



Group Award Specification for:
SQA Advanced Diploma in
Marine Electro-Technology
SCQF level 8

Group Award code — GR5H 48

Publication date: September 2020

Version: 01

© Scottish Qualifications Authority 2012, 2014, 2015, 2017, 2020

This publication may be reproduced in whole or in part for educational purposes provided that no profit is derived from reproduction and that, if reproduced in part, the source is acknowledged.

Contents

1	Introduction	1
2	Qualification structure	3
2.1	Structure	3
3	Aims of the qualification	5
3.1	General aims of the qualification	5
3.2	Specific aims of the qualification	5
3.3	Graded units	5
4	Recommended entry to the qualification	7
4.1	Core Skills entry profile	8
5	Additional benefits of the qualification in meeting employer needs	8
5.1	Mapping of qualification aims to units	9
5.2	Mapping of National Occupational Standards (NOS) and/or trade standards	11
5.3	Mapping of Core Skills development opportunities across the qualification	13
5.4	Mapping of STCW 2010 to qualification (A-III/6)	28
5.5	Assessment strategy for the qualification	36
6	Guidance on approaches to delivery and assessment	38
6.1	Sequencing/integration of units	40
6.2	Recognition of prior learning	40
6.2.1	Articulation and/or progression	41
6.2.2	Professional recognition	41
6.2.3	Credit transfer arrangements	41
6.3	Opportunities for e-assessment	41
6.4	Supporting materials	41
6.5	Resource requirements	41
7	General information for centres	43
8	Glossary of terms	44
9	History of changes	46
10	General information for learners	47

1 Introduction

This document was previously known as the arrangements document. The purpose of this document is to:

- ◆ assist centres to implement, deliver, and manage the qualification
- ◆ provide a guide for new staff involved in offering the qualification
- ◆ inform course managers, teaching staff, assessors, learners, employers, and Higher Education institutions of the aims and purpose of the qualification
- ◆ provide details of the range of learners that the qualification is suitable for and the progression opportunities

The qualification provides learners with the knowledge required for a broad range of employment opportunities, but specifically those knowledge elements required with the Merchant Navy for Electro-technical staff. The qualification name reflects this specialism.

In 2010 the International Maritime Organisation (IMO) introduced a new certification category for the position of Electro-Technical Officer (ETO). This will enable officers on Merchant Navy vessels to gain acknowledgement for their technical skills and hold 'Certificates of Competency (CoC)' at the Operational level. These new CoC requirements are to be introduced from January 2013 in the IMO 'Standards of Training, Certification and Watchkeeping' (STCW) convention as amended in 2010 (Manila 2010). In order for this award to be used towards the issue of UK Certificate of Competence, centres must also be approved by the Maritime and Coastguard Agency as per MSN 1856 (annex G). This is a requirement under the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), 1978 as amended.

Centres who would like to gain approval to offer this award as part of the underpinning knowledge for a UK CoC must contact the MCA prior to gaining SQA approval: exams@mcga.gov.uk.

To comply with this new certification requirement, the maritime authority for the UK Government, the Maritime and Coastguard Agency (MCA) has accepted that new training schemes which meet the training profile for the current Deck and Engineering Operational level CoC will be acceptable for their award of an Electro-Technical Officer CoC.

Client group

The qualification is being created to support additional routes to MCA certification within the context of the STCW 2010 Certificates of Competency for Electro-Technical Officers. The target group ranges from school leavers entering the Merchant Navy to adult returners. For those adults who require professional recognition of the skills, they may already have the required industrial experiences but do not currently have the full range of knowledge and skills to gain academic recognition and therefore improved employment opportunities. This award will contribute to these improved employment opportunities.

Employment opportunities

The SQA Advanced Diploma in Marine Electro-Technology has been designed to develop the skills and knowledge required by the maritime sector and industry.

The retention rates on the current schemes are 95% and the existing trainees will gain employment at sea as ETO's on graduation. The current position of demand over trainee

SQA Advanced Diploma

supply is expected to be maintained in the medium term, until the number of training schemes increase.

In addition the profile of the new STCW certification route will further increase the attractiveness of suitably skilled ETO's. This new route is designed to provide both a front ended academic training (Option 1) and provide an entry route for National 5/GCSE entrants via the Marine Engineering Higher Education Access course (Option 2).

2 Qualification structure

In the design of the SQA Advanced Diploma in Electro-Technology a high level of priority has been placed on producing an award which will allow learners to develop appropriate technical and practical skills which will meet the requirements of employers, prepare learners for the level of responsibility aboard ship and allow future progression to a higher rank within the industry, as well as progress to higher qualifications.

It is not possible to quantify such technical and practical skills in exact detail. The best way to prepare learners to meet the changing requirements of the modern maritime industry is to have a solid foundation of theory and practice on which they can build new knowledge, understanding and skills.

This SQA Advanced Diploma will provide all the higher-level technical competencies and other attributes needed for employment at a professional level within the maritime sector, and enable individuals to serve successfully as an ETO on a range of vessels within the Merchant Navy. With further experience they would also further develop skills and techniques, personal qualities and attributes that are essential for employment and career progression in the shipping industry and in the wider maritime sector where seagoing expertise and skills are in demand.

Some maritime sectors provide promotional advancement within the vessel manning profiles (cruise industry) or within shore based technical support roles (technical superintendent).

Whilst this SQA Advanced Diploma is specifically written for the Merchant Navy sector, there are a range of transferable knowledge and skills that could be used within:

- ◆ Oil and chemical process industry
- ◆ Offshore installations
- ◆ Technology based educational training

2.1 Structure

4 Code	2 Code	Unit title	SQA Credit	SCQF Credit points	SCQF level
HP48	46	Engineering Mathematics 1	1	8.0	6
HP47	47	Analogue Electronic Principles	2	16.0	7
HT1K	47	Applications of Programmable Logic Controllers	1	8.0	7
HP3P	47	Implementing Small Local Area Networks	1	8.0	7
HP49	47	Engineering Mathematics 2	1	8.0	7
HP46	47	DC and AC Principles	1	8.0	7
HV3K	47	Electrical Systems in Potentially Explosive and Gas Hazardous Environments	1	8.0	7
HT1R	47	Fundamentals of Control Systems and Transducers	1	8.0	7
HT1W	47	Power Electronics	1	8.0	7
HV3A	47	Electrical Safety	1	8.0	7
HT7F	47	Pneumatics and hydraulics	1	8.0	7
HV63	47	Distributed Control systems	2	16.0	7

SQA Advanced Diploma

J4BJ	47	Marine Engineering: Electrical and Electronic Devices	1	8.0	7
J4BK	47	Marine Engineering: Electrical Motors and Generators	1	8.0	7
HP3L	48	Electronic Fault Finding	1	8.0	8
HV4V	48	Switchgear and Protection of High Voltage Systems	1	8.0	8
HV4X	48	Transformers	1	8.0	8
HV50	48	Applications of Power Electronics in Electrical Motor Drive Systems	1	8.0	8
J4BL	48	Marine Navigation Systems	2	16.0	8
J4BM	48	Radio Communications	2	16.0	8
J4MV	47	Marine Electro-Technology: Graded Unit 1 Examination	1	8.0	7
J4MW	48	Marine Electro-Technology: Graded Unit 2 Project	2	16.0	8
HW5E	47	Marine Engineering: Propulsion	1	8.0	7
HW5D	47	Marine Legislation and Leadership	1	8.0	7
HW5W	48	Marine Engineering: Management	1	8.0	8
HW5A	47	Marine Engineering: Pneumatics and Hydraulics	1	8.0	7
		Total credit value	30	240	

3 Aims of the qualification

3.1 General aims of the qualification

The SQA Advanced Diploma qualification has a number of generic aims which can be summarised as follows:

- 1 Develop the ability to analyse and plan tasks commonly encountered in the workplace.
- 2 Develop approaches to problem solving and critical thinking.
- 3 Develop an evaluative and reflective approach to work and studies.
- 4 Develop the ability to plan and organise studies.
- 5 Develop skills for employability and allow for progression to higher qualifications.
- 6 To enable the learner to consolidate knowledge and skills to enhance career progression.
- 7 To develop Core Skills required by employers.
- 8 To develop skills which are transferable to other employment opportunities.
- 9 Progression within the SCQF framework.

