal), and how they can be minimised. 3.4 Explain how to extract and use information from engineering drawings and related specifications (to include symbols and conventions to appropriate BS or ISO standards) in relation to work undertaken. 3.5 Explain how to interpret first and third angle drawings, imperial and metric systems of measurement, workpiece reference points and system of tolerancing.

Learning Outcomes The learner will:	Assessment Criteria The learner can:
	3.6 Explain how to prepare the materials in readiness for the marking out activities, in order to enhance clarity, accuracy and safety (such as visually checking for defects, cleaning the materials, removing burrs and sharp edges, applying a marking-out medium). 3.7 Explain how to select and establish a suitable datum; the importance of ensuring that marking out is undertaken from the selected datum, and the possible effects of working from a different datum. 3.8 Describe the use of marking-out conventions when marking out the workpiece (including datum lines, cutting guidelines, square and rectangular profiles, circular and radial profiles, angles, holes linearly positioned, boxed and on pitch circles). 3.9 Describe the tools and techniques available for cutting and shaping sheet materials (such as tin snips, bench shears, guillotines, portable power tools, bench drills, saws). 3.10 Describe the use and care of tools and equipment (including checks that must be made to ensure that the tools are fit for purpose - such as sharp, undamaged, plugs and cables secure and free from damage, machine guards or safety devices operating correctly). 3.11 Describe the hand tools used in fabrication forming activities, and typical operations that they are used for (such as hammers, stakes, formers, sand bags).

Learning Outcomes **The learner will:**	**Assessment Criteria** **The learner can:**
	3.12 Describe the various machine tool forming equipment that can be used to produce a range of shapes (such as bends, box sections, cylinders and curved sections, wired edges and swages). 3.13 Explain how to set up the various machines to produce the required forms (such as setting up of rolls; setting fingers on bending machines; setting forming tools for swaging).
4 Know how to carry out general fabrication and welding applications (continued).	4.1 Describe the characteristics of the various materials used, with regard to the bending and forming process. 4.2 Explain how the materials are to be prepared for the forming operations, and why some materials may require a heating process prior to forming. 4.3 Describe the various methods of securing the assembled components (the range of mechanical fastening devices that are used (such as nuts and bolts, screws, special fasteners, resistance and tack welding methods and techniques, adhesive bonding of components and self-secured joints - such as knocked up, paned down, swaged and joggled). 4.4 Describe the preparations to be carried out on the components prior to assembling them. 4.5 Explain how to set up and align the various components, and the tools and equipment to be used. 4.6 Describe the methods of temporarily holding the joints together to aid the assembly activities (clamps, rivet clamps).

Learning Outcomes The learner will:	Assessment Criteria The learner can:
	4.7 Describe the basic principles of fusion welding and the types of welded joints to be produced (such as lap joints, corner joints, tee joints and butt welds). 4.8 Describe the various welding techniques that can be used, and their typical applications (such as manual metal arc, MIG/MAG, TIG and manual gas welding). 4.9 Describe the types, selection and application of filler wires and welding electrodes. 4.10 Describe the inspection techniques that can be applied to check that shape (including straightness) and dimensional accuracy are to specification and within acceptable limits. 4.11 Describe the problems that can occur with the fabrication and welding activities (such as defects caused by incorrectly set or blunt shearing blades), and how these can be overcome. 4.12 Explain when to act on their own initiative and when to seek help and advice from others. 4.13 Describe the importance of leaving the work area and equipment in a safe and clean condition on completion of the fabrication and welding activities (such as isolating machines, cleaning the equipment, and removing and disposing of waste).

Additional information about the Unit
Unit purpose and aim(s)
To provide the learner with the practical fabrication and welding skills and procedures required to undertake duties as an Electro-technical Officer on board a merchant vessel.
Unit expiry date
31 December 2014
Details of the relationship between the Unit and relevant national occupational standards (if appropriate)
Details of the relationship between the Unit and other standards or curricula (if appropriate)
C31 — Contribute to maintenance of vessel mechanical equipment, C34 — Carry out maintenance of vessel mechanical equipment and systems. International Maritime Organisation (IMO) standards for training and certification for watchkeeping (stcw) requirements for an Electro-technical Officer at Operational Level.
Assessment requirements specified by a sector or regulatory body (if appropriate)
This Unit must be assessed in a work environment and must be assessed in accordance with the 'Common Requirements for National Vocational Qualifications (NVQ) in the QCF' which can be downloaded from Semta's website: **http://www.semta.org.uk/training_providers__awarding/national_occupational_standard/qca_assessment_requirements.aspx** Additional assessment requirements have been published by Semta. These additional assessment requirements are set down in Semta's Performing Engineering Operations Level 2 Unit assessment strategy which can be downloaded from Semta's website: **http://www.semta.org.uk/training_providers__awarding/national_occupational_standard/qca_assessment_requirements.aspx**
Endorsement of the Unit by a sector or other appropriate body (if required)
Maritime and Coastguard Agency (MCA)
Location of the Unit within the subject/sector classification system
4.1 Engineering

Additional information about the Unit (cont)
Name of the organisation submitting the Unit
EAL
Availability for use
Shared
Availability for delivery
September 2011
Guided Learning Hours
55

QCF Assessment specification

Assessment (evidence) Requirements
The following evidence is required to demonstrate that learners have the practical skills and procedures required to undertake duties as an Electro-technical Officer on board a merchant vessel. All Learning Outcomes and Assessment Criteria must be achieved. Written and/or recorded oral evidence is required for the following: ♦ Learning Outcomes 3 and 4 Performance evidence in the workplace or in an appropriate simulated environment is required for the following: ♦ Learning Outcomes 1 and 2 This could be achieved through the observation of learners undertaking practical exercises. An approved Maritime Skills Alliance (MSA) approved Training Record Book (TRB) should be used to record evidence of achievement.
Guidance on Instruments of Assessment
Performance evidence can be generated using an approved Maritime Skills Alliance (MSA) approved Training Record Book (TRB) and/or practical exercises. Short answer written questions and/or oral interview could be used for the other Outcomes and Assessment Criteria.