3.2 Specific aims of the qualification

The SQA Advanced Diploma has a number of specific aims which can be summarised as follows:

- 10 Prepare learners for oral examinations for ETO certification at the Operational level.
- 11 Contribute towards developing skills to enable learners to contribute to the safe and effective operation and maintenance of merchant vessels.
- 12 Contribute towards developing skills to enable learners to work with others in safe and effective manner.
- 13 Contribute towards developing skills to deal with emergency situations.
- 14 Develop awareness of current maritime legislation.
- 15 Provide an award that on successful completion will allow learners to progress to a degree in an engineering related discipline area.
- 16 Develop a range of project management skills.
- 17 Develop the analysis and synthesis skills necessary to ensure the efficient operation of the electrical, electronic and control elements within a modern merchant vessel.

3.3 Graded units

Graded Unit 1

The rationale for including a graded unit at SCQF level 7 is to support the delivery within Option 1, where it is expected that the college phase 1 will be delivered at non-EU partner colleges, linked to the approved centre.

By utilising examination based graded units as an assessment, it will allow external bodies such as the MCA, to monitor the quality of the delivery and assessment at partner colleges.

SQA Advanced Diploma

The responsibility for the setting and marking of the graded unit at level 7 will remain with the approved centre.

Centres are also strongly recommended not to limit opportunities for the transferability of knowledge, understanding and skills within *Marine Electro-technology to the Marine Electro-technology: Graded Unit 1* only but to seek opportunities for the consolidation of these critical skills throughout the whole SQA Advanced Diploma in Marine Electro-technology Award.

Graded Unit 2

A project is preferred at SCQF level 8 because an investigative project-based assignment provides learners with opportunities to demonstrate not only their knowledge and skills in a technical area(s) relating to modern vessels, but also in personal development areas such as planning, scheduling, testing, evaluating and reporting which are important generic aims within this SQA Advanced Diploma award.

An investigative based assignment will allow learners to demonstrate research, analytical and evaluative skills acquired during the course. It allows them to use written reporting skills, evidenced by a logbook/diary of their activities as well as the final report including practical recommendations for future improvement.

4 Recommended entry to the qualification

Entry to this qualification is at the discretion of the centre. The following information on prior knowledge, skills, experience, or qualifications that provide suitable preparation for this qualification has been provided by the Qualification Design Team as guidance only.

Learners would benefit from having attained the skills, knowledge, and understanding required by one or more of the following or equivalent qualifications and/or experience:

Direct entry to the SQA Advanced Diploma award (Option 1)

At least two Higher level or A2 level passes of which one should be Mathematics or a Physical science, or equivalent to meet the minimum 120 UCAS points entry level. Learners should also have National 5 English Language at grade 3 or better (equivalent GCSE English at grade C or better). The following examples would also meet the minimum 120 UCAS points entry level:

- ◆ National Certificate in Electrical/Electronics at Pass/Merit grade
- ◆ National Diploma in Electrical/Electronics at Pass/Pass/Pass grade
- ◆ National Diploma in Engineering at Pass/Pass/Merit grade

Where non-UK qualifications are used to measure suitable entry level, then the learner would have High School certificates with pass in 12th Standard (10+2) from recognised articulation board in Physics, Chemistry and Maths group in Class XII, and at least 50% in English Language (equivalent to minimum IELTS 5.0 standard)

Indirect entry to the SQA Advanced Diploma award (Option 2)

At least five National 5 passes at grade 3 or better (GCSE at grade C or better) in Mathematics, Physics or Chemistry, and English Language.

After the completion of the Higher Education Access course, such as the SQA Diploma in Shipping and Maritime Operations GA6F 57, then learners can directly enter this SQA Advanced award.

Whilst the sea service articulated in both routes is an integral element of the certification to MCA Certificate of Competency, it does not form part of the SQA Advanced award. For MCA certification a sea service requirement in excess of seven (7) months is required, with a suggested sea service of eight (8) months.

In all cases, the learner will be informed that for progression into a career in the Merchant Navy a level of physical health and fitness is required. This will be assessed via the MCA Medical Standard as detailed within Merchant Guidance Notice (MGN) 264.

Mature students

There will be a separate certification route for experienced seafarers to gain MCA certification, and the full SQA Advanced Diploma award may not be required by such learners. Applicants for the experienced seafarer route will be directed to contact the MCA for a 'Letter of Initial Assessment' where an individual assessment will be undertaken.

4.1 Core Skills entry profile

The recommended Core Skill entry profile for the SQA Advanced Diploma in Marine Electro-Technology is as follows:

Core Skills	Recommended Entry profile	Recommended Exit profile
Communication	SCQF level 6	SCQF level 6
Information and Communication Technology (CT)	SCQF level 6	SCQF level 6
Numeracy	SCQF level 6	SCQF level 6
Problem Solving	SCQF level 6	SCQF level 6
Working with Others	SCQF level 6	SCQF level 6

5 Additional benefits of the qualification in meeting employer needs

This qualification was designed to meet a specific purpose and what follows are details on how that purpose has been met through mapping of the units to the aims of the qualification. Through meeting the aims, additional value has been achieved by linking the unit standards with those defined in National Occupational Standards and/or trade/professional body requirements. In addition, significant opportunities exist for learners to develop more generic skills, known as Core Skills, through this qualification.

5.1 Mapping of qualification aims to units

Code	Unit title	Aims																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
HP48 46	Engineering Mathematics 1							X										
HP47 47	Analogue Electronic Principles (double unit)	X				X												
HT1K 47	Applications of Programmable Logic Controllers			X					X									
HP3P 47	Implementing Small Local Area Networks								X									
HP49 47	Engineering Mathematics 2							X										
HP46 47	DC and AC Principles		X															
HV3K 47	Electrical Systems in Potentially Explosive and Gas Hazardous Environments	X				X			X									
HT1R 47	Fundamentals of Control Systems and Transducers		X						X									
HT1W 47	Power Electronics								X									
HV3A 47	Electrical Safety																	
HT7F 47	Pneumatics and hydraulics		X			X			X									
HV63 47	Distributed Control systems (double unit)		X															
J4BJ 47	Marine Engineering: Electrical and Electronic Devices	X							X									
J4BK 47	Marine Engineering: Electrical Motors and Generators	X							X									
HW5E 47	Marine Engineering: Propulsion	X																
HW5W 48	Marine Engineering: Management (double unit)	X		X					X									

SQA Advanced Diploma

Code	Unit title	Aims																	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
HP3L 48	Electronic Fault Finding	X	X					X											
HV4V 48	Switchgear and Protection of High Voltage Systems	X				X			X										
HV4X 48	Transformers																		
HV50 48	Applications of Power Electronics in Electrical Motor Drive Systems		X																
J4BL 48	Marine Navigation Systems (double unit)	X	X	X	X	X													
J4BM 48	Radio Communications (double unit)	X	X	X	X	X													
J4MV 47	Marine Electro-Technology: Graded Unit 1 Examination for level 7 units				X		X												
J4MW 48	Marine Electro-Technology: Graded Unit 2 Project (double unit)		X		X	X	X			X									
HP47 47	Analogue Electronic Principles (double unit)										X							X	
HT1K 47	Applications of Programmable Logic Controllers											X						X	
HP3P 47	Implementing Small Local Area Networks																	X	
J4BL 48	Marine Navigation Systems (double unit)											X	X					X	X
J4BM 48	Radio Communications (double unit)											X	X	X				X	X
J4MV 47	Marine Electro-Technology: Graded Unit 1 Examination for level 7 units																		
J4MW 48	Marine Electro-Technology: Graded Unit 2 Project (double unit)												X				X	X	

5.2 Mapping of National Occupational Standards (NOS) and/or trade standards

		A32 Maintain safe, legal and effective working practices on board a vessel	A36 Manage your own resources	C13 Operate and adjust vessel electrical equipment	C14 Operate and maintain vessel electrical variable speed drives and	C15 Operate and maintain electrical equipment in hazardous areas on board	C16 Operate and maintain vessel internal communication and	C17 Operate and maintain high voltage equipment on board a vessel	C33 Carry out maintenance of vessel electrical machinery and systems	C35 Carry out maintenance of vessel telecommunications and	C41 Identify and report variations in vessel electrical, instrumentation and control systems
Code	Unit title	National Occupation Standards									
HP48 46	Engineering Mathematics 1			X					X		
HP47 47	Analogue Electronic Principles (double unit)			X			X				
HT1K 47	Applications of Programmable Logic Controllers						X				X
HP3P 47	Implementing Small Local Area Networks						X				
HP49 47	Engineering Mathematics 2				X						X
HP46 47	DC and AC Principles			X							X
HV3K 47	Electrical Systems in Potentially Explosive and Gas Hazardous Environments					X					
HT1R 47	Fundamentals of Control Systems and Transducers										X
HT1W 47	Power Electronics				X						
HV3A 47	Electrical Safety					X		X			
HT7F 47	Pneumatics and hydraulics								X		
HV63 47	Distributed Control systems (double unit)										X

SQA Advanced Diploma

Code	Unit title	A32 Maintain safe, legal and effective working practices on board a vessel	A36 Manage your own resources	C13 Operate and adjust vessel electrical equipment	C14 Operate and maintain vessel electrical variable speed drives and	C15 Operate and maintain electrical equipment in hazardous areas on board	C16 Operate and maintain vessel internal communication and	C17 Operate and maintain high voltage equipment on board a vessel	C33 Carry out maintenance of vessel electrical machinery and systems	C35 Carry out maintenance of vessel telecommunications and	C41 Identify and report variations in vessel electrical, instrumentation and control systems
		National Occupation Standards									
J4BJ 47	Marine Engineering: Electrical and Electronic Devices			X					X		
J4BK 47	Marine Engineering: Electrical Motors and Generators			X					X		
HW5E 47	Marine Engineering: Propulsion	X			X				X		
HW5W 48	Marine Engineering: Management (double unit)										
HP3L 48	Electronic Fault Finding									X	X
HV4V 48	Switchgear and Protection of High Voltage Systems							X			
HV4X 48	Transformers			X	X				X		
HV50 48	Applications of Power Electronics in Electrical Motor Drive Systems				X						
J4BL 48	Marine Navigation Systems (double unit)									X	
J4BM 48	Radio Communications (double unit)						X			X	
J4MV 47	Marine Electro-Technology: Graded Unit 1 Examination for level 7 units										
J4MW 48	Marine Electro-Technology: Graded Unit 2 Project (double unit)		X								

5.3 Mapping of Core Skills development opportunities across the qualification

Unit code	Unit title	Communication		Numeracy		ICT		Problem Solving			Working with Others	
		Written	Oral	Using Number	Using Graphical Information	Accessing Information	Providing/Creating Information	Critical Thinking	Planning and Organising	Reviewing and Evaluating	Working Co-operatively with Others	Reviewing Co-operative Contribution
HP48 46	Engineering Mathematics 1			E	E							
HP47 47	Analogue Electronic Principles (double unit)											
HT1K 47	Applications of Programmable Logic Controllers	S		S	S	S	S					
HP3P 47	Implementing Small Local Area Networks	S		S	S	S	S					
HP49 47	Engineering Mathematics 2			E	E							
HP46 47	DC and AC Principles	S		S	S	S	S					
HV3K 47	Electrical Systems in Potentially Explosive and Gas Hazardous Environments	S										
HT1R 47	Fundamentals of Control Systems and Transducers	S			S			S			S	
HT1W 47	Power Electronics	S		S	S	S	S	S		S		
HV3A 47	Electrical Safety	S	S					S			S	
HT7F 47	Pneumatics and hydraulics	S						S				
HV63 47	Distributed Control systems (double unit)	S					S				S	

SQA Advanced Diploma

Unit code	Unit title	Communication		Numeracy		ICT		Problem Solving			Working with Others	
		Written	Oral	Using Number	Using Graphical Information	Accessing Information	Providing/Creating Information	Critical Thinking	Planning and Organising	Reviewing and Evaluating	Working Co-operatively with Others	Reviewing Co-operative Contribution
J4BJ 47	Marine Engineering: Electrical and Electronic Devices	S	S									
J4BK 47	Marine Engineering: Electrical Motors and Generators										S	
HW5E 47	Marine Engineering: Propulsion						S	S				
HW5W 48	Marine Engineering: Management (double unit)	S	S					S	S	S	S	
HP3L 48	Electronic Fault Finding											
HV4V 48	Switchgear and Protection of High Voltage Systems	S		S				S				
HV4X 48	Transformers	S		S				S				
HV50 48	Applications of Power Electronics in Electrical Motor Drive Systems	S		S	S		S	S				
J4BL 48	Marine Navigation Systems (double unit)							S		S	S	
J4BM 48	Radio Communications (double unit)							S		S	S	S
J4MV 47	Marine Electro-Technology: Graded Unit 1 Examination for level 7 units											
J4MW 48	Marine Electro-Technology: Graded Unit 2 Project (double unit)							E	E	E		

SQA Advanced Diploma

Key to tables

S = signposted

E = embedded

OC	=	Oral communications
WC	=	Written Communication (Reading and Writing)
UN	=	Using numbers
UGI	=	Using Graphical Information
AI	=	Accessing Information
PCI	=	Providing/Creating Information
CT	=	Critical Thinking
P&O	=	Planning and Organising
R&E	=	Reviewing and Evaluating
WCO	=	Working Co-operatively with Others
RCC	=	Reviewing Co-operative Contribution

SQA Advanced Diploma

Oral Communication — SCQF level 6

- a Use vocabulary and a range of spoken language structures consistently and effectively at an appropriate level of formality.
- b Convey all essential information, opinions, or ideas with supporting detail accurately and coherently, and with varied emphasis as appropriate.
- c Structure communication to take full account of purpose and audience.
- d Take account of situation and audience during delivery.
- e Respond to others, taking account of their contributions.

Units	Developed/ assessed	a	b	c	d	e
Marine Engineering: Electrical and Electronic Devices	Developed	✓				✓
Marine Engineering: Electrical Motors and Generators	Developed	✓				
Marine Engineering: Marine Management	Developed		✓	✓	✓	✓

Key:

✓ = link between unit and learning outcome

SQA Advanced Diploma

Written Communication (Reading) — SCQF level 6

- a Identify and summarise all significant information, ideas and supporting details in a complex written communication.
- b Evaluate fully the effectiveness of a communication in meeting its purpose and the needs of its intended readership

Knowledge/Skills/Evidence	Developed/ assessed	a	b
Marine Engineering: Propulsion	Developed	✓	
Marine Engineering: Electrical Motors and Generators	Developed	✓	
Fundamentals of Control Systems and Transducers	Developed	✓	
Switchgear and Protection of High Voltage Systems	Developed	✓	
Electrical systems in potentially explosive and gas hazardous environments	Developed	✓	
Power Electronics	Developed	✓	
Marine Engineering: Marine Management	Developed	✓	✓
Electrical Safety	Developed	✓	
Application of Power Electronics in Electrical Motor Drive Systems	Developed	✓	
Transformers	Developed	✓	

SQA Advanced Diploma

Written Communication (Writing) — SCQF level 6

- a Present all essential ideas/information and supporting detail in a logical and effective order.
- b Use a structure which takes account of purpose and audience and links major and minor points in ways which assist the clarity and impact of the writing.
- c Use conventions which are effective in achieving the purpose of the piece and adapted as necessary for the target audience.
- d Use spelling, punctuation, and sentence structures which are consistently accurate .
- e Vary sentence structure, paragraphing, and vocabulary to suit the purpose and target audience.

Knowledge/Skills/Evidence	Developed/ assessed	a	b	c	d	e
Applications of Programmable Logic Controllers	Developed	✓				✓
Implementing Small Local Area Networks	Developed		✓		✓	
DC and AC Principles	Developed		✓	✓	✓	
Electrical Systems in Potentially Explosive and Gas Hazardous Environments	Developed	✓				
Fundamentals of Control Systems and Transducers	Developed	✓				✓
Power Electronics	Developed			✓		
Electrical Safety	Developed	✓			✓	
Pneumatics and hydraulics	Developed	✓		✓		
Distributed Control systems	Developed		✓	✓		
Marine Engineering: Electrical and Electronic Devices	Developed			✓		
Marine Engineering: Electrical Motors and Generators	Developed	✓				✓
Marine Engineering: Propulsion	Developed	✓				✓

SQA Advanced Diploma

Using Graphical Information — SCQF level 6

- a Extract, analyse, and interpret graphical information.
- b Select an appropriate form of complex table, chart, diagram, or qualitative form, and communicate complex information in that form.

Knowledge/Skills/Evidence	Developed/ assessed	a	b
Engineering Mathematics 1	Developed	✓	✓
Analogue Electronic Principles	Developed	✓	✓
Applications of Programmable Logic Controllers	Developed	✓	
Implementing Small Local Area Networks	Developed	✓	
Engineering Mathematics 2	Developed	✓	✓
DC and AC Principles	Developed	✓	✓
Fundamentals of Control Systems and Transducers	Developed	✓	✓
Power Electronics	Developed	✓	✓
Pneumatics and hydraulics	Developed	✓	✓

SQA Advanced Diploma

Using Number — SCQF level 6

- a Work confidently with numerical or statistical methods.
- b Decide on the steps and operations to be carried out to solve a complex problem.
- c Carry out a number of sustained, complex calculations.

Knowledge/Skills/Evidence	Developed/ assessed	a	b	c
Engineering Mathematics 1	Developed	✓	✓	✓
Analogue Electronic Principles	Developed	✓	✓	✓
Applications of Programmable Logic Controllers	Developed	✓	✓	
Implementing Small Local Area Networks	Developed	✓	✓	
Engineering Mathematics 2	Assessed	✓	✓	✓
DC and AC Principles	Developed	✓	✓	✓
Fundamentals of Control Systems and Transducers	Developed	✓	✓	✓
Power Electronics	Developed	✓		
Pneumatics and hydraulics	Developed	✓	✓	

SQA Advanced Diploma

Accessing Information — SCQF level 6

- a Use a range of ICT equipment, observing security procedures.
- b Carry out complex searches for information.
- c Evaluate reliability of information using given criteria.

Knowledge/Skills/Evidence	Developed/ assessed	a	b	c
Applications of Programmable Logic Controllers	Developed	✓	✓	✓
Implementing Small Local Area Networks	Developed	✓		
DC and AC Principles	Developed	✓		
Fundamentals of Control Systems and Transducers	Developed	✓	✓	✓
Power Electronics	Developed	✓		

SQA Advanced Diploma

Providing/Creating Information — SCQF level 6

- a Use a range of ICT equipment, observing security procedures and needs of other users.
- b Resolve simple hardware or software problems.
- c Use software in unfamiliar contexts.
- d Evaluate information.
- e Present findings in an appropriate format.

Knowledge/Skills/Evidence	Developed/ assessed	a	b	c	d	e
Applications of Programmable Logic Controllers	Developed		✓	✓	✓	
Implementing Small Local Area Networks	Developed	✓			✓	✓
DC and AC Principles	Developed	✓				
Fundamentals of Control Systems and Transducers	Developed	✓			✓	
Power Electronics	Developed	✓				
Pneumatics and hydraulics	Developed		✓	✓	✓	✓
Distributed Control systems	Developed	✓	✓	✓		

SQA Advanced Diploma

Critical Thinking — SCQF level 6

- a Identify the factors involved in the situation or issue.
- b Assess the relevance of these factors to the situation or issue.
- c Develop and justify an approach to deal with the situation or issue.

Knowledge/Skills/Evidence	Developed/ assessed	a	b	c
Marine Engineering: Marine Management	Developed	✓		✓
Electronic Fault Finding	Developed	✓	✓	
Switchgear and Protection of High Voltage Systems	Developed	✓	✓	
Electrical Safety	Developed	✓	✓	
Transformers	Developed	✓	✓	✓
Marine Navigation Systems	Developed	✓	✓	✓
Radio Communications	Developed	✓	✓	✓
Marine Electro-Technology: Graded Unit 2 Project	Assessed	✓	✓	✓

SQA Advanced Diploma

Planning and Organising — SCQF level 6

- a Develop a plan.
- b Identify and obtain resources to carry out the plan.
- c Carry out the task.

Knowledge/Skills/Evidence	Developed/ assessed	a	b	c
Marine Engineering: Marine Management	Developed	✓		
Marine Electro-Technology: Graded Unit 2 Project	Assessed	✓	✓	✓

SQA Advanced Diploma

Reviewing and Evaluating — SCQF level 6

- a Evaluate the effectiveness of the strategy/strategies.
- b Identify and gather appropriate evidence.
- c Draw conclusions and make recommendations.

Knowledge/Skills/Evidence	Developed/ assessed	a	b	c
Marine Engineering: Marine Management	Developed		✓	✓
Electronic Fault Finding	Developed	✓	✓	
Power Electronics	Developed		✓	
Marine Navigation Systems	Developed	✓	✓	✓
Radio Communications	Developed	✓	✓	✓
Marine Electro-Technology: Graded Unit 2 Project	Assessed	✓	✓	✓

SQA Advanced Diploma

Working Co-operatively with Others — SCQF level 6

- a Analyse own role and the roles that make up the activity and/or activities and the relationship between them.
- b Organise own role to contribute effectively to the activity and/or activities, adapting own role as necessary.
- c Negotiate working methods.
- d Promote co-operative working with others, progress towards shared goal.

Knowledge/Skills/Evidence	Developed/ assessed	a	b	c	d
Marine Engineering: Marine Management	Developed			✓	✓
Marine Navigation Systems	Developed	✓	✓	✓	✓
Radio Communications	Developed	✓	✓	✓	✓

SQA Advanced Diploma

Reviewing Co-operative Contribution — SCQF level 5

- a Evaluate overall co-operative working, considering own involvement and the involvement of others, referring to supporting evidence.
- b Draw conclusions and justify them with reference to supporting evidence.
- c Identify own learning and objectives for future co-operative working.

Knowledge/Skills/Evidence	Developed/ assessed	a	b	c
Marine Engineering: Marine Management	Assessed		✓	
Marine Navigation Systems	Developed	✓	✓	
Radio Communications	Developed	✓	✓	

5.4 Mapping of STCW 2010 to qualification (A-III/6)

ETO competencies (Operational level)

Mapped to *Table A-III/6* (See table below) — Specification of minimum standards of competence for electro-technical officers.

Reference: STCW, including 2010 Manila Amendments ISBN 978-92-801-1528-4

Competence	Knowledge, understanding and proficiency	
Monitor the operation of electrical, electronic and control systems	Basic understanding of the operation of mechanical engineering systems, including: <ol style="list-style-type: none"> 1 prime movers, including main propulsion plant 2 engine-room auxiliary machinery 3 steering systems 4 cargo handling systems 5 deck machinery 6 hotel systems Basic knowledge of heat transmission, mechanics and hydromechanics <p><i>Knowledge of:</i></p> Electro-technology and electrical machines theory Fundamentals of electronics and power electronics Electrical power distribution boards and electrical equipment Fundamentals of automation, automatic control systems and technology Instrumentation, alarm and monitoring systems Electrical drives	TRB section C13.1, C13.3, C33.10, C33.11, C33.13 Marine Engineering: Propulsion HW5E 47 Marine Engineering: Electrical and electronic devices J4BJ 47 Marine Engineering: Electrical motors and generators J4BK 47 Control systems and transducers HT1R 47 Power electronics HT1W 47 Electrical safety HV3A 47 Pneumatics and Hydraulics HT7F 47 Transformers HV4X 48 Diploma in Maintenance (GD20 60) <ul style="list-style-type: none"> ◆ Marine lighting and control systems

SQA Advanced Diploma

Competence	Knowledge, understanding and proficiency	
	<p>Technology of electrical materials</p> <p>Electro-hydraulic and electro-pneumatic control systems</p> <p>Appreciation of the hazards and precautions required for the operation of power systems above 1,000 volts</p>	<ul style="list-style-type: none"> ◆ Main vessel electrical installation ◆ Maintaining electrical equipment/systems
<p>Monitor the operation of automatic control systems of propulsion and auxiliary machinery</p>	<p>Preparation of control systems of propulsion and auxiliary machinery for operation</p>	<p>Diploma in Maintenance (GD20 60)</p> <ul style="list-style-type: none"> ◆ Marine lighting and control systems <p>Distributed control systems HV63 47</p> <p>Applications of power electronics in Electrical motor drive systems HV50 48</p>
<p>Operate generators and distribution systems</p>	<p>Coupling, load sharing and changing over generators</p> <p>Coupling and breaking connection between switchboards and distribution panels</p>	<p>Diploma in Maintenance (GD20 60)</p> <ul style="list-style-type: none"> ◆ Main vessel electrical installation ◆ Maintaining electrical equipment/systems <p>Marine Engineering: Electrical motors and generators J4BK 47</p> <p>Transformers HV4XHV4X 48</p> <p>TRB tasks C13.2, C13.3 and C17.4</p>

SQA Advanced Diploma

Competence	Knowledge, understanding and proficiency	
Operate and maintain power systems in excess of 1,000 volts	<p><i>Theoretical knowledge</i></p> <p>High-voltage technology</p> <p>Safety precautions and procedures</p> <p>Electrical propulsion of the ships' electrical motors and control systems</p> <p><i>Practical knowledge</i></p> <p>Safe operation and maintenance of high-voltage systems, including knowledge of the special technical type of high-voltage systems and the danger resulting from operational voltage of more than 1,000 volts</p>	<p>Diploma in Maintenance (GD20 60)</p> <ul style="list-style-type: none"> ◆ High voltage awareness <p>MNTB HV Awareness course</p> <p>Switchgear and protection of High Voltage Systems HV4V 48</p>
Operate computers and computer networks on ships	<p>Understanding of:</p> <ol style="list-style-type: none"> 1 main features of data processing 2 construction and use of computer networks on ships 3 bridge-based, engine-room-based and commercial computer use 	<p>Implementing Small Local Area Networks HP3P 47</p> <p>Diploma in Maintenance (GD20 60)</p> <ul style="list-style-type: none"> ◆ Marine lighting and control systems
Use English in written and oral form	<p>Adequate knowledge of the English language to enable the officer to use engineering publications and to perform the officer's duties</p>	<p>Assessment within SQA Advanced Diploma programme and MCA oral Entry level requirements of programme</p>
Use internal communication systems	<p>Operation of all internal communication systems on board</p>	<p>Diploma in Maintenance (GD20 60)</p> <ul style="list-style-type: none"> ◆ Marine vessel communication systems

SQA Advanced Diploma

Competence	Knowledge, understanding and proficiency	
<p>Maintenance and repair of electrical and electronic equipment</p>	<p>Safety requirements for working on shipboard electrical systems, including the safe isolation of electrical equipment required before personnel are permitted to work on such equipment</p> <p>Maintenance and repair of electrical system equipment, switchboards, electric motors, generator and DC electrical systems and equipment</p> <p>Detection of electric malfunction, location of faults and measures to prevent damage</p> <p>Construction and operation of electrical test and measuring equipment</p> <p>Function and performance tests of the following equipment and their configuration:</p> <ol style="list-style-type: none"> 1 Monitoring systems 2 Automatic control systems 3 Protective devices <p>The interpretation of electrical and electronic diagrams</p>	<p>Diploma in Maintenance (GD20 60)</p> <ul style="list-style-type: none"> ◆ Marine vessel electronic systems assembly ◆ Marine vessel electronic systems design and test ◆ Maintaining electrical equipment/systems <p>Electronic fault finding HP3L 48</p> <p>Marine Engineering: Electrical motors and generators J4BK 47</p> <p>Radio Communications J4BM 48</p> <p>TRB tasks C33.1, C33.4, C33.5, C33.6, C33.8, C35.1</p>
<p>Maintenance and repair of automation and control systems of main propulsion and auxiliary machinery</p>	<p>Appropriate electrical and mechanical knowledge and skills</p> <p><i>Safety and emergency procedures</i></p> <p>Safe isolation of equipment and associated systems required before personnel are permitted to work on such plant or equipment</p> <p>Practical knowledge for the testing, maintenance, fault finding and repair</p> <p>Test, detect faults and maintain and restore electrical and electronic control equipment to operating condition</p>	<p>Diploma in Maintenance (GD20 60)</p> <ul style="list-style-type: none"> ◆ Marine lighting and control systems ◆ Maintaining electrical equipment/systems <p>Control systems and transducers HT1R 47</p> <p>Electrical Safety HV3A 47</p>

SQA Advanced Diploma

Competence	Knowledge, understanding and proficiency	
		TRB tasks C33.4, C33.5, C33.6, C33.7, C33.8, C41 (all)
Maintenance and repair of bridge navigation equipment and ship communication systems	<p>Knowledge of the principles and maintenance procedures of navigation equipment, internal and external communication systems</p> <p><i>Theoretical knowledge</i></p> <p>Electrical and electronic systems operating in flammable areas</p> <p><i>Practical knowledge</i></p> <p>Carrying out safe maintenance and repair procedures</p> <p>Detection of machinery malfunction, location of faults and action to prevent damage</p>	<p>Diploma in Maintenance (GD20 60)</p> <ul style="list-style-type: none"> ◆ Marine vessel communication systems ◆ Marine vessel Electronic Navigation Equipment Maintenance <p><i>Analogue electronic principles</i> DG2X 34</p> <p>Marine Navigation systems (J4BL 48)</p> <p>Electrical systems in hazardous areas HV3K 47</p> <p>Radio Communications J4BM 48</p> <p>TRB tasks C35 (all), C15</p>

SQA Advanced Diploma

Competence	Knowledge, understanding and proficiency	
Maintenance and repair of electrical, electronic and control systems of deck machinery and cargo-handling equipment	<p>Appropriate electrical and mechanical knowledge and skills</p> <p><i>Safety and emergency procedures</i></p> <p>Safe isolation of equipment and associated systems required before personnel are permitted to work on such plant or equipment</p> <p>Practical knowledge for the testing, maintenance, fault finding and repair</p> <p>Test, detect faults and maintain and restore electrical and electronic control equipment to operating condition</p>	<p>Diploma in Maintenance (GD20 60)</p> <ul style="list-style-type: none"> ◆ Maintaining electrical equipment/systems <p>Electronic fault finding HP3L 48</p> <p>Electrical systems in potentially explosive and gas hazardous environments HV3K 47</p> <p>Marine Engineering: Electrical motors and generators J4BK 47</p> <p>Electrical Safety HV3A 47</p> <p>TRB tasks C33, C15</p>
Maintenance and repair of control and safety systems of hotel equipment prevent damage	<p><i>Theoretical knowledge</i></p> <p>Electrical and electronic systems operating in flammable areas</p> <p><i>Practical knowledge</i></p> <p>Carrying out safe maintenance and repair procedures</p> <p>Detection of machinery malfunction, location of faults and action to</p>	<p>Diploma in Maintenance (GD20 60)</p> <ul style="list-style-type: none"> ◆ Maintaining electrical equipment/systems <p>Marine Engineering: Electrical motors and generators J4BK 47</p> <p>Electrical Safety HV3A 47</p>
Ensure compliance with pollution prevention requirements	<p><i>Prevention of pollution of the marine environment</i></p> <p>Knowledge of the precautions to be taken to prevent pollution of the marine environment</p> <p>Anti-pollution procedures and all associated equipment</p> <p>Importance of proactive measures to protect the marine environment</p>	<p>Marine Engineering: Management HW5W 48</p> <p>TRB tasks 3.1</p>

SQA Advanced Diploma

Competence	Knowledge, understanding and proficiency	
Prevent, control and fight fire on board	<p><i>Fire prevention and fire-fighting appliances</i></p> <p>Knowledge of fire prevention Ability to organize fire drills Knowledge of fire-fighting systems Action to be taken in the event of fire, including fires involving oil systems</p>	<p>STCW advanced fire fighting course</p> <p>TRB tasks A11</p>
Operate life-saving appliances	<p><i>Life saving</i></p> <p>Ability to organize abandon ship drills and knowledge of the operation of survival craft and rescue boats, their launching appliances and arrangements, and their equipment, including radio life-saving appliances, satellite EPIRBs, SARTs, immersion suits and thermal protective aids Knowledge of survival at sea techniques</p>	<p>STCW Proficiency in Survival Craft and Rescue Boats + Personal Survival Training</p> <p>TRB tasks A11, A15</p>
Apply medical first aid on board ship	<p><i>Medical aid</i></p> <p>Practical application of medical guides and advice by radio, including the ability to take effective action based on such knowledge in the case of accidents or illnesses that are likely to occur on board ship</p>	<p>STCW medical first aid course</p>
Application of leadership and team working skills	<p>Working knowledge of shipboard personnel management and training</p> <p>Ability to apply task and workload management, including;</p> <ol style="list-style-type: none"> 1 Planning and co-ordination 2 Personnel assignment 3 Time and resource constraints 	<p>STCW Leadership and Management course at Operational level.</p>

SQA Advanced Diploma

Competence	Knowledge, understanding and proficiency	
	<p>4 Prioritisation</p> <p>Knowledge and ability to apply effective resource management:</p> <ol style="list-style-type: none"> 1 Allocation, assignment, and prioritization of resources 2 Effective communication on board and ashore 3 Decisions reflect consideration of team experiences 4 Assertiveness and leadership, including motivation 5 Obtaining and maintaining situational awareness <p>Knowledge and ability to apply decision-making techniques:</p> <ol style="list-style-type: none"> 1 Situational and risk assessment 2 Identify and consider generated options 3 Selecting course of action 4 Evaluation of Outcome effectiveness 	
<p>Contribute to the safety of personnel and ship</p>	<p>Knowledge of personal survival techniques</p> <p>Knowledge of fire prevention and ability to fight and extinguish fires</p> <p>Knowledge of elementary first aid</p> <p>Knowledge of personal safety and social responsibilities</p>	<p>Basic STCW courses of PST, BFF, EFA and PSSR</p>

5.5 Assessment strategy for the qualification

An appropriate assessment strategy is in place for the SQA Advanced Diploma in Electrical and Electro-Technology. This strategy had to reflect the needs of the award with regard to STCW and therefore MCA certification. The assessment strategy is outlined below.

Aims

To ensure that:

- ◆ A consistent, rigorous and efficient approach to assessment is used.
- ◆ Assessment instruments for general and graded units satisfy national agreed standards.
- ◆ The assessment load on learners and staff is reasonable and does not unduly detract from teaching and learning elements
- ◆ Reliable and rigorous verification processes are put in place in order to ensure that national standards are achieved.

Objectives

Adopt a holistic approach to assessment. The implications of this are:

- 1 Assessment instruments will be designed to sample Knowledge and Skills in each unit.
- 2 A unit assessment strategy will be adopted, where possible, to produce a single assessment instrument for the whole unit. Where this is not possible the minimum number of assessment instruments required should be used.
- 3 While not seeking to be entirely prescriptive with regard to time spent on assessment in each SQA Advanced unit, over assessment should be avoided.
- 4 Ensure that consistent and rigorous internal and external verification procedures operate throughout.

Graded unit assessment

It is recommended that learners study the key contributing SQA Advanced units prior to sitting the graded unit examination for the SCQF level 7 units. The final SQA Advanced Diploma graded unit at SCQF level 8 is a project based assessment during which learners should be studying, and include, all the contributing SQA Advanced units.

Formative assessment

Formative assessment should be used throughout unit delivery to reinforce learning, build learners' confidence and prepare them for summative assessment.

Re-assessment

The way in which centres re-assess learners is integral to the way they manage the award assessment process as a whole. Re-assessment should be subject to same rigorous internal verification as the primary assessment process.

Due to the sampling nature of assessment for the Group Award units and the need for a 50% pass mark level, all learners must be reassessed utilising a substantially different and alternative assessment. This will be undertaken by the re-assessment of the unit that has not yet achieved the pass grade, and should be based on a substantially different assessment paper.

SQA Advanced Diploma

Re-assessment should be operated in accordance with a centre's assessment policy and the professional judgement of the assessor. The award will utilise current SQA advice that there should normally be at least one re-assessment opportunity available to all learners.

Developing alternative assessments

The design of original assessments should inform the re-assessment process to a large extent as the original determines the type of assessment instruments used and the purpose of the assessment. It is normal practice for centres to build up a bank of assessments which can be used for re-assessment purposes.

Assessment writers should always refer to the unit specification when developing an alternative assessment to ensure that it is of equal demand to the original and that it covers the relevant criteria.

6 Guidance on approaches to delivery and assessment

The elements of this training scheme will be:

A higher education qualification which delivers the knowledge and understanding required under Table A-III/6 (see table in Section 5.4) of the STCW 2010 Manila Amendments.

A practical skills development qualification that provides the skills required under Table A-III/6 (See table in Section 5.4). The SQA qualification GD20 60 (QCF 600/2814/2) has already been developed to meet this training need.

An onboard ETO Training Record Book developed by the Merchant Navy Training Board.

Two training routes are available:

	Duration	Content
First college phase	40 weeks	STCW Basic Training Courses SQA Advanced Diploma Year 1 ETO workshop skills (delivery of relevant electrical proportion)
Second college phase	40 weeks	SQA Advanced Diploma Year 2 Delivery of electronic elements and final assessment of ETO workshop skills
First sea phase	8 months onboard	Shipboard induction, familiarisation with ETO roles onboard. Undertake planned onboard training documented in the Training Record Book
Third college phase	8 weeks	STCW advanced courses. Preparation for MCA oral examination for STCW 2010 reg. A-III/6 ETO certificate of competency.

	Duration	Content
First college phase	32 weeks	STCW Basic Training Courses Industry, company and college induction. Higher Education Access course (Marine Engineering scheme profile) Delivery of electrical elements of ETO workshop skills
First sea phase	28 weeks	Shipboard induction, familiarisation with electrical operations. Undertake planned training documented in the Training Record Book
Second college phase	36 weeks	Assess/consolidate learning from sea phase. SQA Advanced Diploma Year 1 programme (15 units) Delivery of electronic elements of ETO workshop skills

SQA Advanced Diploma

	Duration	Content
Second sea phase	26 weeks	Development of shipboard operations and skills — emphasis moves from basic skills to full ETO duties and responsibilities, including understudying the ETO where feasible Complete programme of shipboard training documented in the Training Record Book
Third college phase	30 weeks	STCW advanced courses SQA Advanced Diploma Year 2 programme (15 units) Preparation for MCA oral examination for STCW2010 Reg. III/6 ETO certificate of competency.

6.1 Sequencing/integration of units

Unit No	Unit title	Year	Credit value	SCQF level
HP48 46	Engineering Mathematics 1	1	1	3
HP47 47	Analogue Electronic Principles	1	2	4
HP49 47	Engineering Mathematics 2	1	1	4
HP46 47	DC and AC Principles	1	1	4
HT1R 47	Fundamentals of Control Systems and Transducers	1	1	4
HT1W 47	Power Electronics	1	1	4
HV3A 47	Electrical Safety	1	1	4
HT7F 47	Pneumatics and hydraulics	1	1	4
HV63 47	Distributed Control systems	1	2	4
J4BJ 47	Marine Engineering: Electrical and Electronic Devices	1	1	4
J4BK 47	Marine Engineering: Electrical Motors and Generators	1	1	4
HW5E 47	Marine Engineering: Propulsion	1	1	4
J4MV 47	Marine Electro-Technology: Graded Unit 1 Examination	1	1	4
			15	
HV3K 47	Electrical Systems in Potentially Explosive and Gas Hazardous Environments	2	1	4
HT1K 47	Applications of Programmable Logic Controllers	2	1	4
HP3P 47	Implementing Small Local Area Networks	2	1	4
HW5W 48	Marine Engineering: Management	2	2	5
HP3L 48	Electronic Fault Finding	2	1	5
HV4V 48	Switchgear and Protection of High Voltage Systems	2	1	5
HV4X 48	Transformers	2	1	5
HV50 48	Applications of Power Electronics in Electrical Motor Drive Systems	2	1	5
J4BL 48	Marine Navigation Systems	2	2	5
J4BM 48	Radio Communications	2	2	5
J4MW 48	Marine Electro-Technology: Graded Unit 2 Project	2	2	5
			15	

6.2 Recognition of prior learning

SQA recognises that learners gain knowledge and skills acquired through formal, non-formal, and informal learning contexts.

In some instances, a full group award may be achieved through the recognition of prior learning. However, it is unlikely that a learner would have the appropriate prior learning and experience to meet all the requirements of a full group award.

The recognition of prior learning may not be used as a method of assessing in the following types of units and assessments:

- ◆ SQA Advanced graded units
- ◆ course and/or external assessments
- ◆ other integrative assessment units (which may or not be graded)
- ◆ certain types of assessment instruments where the standard may be compromised by not using the same assessment method outlined in the unit
- ◆ where there is an existing requirement for a license to practice
- ◆ where there are specific health and safety requirements
- ◆ where there are regulatory, professional, or other statutory requirements

SQA Advanced Diploma

- ◆ where otherwise specified in an assessment strategy

More information and guidance on the recognition of prior learning may be found on our website: www.sqa.org.uk.

The following sub-sections outline how existing SQA unit(s) may contribute to this group award. Additionally, they also outline how this group award may be recognised for professional and articulation purposes.

6.2.1 Articulation and/or progression

Learners who complete the award will have the opportunity to progress to higher level qualifications. Students who successfully achieve the SQA Advanced Diploma programme can progress to a number of higher education programmes which match their career aspirations.

6.2.2 Professional recognition

On completion of the SQA Advanced Diploma award learners may have the opportunity to apply for associate membership of the Institute of Marine Engineering, Science and Technology and subsequently gain Incorporated Engineer status with the Engineering Council with additional learning as outlined by IMarEST.

6.2.3 Credit transfer arrangements

Credit transfer is a decision for centres and can be given where there is broad equivalence between the subject-related content of the units, ie the knowledge and/or skills are covered in the unit for which credit is being awarded. Centres should give some consideration to currency of achievement when awarding credit transfer.

6.3 Opportunities for e-assessment

This mode of delivery will not form any part of the qualification, until a proven record of learner achievement is available. Support materials will utilise an e-learning platform, but this is to supplement existing learning materials.

6.4 Supporting materials

The majority of units within this qualification already exist within other SQA qualifications. As such, use will be made by the delivery centre to request existing pre-validated assessment material.

For the new units, assessment will be created and validated internally utilising the centre's existing relationship with AMERC, who are recognised by the MCA as having technical expertise within the field of maritime radio communications and electronic navigation aids.

<http://www.amerc.ac.uk/>

6.5 Resource requirements

Each centre delivering this award will be required to have a range of electrical and electronic equipment that will enable the centre to replicate operational equipment onboard a modern merchant vessel. Operational radio and electronic navigational aids must be used within those Units where fault finding techniques are gained.

SQA Advanced Diploma

The range of physical resources available should include:

- Electrical distribution or switchboard
- Electrical circuit breaker
- Various electrical motors of sizes in excess of 20kW
- Hydraulic and pneumatic control valves
- Digital and analogue computer controllers
- Three term controller rig
- Pneumatic valve positioner
- Gyro compass
- Echosounder
- Speed log
- Radar with 'ARPA' capability
- GPS navigating unit
- MF/HF transceiver
- Navtex receiver
- Marine VHF walkie talkie
- GMDSS station or simulation system

7 General information for centres

Equality and inclusion

The unit specifications making up this group award have been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners will be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website www.sqa.org.uk/assessmentarrangements.

Internal and external verification

All instruments of assessment used within these group awards should be internally verified using the appropriate policy within the centre and the guidelines set by SQA.

External verification will be carried out by SQA to ensure that internal assessment is within the national guidelines for these qualifications.

Further information on internal and external verification can be found in *SQA's Guide to Assessment* (www.sqa.org.uk).

8 Glossary of terms

Embedded Core Skills: The assessment evidence for the unit also includes full evidence for complete Core Skill or Core Skill components. A learner successfully completing the unit will be automatically certificated for the Core Skill. (This depends on the unit having been successfully audited and validated for Core Skills certification.)

Finish date: The end of a group award's lapsing period is known as the finish date. After the finish date, the group award will no longer be live and the following applies:

- ◆ Candidates may not be entered for the group award.
- ◆ The group award will continue to exist only as an archive record on the Awards Processing System (APS).

Graded unit: Graded units assess learners' ability to integrate what they have learned while working towards the units of the group award. Their purpose is to add value to the group award, making it more than the sum of its parts, and to encourage learners to retain and adapt their skills and knowledge.

Lapsing date: When a group award is entered into its lapsing period, the following will apply:

- ◆ The group award will be deleted from the relevant catalogue.
- ◆ The group award specification will remain until the qualification reaches its finish date, at which point it will be removed from SQA's website and archived.
- ◆ No new centres may be approved to offer the group award.
- ◆ Centres should only enter candidates whom they expect to complete the group award during the defined lapsing period.

SQA credit value: The credit value allocated to a unit gives an indication of the contribution the unit makes to an SQA group award. An SQA credit value of 1 given to an SQA unit represents approximately 40 hours of programmed learning, teaching, and assessment.

SCQF: The Scottish Credit and Qualification Framework (SCQF) provides the national common framework for describing all relevant programmes of learning and qualifications in Scotland. SCQF terminology is used throughout this guide to refer to credits and levels. For further information on the SCQF, visit the SCQF website at www.scqf.org.uk.

SCQF credit points: SCQF credit points provide a means of describing and comparing the amount of learning that is required to complete a qualification at a given level of the framework. One National Unit credit is equivalent to 6 SCQF credit points. One National Unit credit at Advanced Higher and one SQA Advanced unit credit (irrespective of level) is equivalent to 8 SCQF credit points.

SCQF levels: The level a qualification assigned within the framework is an indication of how hard it is to achieve. The SCQF covers 12 levels of learning. SQA Advanced Certificates and SQA Advanced Diplomas are available at SCQF levels 7 and 8, respectively. SQA Advanced units will normally be at levels 6–9 and graded units will be at level 7 and 8. National Qualification Group Awards are available at SCQF levels 2–6 and will normally be made up of National Units which are available from SCQF levels 2–7.

SQA Advanced Diploma

Subject unit: These contain vocational/subject content and are designed to test a specific set of knowledge and skills.

Signposted Core Skills: These refer to opportunities to develop Core Skills in learning and teaching, but are not automatically certificated.

9 History of changes

It is anticipated that changes will take place during the life of the qualification, and this section will record these changes. This document is the latest version and incorporates the changes summarised below. Centres are advised to check SQA Connect to confirm that they are using the most up-to-date qualification structure.

NOTE: Where a unit is revised by another unit:

- ◆ No new centres may be approved to offer the unit which has been revised.
- ◆ Centres should only enter candidates for the unit which has been revised where they are expected to complete the unit before its finish date.

Version number	Description	Date

Acknowledgements

SQA acknowledges the valuable contribution that Scotland’s colleges have made to the development of SQA Advanced qualifications.

Further information

Call SQA’s Customer Contact Centre on 44 (0) 141 500 5030 or 0345 279 1000. Alternatively, complete our [Centre Feedback Form](#).

10 General information for learners

This section will help you to decide whether this is the qualification for you by explaining: what the qualification is about; what you should know or what you should be able to do before you start; what you will need to do during the qualification; and opportunities for further learning and employment.

The SQA Advanced Diploma in Marine Electro-Technology has been designed to complement and extend the current training routes for the Merchant Navy Officer Training Scheme. This phased training scheme consists of college and sea phases over the duration of approximately three and a half years, of which over eight months of the training will take place at sea.

Access to the programme is set by the delivering centre however you would normally be expected to have already achieved either:

At least two Higher level or A2 level passes of which one should be Mathematics or a Physical science, or equivalent to meet the minimum 120 UCAS points entry level. Learners should also have National 5 English Language at grade 3 or better (equivalent GCSE English at grade C or better). The following examples would also meet the minimum 120 UCAS points entry level:

- ◆ National Certificate in Electrical/Electronics at Pass/Merit grade
- ◆ National Diploma in Electrical/Electronics at Pass/Pass/Pass grade
- ◆ National Diploma in Engineering at Pass/Pass/Merit grade

Where non-UK qualifications are used to measure suitable entry level, then the learner would have High School certificates with pass in 12th Standard (10+2) from recognised articulation board in Physics, Chemistry and Maths group in Class XII, and at least 50% in English Language (equivalent to minimum IELTS 5.0 standard)

For those learners with at least five National 5 passes at grade 3 or better (GCSE at grade C or better) in Mathematics, Physics or Chemistry, and English Language, then a Higher Education Access course, such as the SQA Diploma in Shipping and Maritime Operations GA6F 57 would be required which matches the existing Access course for Marine Engineering schemes.

The SQA Advanced Diploma has a number of aims which can be summarised as follows:

- ◆ Prepare you for oral examinations for ETO certification at the Operational level
- ◆ Contribute towards developing skills to enable learners to contribute to the safe and effective operation and maintenance of merchant vessels
- ◆ Contribute towards developing skills to enable you to work with others in safe and effective manner
- ◆ Contribute towards developing skills to deal with emergency situations
- ◆ Develop awareness of current maritime legislation
- ◆ Provide an award that on successful completion will allow you to progress to a degree in an engineering related discipline area
- ◆ Develop a range of project management skills
- ◆ Develop the analysis and synthesis skills necessary to ensure the efficient operation of the electrical, electronic and control elements within a modern merchant vessel
- ◆ Develop approaches to problem solving and critical thinking.

SQA Advanced Diploma

- ◆ Develop an evaluative and reflective approach to work and studies.
- ◆ Develop the ability to plan and organise studies.
- ◆ Develop skills for employability and allow for progression to higher qualifications.
- ◆ To enable you to consolidate knowledge and skills to enhance career progression.
- ◆ To develop Core Skills required by employers
- ◆ To develop skills which are capable of being transferred to any employment.
- ◆ To progress academically within the SCQF/QCF framework

When you complete the full training programme and have the required medical fitness certificate (ENG1) you will receive the ETO Certificate of Competency which will enable you to perform duties at the Operational level as Officers on a Merchant Navy vessel.

In addition after obtaining your SQA Advanced Diploma you can progress onto the final year of a B.Eng. programme of some universities, as well as within the SCQF framework.

The award itself consists of twenty four mandatory units listed (equates to 30 SQA Advanced Credits at SCQF level 7/8) with two graded units.

- 1 Engineering Mathematics 1
- 2 Analogue Electronic Principles (double unit)
- 3 Applications of Programmable Logic Controllers
- 4 Implementing Small Local Area Networks
- 5 Engineering Mathematics 2
- 6 DC and AC Principles
- 7 Electrical Systems in Potentially Explosive and Gas Hazardous Environments
- 8 Fundamentals of Control Systems and Transducers
- 9 Power Electronics
- 10 Electrical Safety
- 11 Pneumatics and hydraulics
- 12 Distributed Control systems (double unit)
- 13 Marine Engineering: Electrical and Electronic Devices
- 14 Marine Engineering: Electrical Motors and Generators
- 15 Marine Engineering: Propulsion
- 16 Marine Engineering: Marine Management (double unit)
- 17 Electronic Fault Finding
- 18 Switchgear and Protection of High Voltage Systems
- 19 Transformers
- 20 Applications of Power Electronics in Electrical Motor Drive Systems
- 21 Marine Navigation Systems (double unit)
- 22 Radio Communications (double unit)
- 23 Marine Electronic Engineering: Graded Unit 1 Examination for level 7 units
- 24 Marine Electronic Engineering: Graded Unit 2 Project (double unit)

The majority of these units are assessed by one or more closed-book assessments. In order to meet the MCA requirements for the STCW Certification the pass marks for these assessments have been set at 50%.

In addition the SQA Advanced Diploma award also contains a graded unit examination at SCQF level 7. This is a three hour examination which will take place towards the end of your first year of the SQA Advanced Diploma programme. The exam is based on a selection of questions from key units in the year one programme. The SQA Advanced Diploma award also a project graded unit built around key SQA Advanced Diploma units.

SQA Advanced Diploma

In order to gain an SQA Advanced Diploma in Marine Electro-Technology you must gain the 30 SQA credits from the units and graded units you study.

The graded units will be marked out of 100. Assessors will aggregate the marks you achieve to arrive at an overall mark for the examination. Assessors will then assign a grade for your graded unit based on the following grade boundaries.

- ◆ A = 70%–100%
- ◆ B = 60%–69%
- ◆ C = 50%–59%

Further information on the format and content of the graded units will be given to you by lecturing staff at the start of your course.

During the first year of the SQA Advanced Diploma you will develop 5 Core Skills to SCQF level 6 in *Communication, Numeracy, Information and Communication Technology (ICT), Problem Solving* and *Working with Others*. In addition you will be certificated for the Core Skill Numeracy at SCQF level 6 when you pass the *Marine Engineering: Mathematics* unit.